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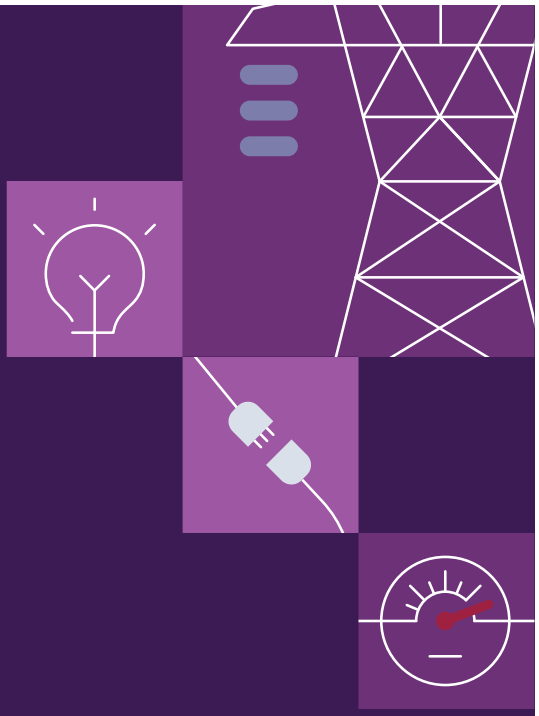

SSIAG Amendment – Calculation of System Strength Quantity

Final Report – Expedited consultation for the National Electricity Market

Published: 28 June 2024

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Executive summary

The publication of this final report concludes the expedited consultation procedure conducted by AEMO for proposed amendments to the System Strength Impact Assessment Guidelines (SSIAG) (the proposal) made under clause 4.6.6 of the National Electricity Rules (NER). The proposed amendments are being made to give effect to the Australian Energy Market Commission's (AEMC) final rule on Calculation of System Strength Quantity (SSQ Final Rule). The SSQ Final Rule requires AEMO to amend the SSIAG to include a methodology for calculation of the system strength quantity (SSQ) for a connection point. The methodology must be made in accordance with principles specified in the SSQ Final Rule. The amendments are also required to provide guidance on the inputs and assumptions that may be used by a Network Service Provider (NSP) when calculating an indicative SSQ in accordance with NER 5.3.4B(a2)(2A).

AEMO thanks all stakeholders for their feedback on the proposal, which was undertaken as required by NER 4.6.6 and 11.163.2, following the expedited rules consultation procedure in NER 8.9.3. Stakeholder feedback was generally supportive of the proposal, and included minor suggested clarifications to the SSQ methodology which have been incorporated in the amendments to the SSIAG. The submissions also raised a number of material issues relating to broader aspects of the SSIAG that were outside the scope of the current proposal. AEMO acknowledges the importance of these issues to the ongoing development of the system strength framework and has provided detailed responses in section 4 of this final report, including reference where relevant to current or planned industry consultation and engagement processes.

The amendments made in the draft SSIAG include the introduction of a methodology for calculation of the SSQ for a connection point and guidance on inputs and assumptions that may be used by NSPs when calculating an indicative SSQ, as required by the SSQ Final Rule.

The amendments also include a number of minor administrative changes to the SSIAG, including:

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

Subsequent to the consultation on the draft SSIAG, further amendments to the SSIAG, which reflect AEMO's consideration and responses to stakeholder submissions on the calculation of SSQ and other broader SSIAG matters, include:

- Expanding the guidance on inputs and assumptions for SSQ calculation to include the final SSQ
- Inclusion of a requirement for AEMO to provide reasons if it forms the opinion that a proposed plant alteration will have a general system strength impact
- Inclusion of a requirement for physical elements within the models used for Withstand SCR testing to be identical to the models used for negotiation of Performance Standards
- Other minor corrections and clarifications.

AEMO has also updated the System Strength Framework Frequently Asked Questions Factsheet to improve clarity and further reflect stakeholder feedback on broader SSIAG matters. The updates include:

- Information and timing requirements for classification of inverter based loads
- PSS®E short-circuit calculation method for system strength locational factor calculation
- Consideration of harmonic filters for Withstand SCR assessment
- Type of simulation tools for Withstand SCR assessment.

AEMO has not made any further changes in response to the issues noted below as they require further investigation and extensive consultation with industry, have dependencies with other workstreams currently underway or are beyond the remit of the SSIAG. These workstreams include the System Strength Framework Status Report maintained by the Market Bodies working group consisting of AEMO, Australian Energy Market Commission (AEMC) and Australian Energy Regulator (AER) and the Review of Technical Requirements for Connection. AEMO will consider the following feedback for future SSIAG amendments as appropriate:

- Exploration of alternatives for using active power Prated as the base for SSQ calculations
- Inclusion of further guidance on inverter based load classification
- Review of the stability coefficient value
- Ability to self-remediate in front of the connection point
- Treatment of grid forming technologies in relation to system strength
- Ability to select alternative system strength node
- Prescriptive timelines for consultation on proposed System Strength Remediation Schemes (SSRS), stability assessment, SSQ and System Strength Locational Factor (SSLF) calculations

AEMO is committed to consulting on the above matters that have been raised in the submissions. Consideration of these matters necessitates a longer and more detailed consultation than AEMO has been able to undertake in this instance to update the guideline by 30 June 2024. AEMO is intending to carry out two tranches of consultations on amendments to the SSIAG in financial years 2025 and 2026 to balance timely resolution of issues whilst minimising the number of changes that may impact investment certainty.

AEMO's final determination on the proposal is to amend the SSIAG in the form published with this final report, with an effective date of 1 July 2024. AEMO is grateful for the contribution of all stakeholders who have participated in this consultation process.

Contents

Tables

1. Stakeholder consultation process

As required by National Electricity Rules (NER) 4.6.6 and 11.163.2, AEMO has consulted 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 made to give effect to the Australian Energy Market Commission (AEMC) final rule on Calculation of System Strength Quantity (**SSQ Final Rule**)[1].

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 Rule[2], for which full implementation is effective from 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 timeline for this consultation are outlined below.

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
Submissions closed on draft report	21 May 2024
Final report published	28 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.

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, containing all published papers and reports, written submissions, and other consultation documents or reference material.

In response to its draft report, AEMO received 4 written submissions and subsequently met with Tesla on 3 June 2024 to better understand their feedback in relation to treatment of GFM technologies.

AEMO thanks all stakeholders for their feedback on the draft report, which has been considered in preparing this final report.

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

[2] See https://www.aemc.gov.au/rule-changes/integrating-energy-storage-systems-nem.

2. Background

2.1. Context for this consultation

The SSQ Final Rule amends NER 4.6.6, which specifies the required content of the SSIAG. Schedule 1 of the SSQ Final Rule[3,4] 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 2024[5].

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 NER6A.23.5(j). The principles to be applied by AEMO in specifying the methodology will be set out in NER4.6.6(b1)(3) (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,

[3] 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

[4] 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

[5] 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 has sought to make a determination that is consistent with the national electricity objective (NEO) and, where relevant, to select the option 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. List of material issues

The key material issues raised in written submissions to the draft report are listed in Table 2 in summary form.

It should be noted that only the issue listed in item 1 in Table 2 relates to the subject matter of the proposed amendments to the SSIAG outlined in the draft report. The remaining items listed in Table 2 comprise feedback related to broader SSIAG matters.

Table 2 List of material issues

No.	Issue	Raised by
1.	System strength quantity	Tesla, Transgrid
2.	Inverter based load classification	Transgrid
3.	Plant alterations	Vestas
4.	Stability coefficient	Tesla, Tilt Renewables, Transgrid
5.	Available fault level calculation	Transgrid
6.	System strength remediation	Tilt Renewables, Vestas
7.	Withstand SCR	Transgrid
8.	Treatment of grid forming technology	Tesla
9.	System strength nodes	Vestas

A detailed table of issues raised by stakeholders in written submissions to the draft report, together with AEMO's responses, is contained in Appendix B.

Each of the material issues in Table 2 is discussed in Section 4.

4. Discussion of material issues

4.1. System strength quantity (SSQ)

4.1.1. Issue summary and submissions

AEMO received submissions from two stakeholders in relation to the SSQ. They are summarised below.

- Inclusion of subsections for indicative and final SSQ in Section 6.2.5 (Inputs and assumptions for SSQ calculations) of the SSIAG.
- Clarification on negative SSQ.
- Exploration of alternatives for using rated active power P_{rated} as the base for calculation.

Transgrid

> It is noted that for indicative SSQ there is a bold sub-section with inputs and assumptions (section 6.2.5). However, we believe that it would be beneficial to also highlight similar arrangement for the final SSQ calculation. It is understood that there is a generic sub-section (6.2.4) on the methodology to be adopted for calculation of SSQ. However, given that the revised document has separated indicative SSQ and final SSQ, we would encourage AEMO to include "inputs and assumptions" sub-sections for each of them i.e., separately for indicative SSQ and final SSQ. This would be beneficial and it would also provide consistency.

Tesla

> Additionally, Tesla seeks further clarification on if this update could lead to negative SSQ, and exploration to alternatives for using rated active power Prated as the base for calculation.

4.1.2. AEMO's assessment

- Inclusion of subsections for indicative and final SSQ in Section 6.2.5 (Inputs and assumptions for SSQ calculations) of the SSIAG:
  - Although NER 4.6.6(b1)(4) only requires that the SSIAG include guidance on inputs and assumptions that may be used for calculation of an indicative SSQ, AEMO has considered Transgrid's suggestion and agrees that including subsections for indicative and final SSQ in Section 6.2.5 of the SSIAG will provide improved clarity and consistency.
  - An indicative SSQ, calculated by the NSP in response to a connection enquiry or upon request for a Preliminary Assessment for an alteration or upon receipt by an Applicant to provide a revised indicative SSQ, is likely to use assumptions on input parameters such as Withstand SCR of the 4.6.6 Connection if these are not provided by the party making the request. The final values recorded in the connection agreement and performance standards are used to determine the final SSQ and the system strength charge that applies to the 4.6.6 connection. Guidance on inputs and assumptions that may be used by the NSP when calculating the SSQ is included in Section 6.2.5 of the SSIAG.
- Clarification on negative SSQ:
  - A negative SSQ can result if the Withstand SCR is less than the stability coefficient which is defined to be 1.2. In such cases, the 4.6.6 Connection has the capability to self-remediate (without the need to remediate for ΔAFL) and is not required to pay a system strength charge.

- In the case of a negative SSQ (i.e., positive system strength impact), proponents may be able to offer any excess system strength to the System Strength Service Provider (SSSP) on commercial terms as a non-network service. The SSSPs must still test these service offerings economically alongside other options capable of contributing to their requirements. This clarification is already provided in item 41 of the System Strength Framework Frequently Asked Questions Factsheet[6].

- Exploration of alternatives for using rated active power P_{rated} as the base for calculation:
  - This is a prescriptive parameter for SSQ calculation under the SSQ Final Rule[7]. Changes to the consideration of this parameter would require further consultation with industry and initiation of a rule change.
  - AEMO has proposed to adopt 'active power capability' instead of 'rated active power' for all Schedule 5.2 access standards, and in relation to the use of SCR, in AEMO's rule change proposal to the AEMC to improve the technical requirements for connection for the National Electricity Market (NEM)[8]. These proposals have been submitted to give effect to the final recommendations of AEMO's detailed review of technical requirements for connections (Access Standards Review)[9]. This rule change process will likely inform changes to the use of P_{rated} in SSQ calculations.

4.1.3. AEMO's conclusion

Based on its assessment above, AEMO has revised Section 6.2.5 of the SSIAG to include subsections to clarify inputs and assumptions for calculation of both indicative and final SSQ.

AEMO will consider the feedback in relation to exploring alternatives for using P_{rated} in the SSQ calculation for future amendments. Changing this parameter would require consultation with industry and an initiation of a rule change. The rule change process that AEMO has initiated to improve the technical requirements for connections[8] will likely inform changes to the use of P_{rated} in SSQ calculations.

4.2. Inverter based load (IBL) classification

4.2.1. Issue summary and submissions

Transgrid commented that:

> We understand that the SSIAG is required to provide criteria for the classification of IBL under the NER, however it does not appear as though the guidelines provide any more guidance than the Rules. (refer to sub-section 2.2). The following is not covered:
>
> - The classification of IBL is not included in the process diagrams. This may increase confusion,
> - What roles do TNSPs and AEMO have in making the classification of individual loads,
> - What information do TNSPs and AEMO need to do this and,
> - How the classification is undertaken.

[6] https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/ssiag/system-strength-framework-frequently-asked-questions-v20.pdf

[7] See NER 4.6.6 (b1)(3)(i)

[8] https://www.aemc.gov.au/sites/default/files/2024-04/New%20rule%20change%20proposal%20-%20AEMO%20-%20Improving%20the%20NEM%20access%20standards%20-%2020240403%20-%20Overview.pdf

[9] https://aemo.com.au/consultations/current-and-closed-consultations/aemo-review-of-technical-requirements-for-connection

It appears that all the above points have not been covered. Therefore, we encourage AEMO to provide greater guidance on how a load should be classified in practice and included in the SSIAG as per the NER requirement.

4.2.2. AEMO's assessment

- Classification of IBL is not included in the process diagrams:
  - Figure 3 shows the assessment process of a 4.6.6 Connection which includes IBL; although not explicitly mentioned, load classification should be undertaken after a connection enquiry is submitted and before the Connecting NSP assesses the enquiry.
- Roles of TNSPs and AEMO in making the classification of individual loads:
  - Section 2.2 of the SSIAG already provides guidance on the criteria for classification of IBL. AEMO considers TNPSs are provided with discretion to classify loads as IBL, in consultation with AEMO.
- Information requirements and how classification is undertaken:
  - NER S5.3.1 prescribes the information to be submitted by a Network User for new or additional equipment. Information listed in the NER, such as NER S5.3.1(a)(1), NER S5.3.1(a)(3), NER S5.3.1(a)(11), NER S5.3.1(a1)(1) and NER S5.3.1(a1)(2), is recommended to be provided at connection enquiry stage so that the load can be appropriately classified. Further clarification is provided in item 4 of the System Strength Framework Frequently Asked Questions Factsheet.

4.2.3. AEMO's conclusion

Based on the assessment above, AEMO has not made any changes to the SSIAG. AEMO has updated the System Strength Framework Frequently Asked Questions Factsheet to clarify the information requirements for classification of IBL. Having regard to the limited scope of this consultation, incorporating further clarification on classification of IBL will be considered for future amendments of the SSIAG. AEMO's review of technical requirements[10], planned to commence in FY2025, proposes to undertake a detailed review of large loads. The outcome of the review will likely support an increased understanding of IBLs and provide further clarity on their classification. AEMO will consider amendments to the SSIAG subsequent to the completion of the review of technical requirements of large loads.

4.3. Plant alterations

4.3.1. Issue summary and submissions

Vestas commented that:

> The SSIAG should clearly state that AEMO will provide the written technical justification on why in its opinion the proposed alteration will have a general system strength impact.

4.3.2. AEMO's assessment

The current practice is that AEMO provides technical justification via email correspondence if in its opinion the proposed alteration will have a general system strength impact. AEMO recognises that

[10] See https://aemo.com.au/consultations/current-and-closed-consultations/aemo-review-of-technical-requirements-for-connection.

including this in the SSIAG as an AEMO obligation will improve certainty and transparency of the NER 5.3.9 process.

4.3.3. AEMO's conclusion

Based on its assessment above, AEMO has expanded Section 2.3.1 of the SSIAG to reflect AEMO's obligation to provide written justification if, as part of a pre-submission assessment (as allowed by the NER 5.3.9 process), AEMO reasonably concludes that a proposed alteration will have a general system strength impact.

4.4. Stability coefficient

4.4.1. Issue summary and submissions

AEMO received submissions from multiple stakeholders in relation to the stability coefficient. They are summarised below.

- Clarity on the selection of value of the stability coefficient.
- Consideration of item in Section 3.4.3 (e) of the SSIAG to improve clarity.
- Future updates and suggested modifications to the stability coefficient.

Tesla

> The proposal put forward by AEMO is a good first step, however, Tesla encourages greater clarity for how the coefficient value was selected to be 1.2, and if this number is fixed or has the potential to change over time.

Tilt Renewables

> Tilt Renewables is concerned that changes to this coefficient may be contemplated in the future which would have serious impacts on the economics of new generation. Tilt Renewables respectfully requests that should any change to this coefficient be contemplated in the future, that it be very carefully considered, widely and thoroughly consulted upon and that it be made crystal clear that any change would not affect operating or committed generators.

Transgrid

> In relation to 3.4.3 (c) of the SSIAG:
>
> > Considering the possibility of stability coefficients below 1.2 at certain network nodes and recognising the need for financial closure during the Connection Application Stage, upon signing the Connection Agreement, we encourage AEMO to consider the below recommendations.
> >
> > 1. NSPs be granted the flexibility to review and revise the alpha factor below 1.2 for relevant network nodes, while maintaining a maximum cap of 1.2.
> > 2. The alpha value, where deemed to be less than 1.2, to be published by the relevant NSP and reviewed periodically to ensure sufficient level of system strength is available at the Connection Points,
> > 3. The alpha value used to assess reduction in AFL & SSQ at the Connection Enquiry stage (as per item (b)) to be retained throughout the project's lifecycle, unless requested to be reviewed by the Connection Applicant.
>
> In relation to 3.4.3 (e) of the SSIAG:

We believe this suggests that all grid-following inverters can operate in a stable manner down to the SCR of 1.2. However, it is not immediately clear if this consideration is at point of connection or the inverter terminals. Most grid following inverters may be capable of stable operation for SCR=1.2 at the terminal but this statement needs to be considered on a case-by-case basis for point of connection. We believe that it could be a more precise for grid following technology if the point of assessment is further clarified.

Given this, we would encourage AEMO to replace the text contained in 3.4.3 (e) with the following:

"*In addition, a review of existing NEM connections found that a value of 1.2 also corresponds to approximately the lowest Withstand SCR capability for grid-following inverters at their inverter terminals.*"

4.4.2. AEMO's assessment

- Clarity on the selection of value of the stability coefficient:
  - The stability coefficient is intended as an approximate value providing a representation of the minimum SCR below which recent studies indicate voltage instability is likely to occur without any additional system strength or reactive power support. A constant value of 1.2 is assumed for the stability coefficient (α). Section 3.4.3 of the SSIAG and the referenced technical literature provide further details on the rationale for selecting 1.2 as the stability coefficient.
- Consideration of item in Section 3.4.3 (e) of the SSIAG to improve clarity:
  - While AEMO acknowledges that the statement in Section 3.4.3 (e) of the SSIAG may not be immediately clear, AEMO does not agree that the Withstand SCR capability should be referenced at the inverter terminals. As noted in Section 7.2.1 of the SSIAG, the Withstand SCR capability is defined at the 4.6.6 Connection Point for safe operation of the 4.6.6 Connection. A Withstand SCR value of 1.2 may not be applicable to all grid following plants, but 1.2 is likely to be the lowest considering power system stability limitations.
- Future updates and suggested modifications to the stability coefficient:
  - Changing the value used for the stability coefficient is not considered in the current amendment. AEMO will consider this feedback for future amendments of the SSIAG. Consultation with industry in relation to this matter will be required prior to an amendment of the SSIAG.

4.4.3. AEMO's conclusion

Based on its assessment above, AEMO has expanded the statement in 3.4.3 (e) of the SSIAG to clarify that a Withstand SCR value of 1.2 may not be applicable to all grid following plants, but 1.2 is likely to be the lowest considering power system stability limitations. Furthermore, Section 3.4.3 of the SSIAG already provides the rationale behind the selection of the value of the stability coefficient. Consultation with industry will be required if any modifications to the stability coefficient are considered.

4.5. Available fault level (AFL)

4.5.1. Issue summary and submissions

AEMO received submissions from Transgrid in relation to the AFL calculation. They are summarised below.

- Determination and treatment of proxy Thevenin impedance for Withstand SCR of 1.2.
- Guidance on short-circuit calculation method to be used in assessments using PSS®E.

Transgrid

In relation to Appendix A A.1 of the SSIAG:

Proxy Thevenin impedance is not defined for inverters with a withstand SCR of 1.2.

Using the formula provided:
$\Delta AFL = (-SCR_{withstand} + \alpha) \times Prated$
for $SCR_{withstand}$ of 1.2
$\Delta AFL = 0$

Using the calculation for ZAFL;
$ZAFL = abs(1/\Delta AFL)$
$ZAFL = NaN$

From the above, we can conclude that the proxy Thevenin impedance becomes undefined for withstand SCR of 1.2

We encourage AEMO to include instructions on how to determine proxy Thevenin impedance for withstand SCR = 1.2, and consider providing an example for greater clarity

In relation to Appendix A A.2 of the SSIAG:

At a high-level, we believe it would be beneficial to provide greater clarity regarding which short-circuit calculation method should be used in the assessments (e.g., ANSI, IEC).

To ensure consistency and clarity, we encourage AEMO to provide further guidance and define the short-circuit calculation method to be used in the assessment as different methods may yield varying results.

4.5.2. AEMO's assessment

- Determination and treatment of proxy Thevenin impedance for Withstand SCR of 1.2:
  - For a Withstand SCR of 1.2, the plant's corresponding proxy impedance (1 / ΔAFL) is infinite, or effectively an open-circuit. In such scenarios the plant is considered to be disconnected from the network. This clarification is already provided in item 21 of the System Strength Framework Frequently Asked Questions Factsheet.
- Guidance on short-circuit calculation method to be used in assessments using PSS®E:
  - Using the methodology described in SSIAG Section 7.3, the user can choose either IEC or ASCC calculation methods. To avoid diverging results, the suggested approach is to use the following settings in PSS®E 34.8 or above:
    1. Click "Short Circuit" and then click "Automatic Sequencing fault calculation (ASCC)".
    2. Select FLAT Classical and click "Apply".
    3. Select "Three phase fault".
    4. Specify the desired bus in "The following buses".
    5. Click "Go".
  - This selection should prevent pre-condition load flow from impacting the results. This clarification is already provided in item 6 of the System Strength Framework Frequently Asked Questions Factsheet.

4.5.3. AEMO's conclusion

Based on its assessment above, AEMO has not made any changes to the SSIAG. The clarifications are already included in the System Strength Framework Frequently Asked Questions Factsheet.

4.6. System strength remediation

4.6.1. Issue summary and submissions

AEMO received submissions from multiple stakeholders in relation to system strength remediation. They are summarised below.

- Self-remediation in front of the connection point.
- Provision of technical justification for rejection of SSRS.

Tilt Renewables

> During the aforementioned webinar, the AEMO representative was asked about deleting the current requirement in the SSIAG [Section 5.1.2(a)] that self-remediation must occur behind the meter. The AEMO representative stated that while they plan to consider changing this, it is quite complicated and was not going to be addressed until next year at the earliest. One of the key issues was stated to be calculating the reduction in system strength remediation caused by the distance to the VRE generator. However, TNSPs must be making such calculations using some methodology today as it is required for TNSPs to decide how to remediate 2 or 3 nearby VRE generators who chose to pay the TNSP for remediation---unless the TNSP decides to install system strength remediation behind every meter which would obviously not be cost effective or sensible. Therefore, it is not clear how this issue could be so complicated as TNSPs are facing it today.
>
> In its submission to the AEMC's Calculation of system strength quantity Draft Rule determination[11], Tilt Renewables outlined why this change is important and should be made and AEMO has appeared amenable to changing this requirement in our previous discussions. Tilt Renewables respectfully requests the behind the meter self-remediation requirement be addressed in the next SSIAG amendment---along with all of the other changes AEMO considers to be needed or beneficial.

Vestas

> The SSIAG allows the use of system strength remediation schemes (SSRSs) only behind the connection point. However, the NER 4.6.6 does not restrict the location for such scheme. Therefore, the SSIAG should not prevent connection applicants to propose self remediation solutions in front of the connection point, as highlighted in CEC's Discussion Paper '*Fixing the system strength frameworks*'.
>
> According to 5.1.6(a)(i), the NSP must reject the SSRS proposal that '*is not reasonably likely to avoid or remediate the general system strength impact of the 4.6.6 Connection.*' However, the SSIAG should state that NSP will provide the written technical justification for rejecting the SSRS proposal, including the criteria applied to assess it.
>
> The same principle should be applied when NSP rejects the SSRS proposal based on its '*reasonable opinion*', that would adversely affect the quality of supply for other Network Users (5.1.6(a)(ii)) and when it would affect the power system security on AEMO's advice (5.1.6(a)(iii)).

[11] https://www.aemc.gov.au/sites/default/files/2024-01/Tilt%20Renewables%20Submission%20to%20ERC0375%20draft%20determination%20-%20recieved%2019%20January%202024.pdf

4.6.2. AEMO's assessment

- Self-remediation in front of the connection point:
  - AEMO acknowledges that the ability to self-remediate in front of the connection point is a matter that requires consideration for future SSIAG amendments.
  - Further consideration of the issue forms part of the System Strength Framework Status Report which investigates and progresses various aspects of the system strength framework. The System Strength Framework Status Report is maintained by the Market Bodies working group consisting of AEMO, Australian Energy Market Commission (AEMC) and Australian Energy Regulator (AER) and is expected to be published in July 2024.
  - Timelines and further details will be published on AEMO's website as the working group further investigates this topic in consultation with industry stakeholders.
- Provision of technical justification for rejection of SSRS:
  - The obligation of the Connecting NSP to provide reasoning for rejecting a proposed SSRS is a NER bound requirement (see NER 5.3.4B (m)). In addition, Section 5.1.6 (b) of the SSIAG includes a further obligation on the Connecting NSP to provide a copy of AEMO's letter where a rejection is based on AEMO's reasonable advice that a proposed SSRS would adversely affect power system security.

4.6.3. AEMO's conclusion

Based on its assessment above, AEMO has made a minor update to include the NER reference in Section 5.1.6 (b) of the SSIAG that notes the obligation of the Connecting NSP to provide reasoning for rejecting a proposed SSRS. As discussed above, self-remediation in front of the connection point is being investigated as one of the issues covered in the System Strength Framework Status Report.

4.7. Withstand SCR

4.7.1. Issue summary and submissions

AEMO received submissions from Transgrid in relation to Withstand SCR. They are summarised below.

- Clarification on assessment of NER S5.2.5.15.
- Guidance on use of simulation software for Withstand SCR assessment.
- Treatment of harmonic filters for assessment of Withstand SCR.

Transgrid

In relation to Section 7.4.1 of the SSIAG:

We encourage AEMO to consider the following points:

- As inferred from NER S5.2.5.15 (b), S5.2.5.15 (d), and the General Requirement under S5.2.5.15, further clarification of the intended purpose of 7.4.1(a) would be beneficial. That is, its intended purpose is to outline the requirements for NAS or MAS for S5.2.5.15 at the withstand SCR and it is not to require compliance with any other performance standards at this withstand SCR.
- It would be beneficial if AEMO could provide further clarification and make it clearer that if the Generating System needs to adopt any Control/Protection Systems/Settings for S5.2.5.15, the

only requirement for demonstrating compliance is to remain stably connected at the withstand SCR, and Generating Systems are not expected to demonstrate compliance with any other performance standards at the withstand SCR with these Control/Protection Systems/Settings.

In relation to Appendix B of the SSIAG:

We encourage AEMO to provide further clarity on Table 2 of Appendix B as it is currently unclear whether Table 2 requires the tests to be done in PSCAD or PSSE. We note, that there is greater clarity on the requirement for Table 3 and Table 4.

As such, we encourage AEMO to consider adding the following text above Table 2:
"The tests listed in Table 2 apply to both PSCAD™/EMTDC™ and PSSE models."

In relation to consideration of removal of harmonic filters for the purpose of S5.2.5.15 Withstand SCR testing:

We encourage AEMO to consider adding the following text to the appropriate section or a new section (whichever AEMO sees fit):

"Elements within the model of the generating system undergoing Withstand SCR testing must identical to the generating system undergoing negotiation for GPS. That is, the size of plant, number of inverters, filters etc should remain constant for the withstand SCR tests"

4.7.2. AEMO's assessment

- Clarification on assessment of NER S5.2.5.15:
  - There is no explicit requirement for 4.6.6 Connections to demonstrate compliance with other performance standards at the Withstand SCR with altered control/protection systems/settings that may be required for NER S5.2.5.15. However, AEMO emphasises that a 4.6.6 Connection is required to achieve more than just maintaining stable operation throughout the tests in Appendix B of the SSIAG. For example:
    - No unstable operation at an SCR of 3.0
    - High voltage ride-through (HVRT) and low voltage ride-through (LVRT) performance (for the commencement and the delivery of reactive support) must not be lower than the NER S5.2.5.5 Minimum Access Standard
    - No anomalies such as retriggering in LVRT, oscillation, etc.
    - Frequency and voltage controller at the 4.6.6 Connection level must be enabled, etc.
  - These requirements, along with other requirements that form the acceptance criteria, are already included in Section 7.4.4 of the SSIAG. Further, clarification of the assessment of NER S5.2.5.15 is already included in item 23 of the System Strength Framework Frequently Asked Questions Factsheet.
- Guidance on use of simulation software for Withstand SCR assessment:
  - AEMO considers that the tests prescribed in Table 2 to Table 4 of Appendix B of the SSIAG are mandatory for a PSCAD™/EMTDC™ simulation model but optional for an RMS simulation model (e.g., PSS®E), as dynamic simulation results produced from an RMS simulation tool may not fully represent performance of a 4.6.6 Connection under low SCR conditions. Hence, the performance of a 4.6.6 Connection should be assessed based on PSCAD™/EMTDC™ simulation results for such conditions. For the same reason, benchmarking between two different simulation tools (e.g., PSS®E and PSCAD™/EMTDC™) is not required.

- Treatment of harmonic filters for assessment of Withstand SCR:
  - AEMO understands that disconnection of harmonic filters may help achieve a lower Withstand SCR to mitigate the reduction in Available Fault Level. This is in effect proposing it as part of a System Strength Remediation Scheme (SSRS) to address an adverse system strength impact. Section 5.1.2 of the SSIAG describes acceptable SSRSs "must address each element of the identified general system strength impact, namely, the adverse system strength impact and the reduction in AFL, as applicable". AEMO would like to note that disconnection of harmonic filters is expected to result in greater harmonic emissions by the 4.6.6 Connection, thereby contributing to an adverse system strength impact due to adverse power quality interactions as per Section 3.3.2(a)(iii) of the SSIAG. Therefore, proposing a Withstand SCR that is achieved by disabling harmonic filters is not an acceptable SSRS.
  - Considering the above, harmonic filters should not be disconnected for Withstand SCR assessment of a 4.6.6 Connection.

4.7.3. AEMO's conclusion

Based on its assessment above, AEMO has updated Section 7.4.3 of the SSIAG to reflect the requirement for physical elements within the models including plant capacity, transformers, number of production units, any auxiliary or reactive plant used for Withstand SCR testing to be identical to the models used for negotiation of Performance Standards.

AEMO has further amended the System Strength Framework Frequently Asked Questions Factsheet (items 24 and 25) to provide guidance on use of simulation software and treatment of harmonic filter(s) for assessment of Withstand SCR.

Clarification of the assessment of NER S5.2.5.15 is already provided in item 23 of the System Strength Framework Frequently Asked Questions Factsheet.

4.8. Treatment of grid forming (GFM) technology

4.8.1. Issue summary and submissions

AEMO received submissions from Tesla and subsequently met with them to better understand their concerns in relation to treatment of GFM technology. They are summarised below.

- Consideration of treatment of GFM technologies in SSIAG.
- Consideration of voluntary specifications of GFM inverters instead of the Withstand SCR test.
- Concerns regarding voluntary specifications of GFM inverters may limit technological development.

Tesla

> Further work also needs to be done to understand how grid-forming-machines (GFM) and batteries will integrate with the proposal, such as in instances where the battery may be required to be derated, or when the voluntary specifications of grid-forming inverters (GFI) are considered instead of the Withstand SCR test. Furthermore, Tesla acknowledges that while voluntary specifications defines and captures the characteristics of today's GFI, this document may act as a limit for further technological development and so needs to be adaptable and flexible together with strong industry engagement.

4.8.2. AEMO's assessment

- Consideration of treatment of GFM technologies in SSIAG:
  - AEMO is of the view that consideration of treatment of GFM technologies (such as in instances where inverters may be required to be derated either via software implementation or derating batteries) is more relevant to the NER performance standards and AEMO Voluntary Specifications for GFM Inverters[12], compared to the SSIAG. AEMO has undertaken a detailed review of technical requirements for connection[13] which addresses similar concerns about GFM technologies.
- Consideration of voluntary specifications of GFM inverters instead of the Withstand SCR test:
  - AEMO's Voluntary Specification for GFM Inverters[12] together with the supplementary document Core Requirement Test Framework[14] provide guidance to stakeholders while this technology and its relevant regulatory environment develop. These documents aim to qualify the capabilities of GFM technology. Whereas the SSIAG quantifies the system strength impact (e.g., quantification of reduction in AFL, SSQ etc.), recognises the capability of GFM technology to improve network stability and proposes it as one of the possible SSRSs. The Voluntary Specification for GFM Inverters[12] and SSIAG complement each other and the Voluntary Specification for GFM Inverters[12] is not intended to be a substitute for the SSIAG.
- Concerns regarding voluntary specifications of GFM inverters may limit technological development:
  - AEMO's Voluntary Specification for GFM Inverters[12] and Core Requirement Test Framework[14] are a result of collaborative effort between AEMO and industry stakeholders. As such they are intended to reflect the development of the GFM technology, as opposed to limiting it. AEMO aims to encourage and facilitate development of new technologies via industry feedback and by removing perceived barriers. Due to the rapid evolution of GFM Inverter technology, AEMO acknowledges that there will be a delay for the AEMO Voluntary Specification to capture all of the latest technological developments. AEMO endeavours to update this document as necessary to minimise this impact, while welcoming new technological updates by OEMs.

4.8.3. AEMO's conclusion

Based on its assessment above, the issues raised in the submission in relation to treatment of GFM technologies are considered to be broader than the scope of the SSIAG. As part of the knowledge sharing exercise related to ARENA's Large Scale Battery Storage Funding Round[15] AEMO is actively engaged with industry stakeholders to develop a detailed understanding of various GFM implementations and to analyse key parameters affecting critical performance characteristics including system strength provision. AEMO endeavours to provide further clarification and guidance via several frameworks such as access standard reviews and initiation of NER changes as appropriate. AEMO will also consider this feedback for future amendments of the SSIAG.

[12] https://aemo.com.au/-/media/files/initiatives/primary-frequency-response/2023/gfm-voluntary-spec.pdf?la=en

[13] https://aemo.com.au/consultations/current-and-closed-consultations/aemo-review-of-technical-requirements-for-connection

[14] https://aemo.com.au/-/media/files/initiatives/engineering-framework/2023/grid-forming-inverters-jan-2024.pdf?la=en

[15] https://arena.gov.au/funding/large-scale-battery-storage-funding-round/.

4.9. System strength nodes (SSN)

4.9.1. Issue summary and submissions

AEMO received submissions from Vestas regarding the ability for applicants to choose the SSN and access to information on all available SSNs for selection.

Vestas commented that:

> According to 6.1.4(b), '*it is recommended that the applicable SSN is the nearest SSN that is located within the same region as the electrical location of the 4.6.6 Connection*.' However, connection applicants should be able to choose the system strength node (SSN) that minimises the overall system strength cost and not only the node with the lowest system strength locational factor (SSLF), because the current limitation might leads to higher costs for connection applicants to address the same issue, as underlined in CEC's Discussion Paper '*Fixing the system strength frameworks*'.
>
> The same principle should be applied to 6.1.4(c).
>
> In additional, connection applicants should have information on all system strength nodes available for selection and their associated system strength charges.

4.9.2. AEMO's assessment

AEMO understands that there are concerns associated with allocation of SSNs for 4.6.6 Connections and access to SSN details. Currently the allocation of an SSN is carried out based on the electrical proximity to the proposed 4.6.6 Connection, the outcome of which is to allocate the node that produces the lowest system strength locational factor (SSLF) or the electrically closest node.

AEMO recognises that this may not necessarily result in the lowest SSC[16], considering the product of SSUP and SSLF, and that investigation into the methodologies for SSLF and SSUP calculations, and SSN selection, should be undertaken.

In addition, it is noted that AEMO's 2023 System Strength Report[17] identified newly proposed SSNs during consultation and invited stakeholder feedback. AEMO is assessing the feedback received to date and is reviewing the full suite of current SSNs and their associated system strength requirements. Where appropriate, new nodes will be published and made effective through the 2024 System Strength Report to be published in December 2024.

4.9.3. AEMO's conclusion

Based on its assessment above, AEMO will consider this feedback for future amendments of the SSIAG. Consultation with industry will be required prior to any amendment of the SSIAG.

[16] $SSC = SSUP \times SSL \times SSQ$

[17] https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system-strength-requirements/2023-system-strength-report.pdf?la=en

5. Other matters

In addition to the amendments noted in Section 4, AEMO has made the following minor amendments to the SSIAG post publication of the draft SSIAG for consultation[18]:

- Removal of references "*6.2.4 6.2.5*" in Section 6.2.2 that have been included in error on page 39 of the draft SSIAG (See item 10 in Appendix B).
- Updates to the footnote associated with Section 7.2.1 (a) of the SSIAG to align with the terminology introduced in the IESS Rule[19].

[18] https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/ssiag/draft-system-strength-impact-assessment-guidelines.pdf?la=en

[19] See https://www.aemc.gov.au/rule-changes/integrating-energy-storage-systems-nem.

6. Final determination on proposal

Having considered the matters raised in the submissions to the draft report, AEMO's final determination is to amend the SSIAG in the form published with this final report, in accordance with NER 4.6.6 and 11.163.2.

The final amendments to the SSIAG differ from the draft determination in the following respects, for the reasons discussed in Sections 4 and 5 of this final report as tabulated in Table 3.

Table 3 Summary of amendments to the SSIAG post publication of the draft

Relevant section in the SSIAG	Summary of the amendments	Relevant section of the assessment in this report
Amendments relating to the SSQ methodology		
Section 6.2	SSQ: Inclusion of subsections for indicative and final SSQ in Section 6.2.5 (Inputs and assumptions) of the SSIAG and updates to text in Section 6.2.2 to include references to Section 6.2.5 Removal of references included in error in Section 6.2.2 of the SSIAG	Section 4.1 Section 5 and Appendix B (item 10)
Other minor and administrative amendments		
Section 2.3.1	Plant alterations: Inclusion of AEMO obligation to provide reasoning on why in its opinion the proposed alteration will have a general system strength impact.	Section 4.3
Section 3.4.3	Stability coefficient: Amendments to item (e) to improve clarity in relation to grid following plants	Section 4.4
Section 5.1.6	SSRS: Inclusion of NER reference in item (b) that notes the obligation of the Connecting NSP to provide reasoning for rejecting a proposed SSRS.	Section 4.6
Section 7.2.1	Terminology associated with the IESS Rule: Updates to the footnote in item (a) to align with the terminology introduced in the IESS Rule	Section 5

Relevant section in the SSIAG	Summary of the amendments	Relevant section of the assessment in this report
Section 7.4.3	Withstand SCR: Updates to Section 7.4.3 to reflect the requirement for physical elements within the models used for Withstand SCR testing to be identical to the models used for negotiation of Performance Standards	Section 4.7

AEMO constrained the scope of the SSIAG amendment as it was necessary to update the guideline by 30 June 2024. AEMO is committed to consulting on the remaining SSIAG matters that were raised in the submissions. Consideration of these matters necessitates a longer and more detailed consultation than AEMO was able to undertake in this instance. AEMO is intending to carry out two tranches of consultations in relation to amendments of the SSIAG in financial years 2025 and 2026 to balance timely resolution of issues whilst minimising the number of changes that may impact investment certainty.

The final amendments to the SSIAG are consistent with the principles specified by the AEMC in the SSQ Final Rule, in particular the principle set out in NER 4.6.6(b1)(3) (reproduced above in section 2.2). The final amendments also support the AEMC's assessment of the contribution the SSQ Final Rule will make to the NEO by promoting efficient investment in and provision of system strength services. The methodology for calculating the SSQ in the amended SSIAG will improve 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.

Effective date

The effective date of this determination is 1 July 2024.

Appendix A. Glossary

Terms defined in the NER have the same meanings in this final report. For ease of reading, they have not been italicised except in direct extracts or where used for definitional purposes in the table below. Other special terms and acronyms used in this final report are defined in this table.

Term or acronym	Meaning
4.6.6 Connection	As defined in the SSIAG.
AEMC	Australian Energy Market Commission.
AER	Australian Energy Regulator.
AFL	*available fault level*. As defined in the SSIAG.
Applicant	As defined in the SSIAG.
Committed	As defined in the SSIAG.
Connecting NSP	As defined in the SSIAG.
CRI	Connection Reform Initiative.
EMT	Electromagnetic transient.
GPS	*Generator* or *Integrated Resource Provider performance standard*.
HVRT	High *voltage* ride-through.
IBL	*inverter based load.*
IBR	*inverter based resource.*
IESS	Integrated Energy Storage System.
LVRT	Low *voltage* ride-through.
NEM	National Electricity Market.
NER	National Electricity Rules. NER followed by a number indicates the corresponding rule or clause of the NER.
NSP	*Network Service Provider*.
OEM	Original equipment manufacturer.
Preliminary Assessment	The assessment referred to in NER 4.6.6(b)(1)(i), under the Amending Rule.
Proposal	The proposed amendments to the SSIAG made under clause 4.6.6 of the NER. Available at https://aemo.com.au/consultations/current-and-closed-consultations/system-strength-impact-assessment-guidelines-amendment-consultation
PSCAD™/EMTDC™	Power Systems Computer Aided Design / Electromagnetic Transient with Direct Current.

Term or acronym	Meaning
PSS®E	Power System Simulator for Engineering.
SCR	*short circuit ratio.*
SMIB	Single machine infinite bus.
SSC	*System strength charge.*
SCP	Streamlined Connection Process.
SSCW	*system strength connection works*.
SSIAG	System Strength Impact Assessment Guidelines.
SSLF	*system strength locational factor.*
SSN	*system strength node.*
SSQ	As defined in NER 6A.23.5(e), under the Amending Rule.
SSQ Final Rule	AEMC final rule on Calculation of System Strength Quantity Available at https://www.aemc.gov.au/rule-changes/calculation-system-strength-quantity
SSRS	*system strength remediation scheme.*
SSS	*system strength service.*
SSSP	*System Strength Service Provider.*
Stability Assessment	The assessment referred to in NER 4.6.6(a)(8), under the Amending Rule.
TNSP	*Transmission Network Service Provider*.
Withstand SCR	See Section 7.2 of the SSIAG.

Appendix B. List of Submissions and AEMO Responses

No.	Stakeholder	Issue	AEMO response
1	Tesla, Transgrid	System strength quantity See Section 4.1.1	See sections 4.1.2 & 4.1.3
2	Transgrid	IBL classification See Section 4.2.1	See sections 4.2.2 & 4.2.3
3	Vestas	Plant alterations See Section 4.3.1	See sections 4.3.2 & 4.3.3
4	Tesla, Tilt Renewables, Transgrid	Stability coefficient See Section 4.4.1	See sections 4.4.2 & 4.4.3
5	Transgrid	AFL calculation See Section 4.5.1	See sections 4.5.2 & 4.5.3
6	Tilt Renewables, Vestas	System strength remediation See Section 4.6.1	See sections 4.6.2 & 4.6.3
7	Transgrid	Withstand SCR See Section 4.7.1	See sections 4.7.2 & 4.7.3
8	Tesla	Treatment of GFM technology See Section 4.8.1	See sections 4.8.2 & 4.8.3
9	Vestas	SSN See Section 4.9.1	See sections 4.9.2 & 4.9.3
10	Transgrid	Editorial issue -we suggest putting a space and separator in the text to separate the two clauses "*6.2.46.2.5*"	These references have been included in error. AEMO has removed them from the SSIAG.
11	Vestas	2.3.1 Generating system alterations under NER 5.3.9 In the version 209 of the NER, released on 4 April 2024, the Clause 5.3.9 does not have the subclauses (a)(1)(ii) and (a)(2)(ii) mentioned on the SSIAG Draft, 2.3.1 (a). The correct reference should be 5.3.9(a)(1) and 5.3.9(a)(2).	These references are in the NER following full implementation of the IESS Rule on 3 June 2024, which is current at the time of publication of the final SSIAG on 30 June 2024.
12	Transgrid	Terms such as '*production unit*', '*distribution connected unit*', '*market network service facility*' and '*integrated resource system*' are not defined in the SSIAG or the NER.	These terms are defined in the NER following full implementation of the IESS Rule on 3 June 2024, which is current at the time of publication of the final SSIAG on 30 June 2024.

No.	Stakeholder	Issue	AEMO response
		To provider greater clarity, we encourage AEMO to consider adding a footnote to explain that the new italicised terms are to be defined in the new rules which have not yet come into effect.	
13	Vestas	AEMO should include a new section to reflect the transitional rules (NER clauses 11.163.1 to 11.163.6) for applicants that are part-way through a connection process or have already commenced paying the charge under the current arrangements.	The transitional rules in NER 11.163.1 to 11.163.6 are associated with the implementation of the SSQ Final Rule. AEMO is of the view that transitional rules should not be included in the SSIAG, given their temporary nature.
14	Vestas	5.1.5 Consultation with AEMO It's important to establish a clear timeline for NSP to consult with AEMO after receiving the proposed SSRS and not relying on general expressions such as 'as soon as practicable'. Therefore, we suggest 5 business days as the time limit for NSP to submit such consultation to AEMO (5.1.5 (a)). 6.1.2 Timing The SSIAG must establish clear timelines for NSP to initiate and conclude the SSLF calculation after receiving the connection enquiry. The same principle should be applied to 6.1.2(b) and 6.1.2(c). 6.2.2 Timing The SSIAG must establish clear timelines for NSP to initiate and conclude the calculation of the indicative system strength quantity (SSQ) after receiving the connection enquiry (6.2.2(a)), a request for a Preliminary Assessment (6.2.2(b)) or a request to provide a revised indicative SSQ (6.2.2(c)). 8.2 Timing The SSIAG must establish clear timelines for NSP to initiate and conclude the Stability Assessment after receiving an application to connect, or a submission under NER 5.3.9(b) or 5.3.12(b), that includes an election to pay the system strength charge.	For a proposed new connection for which NER 5.3.4B applies, NER 5.3.3 (b1) together with NER 5.3.3 (b5) provide timelines for providing a response to a connection enquiry which captures provision of indicative SSQ and SSLF. The Connecting NSP is required to provide the specified details in NER 5.3.3 (b5) within 30 business days after receipt of a connection enquiry or request to process a connection enquiry as noted in NER 5.3.3 (b1). For other instances of SSQ and SSLF calculation requests, Stability Assessment and NSP consultation with AEMO on a proposed SSRS will require consultation with industry prior to introducing any timeline requirements. AEMO will consider this feedback for future amendments of relevant guidelines as appropriate. It should also be noted that there is a workstream under the Connection Reform Initiative (CRI) that is focusing on identifying improvement opportunities across the connection process, i.e., the Streamlined Connection Process (SCP). This is currently being co-designed with industry and is intended to provide enhanced certainty and transparency.
15	Tilt Renewables	This submission is focussed on the general issue of past, continuing and future changes to the SSIAG. System strength has been an issue in the NEM since 2017 and the repetitive changes to the SSIAG are causing uncertainty about what charges future, and current, Variable Renewable Energy (VRE) generators are likely to face. Meanwhile, an important change to the SSIAG requested by market participants remains on the 'back burner'	AEMO understands the impact of the implementation of the system strength framework to future development of projects in the NEM and recognises the rapid changes in technologies of the renewable energy industry. AEMO will endeavour to incorporate as many updates as possible in future releases of the SSIAG to minimise uncertainty.

No.	Stakeholder	Issue	AEMO response
		During the same webinar another amendment to the SSIAG was foreshadowed later this year with another potential amendment next year. Investment in new generation is not proceeding at the required pace, and it is not helpful to have a series of unknown changes to a Guideline with very significant compliance costs hanging over investors' heads. A drip feed of SSIAG amendments is not what industry needs. Tilt Renewables respectfully requests that AEMO's next amendment to the SSIAG include all intended changes, so that market participants can understand what system strength network or self-remediation charges they will be required to pay to enable informed investment decisions. ..... This amendment spends a fair amount of time discussing the currently fixed stability coefficient. During a recent webinar at which AEMO presented, the representative stated that no changes were currently being proposed to the stability coefficient (currently fixed at 1.2). Tilt Renewables is concerned that changes to this coefficient may be contemplated in the future which would have serious impacts on the economics of new generation. Tilt Renewables respectfully requests that should any change to this coefficient be contemplated in the future, that it be very carefully considered, widely and thoroughly consulted upon and that it be made crystal clear that any change would not affect operating or committed generators	
16	Vestas	The use of general terms such as '*as soon as practicable*', '*upon receipt*', '*reasonable opinion*', and '*reasonable advice*' should be avoided in all AEMO's Guidelines because they lead to different interpretations and ambiguity among NSPs, AEMO and connection applicants.	AEMO understands that general terms such as '*as soon as practicable*', '*upon receipt*', '*reasonable opinion*', and '*reasonable advice*' may lead to different interpretation and ambiguity between different stakeholders. However, updates to these terms will require consultation with industry and careful consideration due to the nature of the connection process and the ability to use engineering judgement for decision making. It should be noted that these phrases in many cases reflect the use of equivalent terminology in the NER. AEMO will consider this feedback for future amendments of relevant guidelines as appropriate.