

Amendments to the NSCAS Description and Quantity Procedure

Draft Report – Standard consultation
for the National Electricity Market

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Executive summary and consultation notice

The publication of this draft report commences the second stage of the standard rules consultation procedure conducted by AEMO to update the Network Support and Control Ancillary Service (**NSCAS**) Description and Quantity Procedure (the **Procedure**).

This consultation is undertaken as required by National Electricity Rules (**NER**) 5.20.2. The standard rules consultation procedure is described in NER 8.9.2.

The Australian Energy Market Commission (**AEMC**) published the *National Electricity Amendment (Improving security frameworks for the energy transition) Rule 2024 (Amending Rule)* in March 2024¹. With effect from 1 December 2024, the Amending Rule will amend the NER definition of an ‘NSCAS need’ to include requirements for inertia network services and system strength services. This necessitates changes to the Procedure to describe and quantify those requirements.

AEMO commenced consultation on amendments to the Procedure on 5 July 2024. The consultation paper proposed amendments in the following broad categories:

- **Meeting NER requirements** – amend NSCAS description to include inertia network and system strength services, and the process for quantifying the requirements for those services.
- **Procedure improvements** – use ‘system typical’ conditions for NSCAS studies, consider the impact of anticipated or actionable projects when screening for NSCAS gaps, and other minor amendments and updates.

AEMO received four submissions in response to its consultation paper, with a range of views on the proposal.

After considering first stage submissions, AEMO has issued a draft Procedure with this draft report for further consultation. This reflects AEMO’s draft determination as follows:

- **Describe inertia network and system strength services** – AEMO will include these as types of Reliability and Security Ancillary Services (**RSAS**) in the Procedure, removing the current explicit exclusions, with descriptions of each service as outlined in the consultation paper proposal.
- **Set out how the quantity and location of inertia network and system strength services is determined** – AEMO will specify this process as outlined in the consultation paper proposal, using a three-sigma from the mean approach.
- **Use ‘system typical’ conditions for NSCAS studies** – AEMO will include ‘system typical’ studies in the Procedure substantially as outlined in the consultation paper proposal, but with additional information on defining these configurations based on stakeholder feedback.
- **Anticipated and actionable projects** – AEMO will amend the Procedure to provide for anticipated and actionable projects to be considered in studies to identify and quantify

¹ At <https://www.aemc.gov.au/sites/default/files/2024-03/ERC0290%20-%20ISF%20final%20determination.pdf>.

NSCAS gaps in appropriate cases, as outlined in the consultation paper proposal, with applied assumptions to be noted in NSCAS reports.

AEMO's draft proposal is to amend the Procedure in the form published with this draft report, with a proposed effective date of 1 December 2024.

Consultation notice

AEMO invites written submissions from interested persons on the draft proposal and issues identified in this draft report to 2024_security_consultations@aemo.com.au by 5:00 pm (Melbourne time) on **16 October 2024**.

Submissions may make 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, 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.

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1. Stakeholder consultation process

The ‘NSCAS description’ and ‘NSCAS quantity procedure’ are separately identified in clause 5.20.1 of the National Electricity Rules (**NER**). NER 5.20.2 requires AEMO to consult on any proposed amendments in accordance with the rules consultation procedures. For convenience, AEMO has combined the description and quantity procedure in a single document – the Network Support and Control Ancillary Service (**NSCAS**) Description and Quantity Procedure (**Procedure**).

AEMO is consulting on proposed amendments to the Procedure in accordance with the standard rules consultation procedure in NER 8.9.2.

Note that this document uses terms defined in the NER, which are intended to have the same meanings. There is a glossary of additional terms and abbreviations in Appendix A.

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
Consultation paper published	5 July 2024
Submissions closed on consultation paper	2 August 2024
Draft report published	18 September 2024
Submissions due on draft report	16 October 2024
Final report published	Expected 5 November 2024

AEMO’s consultation webpage for the proposal contains all previous published papers and reports, written submissions, and other consultation documents or reference material².

In response to its consultation paper on the proposal, AEMO received four written submissions, from the Energy Users Association of Australia (**EUAA**), Powerlink, Tesla and Transgrid.

AEMO thanks all stakeholders for their feedback on the proposal to date, and appreciates the thoughtful contributions on these complex matters. The submissions have been considered in preparing this draft report, and AEMO looks forward to further constructive engagement.

² AEMO. *Amendments to NSCAS Description and Quantity Procedure consultation*, at <https://www.aemo.com.au/consultations/current-and-closed-consultations/amendments-to-the-nscas-description-and-quantity-procedure>.

2. Background

2.1. Context for this consultation

The Australian Energy Market Commission (**AEMC**) published the *National Electricity Amendment (Improving security frameworks for the energy transition) Rule 2024 (Amending Rule)* in March 2024. The Amending Rule will expand the **system security procurement frameworks** for the National Electricity Market (**NEM**), providing AEMO with new tools to manage power system security in the NEM through the current energy transition.

With effect from 1 December 2024, the Amending Rule will include inertia network services and system strength services in the NSCAS framework (removing the current explicit exclusion of those services). This will provide a regulated procurement mechanism for these security needs in specified circumstances.

Under the inertia and system strength frameworks in the NEM, Transmission Network Service Providers (**TNSPs**)³ have three years to resolve any forecast shortfall of inertia or system strength from the time AEMO declares them. Where shortfalls emerge within the three-year compliance period, AEMO must seek to manage them in real time under its power system security functions.

To address these gaps more efficiently, the final rule will allow inertia and system strength gaps to be declared and procured through the NSCAS framework if AEMO forecasts that the relevant minimum requirement will exceed the level a TNSP is required to meet at any time in the next three years.

To implement the Amending Rule, the Procedure must be updated to address requirements for inertia network and system strength services within the NSCAS framework. AEMO also identified other aspects of the existing Procedure that would benefit from amendment to improve the accuracy and utility of AEMO's NSCAS Reports.

The Procedure does not cover the new transitional services also introduced by the Amending Rule. Those services are intended to provide a safety net to allow the system to transition through new operating points, while NSCAS addresses known and **quantifiable security shortfalls within existing system standards** or deliver network capability with net market benefits. Transitional services will be procured under a separate framework, and transitional services guidelines will be consulted on separately.

AEMO is also conducting a separate consultation process on proposed changes to the Inertia Requirements Methodology to implement other aspects of the Amending Rule.

³ In their capacity as inertia network service providers or system strength service providers respectively.

2.2. NER requirements

NER reference	Summary of relevant requirement
5.20.1, 5.20.2	<p>AEMO must develop and publish, and may amend, in accordance with the rules consultation procedures:</p> <ul style="list-style-type: none"> • An NSCAS description, defined as a detailed description of each type of NSCAS. • An NSCAS quantity procedure, defined as a procedure that determines the location and quantity of each type of NSCAS required.
10 - Definition of 'NSCAS' (Amending Rule)	<p>From 1 December 2024, NSCAS is defined as:</p> <p>A service (including an inertia network service or system strength service) with the capability to control the active power or reactive power flow into or out of a transmission network to address an NSCAS need.</p>
10 - Definition of 'NSCAS need' (Amending Rule)	<p>Definition of NSCAS need is expanded from 1 December 2024 from the existing definition (which becomes paragraph (a)), to include (b) and (c) for inertia and system strength respectively:</p> <ol style="list-style-type: none"> NSCAS required to: <ol style="list-style-type: none"> maintain power system security and reliability of supply of the transmission network in accordance with the power system security standards and the reliability standard; and maintain or increase the power transfer capability of that transmission network so as to maximise the present value of net economic benefit. A requirement for an inertia network service necessary to meet the inertia requirements where AEMO has revised the inertia requirements in accordance with clause 5.20B.2(f) such that the revised inertia requirements exceed one or more of the binding inertia requirements (as applicable). A requirement for a system strength service necessary to meet the system strength requirements to maintain the minimum three phase fault level where AEMO has revised the minimum three phase fault level in accordance with clause 5.20C.1(e) such that the revised minimum three phase fault level exceeds the minimum three phase fault level specified in the system strength standard specification (as defined in clause S5.1.14).
5.20.3(c1), 5.20.3(c2) (Amending Rule)	<p>If AEMO's annual NSCAS Report identifies an NSCAS gap required to address an NSCAS need for inertia network services or system strength services, the date for the NSCAS need to be addressed must be within three years from the date of the report.</p>

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:

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

3. List of material issues

The key material issues arising from the proposal or raised in submissions or consultation meetings are listed in Table 2.

Table 2 List of material issues

No.	Issue	Raised by
1.	NER requirement to amend the NSCAS description to include inertia and system strength services	AEMO
2.	NER requirement to define how inertia and system strength gaps will be quantified	AEMO
3.	Procedure improvement to capture 'system typical' network conditions not captured by the current Procedure	AEMO
4.	Procedure improvement to consider the impact of anticipated or actionable projects when screening NSCAS gaps	AEMO

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

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

4. Discussion of material issues

4.1. NER requirement to amend the NSCAS description to include inertia and system strength services

4.1.1. Issue summary and submissions

The NER glossary definitions of 'NSCAS' and 'NSCAS need' will be updated to include inertia network services and system strength services (previously excluded). AEMO proposed to describe these services in the Procedure as sub-types of the existing RSAS, namely inertia RSAS and system strength RSAS.

EUAA, Transgrid and Tesla were supportive of this proposal. No stakeholders proposed an alternative to AEMO's proposal.

4.1.2. AEMO's assessment

AEMO notes stakeholder support for this proposal and considers it is appropriate to define these new NSCAS in a way that makes clear they are required for power system security and reliability purposes, while distinguishing them from other types of RSAS given the differences in their NSCAS assessment.

4.1.3. AEMO's conclusion

AEMO will amend section 2.2.1 of the Procedure to describe inertia RSAS, system strength RSAS and other RSAS, as proposed in the consultation paper.

4.2. NER requirement to define how inertia and system strength gaps will be quantified

4.2.1. Issue summary and submissions

Consistent with NER 5.20.1, the Procedure must record the process to determine the location and quantity of each type of NSCAS needed, now including inertia RSAS and system strength RSAS. In the consultation paper, AEMO proposed using a statistically appropriate measure to represent operational uncertainty in the planning timeframe. In particular, AEMO proposed to apply a threshold of three standard deviations from the mean when considering the quantity of services that can reliably be considered 'available' when comparing against the minimum secure requirements for inertia network and system strength services.

In the consultation paper, AEMO noted this approach as covering approximately **99.7%** of periods. For clarity, however, when considering only the upper tail of a normal distribution, three standard deviations corresponds to approximately the **99.87th percentile**. The proposal under consultation remains for three standard deviations, and AEMO has considered the feedback received.

EUAA and Powerlink highlighted that this change presents a risk of over-procuring NSCAS, with associated potential for increased costs. Powerlink also noted the challenges with changing the existing measure (1% tolerance band), considering their obligations to provide system strength services, and respond to existing inertia shortfalls.

4.2.2. AEMO's assessment

Determining an appropriate probabilistic threshold for declaring security shortfalls is difficult given the risks and potential consequences of allowing periods with inadequate system security available. Cases where these services are not available put the system at heightened risk of cascading failures and widespread loss of power.

NSCAS gap declarations represent the final backstop mechanism in the planning timeframe, meaning that any projected (and tolerated) inadequacies represent a need for day-to-day operational intervention in the future. While direct comparisons cannot readily be drawn, **the direct and indirect costs of regular intervention may be significant compared with procuring NSCAS that may (or may not) prove not to be needed in full.** Regular intervention has the potential to deter appropriate investment and may present significant long-term risks for power system security.

For inadequate system strength and inertia, intervention has previously involved directing existing thermal units to come online in both South Australia and New South Wales. Such directions are only possible if suitable units are available to be directed, which will become increasingly rare as many existing thermal units retire over the coming decade. In the absence of available units, intervention likely involves severe network reconfigurations that may shed entire parts of the system to resecure the remaining parts. AEMO believes it is appropriate to minimise the possibility of this outcome in the planning timeframe.

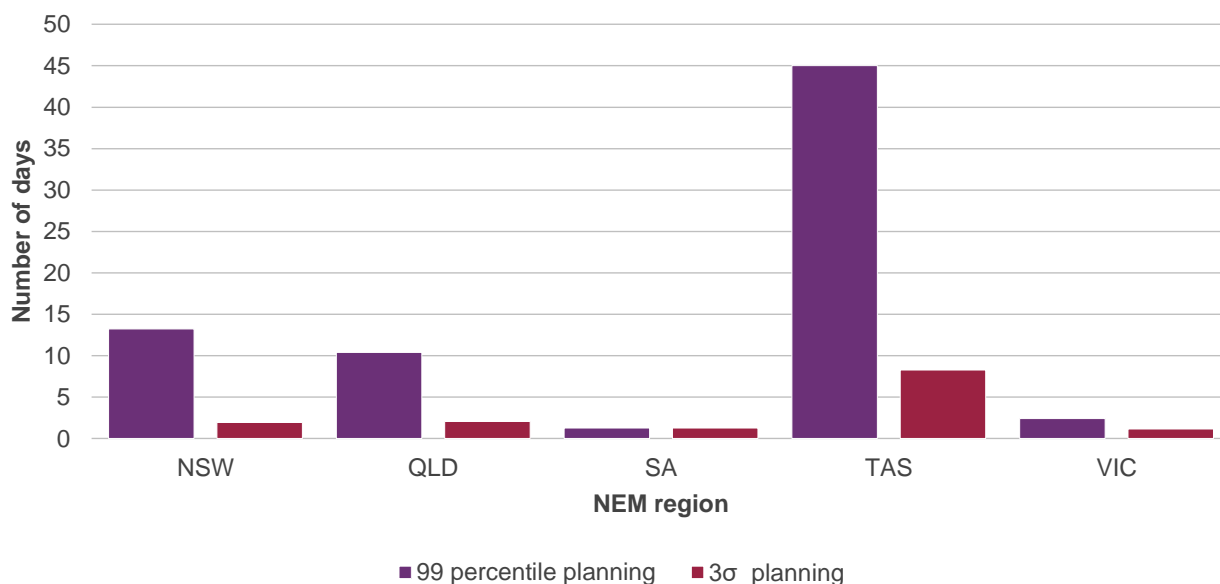
AEMO's assessments of available system strength and inertia use probabilistic, future-looking market modelling that includes simulated outage patterns for generators (both planned and unplanned) and attempts to represent the plausible levels of day-to-day generator availability in the future. Since the consultation paper was published, AEMO has conducted statistical and convergence modelling to ensure there is sufficient confidence in the modelling outcomes. AEMO is preparing to conduct 50 iterations of the market model (previously 10), to exclude the impact of any significant outlying scenarios on the results.

In selecting an appropriate statistical measure for assessing market modelling results, AEMO is effectively determining an acceptable amount of time (for planning purposes), when either the minimum system strength or inertia requirements may not be met, requiring operational intervention. Despite AEMO's modelling with differing outage patterns, **it is not practicable to set an NSCAS requirement that can be expected to meet the minimum requirements for these services all of the time.** As such, AEMO remains of the view that the existing 1% tolerance bands it applies for **system strength** and inertia (~87 hours per year), will no longer represent an acceptable level of projected operational intervention in circumstances where basic units-online directions are expected to become less viable. AEMO considers the proposed three-sigma tolerance band (~9 hours per year) reflects a more statistically appropriate and operationally acceptable margin.

AEMO has analysed how many days would require market intervention when a 99th percentile is used, compared with a three standards deviations from the mean approach. Figure 1 below shows the number of days where AEMO's projection indicates directions for system strength

services would be required⁴, for each region. With a 99th percentile approach, over 72 days⁵ (across all regions) are projected to require market intervention due to insufficient levels of system strength economically dispatched, even with the system planned to meet the requirements for 99% of the time. This would reduce to **less than 15 days** when planning to meet the system strength requirements for 99.87% of the time.

Figure 1 Number of remaining days requiring market intervention for system strength for financial year 2026



AEMO understands the concern that increasing the statistical measure could lead to increased costs to consumers as a result of procuring more NSCAS. While this is a possible outcome, **AEMO is also cognisant that failing to plan for greater uncertainty could have greater adverse consequences (and therefore costs) in terms of power system security and reliability issues.** A shortfall in system strength or inertia network services in operational timeframes will lead to uncertain directions costs (assuming suitable plant is available for direction), and the potential for significant constraints and supply interruption.

In relation to the concern raised by Powerlink on the impact of the proposed change for system strength regulatory investment tests for transmission (**RIT-Ts**), AEMO is aware that different TNSPs may use different approaches when determining their investment obligations under the system strength framework to meet the system strength requirements⁶. **AEMO’s NSCAS studies to determine inertia RSAS needs and system strength RSAS needs are also unique for two main reasons:**

⁴ These are simulated time periods where the system strength for a system strength node in the region is below the minimum three phase fault level for July 2025 – June 2026, based on modelling from the 2023 System Strength Report. This data does not consider any contracts procured by a System Strength Service Provider (SSSP). When information is available regarding the contract arrangements available from the SSSP, these would be included in system strength modelling.

⁵ The total number of days represents the sum of the days on which directions are forecast for individual regions. Directions could occur across multiple regions on the same day.

⁶ While it is unknown at the time of publishing, AEMO expects that this statement is also likely to apply for inertia contracts that a TNSP will develop in their role of inertia network service provider under the Amending Rule.

- AEMO’s last resort planning powers target periods where the inertia or system strength requirements are expected to change within a shorter time horizon than the TNSP’s normal planning period.
- These needs are determined for a rolling three-year window, where input assumption and modelling confidence levels will be higher.

For the reasons explained above, AEMO considers that a more conservative measure of uncertainty is warranted to identify inertia RSAS and system strength RSAS requirements.

4.2.3. AEMO’s conclusion

AEMO will amend the Procedure to use a three-sigma from the mean statistical measure when determining NSCAS needs for inertia RSAS and system strength RSAS.

4.3. Procedure improvement to capture ‘system typical’ network conditions not captured by the current Procedure

4.3.1. Issue summary and submissions

NSCAS studies under the current Procedure consider a ‘system normal’ configuration with all transmission network elements in service⁷. Because this rarely occurs in real time operation, however, NSCAS gap forecasts based on this assumption are likely to become increasingly less reliable.

AEMO proposed to define the concept of ‘system typical’ configuration for use in NSCAS studies to identify and quantify NSCAS needs and potential gaps. The proposed definition of ‘system typical’ was:

“network configurations where AEMO has identified credible or typical pre-contingent operational conditions without all network elements in service, and which present reasonably foreseeable additional challenges in maintaining power system security or reliability”.

Powerlink was supportive of the inclusion of the concept of ‘system typical’ but proposed additional considerations for the definition.

Tesla also supported this inclusion, with the proviso that grid-based inverters (GBIs) are accurately modelled and assessed, without being artificially and unfairly disadvantaged in the technical assessment relative to synchronous generators.

4.3.2. AEMO’s assessment

AEMO notes stakeholder support for this amendment, and agrees with Powerlink that TNSP engagement in assessing typical operating scenarios for their own network is important and valuable. AEMO therefore proposes to include the following additional details in the Procedure relating to ‘system typical’ studies:

⁷ Excluding elements that are out of service as part of the system normal configuration, for example to maintain system security.

AEMO will discuss proposed 'system typical' study assumptions with the local TNSP, and consider their feedback on evolving network considerations as the experts on their local network conditions.

AEMO also agrees with the principle expressed by Tesla that GBIs should be accurately modelled and assessed. AEMO confirms that where an inverter's ability to be grid forming affects the NSCAS study results, appropriate consideration will be given in the assessment, where such information is available. For new installations where information is not yet available, more generalised assumptions may be applied. This is consistent with the Procedure's modelling assumptions. AEMO notes that the NSCAS Report determines the NSCAS need in a technology neutral way, without identifying the solution capable of fulfilling this need.

4.3.3. AEMO's conclusion

AEMO will include 'system typical' studies in the Procedure, including additional information on how these configurations are defined based on **stakeholder feedback** received.

4.4. Procedure improvement to consider the impact of anticipated or actionable projects when screening NSCAS gaps

4.4.1. Issue summary and submissions

AEMO proposed to amend the Procedure to **explicitly allow consideration of expected but uncommitted network and generation changes**, where relevant and appropriate to adequately identify or quantify an emerging NSCAS gap. This could include considering the impact of anticipated and actionable projects, or the impact of generator connection and withdrawal timings.

Transgrid were supportive of this amendment, but noted concerns that the ability to address any advised shortfalls might be problematic if there are short timeframes attached. They encouraged AEMO to investigate ways to mitigate this risk.

4.4.2. AEMO's assessment

AEMO's proposal considered the inclusion of anticipated and actionable transmission projects⁸ and anticipated or Integrated System Plan (**ISP**) forecast generation in cases where this could represent the more onerous network conditions, with the NSCAS Report to indicate where these assumptions have been applied. AEMO's consultation paper included examples of where different assumptions would be applied.

By considering different scenarios, AEMO intends to consider plausible risks with different future operating scenarios. In doing this, AEMO considers that security needs could be identified earlier, assisting with the concern raised by Transgrid. By applying more conservative assumptions when considering transmission network and generation projects, AEMO expects to identify security risks earlier than if these projects were not considered in NSCAS studies. AEMO notes that NSCAS assessments are not intended to replace the detailed analysis conducted by TNSPs when planning and delivering on network projects.

⁸ Actionable transmission projects include both actionable ISP projects and projects that are actionable under a jurisdictional scheme.

4.4.3. AEMO's conclusion

AEMO proposes to amend the Procedure to provide for anticipated and actionable projects to be considered in NSCAS studies on a case by case basis where appropriate, with any applied assumptions to be noted in the relevant NSCAS Report.

5. Drafting improvements

The consultation paper indicated that some drafting improvements or corrections to the Procedure may be identified during this consultation. Stakeholders did not provide any feedback or suggestions for improvement of this nature.

In preparing draft amendments to address the matters discussed in Section 4, AEMO has noted that the Procedure would benefit from drafting updates and other minor changes to improve clarity and readability. These include:

- Expand the introductory scope and purpose to include a brief description of how the Procedure connects to NSCAS acquisition, and remove unnecessary application statements in Section 2.
- Revisions to minimise repetition of content in multiple parts of the Procedure.
- Update terminology to clarify references to sections of the Procedure and provisions of the NER.
- Remove NER-defined terms from the glossary table in the Procedure, and update the glossary to include missing acronyms used in the Procedure.
- Improve consistency of formatting for NER-defined terms.
- Update terminology where required to reflect any relevant NER amendments since the last version of the Procedure⁹.

AEMO's proposed minor amendments are included in the marked-up draft Procedure published with this draft report. For readability of the draft, most formatting changes are not marked up.

⁹ Including the *National Electricity Amendment (Integrating energy storage systems into the NEM) Rule 2021*.

6. Draft determination on proposal

Having considered the matters raised in submissions to the consultation paper, AEMO's draft determination is to amend the Procedure in the form published with this draft report, showing draft amendments from the current published Procedure in mark-up format.

AEMO's proposal meets the requirements in the Amending Rule to include descriptions and quantities of inertia and system strength services as NSCAS. AEMO considers that the proposed amendments are consistent with the NEO. The proposed process for quantifying these services will assist in maintaining power system security and reliability of supply through the energy transition by minimising the uncertainty and cost associated with potential increased reliance on operational intervention.

Effective date

AEMO's proposed effective date for the determination is 1 December 2024. This is the effective date of the Amending Rule.

Appendix A. Glossary

Term or acronym	Meaning
Actionable projects	Includes both actionable ISP projects and projects that are actionable under a jurisdictional scheme.
AEMC	Australian Energy Market Commission
Amending Rule	National Electricity Amendment (Improving security frameworks for the energy transition) Rule 2024
Anticipated projects	A project that is in the process of meeting at least three of the five committed project criteria. Generally, transmission projects will be classified as anticipated once they have passed a contingent project application or similar funding approval.
BESS	battery energy storage system
Committed projects	Committed project means a project that meets the following committed project criteria: <ul style="list-style-type: none"> the proponent has obtained all required planning consents, construction approvals and licenses, including completion and acceptance of any necessary environmental impact statement; construction has either commenced or a firm commencement date has been set; the proponent has purchased/settled/acquired land (or commenced legal proceedings to acquire land) for the purposes of construction; contracts for supply and construction of the major components of the necessary plant and equipment (such as generators, turbines, boilers, transmission towers, conductors, terminal station equipment) have been finalised and executed, including any provisions for cancellation payments; and the necessary financing arrangements, including any debt plans, have been finalised and contracts executed.
GBI	grid-based inverter/s
ISP	Integrated System Plan
NEM	National Electricity Market
NEO	National Electricity Objective as expressed in section 7 of the National Electricity Law
NER	National Electricity Rules
NSCAS	Network Support and Control Ancillary Service
NSP	Network Service Provider
Procedure	AEMO's NSCAS Description and Quantity Procedure
RIT-T	regulatory investment test for transmission
RSAS	reliability and security ancillary service, as defined in the Procedure
TNSP	Transmission Network Service Provider

Appendix B. List of submissions and AEMO responses

No.	Stakeholder	Issue/comment	AEMO response
1	EUAA	We are therefore also supportive of AEMO's proposal to add system strength and inertia to the Reliability and Security Ancillary Services (RSAS) section of the NSCAS procedure.	AEMO appreciates the support for this proposed amendment.
2	EUAA	However, we are concerned with AEMO taking this opportunity to also shift its modelling from one standard deviation (84th percentile) to 3 standard deviations (97th percentile) for NSCAS, system security RSAS and inertia RSAS without any evidence that this level of conservatism is necessary. If incorrect in its assumptions for this level of conservatism, AEMO risks over-procuring NSCAS and unnecessarily increasing costs for consumers, a direct breach of the National Energy Objective.	This issue is discussed in Section 4.2.
3	EUAA	Additionally, AEMO have not included any feedback loop to assure consumers that its conservative approach to NSCAS is both efficient and in the long-term interest of consumers. That is, an annual ex-post review of NSCAS procurement and actual NSCAS shortfalls that were filled using AEMO procured services in the NEM.	In the annual NSCAS Report, AEMO publishes a summary of any NSCAS contracts for the prior five years, including the size of the NSCAS gap, and annual cost of the contract. At the time of writing, AEMO has not used last-resort planning powers to enter into any NSCAS contracts over the past five-year period. AEMO also reports on the effectiveness of the dispatch of NSCAS at least yearly ¹⁰ .
4	Powerlink	Under the Efficient Management of System Strength on the Power System Rule, Powerlink is applying the Regulatory Investment Test for Transmission (RIT-T) to address system strength requirements in Queensland from December 2025. The Project Specification Consultation Report (p. 19) for the RIT-T states that Powerlink intends to plan for the annual availability of the (overall) preferred solution to meet system strength requirements 99% of the time. This approach aligns with AEMO's established practice for declaring shortfalls in system security services based on the 99th percentile of service availability. Powerlink is also required to respond to a declared inertia shortfall in Queensland of 1,660 megawatt seconds from 2027/28 (see AEMO 2023 Inertia Report, p. 3). AEMO proposes to increase the threshold for inertia (currently the 84th percentile) and system strength to the 99.7th percentile, and indicates this change would more efficiently meet the National Electricity Objective and the intent of the planning frameworks. Powerlink anticipates that the change would increase the magnitude and frequency of shortfall declarations and wonders how the anticipated costs and benefits to consumers of increasing the threshold, compare to directing to secure an additional service if and when required.	This issue is discussed in Section 4.2.
5	Powerlink	Powerlink acknowledges AEMO's concern that forecasting NSCAS gaps based on system normal configurations can be problematic given system normal rarely occurs in real time operation, and	AEMO agrees that historical availability may not always be an indicator of future operation. AEMO appreciates

¹⁰ In accordance with AEMO's SO_OP-3708 Non-Market Ancillary Services standard operating procedure, at https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/power_system_ops/procedures/so_op_3708-non-market-ancillary-services.pdf?la=en.

No.	Stakeholder	Issue/comment	AEMO response
		welcomes the definition of system typical to provide better representation of real time operation. In terms of the proposed definition of system typical, historical unavailability of critical plant may not always be an indicator of future operation. Powerlink recommend that AEMO seek advice from Transmission Network Service Providers (TNSPs) on typical plant availability and planned outages which may have an impact on system security. System typical will be challenging to forecast and Powerlink considers that TNSPs would have information that could help inform future system typical configurations; for example, high maintenance requirements for ageing assets leading to an increase in planned outages, or longer-term outages planned to facilitate conductor restringing and/or life extension works. We would welcome the opportunity to advise AEMO on anticipated system typical arrangements.	Powerlink's feedback and will provide further information in the Procedure on how AEMO sources and reviews items to be included under 'system typical' each year. AEMO agrees that external engagement with TNSPs as the experts in the condition of transmission assets in their region is an important part of defining specific 'system typical' studies.
6	Powerlink	When AEMO is considering whether an NSCAS gap exists, AEMO should consider what services are required to resecure the power system after a credible contingency from the system normal state (this is what Powerlink would consider as its planning obligation). This would provide a level of capacity whereby under a prior outage there would be sufficient services for at least the power system to fall to a satisfactory state following a credible contingency coincident with the prior outage. To resecure from here AEMO would need to direct. This would provide a level of coverage anticipated to be prudent under more typical system conditions.	AEMO agrees that considering resecuring the power system as part of NSCAS gap declaration and quantification is important. AEMO intends to approach this from two perspectives: looking at resecure risks directly as AEMO has under the existing Procedure, and by considering 'system typical' conditions which may capture known or long-duration prior outage conditions.
7	Powerlink	Powerlink also considers there should be alignment between the network assumptions made for the analysis done by the TNSP to determine the magnitude and timing of the investment/s, and the analysis by AEMO to identify any subsequent gaps. This extends to not only the assumptions regarding prior outage of transmission elements but also the confidence interval if a probabilistic approach is also employed when making the 'planning' investment decision.	AEMO agrees on the importance of aligning planning assumptions with TNSPs and will continue to collaborate with TNSPs on the inputs and assumptions for NSCAS studies. The intention is not to study network conditions or consider network assumptions that TNSPs could not apply under the existing planning framework.
8	Transgrid	We are broadly supportive of AEMO's recommendations in the consultation paper. We believe it incorporates the changes outlined by the National Electricity Amendment (Improving security frameworks for the energy transition) Rule 2024 (Amending Rule) published in March 2024. Specifically, we welcome: <ul style="list-style-type: none"> • The inclusion of inertia network services and system strength services in the definition of an 'NSCAS need' in specified circumstances. • The approach to use system typical cases as outlined in the consultation paper to recognise the impact of extended or more frequent outages of certain critical equipment. • The consideration of future investment as per the methodology described in the consultation paper. This will align the various planning methodologies across the industry. 	AEMO appreciates the support for the proposed amendments.
9	Transgrid	Transgrid supports AEMO's proposal to consider both committed and anticipated projects in their NSCAS assessments. However, we are concerned that the ability to address any advised shortfalls might be problematic if there are short timeframes attached to address a system security need. We would encourage AEMO to investigate ways to mitigate this risk.	AEMO notes the risk in delivery of projects in short timeframes can be challenging. AEMO's proposal considers anticipated and actionable projects where this represents the more onerous conditions, and will be transparent where these assumptions have been applied. By considering different scenarios, AEMO intends to consider plausible risks with different future operating

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			scenarios. This work is not intended to replace the detailed analysis conducted by TNSPs when planning and delivering on network projects.
	Transgrid	<p>It appears that the 'NSCAS need' is defined as a requirement to maintain only the minimum three phase fault level above the level that a TNSP is required to meet at the applicable time (i.e. the requirement does not relate to the 'efficient level' of system strength, required to achieve stable voltage waveforms of new inverter-based resources). Based on this, Transgrid encourages AEMO to provide clarity on the following:</p> <ul style="list-style-type: none"> In the case where an NSCAS gap is declared for system strength RSAS or Inertia RSAD, if the TNSP already has existing contracts in place to meet the efficient level requirements with system strength solutions that can contribute towards, and would meet, the revised minimum level requirements, it is not clear whether TNSPs are able to rely on the existing contracts to fulfil the declared NSCAS gap or whether they required to procure specific contracts for System strength RSAS. 	AEMO agrees that the NSCAS need is related to only the minimum three phase fault level, not the efficient level. If an existing contract to meet the efficient level of system strength is considered suitable by the TNSP to meet a revised minimum requirement, this could be proposed by the TNSP.
	Transgrid	<p>Subject to the success of the Rule Change request by AEMO to improve NEM access standards, Network Service Provider's (NSP) synchronous condensers will be required to be registered with AEMO and meet applicable technical standards. We would encourage AEMO to provide additional information on the treatment of registered synchronous condensers in NSCAS studies. In particular:</p> <ul style="list-style-type: none"> Are the NSP's registered synchronous condensers included or excluded from NSCAS studies, and if included, are they assumed to be in-service continuously? How are synchronous condensers that provide interregional contribution to fault level requirements (e.g. contribute towards requirements in both Vic and NSW) treated? 	<p>AEMO proposes that any new synchronous condensers, once they meet the criteria to be considered committed, would be included in NSCAS assessments. The availability assumptions would be discussed with the NSP to determine how these assets would be operated.</p> <p>AEMO's fault level assessments consider interregional fault level contributions, subject to any credible events which may separate services between regions.</p>
	Transgrid	<p>Table 1 (page 15 of the consultation paper) refers to voltage control as a distinct type of NSCAS study to system strength. However, the efficient level of system strength requirements defined by AEMO require voltage control to ensure a stable voltage waveform can be maintained at specified capacities of IBR. If a project has a voltage control issue, we encourage AEMO to specify how it would be treated under the NSCAS framework. We also encourage AEMO to specify whether this is included under the efficient level system strength requirements and therefore be excluded from NSCAS or if it is included as a voltage control component of NSCAS.</p>	<p>AEMO acknowledges Transgrid's concerns with the separation of system strength from voltage control. This distinction came from historical NSCAS assessments where pre- and post-contingent bus voltages were assessed against the region's relevant voltage control operating guide. These load flow studies are separate to specific voltage issues from generating plant. AEMO proposes that where a particular generating plant is not meeting its relevant performance standards, this could be included in 'system typical' type studies.</p>
	Tesla	<p>We support AEMO's proposed method for describing the additional NSCAS needs.</p>	<p>AEMO appreciates the support for this proposed amendment.</p>
	Tesla	<p>Regarding the move from 'system normal' to 'system typical', Tesla is supportive of this change within NSCAS studies, as long as grid-based inverters (GBI) are accurately modelled and assessed, without being artificially and unfairly disadvantaged in the technical assessment relative</p>	<p>AEMO agrees that where an inverter's ability to be grid forming affects the NSCAS study, appropriate consideration will be given, where information is available.</p>

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		to synchronous generators. Such barriers have been outlined in depth in our previous submissions, for instance, for the AEMC Rule Change for 'Efficient Provision of Inertia' (ERC0339).	For new installations where information is not yet available, more generalised assumptions may be applied.
	Tesla	<p>With regards to consideration for screening for NSCAS gaps, Tesla has concern with the following statement from AEMO: <i>“For inertia and system strength requirements, however, higher projected penetrations of inverter-based resources represent a more onerous condition as they tend to displace synchronous generation and lower the projected levels of inertia or system strength in the system.</i></p> <p>While Tesla acknowledges that inverter-based VRE will displace synchronous generation and consequently inertia and system strength, there have been advancements in battery-technology that will support mitigating this change. Nearly all of the BESS that are in the process of coming online the NEM have grid-forming capabilities, whereas previously most BESS were grid-following. These incoming grid-forming assets will provide inertia and system strength to support greater VRE penetration in the system.</p>	<p>AEMO acknowledges Tesla’s concerns with the noted statement. The framing of increasing levels of inverter based resources should change based on technological advances as noted by Tesla. AEMO will need to consider the differing impacts of different inverter technologies. This is in terms of displacing existing generation sources, changing flow patterns through energy arbitrage, and providing new sources of system security services in some cases.</p>
	Tesla	<p>Tesla notes that grid-following BESS currently operating in the NEM can, and are, being converted into gridforming BESS through a 5.3.9 process, with the Victoria Big Battery (300MW / 450 MWh) one prime example – both through support of ARENA funding and independently. These conversions are currently excluded under AEMO’s proposal of reviewing upcoming committed and actionable projects in table 1 of the consultation. Consequently, Tesla recommends AEMO expands their consideration of expected augmentation inclusion assumptions to identify potential NSCAS reports.</p>	<p>AEMO will consider committed and anticipated projects in NSCAS assessments as described in Section 4.4. As noted by Tesla, some battery energy storage systems (BESS) are being converted through a NER 5.3.9 process, however AEMO proposes to consider these changes aligned with other generation projects which are included for system strength and inertia studies when they reach anticipated status. AEMO considers this would be when a conversion project receives 5.3.9 approval.</p>

Table 1: Amendments to the NSCAS Description and Quantity Procedure – feedback from ElectraNet

No.	Stakeholder	Issue / comment	AEMO response
1	ElectraNet	System Strength and Inertia are different to entities usually included in the NSCAS. The stable voltage waveform is supported by controls within GFM plants, Physics of Synchronous machines and Fault Level at the node. Inertia is supported by Physics of Synchronous machines and fine controls of GFM plants but not by the Fault Level. Which of these components are quantifiable within the NSCAS?	
2	ElectraNet	Referring to page 11 of the Amendments, Synchronous Condenser outage may exceed 1%. Therefore, assuming a 99.87% reliability (ie. 9~11 hours of loss per year) may not be realistic. In order to achieve 99.87% availability the cost increase may be significant too.	
3	ElectraNet	Referring to page 14 of the Amendments, Special large loads such as Hydrogen Electrolysers need accurate modelling when it comes to NSCAS assessment studies.	
4	ElectraNet	The Amendments implies considering only the fault current as a NSCAS measure for system strength; however, actual need of the TNSP may be the stable voltage waveform (SVW). In such a situation can the NSCAS measure be applicable to system strength at efficient level (SVW)?	
5			