NETWORK SUPPORT AND CONTROL ANCILLARY SERVICE (NSCAS) DESCRIPTION AND QUANTITY PROCEDURE REVIEW

DRAFT REPORT AND DETERMINATION

Published: **August 2020**

NOTICE OF SECOND STAGE CONSULTATION – NETWORK SUPPORT AND CONTROL ANCILLARY SERVICES (NSCAS) DESCRIPTION AND QUANTITY PROCEDURE

National Electricity Rules – Rule 8.9

Date of Notice: 4 August 2020

This notice informs all Registered Participants and interested parties (Consulted Persons) that AEMO is commencing the second stage of its consultation on the NSCAS description and quantity procedure.

This consultation is being conducted under clause 5.20.2 of the National Electricity Rules (NER), in accordance with the Rules consultation requirements detailed in rule 8.9 of the NER.

Invitation to make Submissions

AEMO invites written submissions on this Draft Report and Determination (Draft Report). AEMO also welcomes submissions on the proposed updates to the NSCAS description and the NSCAS quantity procedure (Attachment 1) including any alternative or additional proposals you consider may improve the documents.

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.

Consulted Persons should note that material identified as confidential may be given less weight in the decision-making process than material that is published.

Meetings

In your submission, you may request a meeting with AEMO to discuss the matter under consultation, stating why you consider a meeting is necessary or desirable.

If appropriate, meetings may be held jointly with other Consulted Persons. Subject to confidentiality restrictions, AEMO will generally make details of matters discussed at a meeting available to other Consulted Persons, and may publish them.

Closing Date and Time

Submissions in response to this Notice of Second Stage of Rules Consultation should be sent by email to planning@aemo.com.au, to reach AEMO by 5.00pm (AEST) on 18 August 2020.

All submissions must be forwarded in electronic format (both pdf and Word). Please send any queries about this consultation to the same email address.

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.

Publication

All submissions will be published on AEMO's website, other than confidential content.

EXECUTIVE SUMMARY

The publication of this Draft Report and Determination (Draft Report) commences the second stage of the Rules consultation process conducted by AEMO on the Network Support and Control Ancillary Service (NSCAS) description and NSCAS quantity procedure under the National Electricity Rules (NER).

In the Issues Paper released on 1 June 2020 for the first stage of the consultation, AEMO proposed changes to make the NSCAS description and quantity procedure more adaptive and flexible, to allow AEMO to respond to the changing needs of the power system. Key changes proposed were:

- Changing the definition of NSCAS types, from three types based on electrical phenomena, to two types based on the need they primarily address.
- Allowing assessments of system security to consider whether the system can be returned to a secure operating state within 30 minutes of a credible contingency or protected event.
- Allowing flexibility in how constraints inhibiting net economic benefit are chosen for investigation.
- Replacing prescriptive modelling and methodological assumptions with high level modelling principles.

AEMO received three submissions in response to the Issues Paper. The submissions were generally supportive of the proposed amendments, although some concerns were raised, some support was conditional, and some additional recommendations were made. Table 1 summarises AEMO's response to the key issues raised in the submissions.

Table 1 AEMO response to key issues raised in submissions on the Issues Paper

NSCAS description limitations	
Issue and AEMO proposal	The existing NSCAS types are not flexible enough to address emerging novel system security and reliability issues in the rapidly transforming power system. AEMO proposes to amend the NSCAS types, classifying each type according to the NSCAS need addressed.
Submissions	Two of three submissions supported AEMO's proposed changes to the NSCAS types, with one recommending AEMO support, where considered appropriate by market participants, the development of market-based solutions for the required services. One submission opposed changing the definition of the NSCAS types before the Energy Security Board (ESB) and Australian Energy Market Commission (AEMC) system services workstreams have been completed and their findings considered.
Assessment and outcome	To address NSCAS gaps promptly, whilst addressing emerging issues, changes to the NSCAS types need to be implemented before the 2020 NSCAS review. Consideration of market-based solutions is expected to be considered as part of the Energy Security Board (ESB) Post 2025 Market Design review, to which AEMO is contributing, rather than in the NSCAS description and NSCAS quantity procedure. AEMO will reassess, where necessary, the NSCAS description and NSCAS quantity procedure in light of the findings from that review. AEMO proposes to amend the NSCAS types according to the need addressed.
Catering for system security	
Issue and AEMO proposal	The current NSCAS quantity procedure considers only single credible contingencies when assessing system security. AEMO proposes to include the ability to restore the network to a secure state within 30 minutes following a credible contingency in the assessment.
Submissions	No submissions opposed AEMO's proposal.
Assessment and Outcome	Including the ability to restore the system to a secure operating state within 30 minutes of a single credible contingency will assist AEMO to meet its power system security obligations under NER 4.2.6. AEMO will amend the NSCAS quantity procedure to consider the ability to restore the network to a secure state within 30 minutes following a credible contingency or protected event.

Limitations in the assessment of binding constraints	
Issue and AEMO proposal	The current NSCAS quantity procedure restricts AEMO's assessment to the top 10 historically binding system normal constraints. AEMO proposes to allow for flexibility in the methodology such that any appropriate analysis, historical or forward-looking, can be used to identify any constraints inhibiting economic benefit.
Submissions	No submissions opposed AEMO's proposal. One submission's support was conditional on AEMO determining a methodology aligning with the Australian Energy Regulators (AER) Best Forecast Practice Guideline and Cost Benefit Analysis Guideline, to be included in the appendix of the procedures. One submission suggested that AEMO also seek market participant input with regards to their views of potential NSCAS gaps.
Assessment and outcome	A prescriptive methodology risks leaving some constraints outside defined assessment processes. AEMO will amend the NSCAS quantity procedure to allow for flexibility in the methodology to allow AEMO to use any appropriate analysis, historical or forward-looking. Market participants may have insights into potential NSCAS gaps unknown to AEMO that should be considered. AEMO will create a mechanism whereby market participants can recommend network issues or constraints for AEMO to consider in an annual NSCAS review.
Detailed modelling assumptions	
Issue and AEMO proposal	The prescriptive modelling methodology and assumption descriptions recorded in the current NSCAS quantity procedure limit the flexibility of investigations. AEMO propose to remove the prescriptive modelling methodology and assumption descriptions and replace them with high-level modelling principles. Detailed assumptions and methodology used can then be included in the NSCAS Report.
Submissions	Two of three submissions supported AEMO's proposal, but with further recommendations: 1. One submission recommended AEMO discuss and agree assumptions with the local TNSP. 2. One submission's support was conditional on AEMO providing details of the modelling assumptions coupled with an opportunity for Participants to challenge or seek further information on the modelling assumptions. One of the submissions opposed the proposal and recommended a specific and detailed methodology document be developed for the NSCAS requirements.
Assessment and outcome	AEMO accepts that transparency of how assessments will be conducted is valuable. However, this needs to be weighed against maintaining flexibility such that a wide range of varying and difficult to predict scenarios can be analysed without falling outside prescriptive methodological descriptions. TNSPs have valuable network knowledge that should inform AEMO's assumptions. AEMO will continue to consult with the TSNPs during the NSCAS review and will include study assumptions for discussion. AEMO will provide a mechanism for the participants to seek further information on the inputs and assumptions.

After considering the submissions received, AEMO's draft determination is to amend the NSCAS description and the NSCAS quantity procedure in the form published with this Draft Report and Determination.

CONTENTS

1. STAKEHOLDER CONSULTATION PROCESS

As required by clause 5.20.2 of the NER, AEMO is consulting on the NSCAS description and NSCAS quantity procedure in accordance with the Rules consultation process in rule 8.9.

AEMO's indicative timeline for this consultation is outlined below. Future dates may be adjusted depending on the number and complexity of issues raised in submissions.

Deliverable	Indicative date
Notice of first stage consultation [and Issues Paper] published	1 June 2020
First stage submissions closed	7 July 2020
Draft Report & Notice of second stage consultation published	4 August 2020
Submissions due on Draft Report	18 August 2020
Final Report published	30 September 2020

The publication of this Draft Report marks the commencement of the second stage of consultation.

Note that there is a glossary of terms used in this Draft Report at **Appendix A**.

2. BACKGROUND

2.1. NER requirements

AEMO is responsible for managing power system security and reliability of supply in the National Electricity Market (NEM). The NSCAS framework is one of the last-resort tools in place for AEMO to manage power system security and reliability of supply, and is part of the broader joint system planning process between AEMO and TNSPs who are Jurisdictional Planning Bodies.

NSCAS are non-market ancillary services acquired to control active and reactive power flow into or out of an electricity transmission network to address an NSCAS need[1]. An NSCAS need is NSCAS required to:

- Maintain power system security and reliability of supply of the transmission network in accordance with the power system security standards and the reliability standard[2]; and
- Maintain or increase power transfer capability of the transmission network to maximise the present value of net economic benefit to all those who produce, consume or transport electricity in the market[3].

AEMO is required to develop and publish an NSCAS description[4] providing a detailed description of each type of NSCAS, and an NSCAS quantity procedure[5] explaining the determination of the location and quantity of each type of NSCAS required. AEMO may amend the NSCAS description and quantity procedure. When amending the NSCAS description and/or the NSCAS quantity procedure AEMO must comply with the NER consultation procedures[6].

[1] The NSCAS definition is in the Chapter 10 Glossary of the NER Version 144.
[2] *NSCAS need* definition, Chapter 10 glossary, NER Version 144. The *NSCAS need* definition specifically excludes an *inertia network service* to address an *inertia shortfall* and a *system strength service* to address a *fault level shortfall*
[3] *NSCAS need* definition, Chapter 10 glossary, NER Version 144. The *NSCAS need* definition specifically excludes an *inertia network service* to address an *inertia shortfall* and a *system strength service* to address a *fault level shortfall*
[4] AEMO. Network Support and Control Ancillary Service (NSCAS) description, published December 2011, at https://aemo.com.au/-/media/files/pdf/0160-0102-pdf.pdf
[5] AEMO. Network Support and Control Ancillary Service (NSCAS) Quantity Procedure, published December 2011, at https://aemo.com.au/-/media/files/pdf/nscas_quantity_procedure.pdf.
[6] Except for minor and administrative amendments (NER clause 5.20.2(d).)).

Annually, AEMO must also publish an assessment of any NSCAS gaps in the coming five-year period, and a summary of any NSCAS it has procured in the previous year[7]. An NSCAS gap is defined as any NSCAS need that AEMO forecasts will arise at any time within a planning horizon of at least five years.

When AEMO declares an NSCAS gap, it may ask the relevant TNSP when it will have arrangements in place to address the gap, via connection agreements or network support agreements. In cases where AEMO does not consider that an NSCAS gap will be met, where the gap relates to preventing an adverse impact on power system security and reliability of supply of the transmission network, AEMO may use reasonable endeavours to acquire the necessary NSCAS itself via an ancillary services agreement.

2.2. Context for this consultation

Since the 2011 release of the current NSCAS description and NSCAS quantity procedure, the NEM has undergone a significant transformation. The power system is transitioning from being dominated by large thermal power stations to including a multitude of generation sources and technologies of various sizes. Customer demand profiles have also changed rapidly, primarily driven by the introduction of significant distributed energy resources, predominantly distributed solar photovoltaic (PV) systems.

The changing nature of the NEM power system is explored in detail in AEMO's recently published Renewable Integration Study (RIS) report[8]. The report demonstrated the potential for significant change in the NEM over the coming five years, highlighting the need for flexible market and regulatory frameworks that can adapt swiftly and effectively as the power system evolves.

Three known trends in the changing system have the potential to affect the type and way in which NSCAS will be required in the coming years:

- Fewer synchronous machines online and more inverter-based resources online.
- Increasing variability and uncertainty in the NEM.
- Increasing decentralised generation, particularly growth in distributed PV systems.

As the power system's transition continues, additional trends may become evident.

AEMO considers that the known trends, and the potential for additional trends in future, highlight that NSCAS procedures must be adaptive and flexible to allow AEMO to respond to the changing needs of the power system.

2.3. First stage consultation

AEMO issued a Notice of First Stage Consultation on 1 June 2020, and published an Issues Paper for the NSCAS Consultation. This information is available on AEMO's website[9]. The Issues Paper provided detail on AEMO's review of the NSCAS description and quantity procedure. The purpose of this review is to:

1. Develop the NSCAS description such that it fulfils the NER requirement to be a "detailed description of each type" of NSCAS, while still being flexible enough to allow NSCAS to be used to address emerging challenges.
2. Develop the NSCAS quantity procedure such that it meets the NER requirement to specify how the location and quantity of NSCAS required will be determined, while allowing investigation of a variety of relevant and localised challenges.

[7] NER 5.20.3.

[8] See AEMO's Renewable Integration Study Stage 1 Report, April 2020, at https://www.aemo.com.au/energy-systems/Major-publications/Renewable-Integration-Study-RIS.

[9] See AEMO's current consultation on Network Support and Control Ancillary Services Description and Quantity Procedure Amendment, June 2020, at https://aemo.com.au/consultations/current-and-closed-consultations/network-support-and-control-ancillary-services-description-and-quantity-procedure-amendments.

In the Issues Paper, AEMO sought views on its proposals to amend the NSCAS description and the NSCAS quantity procedure. The current arrangements and proposed amendments are summarised in Table 2.

Table 2 Proposed changes to NSCAS description and quantity procedure from NSCAS Issues Paper

	Summary of existing restrictions and proposed amendments
NSCAS Types	Current: NSCAS types are classified according to electrical phenomena Proposal: Classify NSCAS types according to which of the two NSCAS needs the service would primarily address: • System Security and Reliability Ancillary Service - a non-market ancillary service primarily procured in order to assist AEMO to operate the NEM within the System Security and Reliability Standards. This service will exclude any services excluded by the rules that have existing frameworks. • Constraints Alleviation through Net Market Benefits Ancillary Service - a non-market ancillary service primarily acquired to increase the power transfer capability of the transmission network, to maximise the present value of net economic benefit to all those who produce, consume or transport electricity in the market. The identification of top binding current and/or projected top binding future constraints would be assessed to determine if there is an identified need to alleviate these constraints.
System security and reliability assessment assumptions	Current: Assess NSCAS needs under system normal plus a credible contingency for the next five years. Proposal: Include in the assessment the ability to restore the network to a secure state within 30 minutes following a credible contingency.
Increase power transfer capability methodology	Current: Assess the net economic benefit of alleviating the top 10 historically binding system normal constraints. Proposal: Allow for flexibility in the methodology such that any appropriate analysis, historical or forward-looking, can be used to determine any constraints inhibiting net economic benefit.
Modelling assumptions	Remove the prescriptive modelling assumptions in the NSCAS Schedule 1 and replace them with high-level modelling principles. Any detailed assumptions can then be included in the annual NSCAS review.

AEMO received **three** written submissions in the first stage of consultation. Copies of all written submissions have been published on AEMO's website at: https://aemo.com.au/en/consultations/current-and-closed-consultations/network-support-and-control-ancillary-services-description-and-quantity-procedure-amendments.

3. SUMMARY OF MATERIAL ISSUES

The key material issues arising from the proposal and raised by Consulted Persons are summarised in the following table:

No.	Issue	Raised by
1.	NSCAS description limitations	AEMO
2.	Catering for system security	AEMO
3.	Limitations in the assessment of binding constraints	AEMO
4.	Detailed modelling assumptions	AEMO

AEMO received three written submissions from stakeholders. The written submissions were from:

- CS Energy
- ERM Power
- Powerlink.

AEMO would like to thank all stakeholders who provided feedback throughout this process. A detailed summary of issues raised by Consulted Persons in submissions, together with AEMO's responses, is contained in **Appendix B**.

4. DISCUSSION OF MATERIAL ISSUES

This section discusses the material issues raised, along with AEMO's considerations and conclusions. Appendix B summarises all issues raised.

4.1. NSCAS description limitations

4.1.1. Issue summary and submissions

AEMO considers that the existing NSCAS description is not flexible enough to encompass the variety of services that may be needed to deliver a secure and reliable power system in the context of declining minimum demand, changing generation operation, increasing penetration of inverter-based resources, or other as yet unforeseen changes in the rapidly transforming power system. AEMO considers that amending the NSCAS type and description may address this issue. AEMO proposed two options for the classification of the NSCAS types:

- Option 1: Keep the current NSCAS types which are classified according to physical services it provides. These services address network loading, voltage control and transient and oscillatory stability.
- Option 2: Amend the NSCAS types, classifying each type according to the need addressed:
  - maintaining power system security and reliability in accordance with the power system security standards and the reliability standard, and
  - increase power transfer capability of the transmission network to maximise the present value of net economic benefit to all those who produce, consume or transport electricity in the market.

AEMO proposed to adopt Option 2 – to classify the NSCAS types according to the needs they address. AEMO's proposal to adopt Option 2 above was supported by ERM Power and Powerlink. However, ERM Power also suggested that many of the services could equally be supplied by real time or close to real time markets or via traditional longer duration NSCAS contracts.

ERM Power stipulated that it would, for some services, support the development of interim NSCAS contracts to meet emerging power system needs on a short term basis. However, it cautioned that any interim arrangements should not lead to a delay in the development of potentially superior arrangements such as real time markets for the provisions of these services.

ERM Power recommended that AEMO should set out details with regards to this in the NSCAS description and quantity procedures, in particular that AEMO will support, where considered appropriate by market participants, the development of market-based solutions for the required services.

CS Energy stated that it recognises the changing context for the NSCAS framework but remains unconvinced the changes justify a change to the NSCAS description at this stage. CS Energy raised concerns that AEMO's proposal does not consider the Energy Security Board (ESB) and (Australian Energy Market Commission) AEMC system services workstreams. CS Energy suggested that AEMO consider a change to the NSCAS description following the completion of these workstreams. CS Energy also raised the possibility of conflicting outcomes arising on the appropriate pricing mechanisms for the provision of the system services through real time markets.

4.1.2. AEMO's assessment

Adopting option 2 will make the NSCAS types independent of the electrical phenomena being addressed. This will remove the risk that an unforeseen issue will arise that cannot be addressed via the NSCAS framework because either the phenomenon itself or a new type of solution does not fit within the existing defined NSCAS types.

To address any NSCAS gaps promptly, whilst addressing emerging issues, AEMO considers that the changes to the NSCAS types in the NSCAS description need to be implemented before the next 2020 NSCAS review. AEMO believes that these changes cannot wait until the Post 2025 Market Design is implemented or the conclusion of the AEMC system services workstreams. Following the conclusions of the work currently undertaken by the ESB and the AEMC, AEMO will reassess where necessary the NSCAS description and quantity procedure. If any of the market services are found to be conflicting within these NSCAS procedures, AEMO will update and adapt the procedures as deemed necessary, through the consultation process.

AEMO's proposal to change the NSCAS types is expected to assist with meeting the National Electricity Objective, specifically with regard to:

> *"efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to… the reliability, safety and security of the national electricity system."*[10]

It will contribute to this objective by ensuring that emerging phenomena that cause network issues or novel solutions to issues can be considered under the NSCAS framework, unless they are explicitly excluded and managed under other frameworks.

Regarding ERM Power's recommendation that AEMO support, where appropriate, the development of market-based solutions for the required services, consideration of market based solutions will be considered via the ESB Post 2025 Market Design review, rather than in the NSCAS description or NSCAS quantity procedure.

4.1.3. AEMO's conclusion

AEMO has determined to adopt the option 2 proposal, with a name change. The name change does not change the concept or meaning but better represents the description. The two NSCAS types are classified below. Please refer to the draft NSCAS description and quantity procedure in Attachment 1 for more details:

- **Reliability and Security Ancillary Service (RSAS)**

  RSAS is a non-market ancillary service procured in order to assist AEMO to operate the NEM within the System Security and Reliability Standards. This service will exclude any services that have been excluded by the rules that have existing frameworks.

- **Market Benefit Ancillary Service (MBAS)**

  MBAS is a non-market ancillary service procured to increase the power transfer capability of the transmission network, to maximise the present value of net economic benefit to all those who produce, consume or transport electricity in the market.

[10] AEMC, National Electricity Objective, available at https://www.aemc.gov.au/regulation/regulation

4.2. Catering for system security

4.2.1. Issue summary and submissions

The current NSCAS quantity procedure restricts the NSCAS assessment to simulating only a single credible contingency occurring on the network starting from a system normal configuration (all transmission elements in service, no prior outages)[11].

In the NSCAS description and quantity procedure amendments issues paper[12] AEMO proposed to expand this assessment, to also assess the ability to restore the system to a secure operating state within 30 minutes of a single credible contingency. That is, to consider if 30 minutes after the first event, following a second credible contingency the network would remain in a satisfactory operating state.

AEMO is obliged under NER 4.2.6 to take all reasonable actions to operate the power system in a secure operating state and following a contingency to return the power system to a secure operating state as soon as practicable, and at most within 30 minutes. The intent of AEMO's proposal is to allow NSCAS to be procured to help fulfil this obligation if necessary.

AEMO is finding it increasingly difficult to return the system to a secure state following a contingency event, and AEMO and TNSPs are increasingly operating the transmission network closer to the network limits in real time. There are inherent risks associated with this situation.

If AEMO is unable to return the power system to a secure operating state using standard operational tools, it must intervene in NEM dispatch (for example via directions) or allow the power system to not be operated in a secure operating state for longer periods. The longer the power system is not being operated in a secure operating state, the greater the risk that a contingency will occur that will push the system outside of acceptable technical limits risking load shedding, equipment damage, equipment malfunction or physical injuries.

No submissions opposed AEMO's proposal. ERM Power and CS Energy supported the proposal, Powerlink made no comment on it.

4.2.2. AEMO's assessment

Expansion of the NSCAS assessment to also assess the ability to restore the system to a secure operating state within 30 minutes of a single credible contingency will assist AEMO to meet its power system security obligations under NER 4.2.6. It will allow NSCAS to be procured to help fulfil this obligation if necessary.

Without change, NSCAS will only be able to be procured for system security in so far as it will assist the system to be operated in a secure operating state while in a system normal configuration. If AEMO is aware of scenarios for which it would not be able to return the system to a secure operating state within 30 minutes, it will have no tools to address this other than intervening in NEM dispatch, and at times even such interventions are likely to prove inadequate.

AEMO's obligations under 4.2.6 extend to returning the power system to a secure operating state within 30 minutes "following a contingency event (whether or not a credible contingency event) or a significant change in power system conditions". The obligation does not exclude consideration of prior transmission outages.

However, AEMO considers it impractical that NSCAS should be procured to cover any non-credible contingency event or any number of prior transmission outages as these can be unlimited in scale. Therefore, AEMO's proposal limits the expansion of the assessment to consider restoration of system

[11] AEMO. Network Support and Control Ancillary Service (NSCAS) Quantity Procedure, p14, published December 2011, at https://aemo.com.au/-/media/files/pdf/nscas_quantity_procedure.pdf.

[12] AEMO, Network Support and Control Ancillary Services description and quantity procedure amendments issues paper, at https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2020/ncas/2020-nscas-description-and-quantity-procedure-amendments-issues-paper.pdf?la=en

security following a credible contingency event. The same logic would apply to protected events, in that they are treated similarly to credible contingency events in an operational sense, and therefore they should be considered also. It is also practical to consider the starting point for the assessment to be the network in a system normal configuration with all transmission network elements in service[13].

AEMO's proposal is expected to assist with meeting the National Electricity Objective, specifically with regard to:

> *"efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to .. the reliability, safety and security of the national electricity system."*[14]

The proposal will achieve this firstly by reducing the use of directions to restore the power system to a secure operating state, which is an inefficient use of assets in that it forces assets (usually generating units or batteries) to operate in a manner inconsistent with their market availability bids. Secondly, it will increase the reliability, safety and security of the system by reducing the length of periods that the system is not operated in a secure operating state.

4.2.3. AEMO's conclusion

AEMO will amend the NSCAS description and NSCAS quantity procedure to also assess the ability to restore the system to a secure operating state within 30 minutes of a single credible contingency or protected event. The starting point of the assessment will be the network in a system normal configuration with all transmission network elements in service.

4.3. Limitations in the assessment of binding constraints

4.3.1. Issue summary and submissions

The current NSCAS quantity procedure prescribes the manner in which a list of constraints is chosen to investigate if mitigation of the constraints would maximise the present value of net economic benefit to all who produce, consume or transport electricity in the market. It states that the constraints should be chosen from at least the top 10 binding system normal constraint equations during the previous financial year.

AEMO considers that this unnecessarily limits opportunities to investigate other constraints that may be as worthy or better candidates for assessment. Firstly, because the power system is rapidly changing, historical binding information may be an inaccurate indicator of future binding levels over the NSCAS planning horizon. Secondly, because there may be prior outage constraints that could yield greater net economic benefits if mitigated.

AEMO proposes to amend the quantity procedure such that any relevant constraint can be considered for assessment. This would allow prior outage constraints to be considered, and for AEMO to choose constraints based on forward looking projections of constraint binding rather than based on historical binding alone. Forward looking projections may consider future changes to the power system expected within the NSCAS planning horizon (including, but not limited to, new infrastructure such as planned transmission network augmentations, committed and anticipated development of VRE, and reactive plant, and control schemes).

No submissions opposed AEMO's proposal. CS Energy was supportive of the proposal. Powerlink did not specifically comment on the proposal. ERM Power was supportive of the proposal, however:

> *"this support is conditional on AEMO detailing the methodology for such assessment and that the relevant methodology for such assessment be included as an appendix to the NSCAS description and quantity procedures. Support is also conditional on the development of this methodology in*

[13] Excluding elements that are out of service as part of the system normal configuration, for example to maintain system security.
[14] AEMC, National Electricity Objection, available at https://www.aemc.gov.au/regulation/regulation

accordance with the Australian Energy Regulator's (AER) Best Forecast Practice Guideline and Cost Benefit Analysis Guideline."

In addition, ERM Power suggested that AEMO also seek market participant input with regards to their views of potential NSCAS gaps. This suggestion was made regarding the NSCAS review in general, but is particularly relevant to how AEMO should choose which constraints to assess.

4.3.2. AEMO's assessment

AEMO's proposal will remove arbitrary barriers to particular constraints being chosen for investigation in an NSCAS review. It will also allow AEMO to consider the best information available when judging which constraints to investigate (including forward looking projections), rather than relying on historical information alone. This will lead to a more efficient application of AEMO's finite analysis resources to constraints with the best likelihood of maximising net economic benefits, rather than analysis resources being allocated mechanically to particular constraints based on binding levels in the previous financial year.

One source of information could be suggestions from market participants, as recommended by ERM Power. Market participants may have insights into opportunities for constraint mitigation unknown to AEMO that should be considered.

This in turn will maximise the probability of AEMO identifying the best opportunities to mitigate constraints to maximise net economic benefits, and is expected to contribute to the achievement of the National Electricity Objective, specifically:

"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"

Regarding ERM Power's recommendation to detail a methodology for this process in an Appendix, AEMO accepts that transparency of how assessments will be conducted is valuable. However, this needs to be weighed against maintaining flexibility such that a wide range of varying and difficult to predict scenarios can be analysed without falling outside prescriptive methodological descriptions.

This is particularly the case in relation to benefit analysis, where it is important to ensure that the resources allocated to the benefit analysis are proportionate to the value of potential economic benefits. An overly detailed and prescriptive methodology risks leaving some constraints outside defined assessment processes and therefore outside consideration, or risks having benefit analysis that consumes a material portion of the potential economic benefits of constraint alleviation.

4.3.3. AEMO's conclusion

AEMO will amend the NSCAS quantity procedure such that any relevant constraint can be considered for assessment to determine whether alleviation of the constraint will maximise the present value of net economic benefits to all who produce, consume or transport electricity in the market.

The amendments will provide examples of sources of information AEMO will consult to determine which constraints to investigate.

The amendments will create a mechanism whereby market participants can recommend network issues or constraints for AEMO to consider in an annual NSCAS review.

The amendments will include a description of factors AEMO may consider in assessing constraints and conducting a benefit analysis of constraint alleviation. It will be as comprehensive as possible without forming a prescriptive methodology that limits AEMO's flexibility to tailor studies as needed on a case by case basis.

4.4. Detailed modelling assumptions

4.4.1. Issue summary and submissions

The current quantity procedure is specific about exact planning assumptions AEMO should make when determining NSCAS needs each year. These specifications are outdated, given the significant market and power system changes since the procedure was released in 2011. AEMO proposes removing the prescriptive modelling specification for the NSCAS studies – that is, Schedule 1 of the current NSCAS quantity procedure[15] – and instead proposes including a set of higher-level modelling principles which will guide industry on the nature of the analysis.

Powerlink agreed that the exact planning assumptions contained in the quantity procedure are no longer appropriate for the rapidly changing power system. Powerlink was supportive of the concept of flexibility in the modelling assumptions. Powerlink stipulated that it is important that such assumptions align with the planning criteria used by the TNSPs that may be required to ultimately deliver a lower cost network or non-network solution (via a RIT-T) as a result of the declared NSCAS gap. Powerlink supported the removal of detailed assumptions from the quantity procedure but recommended that all assumptions be discussed and agreed with TNSPs during the NSCAS review process.

CS Energy supported AEMO's proposal to adopt high-level modelling principles on the condition that AEMO provide details of the modelling assumptions coupled with an opportunity for Participants to challenge or seek further information on the modelling assumptions. CS Energy noted that AEMO proposes to include any detailed assumptions in the annual NSCAS review.

ERM did not support AEMO's proposal to include high-level modelling principles. They recommend a specific and detailed methodology document be developed for the NSCAS requirements.

4.4.2. AEMO's assessment

The power system is changing rapidly. Detailed study assumptions and methodologies appropriate for today's network may not be appropriate into the near future.

AEMO accepts that transparency of how assessments will be conducted is valuable. However, this needs to be weighed against maintaining flexibility such that a wide range of varying and difficult to predict scenarios can be analysed without falling outside prescriptive methodological descriptions. Without this flexibility it is inevitable that a network issue will arise or a novel solution will become available that cannot be addressed under the NSCAS framework because it does not quite fit within the prescribed assumptions and methodology.

Allowing AEMO the flexibility to adjust study assumptions and methodologies according to the best information available would enhance AEMO's ability to identify potential NSCAS gaps to ensure that AEMO has the resources or services to maintain the system in, or restore the system to, a secure operating state[16].

To contribute to the goal of transparency as much as possible AEMO will, where necessary, publish descriptions of any relevant assumptions and methodologies used in the NSCAS review. AEMO will publish this information at the time of publication of the NSCAS Report (for example as an appendix) or as soon as practicable thereafter. Contact details will be provided for if market participants require any further information than what is included in the NSCAS report.

Due to time constraints on preparing an annual NSCAS review, AEMO considers that it would not be possible to consult market participants on all inputs for the NSCAS review. AEMO will however continue to consult with the TNSPs during the NSCAS review. To address Powerlink's concerns, AEMO will include discussions on the NSCAS assumptions and methodologies in this process.

[15] AEMO. Network Support and Control Ancillary Service (NSCAS) Quantity Procedure, p14, published December 2011, at https://aemo.com.au/-/media/files/pdf/nscas_quantity_procedure.pdf.

[16] NER 4.2.6 General principles for maintaining power system security

4.4.3. AEMO's conclusion

AEMO will include high level modelling principles in the NSCAS quantity procedure.

AEMO will consult with TNSPs during the NSCAS review, including discussing detailed study assumptions and methodologies to ensure that the most appropriate inputs are used.

A description of the specific methodology followed, and the assumptions applied in the calculation of any declared *NSCAS gap* will be provided to the local TNSP at the time of publication of the *NSCAS Report* or as soon as practicable thereafter. This may also include relevant study files and models to the extent necessary and consistent with AEMO's confidentiality obligations.

AEMO where necessary, will publish descriptions of any relevant assumptions and methodologies used in the NSCAS review. AEMO will publish this information at the time of publication of the NSCAS Report (for example as an appendix) or as soon as practicable thereafter.

The *NSCAS report* will include contact information whereby market participants may request more detailed information regarding study assumptions and methodologies, beyond what is published in the *NSCAS report*.

5. OTHER MATTERS

Previously, the NSCAS description and the NSCAS quantity procedure have been published as separate documents. AEMO are now combining them into a single document for simplicity and convenience. AEMO is publishing the draft NSCAS description and NSCAS quantity procedure as Attachment 1 to this Draft Report and in alignment with the matters discussed above.

6. DRAFT DETERMINATION

Having considered the matters raised in submissions, AEMO's draft determination is to **amend** the **NSCAS description and quantity procedure** in the form of Attachment 1, in accordance with clause 5.20.2 of the NER.

APPENDIX A. GLOSSARY

Term or acronym	Meaning
AEMC	Australian Energy Market Commission
ESB	Energy Security Board
MBAS	Market Benefit Ancillary Service
NEM	National Electricity Market
NER	National Electricity Rules
NSCAS	Network Support and Control Ancillary Service
PV	Photovoltaic
RIS	Renewable Integration Study
RSAS	Reliability and Security Ancillary Service
RIT-T	Regulatory Investment Test – Transmission
TNSP	Transmission Network Service Provider

APPENDIX B. SUMMARY OF SUBMISSIONS AND AEMO RESPONSES

No.	Consulted person	Point raised in submission	AEMO response
1.	CS Energy	CS Energy is supportive of the AEMO proposal to include in the assessment the ability to restore the network to a secure state within 30 minutes following a credible contingency.	AEMO notes support of proposed changes. See section 4.2 for further detail.
2.	CS Energy	CS Energy supports the proposal to allow for flexibility in the methodology to ensure the delivery of relevant analysis that enables the identification of any constraints inhibiting net economic benefits.	AEMO notes support of proposed changes. See section 4.3 for further detail.
3.	CS Energy	CS Energy supports AEMO's proposal to adopt high-level modelling principles on the proviso AEMO provide details of the modelling assumptions coupled with an opportunity for Participants to challenge or seek further information on the modelling assumptions.	Due to time constraints on preparing an annual NSCAS review, AEMO considers that it would not be possible to consult market participants on all inputs for the NSCAS review AEMO will include high level modelling principles in the NSCAS Quantity procedure. AEMO where necessary, will publish descriptions of any relevant assumptions and methodologies used in the NSCAS review. AEMO will publish this information at the time of publication of the *NSCAS report* (for example as an appendix) or as soon as practicable thereafter. The *NSCAS report* will include contact information whereby market participants may request more detailed information regarding study assumptions and methodologies, beyond what is published in the *NSCAS report* See section 4.4 for further detail.

No.	Consulted person	Point raised in submission	AEMO response
4.	CS Energy	CS Energy recognises the changing context for the NSCAS framework but remains unconvinced that the changes justify a change to the NSCAS description at this stage. The proposal does not acknowledge the Energy Security Board (ESB) and Australian Energy Market Commission (AEMC) workstreams on system services. CS Energy suggests that AEMO consider a change to the NSCAS description following the completion of the ESB and AEMC system services workstreams. Furthermore, there is possibility of conflicting outcomes arising on the appropriate pricing mechanisms for the provision of the system services through real time markets.	To address NSCAS gaps promptly, whilst addressing emerging issues, changes to the NSCAS types need to be implemented before the 2020 NSCAS review. Upon completion of the work currently underway by the ESB and AEMC, AEMO will reassess, where necessary, the NSCAS description and NSCAS quantity procedure in light of their findings. In the meantime, AEMO will amend the NSCAS types in the NSCAS description, classifying each type according to the need addressed, rather than according to electrical phenomena. See section 4.1 for further detail.
5.	ERM Power	ERM Power recommend that AEMO also seek market participant input with regards to their views of potential NSCAS gaps. ERM recommend that the NSCAS procedures be amended to include the capability for market participants to propose potential NSCAS solutions to AEMO.	AEMO will create a mechanism whereby market participants can recommend network issues or constraints for AEMO to consider in an annual NSCAS review. See section 4.3 for further detail.
6.	ERM Power	ERM Power is generally supportive of the proposed changes to the NSCAS descriptions from the provision of defined physical services to the needs of the power system that different physical services would address.	AEMO notes support of proposed changes. See section 4.1 for further detail.
7.	ERM Power	ERM Power are concerned that many of the services included as examples in the Paper could equally be supplied by real time or close to real time markets or via traditional longer duration NSCAS contracts. Whilst for some services we would support the development of interim NSCAS contracts to meet emerging power system needs on a short term basis, we are concerned that establishing interim arrangements should not lead to a delay in the development of potentially superior arrangements, such as real time markets for the provision of these services. We recommend that the NSCAS description and quantity procedures set out details with regards to this, in particular that AEMO will support, where considered appropriate by market participants, the development of market-based solutions for the required services.	Consideration of market based solutions will be addressed in the ESB Post 2025 Market Design review, to which AEMO is contributing, rather than in the NSCAS description or NSCAS quantity procedure. In the meantime, AEMO will not refer to market based solutions in the NSCAS description or NSCAS quantity procedure. See section 4.1 for further detail.

No.	Consulted person	Point raised in submission	AEMO response
8.	ERM Power	AEMO has proposed that in considering the procurement quantities of NSCAS that AEMO be allowed to include the requirement to restore the system to a secure state within 30 minutes of the first credible contingency, which includes consideration of the potential impact to the power system of a second credible contingency during this restoration period. ERM Power is supportive of the proposed change to procure NSCAS to meet this need.	AEMO notes support of proposed changes. See section 4.2 for further details.
9.	ERM Power	ERM Power are supportive of AEMO's proposed change to; "allow a comprehensive assessment of NSCAS requirements that may be justified to increase power transfer capability of the network." We are also supportive of AEMO's proposal that "this assessment should also consider changes to the power system expected within the NSCAS planning horizon of at least five years (including, but not limited to, new infrastructure such as planned transmission network augmentations, committed and anticipated development of VRE, and reactive plant, and control schemes)." However, this support is conditional on AEMO detailing the methodology for such assessment and that the relevant methodology for such assessment be included as an appendix to the NSCAS description and quantity procedures. Support is also conditional on the development of this methodology in accordance with the Australian Energy Regulator's (AER) Best Forecast Practice Guideline and Cost Benefit Analysis Guideline.	A prescriptive methodology risks leaving some constraints outside defined assessment processes. It also risks having constraint alleviation benefit analysis that consumes a material portion of the potential economic benefits of alleviating a constraint. AEMO will amend the NSCAS description and NSCAS quantity procedure to include a description of factors AEMO may consider in assessing constraints and conducting a benefit analysis of constraint alleviation. It will be as comprehensive as possible without forming a prescriptive methodology that limits AEMO's flexibility to tailor studies as needed on a case by case basis. See section 4.3 for further details.

No.	Consulted person	Point raised in submission	AEMO response
10.	ERM Power	ERM Power do not support AEMO's proposal to only include "a set of higher-level modelling principles which will guide industry on the nature of the analysis." We recommend a specific and detailed methodology document be developed for NSCAS requirements.	AEMO accepts that transparency of how assessments will be conducted is valuable. However, this needs to be weighed against maintaining flexibility such that a wide range of varying and difficult to predict scenarios can be analysed without falling outside prescriptive methodological descriptions. AEMO will include high level modelling principles in the NSCAS Quantity procedure. AEMO where necessary, will publish descriptions of any relevant assumptions and methodologies used in the NSCAS review. AEMO will publish this information at the time of publication of the *NSCAS report* (for example as an appendix) or as soon as practicable thereafter. The *NSCAS report* will include contact information whereby market participants may request more detailed information regarding study assumptions and methodologies, beyond what is published in the *NSCAS report* See section 4.4 for further details.
11.	Powerlink	The reclassification of the NSCAS service into broader categories is a logical simplification and inclusive of all types of service that may be required.	AEMO notes support of proposed changes. See section 4.1 for further details.
12.	Powerlink	Powerlink supports the detailed assumptions be removed from the NSCAS quantity procedure, but recommends that all assumptions should be discussed and agreed with the TNSPs during the NSCAS review process.	AEMO will consult with TNSPs during the NSCAS review, including discussing detailed study assumptions and methodologies to ensure that the most appropriate inputs are used.

APPENDIX C. ATTACHMENT 1 – DRAFT NSCAS DESCRIPTION AND QUANTITY PROCEDURE

Please see Attachment 1 provided on AEMO's website: https://aemo.com.au/en/consultations/current-and-closed-consultations/network-support-and-control-ancillary-services-description-and-quantity-procedure-amendments.