



# Non-market Ancillary Services

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Australian Energy Market Operator Ltd ABN 94 072 010 327

## Disclaimer

### Purpose

The purpose of this publication is to provide to provide information about Non-market ancillary services, as at the date of publication.

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# Current version release details

Version	Effective date	Summary of changes
<a href="#">V19</a>	<a href="#">3 June 2024</a>	<p><a href="#">Minor updates including to reflect the National Electricity Amendment (Integrating energy storage systems into the NEM) Rule 2021 and Rule 2023 No. 2.</a></p> <p><del><a href="#">Minor update to align with rule changes associated with bidirection units.</a></del></p>

**Note: There is a full version history at the end of this document.**

# 1. Introduction

## 1.1. Purpose and scope

This procedure is written and published in accordance with clause 3.11.6(b) of the National Electricity Rules and provides detail on the processes AEMO will use to *dispatch non-market ancillary services*, and the periodic reporting on the effectiveness of the *dispatch of non-market ancillary services* using criteria related to the performance of the *power system*.

This procedure only relates to those *non-market ancillary services* procured and *dispatched* by AEMO.

## 1.2. Definitions and interpretation

### 1.2.1. Glossary

Terms defined in the National Electricity Law and the NER have the same meanings in ~~these Procedures~~ this procedure unless otherwise specified in this clause.

Terms defined in the NER are intended to be identified in ~~these Procedures~~ this procedure by italicising them, but failure to italicise a defined term does not affect its meaning.

In addition, the words, phrases and abbreviations tyin the table below have the meanings set out opposite them when used in ~~these Procedures~~ this procedure.

Term	Definition
NSCAS	Network Support and Control Ancillary Service
<del>MBAS</del>	<del>Market Benefit Ancillary Service</del>
NCAS	Network Control Ancillary Service
<del>RSAS</del>	<del>Reliability and Security Ancillary Service</del>
SRAS	<i>System Restart Ancillary Service</i>
<del>NLAS</del>	<del>Network Loading Ancillary Service</del>
<del>VCAS</del>	<del>Voltage Control Ancillary Service</del>
<del>TOSAS</del>	<del>Transient &amp; Oscillatory Stability Ancillary Service</del>

### 1.2.2. Interpretation

~~These Procedures are~~ This procedure is subject to the principles of interpretation set out in Schedule 2 of the National Electricity Law.

## 1.3. Related documents

Title	Location
National Electricity Rules	
Network Support and Control Ancillary Service Description	<a href="http://www.aemo.com.au/en/Electricity/Market-and-Power-Systems/Ancillary-Services/~media/Files/Other/electricityops/0160-0102%20pdf.ashx">http://www.aemo.com.au/en/Electricity/Market-and-Power-Systems/Ancillary-Services/~media/Files/Other/electricityops/0160-0102%20pdf.ashx</a>
NSCAS <i>Dispatch</i> Guidelines consultation	AEMO Communication 981 dated 12 March 2012

Title	Location
SO_OP5000 System Restart Overview	<u>The SO_OP_5000 is made available by AEMO to NSPs, Jurisdictional System Security Coordinators (JSSCs), and certain other Registered Participants</u>

## 2. General principles of non-market ancillary services

*Non-market ancillary services* are defined in clause 3.11.1(c) of the NER and are split into two major categories, namely system restart ancillary services (SRAS) and network support and control ancillary services (NSCAS).<sup>1</sup>

Network Support and Control Ancillary Services are further divided into Reliability and Security Ancillary Service (RSAS) and Market Benefit Ancillary Service (MBAS).

Reliability and Security Ancillary Service is a NMAS procured in order to assist AEMO to maintain power system security of the transmission network in accordance with the power system security standards or maintain reliability of supply of the transmission network in accordance with the reliability standard. This service may not include any services that are excluded from NSCAS under the NER. RSAS can be provided by entities including but not limited to generators, TNSPs, and market customers.

Market Benefit Ancillary Service is a NMAS 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. MBAS can be provided by entities including but not limited to generators, TNSPs, and market customers.

### 2.1. Reliability and Security Ancillary Service (RSAS)

The purpose of procuring RSAS is to maintain the power system within acceptable technical parameters or to increase access to supply such that the NEM can maintain power system security and reliability of supply of the transmission network in accordance with the power system security standards and the reliability standard.

RSAS provides AEMO with the tools it needs to operate the NEM consistent with its system security and reliability obligations. These obligations are described as follows:

- System security:
  - (1) To maintain the system in a secure operating state<sup>2</sup> during normal operation, consistent with the power system security standards.
  - (2) To return the system to a secure operating state within 30 minutes following a credible contingency event or protected event, consistent with the power system security standards.

<sup>1</sup> NSCAS was previously referred to as Network Control Ancillary Service (NCAS). AEMO has a number of existing NCAS contracts in place. These contracts will be *dispatched* as if they were NSCAS contracts until these contracts expire.

<sup>2</sup> The power system is in a secure operating state if it will return to a satisfactory operating state following a credible contingency event or a protected event (for example trip of a transmission line or generating unit). A satisfactory operating state is a state in which all transmission network elements operate within acceptable technical limits (for example voltage, frequency and current are all within safe accepted limits). See clauses 4.2.2 and 4.2.4 of the NER for more information.

- Reliability:

(1) To ensure each NEM region has sufficient local generation and transmission capacity such that demand can be supplied consistent with the *reliability standard*<sup>3</sup>.

AEMO meets these obligations by dispatching generation in line with market bids, invoking and revoking constraint equations, and adjusting network equipment such as voltage setpoints and reactive plant status.

However, network conditions can arise such that after AEMO has used all available operational tools the network is still not secure, or there is still insufficient supply to meet demand in a NEM region.

In this situation, AEMO must intervene in the dispatch of the NEM through some combination of directing or instructing market participants, activating emergency reserves, and shedding load.

Procurement of RSAS will increase the security and reliability of the NEM while also reducing the number of instances that AEMO needs to intervene in the dispatch of the NEM.

## 2.2. Market Benefit Ancillary Service (MBAS)

The purpose of procuring MBAS is to maximise the present value of net economic benefit to all those who produce, consume or transport electricity in the electricity market.

One way that MBAS can be delivered is by increasing power transfer limits in order to reduce the impact of constraint equations on NEM dispatch. AEMO uses constraint equations to model power system limits in the National Electricity Market dispatch engine (NEMDE), with each constraint equation providing a mathematical representation of a physical limit of the transmission network.

These and a large range of other constraints apply in NEMDE to ensure that physical limits are not exceeded. NEMDE will optimise the solution across all constraints and costs to fulfil the optimisation objective, and in doing so, determine the lowest-cost solution possible within constraints. This may mean that the resultant dispatch includes higher cost generation. MBAS may be procured to maintain or increase the power transfer limit of constraints by addressing the underlying power system limitations, if the cost of the procured MBAS is less than the benefit of the lowered cost of generation dispatch.

Examples of power system limits addressed through MBAS include but are not limited to:

- Transmission thermal limitations.
- Voltage upper and lower limitations.
- Voltage stability.
- Transient stability.
- Oscillatory stability.
- System strength limitations<sup>4</sup>.

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<sup>3</sup> The reliability standard is determined by the Reliability Panel and defined in the NER. In NER version 150 the reliability standard is defined in NER 3.9.3C and allows for up to 0.002 % unserved energy in a NEM region per year. This may change in future NER versions.

<sup>4</sup> MBAS procured to address system strength limitations excludes any service that is also capable of being made available as a system strength service to address a fault level shortfall through the arrangements in NER 5.20C, as excluded under NER 11.101.5.

Network Support and Control Ancillary Services are further divided into network loading ancillary service (NLAS), voltage control ancillary service (VCAS) and transient & oscillatory stability ancillary service (TOSAS).

Network loading ancillary service is the capability of reducing an active power flow from a *transmission network* in order to keep the current loading on *transmission elements* within their respective ratings following a *credible contingency event* in a *transmission network*.

Voltage control ancillary service is the capability to supply reactive power to, or absorb reactive power from, the *transmission network* in order to maintain the *transmission network* within its voltage and stability limits following a *credible contingency event* but excluding such capability provided within a transmission or distribution system or as a condition of connection.

Transient and oscillatory stability ancillary service is the capability to control power flow into or out of the transmission network to maintain the transmission network within its transient or oscillatory limits and to maintain or increase power transfer capability by improving transient or oscillatory stability.

Network Support and Control Ancillary Services may also be dispatched to provide a market benefit providing the benefit gained exceeds the cost of dispatching the service.

## 2.1. Network loading ancillary service (NLAS)

This service is manually *dispatched* with no *pre-dispatch* forecast data provided. The requirement for NLAS will need to be identified in sufficient lead time to allow Ancillary Service Providers time to enable the appropriate service.

The requirement for NLAS is closely related to the type of limit being used for *transmission elements*. If all *transmission elements* are operating within their continuous limits and interconnectors are within secure operating limits, then there is no requirement to enable any NLAS. However, if a *transmission element* is operating to a reduced time dependant limit, then there will be a need to enable sufficient NLAS to reduce the post contingent flows back to within that elements' continuous rating.

Regardless of any requirement for *dispatch* of NLAS to manage power system security AEMO may also *dispatch* NLAS if a market benefit test is satisfied. This will be done by assessing the impact of the service on the objective function by utilising the marginal value of the relevant binding constraint. If the market benefit is greater than the enabling cost of the service the NLAS may be enabled.

## 2.2. Voltage control ancillary services (VCAS)

AEMO will use Network Analysis applications, EMS Contingency Analysis (CA) or violating constraints to determine the requirement for reactive support.

This ancillary service is divided into two categories according to the means of provision and payment structure — generation mode and synchronous compensation mode.

### 2.2.1. Generation mode

This service is for the provision of reactive capability in excess of that defined in a generating or bidirectional unit's registered performance standard.

Under the terms of the NCAS Agreements the VCAS for generating or bidirectional units in generation mode can only be activated in the following manner;

- ~~If a credible contingency event occurs, the NCAS equipment must automatically generate reactive power.~~

~~As such AEMO cannot manually dispatch a generator generating or bidirectional unit to its VCAS contracted level.~~

### ~~2.2.2. Synchronous compensation mode~~

~~Generating or bidirectional Units dispatched in synchronous compensation mode for reactive power ancillary service may be used either to maintain system security or to enhance network transfer. An enabling payment is made for these services. These generating or bidirectional units (in synchronous compensation mode) will be dispatched only after all no cost options have been utilised.~~

~~Regardless of any requirement for dispatch of VCAS to manage power system security AEMO may also dispatch VCAS if a market benefit test is satisfied. This will be done by assessing the impact of the service on the objective function by utilising the marginal value of the relevant binding constraint. If the market benefit is greater than the enabling cost of the service the VCAS may be enabled.~~

### ~~2.2.3. Constraining generating or bidirectional units~~

~~Should the reactive power requirements still not be satisfied after all the contracted reactive power capacity of generating and/or bidirectional units in generation mode (unconstrained) and synchronous compensation mode then for the purpose of maintaining a secure operating state, selected contracted generating and/or bidirectional units in generation mode may be constrained to a lower level of real power output where this would result in the provision of more reactive power. Compensation payments would apply in accordance with the ancillary service agreements.~~

## ~~2.3. Transient and oscillatory stability ancillary service (TOSAS)~~

~~AEMO will use its transient and oscillatory monitoring applications to determine any requirement for TOSAS.~~

~~Regardless of any requirement for dispatch of TOSAS to manage power system security AEMO may also dispatch TOSAS if a market benefit test is satisfied. This will be done by assessing the impact of the service on the objective function by utilising the marginal value of the relevant binding constraint. If the market benefit is greater than the enabling cost of the service the TOSAS may be enabled.~~

### 2.4.2.3. System restart ancillary services (SRAS)

Contracted Service Providers will receive availability payments for the provision of this service. There will be no ongoing *dispatch* of this Service as it is paid on an availability basis. Contracts will be awarded to Service Providers who would then be expected to maintain system restart capability.

In the event of a black system condition or major supply disruption, SRAS will be selected according to their availability to assist in the restoration of the affected part of the power system and the Service Providers will be instructed to provide the service. Refer to SO\_OP5000 System Restart Overview for more detail.



### 2.4.1.2.3.1. Insufficient system restart service

In the event that the minimum number of SRAS is not available, AEMO is to decide what action should be reasonably taken.

AEMO will determine the expected length of time that the SRAS is likely to be unavailable.

If it is expected that sufficient SRAS will be available again within a week, and there is not a greater than normal risk to the power system, then AEMO will take no action. However during this period AEMO will closely monitor the situation.

If the SRAS is expected to be unavailable for a period in excess of 1 week, then AEMO may initiate the following procedure to determine the potential availability of SRAS:

- Identify any participants who could potentially be directed to provide SRAS in the affected electrical sub-network(s).
- AEMO shall commence preliminary discussions (non-binding) with those participants who are considered likely to be available to be directed. Such discussions would be aimed at establishing:
  - the capability of the participant to adequately comply with the direction,
  - estimate of the likely financial impact on the participant of a direction,
  - any other matters considered relevant by either AEMO or the participant.
- All this information must be recorded by AEMO to facilitate subsequent determination of compensation to affected parties.
- AEMO will then decide which participant(s) may be directed during a black system condition or major system disturbance and which plant to be used, taking into account the information gained, with a view to meeting the SRAS shortfall in a manner that minimises the cost of the service.
- If required due to a black system condition of a major system disturbance AEMO may then direct sufficient suitable participants to make available additional SRAS to meet the shortfall. When directing participants, AEMO will ensure that each directed participant understands that it is being directed under Rules clause 4.8.9.

### 2.5.2.4. Network control and system restart ancillary service conformance

The issue of conformance for the NSCAS and SRAS will continue to be addressed through the Ancillary Services Agreements.

## 3. Ancillary Services *Dispatch* Instructions

For ~~NLAS~~ and ~~VCAS~~ SRAS and MBAS, confirmation of availability will be established prior to any instruction being issued. The requirement for the service will be notified by telephone to the Service Provider via the normal operational contact and then, a *dispatch* instruction will be issued via the market systems.

Each manual *dispatch* instructions for ancillary services will include the following detail:

- Time the *dispatched* service level is changed

- Particular service to be *dispatched*
- Amount of service required (if applicable)
- Mode of operation, if applicable.

For the remaining aspects of *dispatch* of SRAS, Participants would need to Refer to SO\_OP5000 System Restart Overview ~~for procedures procedure~~. The SO\_OP\_5000 is made available by AEMO to NSPs, Jurisdictional System Security Coordinators (JSSCs), and certain other Registered Participants. associated with *dispatch* of SRAS.

## Appendix A. Reporting

In accordance with NER 3.11.6, AEMO has developed procedures for reporting to Participants, on a periodic basis the effectiveness of the *dispatch of non-market ancillary services*.

### A.1 Reliability and Security Ancillary Service (RSAS)

A Reliability and Security Ancillary Service (RSAS) may be procured by AEMO in its 'last resort' procurement role. This NMAS, could be for different purposes such as voltage control, network loading, or other purposes to enable AEMO to operate the NEM within the power system security standards and the reliability standard.

Examples of RSAS to maintain power system security could include, but are not limited to:

- **Voltage control:** NMAS contracts with market participants such as *generators* or energy storage providers for voltage control beyond what is required by their registered performance standards (for example contracting a gas unit to come online when needed to provide voltage control or a hydro unit to operate in synchronous condenser mode). A reactive power ancillary service, where there is a contracted service that meets the requirements, would be effectively *dispatched* where the *transmission network* was maintained within its voltage and stability limits following a credible contingency event. The reporting criteria to be used for reactive power ancillary service is the exceedance or not of voltage or stability limits following a credible contingency event.
- **Network loading:** Upgrading *network* elements to expand their secure operating envelope (for example, increasing the maximum voltage rating of a bushing in a substation). Where there is a contracted service that meets these requirements, it would be effectively *dispatched* where the active power flow from a *transmission network* is reduced and keeps the current loading on interconnector *transmission elements* within their respective ratings following a *credible contingency event* in a *transmission network*. The reporting criteria for a service contracted for network loading, is the exceedance or not of ratings of interconnector *transmission elements* following a credible contingency event.

Examples of RSAS to avoid unserved energy (USE), and thereby meet the *reliability standard*, could include, but are not limited to:

- Increasing *network* thermal limits, voltage limits, transient limits or oscillatory limits to increase power transfer. This could involve solutions such as runback schemes, NMAS voltage support contracts, dynamic reactive plant or others.
- Increasing power transfer capability by reducing the largest effective contingency size with controllable distributed energy resources, batteries, or pre-contingent load reduction.

### ~~A.1 Voltage control ancillary service (VCAS)~~

~~The reactive power criteria relating to the performance of the power system is that the *transmission network* is to be maintained within its voltage and stability limits following a credible contingency event.~~

~~A reactive power ancillary service, where there is a contracted service that meets the requirements, would be effectively dispatched where the transmission network was maintained within its voltage and stability limits following a credible contingency event.~~

~~The reporting criteria to be used for reactive power ancillary service is the exceedance or not of voltage or stability limits following a credible contingency event.~~

## ~~A.2 Network loading ancillary service (NLAS)~~

~~The network loading criteria relating to the performance of the power system is that the current loadings on transmission elements are to be kept within their respective ratings following a credible contingency event in a transmission network.~~

~~An NLAS, where there is a contracted service that meets the requirements, would be effectively dispatched where the active power flow from a transmission network is reduced and keeps the current loading on interconnector transmission elements within their respective ratings following a credible contingency event in a transmission network.~~

~~The reporting criteria to be used for NLAS is the exceedance or not of ratings of interconnector transmission elements following a credible contingency event.~~

## ~~A.3 Transient and oscillatory stability ancillary service (TOSAS)~~

~~The transient and oscillatory stability criteria relating to the performance of the power system is that the transmission network is to be maintained within its transient and oscillatory stability limits following a credible contingency event in the transmission network.~~

~~A transient and oscillatory stability ancillary service, where there is a contracted service that meets the requirements, would be effectively dispatched where the transmission network was maintained within its transient and oscillatory stability limits following a credible contingency event.~~

~~The reporting criteria to be used for transient and oscillatory stability ancillary service is the exceedance or not of transient or oscillatory stability limits following a credible contingency event.~~

### A.4A.2 System restart ancillary service (SRAS)

An SRAS is required to deliver its contracted service, when requested by AEMO, in response to a system restart or major system disturbance.

The reporting criteria to be used for system restart ancillary service is the *dispatch* of the contracted service in line with its contract requirements following a black system or major system disturbance condition occurring.

### A.5A.3 Reporting

Refer to Table 1 for the details relating to reporting on the effectiveness of the *dispatch* of non-market ancillary service.

**Table 1 Reporting**

Non-market ancillary service	Event	Criteria for effectiveness of dispatch	Reported items	Reporting Period
<del>RSAS</del> <b>Network loading</b>	credible contingency event	Where there was a <u>RSAS related to managing network loading ancillary service</u> that met the requirements, whether the ratings of <i>transmission elements</i> were exceeded following a credible contingency event	Salient power system conditions. Number of events where thermal ratings were exceeded and details of the amount of service delivered and the amount expected.	A report will be issued <u>at least yearly following each credible contingency event for which NLAS was enabled.</u> <del>Where no such events occurred a routine report will be issued on an annual basis.</del>
<del>Voltage Control</del> <b>RSAS</b>	credible contingency event	Where there was <u>RSAS related to a voltage control ancillary service</u> that met the requirements, whether the voltage limit is exceeded by greater than 1.5kV for more than five minutes following a credible contingency event.	Salient power system conditions. Number of events where limits were exceeded and details of the amount of service delivered and the amount expected.	<u>A report will be issued at least yearly. A report will be issued on voltage control credible contingency events on a monthly basis.</u> <del>Where no reportable events occurred, a routine report will be issued quarterly.</del>
<del>Transient and Oscillatory Stability</del> <b>RSAS</b>	credible contingency event	<del>Where there was a transient and oscillatory stability ancillary service that met the requirements, whether the transient or oscillatory stability limits of the transmission network were exceeded following a credible contingency event</del> Where RSAS is <u>contracted for other reasons than the examples above, the contract by AEMO shall define the specific criteria for effectiveness.</u>	Salient power system conditions. Number of events where limits were exceeded and details of the amount of service delivered and the amount expected.	<u>A report will be issued at least yearly. A report will be issued following each credible contingency event for which TOSAS was enabled.</u> <del>Where no such events occurred a routine report will be issued on an annual basis if a TOSAS contract existed for that time period.</del>
<b>System restart</b>	black system condition	Where a system restart service was able to meet a requirement - whether the service was <i>dispatched</i> .	Salient power system conditions. Number of times a system restart service was <i>dispatched</i> .	A report will be issued following each black system condition. Where no reportable events occurred a routine report will be issued on an annual basis.

## Version release history

Version	Effective date	Summary of changes
<u>V19</u>	<u>Effective 3 June 2024</u>	<u>Minor updates including to reflect the National Electricity Amendment (Integrating energy storage systems into the NEM) Rule 2021 and Rule 2023 No. 2.</u>
V18	31/7/12	Added TOSAS to section 4 new section 4.3 and section 6
V17	30/4/12	Major review to align with Rule changes associated with NSCAS
v16	01/07/09	Change to AEMO document.