



Short Term Reserve Management

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Current version release details

Version	Effective date	Summary of changes
23	3 June 2024	Changes to reflect the National Electricity Amendment (Integrating energy storage systems into the NEM) Rule 2021 No.13 and Rule 2023 No. 2, including to incorporate references to Integrated Resource Providers and bidirectional units.

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

1. Introduction

1.1. Purpose and scope

These Short Term Reserve Management procedures (**Procedures**) are *power system operating procedures* made under clause 4.10.1 of the NER, and incorporate (in Appendix A) the supply scarcity procedures required under clause 3.8.14A of the NER.

These Procedures have effect only for the purposes set out in the National Electricity Rules. The NER and the National Electricity Law prevail over these Procedures to the extent of any inconsistency.

The purpose of these Procedures is to provide *Registered Participants* with information on how AEMO manages *low reserve* conditions and *lack of reserve* conditions based on the output of the ST PASA and PD PASA processes.

These procedures do not detail the ST PASA or PD PASA processes.

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 unless otherwise specified in this clause.

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

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

Table 1 Glossary

Term	Definition
DRSP	<i>Demand Response Service Provider</i>
FUM	<i>Forecast Uncertainty Measure</i>
LOR	<i>Lack of reserve</i>
LRC	<i>Low reserve condition</i>
LTTI	<i>Latest time to intervene</i>
MNSP	<i>Market Network Service Provider</i>
NER	<i>National Electricity Rules</i>
PD PASA	<i>PASA in the pre-dispatch timeframe</i>
ST PASA	<i>Short term PASA</i>
WDR	<i>Wholesale Demand Response</i>

1.2.2. Interpretation

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

1.3. Application

This procedure applies to AEMO staff responsible for managing *power system reserve* conditions.

1.4. Related documents

Table 2 Relevant legislation or other legal references

Reference	Title
National Electricity Rules (NER)	3.7.1 – Administration of PASA
NER	3.7.3 – Short term PASA
NER	3.20 – Reliability and Emergency Reserve Trader
NER	4.8.9 – Power to issue directions and clause 4.8.9 instructions
NER	4.8.9A – System security directions
NER	4.8.4A - Reserve level declaration guidelines

Table 3 Related policies and procedures

Reference	Title	Location
SO_OP_3707	Procedures for Issue of Directions and Clause 4.8.9 instructions	https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/power-system-operation/power-system-operating-procedures
SO_OP 3717	Procedure for the Exercise of the Reliability and Emergency Reserve Trader	https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/power-system-operation/power-system-operating-procedures
431-0002	Short Term PASA Process Description	https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/policy-and-process-documentation
SO_OP_2000	Glossary	https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/power-system-operation/power-system-operating-procedures
RLDG-V2.1-FINAL	Reserve level declaration guidelines	https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/power-system-operation

2. Reserve Conditions in short term PASA and pre-dispatch timeframe

AEMO is responsible for reviewing the ST PASA and PD PASA outputs and checking adequacy of *capacity reserves*.

AEMO will identify *low reserve conditions (LRC)* or *lack of reserve (LOR)* conditions in either the *short term PASA* or *pre-dispatch* timeframe and proceed as per below.

2.1. Low Reserve (LRC) conditions

AEMO will not *publish a market notice* or intervene in the *market* for *LRC* conditions forecast in either the *short term PASA* or *pre-dispatch* timeframe.

2.2. Lack of Reserve (LOR) trigger levels and LOR conditions

The Reserve Level Declaration Guidelines require AEMO to declare *LOR* conditions when it determines that there is a non-remote probability of load shedding due to a shortfall of available *capacity reserves* at a given time in the *short term PASA* or *pre-dispatch* timeframe.

AEMO uses a probabilistic model which determines reserve forecasting uncertainty taking into account the prevailing conditions to achieve this. The estimated reserve forecasting uncertainty is converted to a MW value for operational use and it is called the Forecast Uncertainty Measure (FUM). FUM is used in conjunction with the largest and the second largest contingency in NEM regions to determine the LOR1 and LOR2 trigger levels.

FUM is calculated up to 72 hours ahead, FUM is set to zero beyond 72 hours. This means that the LOR1 and LOR2 trigger levels vary with operating conditions and the forecasting horizon, up to 72 hours ahead.

LOR2 trigger level = MAX (LCR, FUM)

LOR1 trigger level = MAX (LCR2, FUM)

where:

LCR: The largest credible risk in the region

LCR2: The sum of the two largest credible risks in the region

The LOR3 trigger level remains unchanged.

2.2.1. Declaration of LOR Conditions

AEMO will declare an LOR condition when the *capacity reserves* of a region is less than the relevant LOR trigger level.

These conditions will be declared as follows:

- In *short term PASA* timeframe, AEMO will issue a market notice advising forecast LOR1 conditions only if the LOR1 conditions are present in the 1400 hours run. For forecast LOR2 or LOR3 conditions AEMO will issue a market notice as soon as possible if an LOR2 or LOR3 condition is identified in any ST PASA run.
- In *pre-dispatch* timeframe, AEMO will issue a market notice advising forecast LOR conditions if LOR conditions are present in the current PD PASA run.

2.2.2. Update of LOR conditions

AEMO will issue market notices advising updated LOR conditions when one and/or both of the following two conditions occur:

- The LOR condition changes by the MW amount as specified in Table 4, and/or
- The LOR period has changed by two or more *30-minute periods*.

Table 4 Threshold triggers

Region	Threshold (MW)
Queensland	120
New South Wales	190
Victoria	125
South Australia	65
Tasmania	50

These condition updates will be declared as follows:

- In the *short term PASA* timeframe, AEMO will issue market notices advising updated LOR1 conditions based on the 1400 hrs ST PASA run only. AEMO will issue market notices advising updated LOR2 or LOR3 conditions if the triggers are breached in any ST PASA run.
- In the *pre-dispatch* timeframe, AEMO will issue a market notice advising updated LOR conditions if LOR update triggers are satisfied in any PD PASA run.

2.2.3. Cancellation of LOR conditions

AEMO will publish a LOR1 cancellation market notice if the LOR1 conditions are resolved in the 1400 hrs ST PASA run or the most recent PD PASA run.

AEMO will publish a LOR2 or LOR3 cancellation *market notice* if the LOR2 or LOR3 conditions are resolved in any ST PASA or PD PASA run.

Market notices will indicate the start time of the first *30-minute period* and end time of the last *30-minute period* in which the condition exists.

2.3. Determining the Latest Time to Intervene

In accordance with NER clause 4.8.5A, AEMO will estimate the latest time to intervene based on advice from market participants and information in RERT Panel Agreements or Contracts.

AEMO will advise the market of the latest time to intervene in accordance with NER clause 4.8.5B.

3. Market intervention

If the market mechanisms are not successful in alleviating the reserve shortfall and the latest time to intervene has been reached, AEMO may intervene in the *market* by issuing a *direction* or a *clause 4.8.9 instruction* or by exercising the *reliability and emergency reserve trader* (RERT) in accordance with NER clause 3.20.

Refer to Appendix A for AEMO's approach to determining its choice of *supply scarcity mechanism* when the need for intervention arises (*RERT, direction* or *clause 4.8.9 instruction*).

Refer to SO_OP 3707 – Intervention, Direction and Clause 4.8.9 instructions, and SO_OP 3717 – Procedure for the dispatch and activation of reserve contracts.

4. NEM local temperature alerts

High ambient temperatures reduce the efficiency and the reliability of thermal power stations, wind farms, solar farms and *bidirectional units*, hence their *available capacity*. The power transfer capability of *market network services* (MNSP) is also reduced at higher temperatures. Hence, basing *available capacities* on forecast local ambient temperatures provides a better representation of supply availability in the NEM.

When the forecast temperatures are equal to or greater than the alert levels defined as NEM Local Temperature Alert Levels listed in Table 5, AEMO will *publish a market* notice reminding *Generators, Integrated Resource Providers* and/or the MNSP to review the available capacities in their *dispatch bids* and *plant availability*¹ submissions.

Table 5 NEM local temperatures alert levels

Region(s)	Weather station	Local temperatures alert Level (°C)
TAS1	Launceston (Ti Tree Bend)	33 °C
QLD1	Dalby Airport	37 °C
QLD1	Rockhampton Airport	39 °C
QLD1	Townsville Airport	39 °C
QLD1	Mareeba	39 °C
NSW1	Armidale Airport	39 °C
NSW1	Yass	39 °C
NSW1	Mudgee Airport	39 °C
NSW1	Sydney Observatory Hill	39 °C
VIC1/NSW1	Mildura Airport	39 °C
VIC1	Ararat Prison	39 °C
VIC1	Latrobe Valley Airport	39 °C
VIC1	Melbourne Olympic Park	39 °C
VIC1	Mortlake	39 °C
SA1/VIC1	Mt Gambier Airport	39 °C
SA1	Adelaide West Terrace	39 °C
SA1	Clare High School	39 °C
SA1	Port Augusta Airport	39 °C

Notes:

- Tasmania is a winter peaking region and the alert temperature is set based on the capacity of the Tasmanian BassLink MNSP converter station.
- Some weather stations are located near the border of two regions and provide temperature information for participants in the two regions.

The market notice will include the following information:

- Period and the Region/s where Local Temperature Alert Levels are reached or exceeded
- Date

¹ For *semi-scheduled generating units*.

- Forecast temperature
- Request participants for a *review* of the weather forecast in the local area where their generating plant are located and if required, update their *available capacities* consistent with the forecast temperature.

Appendix A. Supply scarcity procedures

This appendix sets out the supply scarcity procedures to describe AEMO's approach to determining its choice of *supply scarcity mechanism* under clause 3.8.14A of the NER.

A.1 Supply scarcity mechanisms

A *supply scarcity mechanism* refers to any of the following:

- (a) exercising the *RERT*;
- (b) issuing a *direction* in accordance with clause 4.8.9 of the NER; and
- (c) issuing a *clause 4.8.9 instruction*.

If, after dispatching all *dispatch bids*, AEMO determines additional actions are required to address conditions of *supply scarcity*², AEMO must decide which *supply scarcity mechanism(s)* to use.

In making that decision, AEMO must use reasonable endeavours to choose the mechanism, or combination of mechanisms, that is effective in addressing the *supply scarcity* conditions while minimising the associated direct and indirect costs.

Supply scarcity mechanisms that are also AEMO *intervention events* (that is, *RERT* and *directions*) are in practice preferred ahead of *clause 4.8.9 instructions* as these generally have lower costs and are more effective.

A.2 Methodology

This section describes the factors AEMO will take into account in evaluating both the costs and effectiveness of each *supply scarcity mechanism*, in comparison to others, or a combination of mechanisms.

A.2.1 RERT

For *RERT*, the direct costs AEMO will consider include pre-activation and activation costs payable under relevant *reserve contracts*, as well as potential compensation payable to *Affected Participants*, *Affected Load Participants* or *Market Customers* under rule 3.12 of the NER as a consequence of exercising the *RERT*. AEMO will also have regard to any material distortionary effects due to the use of emergency reserves.

In terms of effectiveness, the selection of *RERT* as an appropriate *supply scarcity mechanism* will depend on the availability of *reserve contracts* for *dispatch* or *activation* that are likely to address the prevailing *supply scarcity* conditions, based on factors including:

- size of *reserve blocks*;
- length of *dispatch* or *activation* times;

² Indicating conditions in which the available *supply* may become insufficient to securely meet demand for energy. This is different from the concept of 'system restoration' as defined in the *frequency operating standard*.

- *dispatch* or *activation* constraints (for example, maximum number of days or consecutive days per week of *dispatch* or *activation*, maximum and/or minimum periods of *dispatch* or *activation*)
- historical performance of the *reserve*: and
- shutdown periods when the *reserve* blocks are not available.

A.2.2 Directions

With respect to the cost of *directions*, AEMO will consider any cost estimates provided to AEMO by potential *Directed Participants* and account for the amount payable under the formula compensation mechanism in clause 3.15.7 of the NER by considering the minimum estimated *energy* required under the most likely potential *direction(s)* (MWh) x the price below which are 90% of the *spot prices* in the relevant *region*, for the 12 months preceding the *trading day* in which the *supply* scarcity conditions have occurred. As with the *RERT*, AEMO will also have regard to potential compensation payable to *Affected Participants*, *Affected Load Participants* or *Market Customers* and any material distortionary effects.

In terms of effectiveness, the selection of *directions* as an appropriate *supply scarcity mechanism* will depend on the availability for *direction* of *scheduled resources* or *market generating units* that are likely to address the prevailing *supply* scarcity conditions, based on factors including:

- time taken to synchronise;
- recall times;
- minimum run times;
- network location;
- minimum generation or demand reduction levels;
- delivery risk and uncertainty; and
- fuel availability.

A.2.3 Instructions

For *clause 4.8.9 instructions* for *load shedding*, the key cost consideration is the implied value of lost load when *load shedding* occurs. For this calculation, AEMO will use the energy-weighted average aggregate value of customer reliability (VCR) values (or equivalent) published by the *AER* for each *region*. AEMO will also have regard to any material distortionary effects.

The effectiveness of *clause 4.8.9 instructions* to address the *supply* scarcity condition will be considered having regard to all relevant factors, including the amount of *load* available to be shed at key *network* locations, the relative *load shedding* priorities and the application of the relevant *load shedding procedures*.

A.2.4 Assumptions

The key assumptions in the methodology are the three cost metrics above, as some of these values are not easily determined prior to the use of the *supply* scarcity mechanism.

AEMO will assume all facilities will perform/deliver as anticipated (including in accordance with *performance standards and reserve contracts* as applicable).

Version release history

Version	Effective date	Summary of changes
22	30 November 2023	Updated weather stations used for NEM Local Temperature Alerts.
21	1 October 2021	Updated to reflect terminology changes associated with Five Minute Settlements.
20	3 September 2021	Updated to reflect Wholesale Demand Response Rule changes made in June 2020 and the relevant schedules that commence operation on 24 October 2021.
19.0	3 May 2021	Updated LOR declaration description (Section 2.2) Finalised Supply Scarcity Procedures (Appendix A) required under NER clause 3.8.14A Updated document links
18.0	19 Nov 2020	Updated section on NEM Local Temperature Alerts
17.0	22 October 2020	Added new Appendix A to incorporate interim procedures required under NER clause 3.8.14A that relate to intervention under supply scarcity.
16.0	18 June 2020	Use of Forecast Uncertainty Measure in LOR trigger levels Inclusion of actions in <i>pre-dispatch</i> timeframe.
15.0	15 May 2017	Updated weather stations in use.
14.0	19 December 2016	Updated information of market reporting for forecast extreme temperature. Directions for updating LOR1 market notices. Tables 5 & 6 updated to reflect the latest weather stations in use.
13.0	07 January 2015	Weather stations for extreme temperatures included.
12.0	03 November 2014	Annual Review Updated reference temperature table.

Earlier versions are available by contacting the AEMO Support Hub at supporthub@aemo.com.au or call 1300 236 600.