

NEM Lack of Reserve Framework Report

30 April 2019

Reporting period 01 January 2019 to 31 March 2019

A report for the National Electricity Market on the operation of the Lack of Reserve Framework

Important notice

PURPOSE

AEMO has prepared this document under clause 4.8.4B of the National Electricity Rules to report on the operation of the NEM Lack of Reserve Framework for the period 1 January 2019 to 31 March 2019.

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VERSION CONTROL

Version	Release date	Changes
1	30 April 2019	Initial version

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Executive summary

In the reporting period 01 January to 31 March 2019 (Quarter 1 2019), AEMO declared a total of 27 Lack of Reserve (LOR) conditions¹, compared with nine in the previous reporting period (Quarter 4 2018). Sixteen LOR conditions were declared for the same period last year (Quarter 1 2018)². Of the 27 declared conditions in this reporting period, 10 were declared in relation to the extreme heat event on 24 - 25 January 2019.

Quarter 1 2019 covered the peak summer months, with a significantly higher number of periods of high demand, relative to the prior quarter. The predominant cause of LOR conditions was reduced generation availability (due to planned outages, forced outages, or capacity reductions), occurring during high demand periods. This increased the number of forecast and actual LOR conditions. Of the 27 forecast LOR conditions, six resulted in actual LOR1 condition declarations, three resulted in actual LOR2 condition declarations, and two resulted in the declaration of an actual LOR3 condition.

Of the 27 forecast LOR conditions, the FUM set the reserve requirement in 10 cases (37%). The percentage of LOR conditions where the FUM set the reserve requirement has decreased relative to the prior quarter, from approximately 67% in Quarter 4 2018 to 37% in Quarter 1 2019. This decrease coincides with the implementation of the updated Reserve Level Declaration Guidelines (Guidelines) in December 2018³. All forecast LOR2 conditions were declared with the FUM setting the reserve requirement. All actual LOR2 conditions were declared with the largest credible risk (LCR) setting the reserve requirement. These two outcomes indicate that the newly-tuned FUM and the LCR mechanisms are operating as anticipated to effectively identify credible risk in the respective forecast and real-time timeframes.

AEMO has published a detailed report for the declared actual LOR3 condition: *Load Shedding in Victoria on 24 and 25 January 2019*.⁴ The report provides information on the sequence of events, and the actions taken by AEMO to balance the demand with available supply and maintain the power system in a secure operating state.

The next report on the NEM Lack of Reserve Framework, for the reporting period 01 April 2019 to 30 June 2019, will be published by 31 July 2019.

¹ Forecast or Actual LOR1, LOR2, or LOR3

² This comparison is of limited value because the forecast uncertainty measure (FUM) was not in effect for those declarations. The FUM was introduced from 15 February 2018, MN 61250. All 16 LOR conditions in Q1 2018 were declared before that date under the previous LOR regime.

³ The changes to the Guidelines became effective on 12 December 2018. Refer to Market Notice 65921 issued on 13 December 2018 at 13:31 hrs.

⁴ Published 16 April 2019, available on AEMO's website at: http://aemo.com.au/-/media/Files/Electricity/NEM/Market_Notices_and_Events/Power_System_Incident_Reports/2019/Load-Shedding-in-VIC-on-24-and-25-January-2019.pdf

Contents

Executive summary	3
1. Introduction	5
2. Reserve Level Declaration Guidelines	7
2.1 Changes in the reporting period	7
2.2 Retraining of the Bayesian Belief Network	7
3. Lack of Reserve Conditions Declared	9
4. Review of Performance	27
4.1 Forecast Uncertainty Measure values	27
4.2 LOR declaration reserve requirements	30
4.3 Forecast and actual LOR declarations	31
4.4 Number and cause of LOR declarations	32
4.5 Load Shedding Events (24 and 25 January 2019)	32
Glossary	33
Tables	
Table 1 Summary of forecast and actual LOR conditions, with causing factors.	5
Table 2 LOR notices declared during the reporting period 1 January 2019 and 31 March 2019	10
Table 3 LORs declared during the reporting period by trigger (FUM or LCR).	31
Figures	
Figure 1 NSW region: maximum, minimum and average FUM values for the reporting period.	28
Figure 2 QLD region: maximum, minimum and average FUM values for the reporting period.	28
Figure 3 SA region: maximum, minimum and average FUM values for the reporting period.	29
Figure 4 TAS region: maximum, minimum and average FUM values for the reporting period.	29
Figure 5 VIC region: maximum, minimum and average FUM values for the reporting period.	30

1. Introduction

This report has been published in accordance with clause 4.8.4B of the National Electricity Rules (NER), to provide a high-level analysis of how the lack of reserve framework is operating. This report covers the period 01 January 2019 to 31 March 2019.

This report is divided into three sections:

- Reserve Level Declaration Guidelines – a summary of changes to the Guidelines over the past quarter, and the retraining of the Bayesian Belief Network.
- Lack of Reserve (LOR) conditions declared – details of all LOR conditions declared or revised during the past quarter (based on market notices), including an indication of the required reserve level and if the requirement was set by the Forecast Uncertainty Measure (FUM) or the largest credible risk/s (LCR) in the region. The FUM value for the respective period is also provided. Table 1 below provides a high-level summary of the LOR declarations and their causes.
- Review of Performance – a review of the performance of the lack of reserve framework and any observed trends, providing an assessment of FUM values compared to previous quarters, determinants of reserve level requirements, number of LOR declarations and leading factors or causes of LOR declarations.

Please direct all LOR inquiries to: www.aemo.com.au/Contact-us. In the inquiry form field 'What is your enquiry regarding?' write "LOR Framework Report".

The next LOR Framework report for period 01 April 2019 to 30 June 2019 will be published by 31 July 2019.

Table 1 Summary of forecast and actual LOR conditions, with causing factors.

Effective date ⁵	Region	LOR1		LOR2		LOR3		Cause
		Actual	Forecast	Actual	Forecast	Actual	Forecast	
03/01/2019	SA		1					High forecast demand.
15/01/2019	VIC		1		1			High forecast demand and reduced generation availability.
16/01/2019	NSW		1					High forecast demand and reduced generation availability.
17/01/2019	NSW	1			1			Reduced generation availability and relatively high demand.
18/01/2019	NSW		1		1			Reduced generation availability and relatively high forecast demand.
24/01/2019	SA		1	1			1	Very high demand and reduced generation availability.

⁵ Effective date is the date on which the condition has or is expected to occur, and may differ from the date on which a market notice advising of the (forecast) condition is issued.

Effective date ⁵	Region	LOR1		LOR2		LOR3		Cause
		Actual	Forecast	Actual	Forecast	Actual	Forecast	
24/01/2019	VIC	1		1		1		Very high demand and reduced generation availability. 266 MW of load was shed in Victoria.
25/01/2019	NSW				1			Import to Victoria being maximised when Victoria in LOR3 condition.
25/01/2019	VIC	1		1		1		Very high demand and reduced generation availability. A total of at least 250 MW load was shed in Victoria.
29/01/2019	VIC		1					Reduced generation availability and relatively high forecast demand.
30/01/2019	NSW		1					Relatively high forecast demand.
30/01/2019	VIC	1						High demand and reduced generation availability.
31/01/2019	NSW	1			1			Relatively high forecast demand.
01/03/2019	VIC	1			1			Forecast decrease in generation availability and relatively high demand.
12/03/2019	QLD		1		1			Relatively high forecast demand and reduced generation availability.
Total		6	8	3	7	2	1	27

The count of LOR conditions uses the methodology defined in section 3.

2. Reserve Level Declaration Guidelines

2.1 Changes in the reporting period

During the reporting period, there were no changes to the Guidelines⁶.

2.2 Retraining of the Bayesian Belief Network

The Bayesian Belief Network (BBN) is the algorithm which determines the Forecasting Uncertainty Measure (FUM), which in turn can determine Lack of Reserve (LOR) levels. This process is summarised in the Guidelines.

The intention of retraining the BBN is to update the network to include recent historical data since the last retraining. AEMO commenced retraining of the BBN in April 2019 to include data up to 31 March 2019. The retraining involves a three-stage process:

1. An Extract-Transform-Load (ETL) stage, to extract historical data up to 31 March 2019, perform data validation and cleansing, and compile the data into the structured format required to incorporate into the network.
2. An analysis and modelling stage, to update the network and compile the network nodes.
3. A test and verification stage, to ensure the retrained network is suitable for production implementation.

AEMO is in the final stage of the retraining process and plans to implement the retrained BBN into production in May 2019, pending final verification and readiness checks currently underway in the pre-production environment.

2.2.1 Results from retraining

To verify the retraining AEMO completed a backcast of every forecast interval of the calendar year 2018 using the existing BBN and the retrained BBN.

The results of this comparison indicate that changes to future FUM values can be expected due to the retrained BBN as follows:

- NSW – minor increase in FUM values of up to 60 MW for all forecast horizons.
- QLD – reduction in FUM values of up to approximately 90 MW for forecast horizons up to 24hrs ahead. For forecast horizons beyond 24hrs ahead changes to FUM values are expected to be immaterial.
- SA – minor increase in FUM values of up to approximately 10 MW for forecast horizons beyond 48hrs ahead. For forecast horizons up to 48hrs ahead changes to FUM values are expected to be immaterial.

⁶ The Guidelines are published on AEMO's website: <http://aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Power-system-operation>

- TAS – minor reduction in FUM values of up to approximately 15 MW for all forecast horizons.
- VIC – minor reduction in FUM values of up to approximately 45 MW for forecast horizons beyond 24hrs ahead. For forecast horizons up to 24hrs ahead changes to FUM values are expected to be immaterial.

3. Lack of Reserve Conditions Declared

Table 2 lists all forecast and actual LORs declarations over the reporting period 01 January 2019 to 31 March 2019. Table 2 also identifies the market notices that communicated updates to, and cancellation of, either forecast or actual LOR conditions.

The total count for LOR conditions is based on the following principles:

- All market notices making the initial declaration of a forecast or actual LOR condition with an effective date during the reporting period were counted.
- Any market notices which updated previously issued forecast or actual LORs for a given effective date (in relation to the reserve requirement, reserve capacity available or effective period) were not counted to prevent double counting of a continuing condition.
- In cases where forecast LORs were cancelled but subsequently re-issued with approximately the same effective period, re-issues were not counted to prevent double counting of effective periods.
- Updates to existing LOR conditions where the LOR level changed were counted as separate LOR conditions.
- Any forecast LORs which were subsequently declared as actual LORs at the same LOR level are counted once. In the summary table in section 1 these are shown as actual conditions only.

For example, where a forecast LOR1 was issued and later an actual LOR1 was declared for a similar period, only the actual LOR1 is counted. But if the initial forecast was for a forecast LOR2 condition and this was later declared as an actual LOR1 then this would be counted as two LOR conditions due to the differing LOR levels.

In addition to LOR conditions listed in Table 2, during the reporting period there were four instances of suspect forecast LORs⁷. In each instance, the condition was either found to be invalid or was resolved as the forecast condition was being investigated. AEMO will review and update its procedures to communicate the purpose and process for advising of suspect LOR conditions.

⁷ Market notices: 66627 issued 24/01/2019 at 1600 hrs, 66720 issued 24/01/2019 at 2137 hrs, 66727 issued 25/01/2019 0228 hrs, 67751 issued 13/03/2019 0627 hrs

Table 2 LOR notices declared during the reporting period 1 January 2019 and 31 March 2019

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
NSW Region									
16/01/2019 1500 - 1700	66415	16/01/2019 09:14	LOR1	Forecast	Forecast LOR1 due to relatively high demand and reduced generation availability.	1,300	1,106	635	LCR2
16/01/2019	66418	16/01/2019 12:37	LOR1	Cancelled	This cancels MN 66415. Forecast LOR1 cancelled mainly due to an increase in generation availability.	1,300	1,309	472	LCR2
17/01/2019 1530 - 1700	66420	16/01/2019 12:46	LOR2	Forecast	Forecast LOR2 due to a combination of generation plant outages and high demand.	889	734	889	FUM
17/01/2019 1430 - 1530	66421	16/01/2019 13:26	LOR1	Forecast	Forecast LOR1 due to relatively high demand and reduced generation availability.	1,300	1,006	870	LCR2
17/01/2019 1700 - 1730	66421	16/01/2019 13:26	LOR1	Forecast	Forecast LOR1 due to relatively high demand and reduced generation availability.	1,300	1,054	894	LCR2
17/01/2019	66426	16/01/2019 14:47	LOR2	Cancelled	This cancels MN 66420. LOR2 condition was cancelled mainly due to an increase in generation availability.	877	938	804	LCR
17/01/2019 1500 - 1730	66428	16/01/2019 14:54	LOR1	Updated	Updated due to change in the effective period (reserve condition improved, LOR2 periods downgraded to LOR1 and some previous LOR1 periods remain).	1,320	946	804	LCR2
17/01/2019 1530 - 1700	66434	17/01/2019 10:47	LOR1	Updated	Update to existing LOR1 due to changes in the reserve available, and effective period.	1,320	1,139	608	LCR2
17/01/2019 1530 - 1700	66439	17/01/2019 15:49	LOR1	Actual	Actual LOR1 declared.	1,320	1,148	213	LCR2

⁸ Reserve Required and Reserve Available are the values that correspond to the trading interval in the effective period with the lowest reserve available.

⁹ The value in this field represents the FUM value for the trading interval during which the minimum available reserve occurred (see Reserve Requirement (MW) – Available field).

¹⁰ LCR refers to Largest Credible Risk, this is the single largest credible risk in the region. LCR2 refers to the sum of the two largest credible risks in the region.

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
17/01/2019	66442	17/01/2019 17:11	LOR1	Cancelled	This cancels MN 66439. Cancellation of actual LOR1 condition.	1,320	1,388	213	LCR2
18/01/2019 1530 - 1600	66391	15/01/2019 15:31	LOR1	Forecast	Forecast LOR1 due to combination of relatively high demand, and significant reduction of generation availability for the effective period.	1,320	1,258	n/a - forecast > 72hrs ahead	LCR2
18/01/2019 1530 - 1600	66397	15/01/2019 18:25	LOR2	Forecast	Forecast LOR2 due to relatively high forecast demand.	1,191	1,106	1,191	FUM
18/01/2019 1500 - 1630	66407	15/01/2019 20:47	LOR2	Updated	Update to existing LOR2 with changes to generation availability and effective period.	1,180	1,013	1,180	FUM
18/01/2019	66413	16/01/2019 07:09	LOR2	Cancelled	This cancels MN 66407. Cancellation due to reduction in reserve requirements (FUM reduced).	1,014	1,056	1,014	FUM
18/01/2019 1430 - 1700	66419	16/01/2019 12:53	LOR2	Forecast	Forecast LOR2 due to a combination of reduced generation availability and relatively high demand.	1,107	711	1,107	FUM
18/01/2019 1430 - 1500	66425	16/01/2019 14:57	LOR1	Forecast	LOR1 condition forecast due to relatively high demand and decrease in generation availability.	1,320	1,172	1,058	LCR2
18/01/2019 1500 - 1700	66427	16/01/2019 14:56	LOR2	Updated	Update to existing LOR2 with changes to generation availability and effective period.	1,062	911	1,062	FUM
18/01/2019 1430 - 1700	66433	17/01/2019 08:38	LOR2	Updated	Update to existing LOR2 with changes to demand and effective period.	904	573	904	FUM
18/01/2019 1430 - 1700	66435	17/01/2019 11:03	LOR2	Updated	Update to existing LOR2 with changes to generation availability for the effective period.	907	475	907	FUM
18/01/2019 1400 - 1500	66436	17/01/2019 12:55	LOR1	Forecast	Forecast LOR1 due to a combination of reduced generation availability and relatively high demand for the effective period.	1,320	878	870	LCR2

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
18/01/2019 1700 - 1730	66436	17/01/2019 12:55	LOR1	Forecast	Forecast LOR1 due to a combination of reduced generation availability and relatively high demand, and effective period.	1,320	1,148	897	LCR2
18/01/2019 1500 - 1700	66437	17/01/2019 12:57	LOR2	Forecast	Forecast LOR2 due to a combination of reduced generation availability, relatively high demand, and effective period.	889	562	889	FUM
18/01/2019 1400 - 1600	66440	17/01/2019 16:50	LOR1	Updated	Update to existing LOR1 with changes to generation availability, forecast demand and effective period.	1,320	779	767	LCR2
18/01/2019 1700 - 1730	66440	17/01/2019 16:50	LOR1	Updated	Update to existing LOR1 with changes to generation availability, forecast demand and effective period.	1,320	1,114	783	LCR2
18/01/2019 1600 - 1700	66441	17/01/2019 16:51	LOR2	Updated	Update to existing LOR2 with changes to generation availability, forecast demand, and effective period.	775	729	775	FUM
18/01/2019	66445	18/01/2019 03:06	LOR2	Cancelled	This cancels MN 66419. LOR2 condition was cancelled mainly due to an increase in generation availability (non-energy limited) for the effective period.	772	764	764	LCR
18/01/2019 1430 - 1730	66447	18/01/2019 03:07	LOR1	Updated	Update to existing LOR1 with changes to generation availability (non-energy limited) and effective period.	1,320	823	531	LCR2
18/01/2019 1500 - 1730	66457	18/01/2019 12:39	LOR1	Updated	Update to existing LOR1 with changes to generation availability (non-energy limited) and effective period.	1,360	1,138	511	LCR2
18/01/2019	66458	18/01/2019 14:07	LOR1	Cancelled	This cancels MN 66457. LOR1 condition was cancelled mainly due to reduction of forecast demand.	1,360	1,367	392	LCR2
25/01/2019 1500 – 1530	66591	24/01/2019 08:39	LOR2	Forecast	Spare capacity in NSW transferred to VIC region to minimise its LOR3 condition subject to power transfer limits, resulting in LOR2 condition in NSW.	898	722	898	FUM
25/01/2019	66611	24/01/2019 13:17	LOR2	Cancelled	This cancels MN 66591. Improved reserves in VIC region removing forecast LOR3 condition in VIC between 1430 – 1630 hrs in turn reduced support required from NSW to VIC.	897	1,746	889	FUM

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
30/01/2019 1500 - 1700	66904	29/01/2019 13:02	LOR1	Forecast	LOR1 condition forecast due to relatively high demand forecast.	1,300	1,098	889	LCR2
30/01/2019 1400 - 1700	66954	30/01/2019 00:39	LOR1	Updated	Update to existing LOR1 with changes generation availability (non-energy limited) for the effective period.	1,300	892	657	LCR2
30/01/2019	66973	30/01/2019 11:44	LOR1	Cancelled	This cancels MN 66904. LOR1 condition was cancelled mainly due to an increase in generation availability (non-energy limited).	1,320	1,416	516	LCR2
31/01/2019 1530 - 1700	66906	29/01/2019 15:23	LOR2	Forecast	Forecast LOR2 due to relatively high demand forecast.	1,138	924	1,138	FUM
31/01/2019 1500 - 1700	66950	29/01/2019 22:29	LOR1	Forecast	Forecast LOR1 due to forecast relatively high demand for the effective period.	1,300	1,075	933	LCR2
31/01/2019	66951	29/01/2019 22:31	LOR2	Cancelled	This cancels MN 66906. LOR2 condition was cancelled due to reduction in reserve requirements (FUM reduced) and an increase in generation availability (non-energy limited).	995	1,089	995	FUM
31/01/2019 1530 - 1630	66962	30/01/2019 06:28	LOR2	Forecast	Forecast LOR2 due to a combination of forecast generation availability and relatively high forecast demand.	874	770	874	FUM
31/01/2019 1430 - 1730	66976	30/01/2019 13:18	LOR1	Forecast	Forecast LOR1 due to relatively high demand forecast, and interconnector flow reduction.	1,300	767	851	LCR2
31/01/2019 1600 - 1630	66977	30/01/2019 13:19	LOR2	Updated	Update to existing LOR2 with changes to reserve requirements, interconnector flow reduction, and change to effective period.	851	767	851	FUM
31/01/2019 1600 - 1630	66978	30/01/2019 13:22	LOR2	Updated	Forecast LOR2 due to relatively high demand forecast, and interconnector flow reduction.	851	767	851	FUM
31/01/2019	66989	30/01/2019 17:14	LOR2	Cancelled	This cancels MN 66978. LOR2 was cancelled mainly due to decrease in forecast demand and increase in generation availability.	750	777	750	FUM

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
31/01/2019 1430 - 1700	67037	31/01/2019 10:45	LOR1	Updated	Update to existing LOR1 with changes to reserve requirements and effective period.	1,397	1,114	637	LCR2
31/01/2019 1530 - 1700	67038	31/01/2019 11:41	LOR1	Updated	Update to existing LOR1 with changes to reserve requirements and effective period.	1,340	1,177	600	LCR2
31/01/2019 1500 - 1700	67042	31/01/2019 15:04	LOR1	Actual	Actual LOR1 declared.	1,340	1,142	213	LCR2
31/01/2019	67049	31/01/2019 17:31	LOR1	Cancelled	Cancellation of actual LOR1. This cancels MN 67042.	1,320	1,835	213	LCR2
QLD Region									
12/03/2019 1630 - 1730	67717	11/03/2019 12:51	LOR2	Forecast	Forecast LOR2 due to relatively high demand and reduced generation availability.	621	507	621	FUM
12/03/2019 1600 - 1630	67718	11/03/2019 12:51	LOR1	Forecast	Forecast LOR1 due to relatively high demand and reduced generation availability.	849	681	624	LCR2
12/03/2019 1730 - 1830	67718	11/03/2019 12:51	LOR1	Forecast	Forecast LOR1 due to relatively high demand and reduced generation availability.	820	651	603	LCR2
12/03/2019 1600 - 1800	67720	11/03/2019 16:21	LOR2	Cancelled	This cancels MN 67717. Cancellation of forecast LOR2 due to an increase in generation availability and reduction in FUM.	586	593	586	FUM
12/03/2019	67721	11/03/2019 16:26	LOR1	Updated	Update to existing LOR1 forecast with changes to reserve requirement and effective period.	793	593	586	LCR2
12/03/2019 1600 - 1800	67723	12/03/2019 05:37	LOR1	Updated	Update to existing LOR1 forecast with changes to reserve requirement for the effective period.	793	551	384	LCR2
12/03/2019 1630 - 1700	67738	12/03/2019 12:41	LOR1	Updated	Update to existing LOR1 forecast with changes to demand forecast and effective period.	793	788	440	LCR2
12/03/2019 1630 - 1730	67739	12/03/2019 14:13	LOR1	Updated	Update to existing LOR1 forecast with changes to demand forecast.	793	739	381	LCR2

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
12/03/2019	67741	12/03/2019 16:14	LOR1	Cancelled	This cancels MN 67739. Forecast LOR1 was cancelled due to a reduction in forecast demand.	793	849	318	LCR2
SA Region									
03/01/2019 1800 - 1930	66230	31/12/2018 14:41	LOR1	Forecast	Forecast LOR1 due to relatively high demand.	600	545	n/a - forecast > 72hrs ahead	LCR2
03/01/2019 1900 - 1930	66235	01/01/2019 14:29	LOR1	Updated	Forecast LOR1 due to relatively high demand.	600	501	379	LCR2
03/01/2019	66241	02/01/2019 14:15	LOR1	Cancelled	This cancels MN 66235. Cancellation of forecast LOR1 condition due to an increase in generation availability.	600	675	338	LCR2
24/01/2019 1900 - 2000	66498	22/01/2019 15:26	LOR1	Forecast	Forecast LOR1 due to relatively high demand.	600	474	368	LCR2
24/01/2019 1630 - 1830	66506	22/01/2019 16:51	LOR2	Forecast	Forecast LOR2 due to relatively high demand and reduced generation availability. Net import was reduced by 470 MW.	351	215	351	FUM
24/01/2019 1800 - 1830	66550	23/01/2019 13:14	LOR2	Updated	Forecast LOR2 due to relatively high demand, reduced generation availability and change in effective period. Net import was reduced by 390 MW.	316	256	316	FUM
24/01/2019 1730 - 1900	66551	23/01/2019 14:58	LOR1	Updated	Forecast LOR1 due to relatively high demand and reduced generation availability.	429	300	277	LCR2
24/01/2019	66552	23/01/2019 15:01	LOR2	Cancelled	This cancels MN 66506. Forecast LOR2 was cancelled due to reduction in the level of LCR1 / LOR2 trigger.	277	300	277	LCR
24/01/2019 1800 - 1830	66558	23/01/2019 16:18	LOR3	Forecast	Forecast LOR3 due to relatively high demand and reduced generation availability. Net import was reduced by 728 MW.	0	-39	255	0
24/01/2019 1630 - 1800	66560	23/01/2019 16:49	LOR2	Forecast	Forecast LOR2 due to relatively high demand and reduced generation availability.	260	54	260	FUM

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
24/01/2019 1830 - 1900	66560	23/01/2019 16:49	LOR2	Forecast	Forecast LOR2 due to relatively high demand, reduced generation availability, and change to effective period.	265	87	265	FUM
24/01/2019 1900 - 1930	66565	23/01/2019 16:57	LOR1	Updated	Update to existing LOR1 condition due to relatively high demand and reduced generation availability.	431	286	270	LCR2
24/01/2019	66570	23/01/2019 20:53	LOR3	Cancelled	This cancels MN 66558. The forecast LOR3 condition was cancelled due to changes in net Import.	0	5	257	0
24/01/2019 1600 - 2000	66572	23/01/2019 21:19	LOR2	Updated	Update to existing LOR2 due to improvement in net import and effective period.	244	1	244	FUM
24/01/2019 1730 - 1900	66575	24/01/2019 02:09	LOR2	Updated	Update to existing LOR2 due to improvement net import and effective period.	234	120	201	LCR
24/01/2019 1730 - 1830	66577	24/01/2019 07:55	LOR2	Updated	Update to existing LOR2 due to improvement in net import, and effective period.	234	203	190	LCR
24/01/2019 1630 - 1730	66578	24/01/2019 07:56	LOR1	Updated	Update to existing LOR1 due to improvement in net import.	430	245	186	LCR2
24/01/2019 1830 - 1930	66578	24/01/2019 07:56	LOR1	Updated	Update to existing forecast LOR1 due to improvement in net import, and effective period.	430	245	192	LCR2
24/01/2019 1730 - 1900	66589	24/01/2019 08:25	LOR2	Updated	Update to existing LOR2 forecast due to improvement in net import.	234	192	177	LCR
24/01/2019 1630 - 1700	66602	24/01/2019 10:53	LOR1	Updated	Update to existing LOR1 forecast with improvement in net import, and effective period.	430	334	203	LCR2
24/01/2019 1900 - 1930	66602	24/01/2019 10:53	LOR1	Updated	Update to existing LOR1 forecast with improvement in net import, and effective period.	430	334	175	LCR2
24/01/2019 1700 - 1900	66603	24/01/2019 10:53	LOR2	Updated	Update to existing LOR2 forecast with improvement in net import, and effective period.	234	60	185	LCR
24/01/2019 1800 - 1900	66638	24/01/2019 17:03	LOR3	Forecast	Forecast LOR3 due to relatively high demand and reduced generation availability. Net import constrained (export 337 MW).	0	-39	163	0

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
24/01/2019 1740 - 1900	66666	24/01/2019 18:06	LOR2	Actual	Actual LOR2 condition declared.	233	10	178	LCR
24/01/2019	66721	24/01/2019 21:53	LOR2	Cancelled	This cancels MN 66666. Cancellation of actual LOR2 condition.	350	409	183	LCR
VIC Region									
15/01/2019 1500 - 1800	66333	12/01/2019 22:47	LOR2	Forecast	Forecast LOR2 due to a combination of forecast relatively high demand and reduced generation availability.	1,075	800	1,075	FUM
15/01/2019	66336	13/01/2019 16:31	LOR2	Cancelled	This cancels MN 66333. LOR2 condition was cancelled mainly due to an increase in forecast available generation for the effective period.	1,120	1,387	1,003	FUM
15/01/2019 1530 - 1700	66337	13/01/2019 20:26	LOR2	Forecast	Forecast LOR2 due to a combination of forecast relatively high demand and reduced generation availability.	948	863	948	FUM
15/01/2019 1500 - 1530	66338	13/01/2019 20:39	LOR1	Forecast	Forecast LOR1 due to a combination of forecast relatively high demand and reduced generation availability.	1,090	1,037	956	LCR2
15/01/2019 1700 - 1800	66338	13/01/2019 20:39	LOR1	Forecast	Forecast LOR1 due to a combination of forecast relatively high demand and generation availability.	1,090	955	950	LCR2
15/01/2019 1430 - 1800	66346	14/01/2019 12:51	LOR2	Forecast	Forecast LOR2 due to a combination of forecast relatively high demand and generation availability.	978	658	978	FUM
15/01/2019 1500 - 1730	66347	14/01/2019 17:47	LOR2	Updated	Update to existing LOR2 condition due to a relatively high demand and plant outages.	748	572	748	FUM
15/01/2019 1400 - 1500	66348	14/01/2019 17:47	LOR1	Updated	Update to existing LOR1 due to changes to forecast demand and interconnector flow for the effective period.	1,090	887	748	LCR2
15/01/2019 1730 - 1800	66348	14/01/2019 17:47	LOR1	Updated	Update to existing LOR1 due to changes to forecast demand and interconnector flow for the effective period.	1,090	887	773	LCR2
15/01/2019	66349	14/01/2019 20:26	LOR2	Cancelled	This cancels MN 66346. LOR2 condition was cancelled mainly due to reduction in forecast demand for the effective period.	723	1,001	697	FUM

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
15/01/2019 1530 - 1700	66351	14/01/2019 20:30	LOR1	Updated	Update to existing LOR1 condition due to reduction in forecast demand for the effective period.	1,090	1,002	697	LCR2
15/01/2019	66386	15/01/2019 11:57	LOR1	Cancelled	This cancels MN 66338. LOR1 condition was cancelled predominately due to a combination of a reduction in forecast demand and generation availability for the effective period.	1,090	1,126	554	LCR2
15/01/2019 1600 - 1700	66390	15/01/2019 13:14	LOR1	Forecast	Forecast LOR1 due to forecasted high demand and generation availability.	1,090	1,032	455	LCR2
15/01/2019	66392	15/01/2019 14:47	LOR1	Cancelled	This cancels MN 66390. LOR1 condition was cancelled due to a reforecast in demand for the effective period.	1,050	1,626	338	LCR2
24/01/2019 1500 - 1930	66484	21/01/2019 14:47	LOR1	Forecast	Forecast LOR1 due to forecasted high demand for the effective period.	1,120	740	n/a as forecast period beyond 72hrs ahead	LCR2
24/01/2019 1530 - 1600	66486	21/01/2019 17:04	LOR2	Forecast	Forecast LOR2 due to a combination of forecasted high demand, reduced generation availability for the effective period and increase in LOR trigger level due to FUM.	1,075	908	1,075	FUM
24/01/2019 1600 - 1900	66489	22/01/2019 07:43	LOR2	Updated	Update to existing LOR2 due to changes to forecast demand and the effective period.	1,100	902	1,100	FUM
24/01/2019 1600 - 1900	66492	22/01/2019 13:46	LOR2	Updated	Update to existing LOR2 due to changes to forecast demand.	1,129	792	1,129	FUM
24/01/2019	66499	22/01/2019 15:26	LOR1	Cancelled	This cancels MN 66484. LOR1 condition was cancelled predominately due to a combination of a reduction in forecast demand and generation availability for the effective period.	1,120	786	1,033	LCR2
24/01/2019 1530 - 1930	66503	22/01/2019 16:48	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,070	215	1,070	FUM

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
24/01/2019 1530 - 1930	66532	23/01/2019 07:41	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,003	202	1,003	FUM
24/01/2019 1530 - 1930	66534	23/01/2019 10:44	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,066	180	1,066	FUM
24/01/2019 1600 - 1930	66542	23/01/2019 13:13	LOR2	Forecast	Forecast LOR2 due to forecasted relatively high demand and decrease in interconnector flow for the effective period.	991	256	991	FUM
24/01/2019 1530 - 1600	66553	23/01/2019 15:04	LOR1	Forecast	Forecast LOR1 due to forecasted relatively high demand.	1,120	1,069	929	LCR2
24/01/2019 1930 - 2000	66553	23/01/2019 15:04	LOR1	Forecast	Forecast LOR1 due to forecasted relatively high demand.	1,120	1,050	932	LCR2
24/01/2019 1800 - 1830	66556	23/01/2019 16:18	LOR3	Forecast	Forecast LOR3 due to very high demand and reduced generation availability. Net import got reduced by 566 MW.	0	-39	861	0
24/01/2019 1530 - 1800	66561	23/01/2019 16:48	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability and reduction in net import.	832	54	832	FUM
24/01/2019 1830 - 2000	66561	23/01/2019 16:48	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability and reduction in net import.	841	87	841	FUM
24/01/2019	66569	23/01/2019 20:51	LOR3	Cancelled	This cancels MN 66556. Forecast LOR3 condition was cancelled predominately due to increase generation availability for the effective period.	0	14	685	0
24/01/2019 1600 - 2000	66571	23/01/2019 21:14	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	681	1	681	FUM
24/01/2019 1630 - 2000	66574	24/01/2019 02:08	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	647	120	647	FUM
24/01/2019 1630 - 2000	66579	24/01/2019 07:56	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	585	203	585	FUM

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
24/01/2019 1530 - 1630	66581	24/01/2019 07:56	LOR1	Updated	Update to existing LOR1 due to changes in forecast generation availability.	1,120	634	553	LCR2
24/01/2019 2000 - 2030	66581	24/01/2019 07:56	LOR1	Updated	Update to existing LOR1 due to changes in forecast generation availability.	1,120	859	616	LCR2
24/01/2019 1630 - 2000	66588	24/01/2019 08:26	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	577	192	577	FUM
24/01/2019 1500 - 1630	66604	24/01/2019 10:55	LOR1	Updated	Update to existing LOR1 due to changes in forecast generation availability.	1,120	571	568	LCR2
24/01/2019 2000 - 2030	66604	24/01/2019 10:55	LOR1	Updated	Update to existing LOR1 due to changes in forecast generation availability.	1,120	881	592	LCR2
24/01/2019 1630 - 2000	66605	24/01/2019 10:56	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	577	60	577	FUM
24/01/2019 1500 - 2030	66621	24/01/2019 15:21	LOR1	Actual	Actual LOR1 declared.	1,120	761	160	LCR2
24/01/2019 1600 - 2000	66630	24/01/2019 16:22	LOR2	Actual	Actual LOR2 declared.	560	56	522	LCR
24/01/2019 1800 - 1900	66637	24/01/2019 17:03	LOR3	Forecast	Forecast LOR3 due to very high demand and reduced generation availability.	0	-39	535	0
24/01/2019 1810 - 1910	66670	24/01/2019 18:14	LOR3	Actual	Actual LOR3 declared.	0	-75	372	0
24/01/2019	66708	24/01/2019 20:00	LOR3	Cancelled	This cancels MN 66670. Cancellation of actual LOR3 condition.	0	61	258	0
24/01/2019	66722	24/01/2019 21:54	LOR2	Cancelled	This cancels MN 66630. Cancellation of actual LOR2 condition.	560	646	646	LCR
24/01/2019	66723	24/01/2019 21:56	LOR1	Cancelled	This cancels MN 66621. Cancellation of actual LOR1 condition.	1,120	1,370	1,370	LCR2

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
25/01/2019 1200 - 1500	66484	21/01/2019 14:47	LOR1	Forecast	Forecast LOR1 due to forecasted high demand for the effective period.	1,120	787	n/a as forecast period beyond 72hrs ahead	LCR2
25/01/2019	66499	22/01/2019 15:26	LOR1	Cancelled	This cancels MN 66484. LOR1 condition was cancelled due to effective period being declared as forecast LOR2 – refer to MN 66500.	1,100	1,054	1,100	FUM
25/01/2019 1230 - 1400	66500	22/01/2019 15:26	LOR2	Forecast	Forecast LOR2 due to a combination of forecasted high demand, reduced generation availability for the effective period and increase in LOR trigger level due to FUM.	1,100	1,053	1,100	FUM
25/01/2019 1100 - 1530	66503	22/01/2019 16:48	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,175	524	1,175	FUM
25/01/2019 1030 - 1600	66532	23/01/2019 07:41	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,063	192	1,063	FUM
25/01/2019 1130 - 1600	66534	23/01/2019 10:44	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,099	622	1,099	FUM
25/01/2019 1000 - 1700	66559	23/01/2019 16:29	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,109	283	1,109	FUM
25/01/2019 1030 - 1700	66573	24/01/2019 02:13	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	944	174	944	FUM
25/01/2019 1500 - 1530	66593	24/01/2019 08:43	LOR3	Forecast	LOR3 condition forecast due to very high demand and reduced generation availability.	0	-27	1,033	0
25/01/2019 1000 - 1500	66600	24/01/2019 09:36	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,046	57	1,046	FUM
25/01/2019 1530 - 1800	66600	24/01/2019 09:36	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,032	102	1,032	FUM

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
25/01/2019 1300 - 1330	66607	24/01/2019 11:51	LOR3	Updated	Update to existing LOR3 due to changes in forecast generation availability.	0	-2	1,012	0
25/01/2019 1400 - 1430	66607	24/01/2019 11:51	LOR3	Updated	Update to existing LOR3 due to changes in forecast generation availability.	0	-2	1,036	0
25/01/2019 1500 - 1530	66607	24/01/2019 11:51	LOR3	Updated	Update to existing LOR3 due to changes in forecast generation availability.	0	-127	1,028	0
25/01/2019 1000 - 1300	66608	24/01/2019 11:52	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	997	8	997	FUM
25/01/2019 1330 - 1400	66608	24/01/2019 11:52	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,027	1	1,027	FUM
25/01/2019 1430 - 1500	66608	24/01/2019 11:52	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,034	27	1,034	FUM
25/01/2019 1530 - 1800	66608	24/01/2019 11:52	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	1,021	5	1,021	FUM
25/01/2019 1230 - 1430	66613	24/01/2019 13:46	LOR3	Forecast	Forecast LOR3 due to very high demand and reduced generation availability.	0	-10	837	0
25/01/2019 1030 - 1230	66614	24/01/2019 13:46	LOR2	Forecast	Update to existing LOR2 due to changes in forecast generation availability.	806	91	806	FUM
25/01/2019 1430 - 1630	66614	24/01/2019 13:46	LOR2	Forecast	Update to existing LOR2 due to changes in forecast generation availability.	886	65	886	FUM
25/01/2019 0930 - 1030	66615	24/01/2019 13:46	LOR1	Forecast	Update to existing LOR1 due to changes in forecast generation availability.	1,120	795	732	LCR2
25/01/2019 1630 - 1700	66615	24/01/2019 13:46	LOR1	Forecast	Update to existing LOR1 due to changes in forecast generation availability.	1,120	1,032	951	LCR2
25/01/2019	66623	24/01/2019 15:29	LOR3	Cancelled	This cancels MN 66613. LOR1 condition was cancelled predominately due to increase in Net export.	0	23	762	0

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
25/01/2019 1200 - 1500	66714	24/01/2019 21:25	LOR3	Forecast	Forecast LOR3 due to very high demand and reduced generation availability.	0	-186	626	0
25/01/2019 1030 - 1200	66716	24/01/2019 21:29	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	614	166	614	FUM
25/01/2019 1500 - 1530	66716	24/01/2019 21:29	LOR2	Updated	Update to existing LOR2 due to changes in forecast generation availability.	657	375	657	FUM
25/01/2019 0930 - 1030	66717	24/01/2019 21:31	LOR1	Updated	Update to existing LOR1 due to changes in forecast generation availability.	1,120	848	619	LCR2
25/01/2019 1530 - 1630	66717	24/01/2019 21:31	LOR1	Updated	Update to existing LOR1 due to changes in forecast generation availability.	1,120	665	658	LCR2
25/01/2019 1400 - 1500	66728	25/01/2019 04:40	LOR3	Updated	Forecast LOR3 due to very high demand and reduced generation availability.	0	-47	569	0
25/01/2019 1100 - 1400	66729	25/01/2019 04:40	LOR2	Updated	Update to Forecast LOR2 condition due to a combination of forecast relatively high demand and generation availability.	561	5	561	FUM
25/01/2019 1500 - 1530	66729	25/01/2019 04:40	LOR2	Updated	Update to Forecast LOR2 condition due to a combination of forecast relatively high demand and generation availability.	585	389	585	FUM
25/01/2019 0900 - 1200	66731	25/01/2019 07:52	LOR2	Updated	Update to Forecast LOR2 condition due to a significant demand forecast increase.	560	82	479	LCR
25/01/2019 1500 - 1530	66731	25/01/2019 07:52	LOR2	Updated	Update to Forecast LOR2 condition due to a significant demand forecast increase.	548	279	548	FUM
25/01/2019 1200 - 1500	66744	25/01/2019 07:51	LOR3	Updated	Update to Forecast LOR3 condition due to a combination of forecast relatively high demand and generation availability.	0	-307	544	0
25/01/2019 0800 - 0900	66745	25/01/2019 07:52	LOR1	Updated	Update to existing LOR1 due to increase in demand forecast.	1,120	681	282	LCR2

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
25/01/2019 1530 - 1630	66745	25/01/2019 07:52	LOR1	Updated	Update to existing LOR1 due to increase in demand forecast.	1,120	561	549	LCR2
25/01/2019 0800 - 1630	66746	25/01/2019 08:21	LOR1	Actual	Actual LOR1 declared.	1,120	640	160	LCR2
25/01/2019 1000 - 1500	66747	25/01/2019 08:50	LOR3	Updated	Update to existing LOR1 due to increase in demand forecast.	0	-361	530	0
25/01/2019 0900 - 1000	66748	25/01/2019 08:51	LOR2	Updated	Update to Forecast LOR2 condition due to a significant demand forecast increase.	560	149	282	LCR
25/01/2019 1500 - 1600	66748	25/01/2019 08:51	LOR2	Updated	Update to Forecast LOR2 condition due to a significant demand forecast increase.	543	265	543	FUM
25/01/2019 0945 - 1530	66751	25/01/2019 09:50	LOR2	Actual	Actual LOR2 declared.	560	119	160	LCR
25/01/2019 1030 - 1500	66752	25/01/2019 10:01	LOR3	Updated	Decrease in available generation.	0	-200	498	0
25/01/2019 1030 - 1500	66767	25/01/2019 10:49	LOR3	Updated	Decrease in available generation.	0	-463	361	0
25/01/2019 1100 - 1500	66768	25/01/2019 11:04	LOR3	Actual	Actual LOR3 declared.	0	-100 ¹¹	160	0
25/01/2019	66819	25/01/2019 13:50	LOR3	Cancelled	This cancels MN 66768. Cancellation of actual LOR3 condition.	0	223	160	0
25/01/2019 1400 - 1530	66820	25/01/2019 14:22	LOR2	Updated	Update to existing LOR2 due to forecast demand reduction.	540	223	160	LCR
25/01/2019 1600 - 1700	66821	25/01/2019 16:15	LOR1	Updated	Update to Forecast LOR2 condition due to a combination of forecast relatively high demand and generation availability.	1,075	760	239	LCR2

¹¹ AEMO directed load shedding of 100 MW at 1100. At 1130 AEMO directed a further 150 MW to be shed, making the total requirement 250 MW.

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
25/01/2019	66828	25/01/2019 16:01	LOR2	Cancelled	This cancels MN 66820. Cancellation of actual LOR2 condition.	540	621	239	LCR
25/01/2019	66832	25/01/2019 18:05	LOR1	Cancelled	This cancels MN 66821. Cancellation of actual LOR1 condition.	1,100	1,385	160	LCR2
29/01/2019 1600 - 1700	66907	29/01/2019 15:02	LOR1	Forecast	Forecast LOR1 due to a combination of relatively high demand and reduced generation availability.	1,120	1,042	383	LCR2
29/01/2019	66913	29/01/2019 16:05	LOR1	Cancelled	Cancellation of forecast LOR1 condition due to a significant decrease in forecasted demand.	1,120	1,173	284	LCR2
30/01/2019 1600 - 1700	66905	29/01/2019 13:02	LOR1	Forecast	Forecast LOR1 due to a combination of relatively high demand and reduced generation availability.	1,120	1,043	982	LCR2
30/01/2019 1530 - 1800	66934	29/01/2019 16:42	LOR1	Updated	Update to Existing LOR1 forecast with decrease in forecast demand for the effective period.	1,120	909	798	LCR2
30/01/2019 1400 - 1800	66974	30/01/2019 12:09	LOR1	Updated	Forecast LOR1 due to very high demand and reduced generation availability.	1,120	744	529	LCR2
30/01/2019 1400 - 1800	66981	30/01/2019 14:16	LOR1	Actual	Actual LOR1 declared.	1,120	766	422	LCR2
30/01/2019	66988	30/01/2019 16:43	LOR1	Cancelled	Cancellation of actual LOR condition, LOR period reduced due to demand forecast reduction.	1,120	1,201	164	LCR2
01/03/2019 1630 - 1700	67411	27/02/2019 13:22	LOR2	Forecast	Forecast LOR2 due to a combination of relatively high demand and forecast decrease in generator availability (and interconnector flow).	1,164	1,132	1,164	FUM
01/03/2019	67413	27/02/2019 14:58	LOR2	Cancelled	This cancels MN 67411. LOR2 condition was cancelled mainly due to an increase in interconnector availability for the effective period.	1,097	1,134	1,097	FUM
01/03/2019 1600 - 1800	67431	28/02/2019 16:52	LOR1	Forecast	Forecast LOR1 due to relatively high demand.	1,100	1,019	842	LCR2

Effective date & time	Market Notice ID	Issue date and time	Level	Actual, forecast, update or cancel	Comments	Reserve requirement (MW) ⁸		FUM value (MW) ⁹	Reserve requirement set by ¹⁰
						Required	Available		
01/03/2019 1530 - 1800	67448	01/03/2019 02:12	LOR1	Updated	Update to existing LOR1 with changes to interconnector flow and effective period.	1,100	895	670	LCR2
01/03/2019 1600 - 1800	67449	01/03/2019 06:18	LOR1	Updated	Update to existing LOR1 with changes to forecast generation availability and effective period.	1,100	984	608	LCR2
01/03/2019 1630 - 1700	67451	01/03/2019 13:06	LOR1	Updated	Update to existing LOR1 with changes to forecast generation availability and effective period.	1,100	1,083	561	LCR2
01/03/2019	67454	01/03/2019 14:12	LOR1	Cancelled	This cancels MN 67431. LOR1 condition was cancelled mainly due to an increase in forecast available generation for the effective period.	1,120	1,163	491	LCR2
01/03/2019 1630 - 1730	67480	01/03/2019 16:09	LOR1	Forecast	Forecast LOR1 due to relatively high demand and forecast generation availability for the effective period.	1,120	1,040	218	LCR2
01/03/2019 1630 - 1800	67481	01/03/2019 16:41	LOR1	Actual	Actual LOR1 declared.	1,120	953	160	LCR2
01/03/2019	67483	01/03/2019 17:07	LOR1	Cancelled	This cancels MN 67481. Cancellation of actual LOR1 condition.	1,120	1,274	160	LCR2
01/03/2019	67484	01/03/2019 17:11	LOR1	Cancelled	This cancels MN 67480. The forecast LOR1 condition was cancelled due to an increase in generation availability.	1,120	1,274	160	LCR2

4. Review of Performance

4.1 Forecast Uncertainty Measure values

The following section details the average, minimum and maximum FUM values for this reporting period, as compared with the equivalent quarterly values for each quarter of 2018. The relative changes in the FUM value distributions for this reporting period when compared to previous reporting periods can be seen in Figure 1 to Figure 5 below, and are summarised as follows:

- For NSW, average and maximum FUM values have significantly decreased, whilst minimum FUM values have remained relatively steady.
- For QLD, average and maximum FUM values have significantly decreased, whilst minimum FUM values have remained relatively steady.
- For SA, average and maximum FUM values have significantly decreased. Minimum FUM values have either minimally increased or decreased depending on the forecast horizon.
- For TAS, maximum FUM values have significantly decreased. Average FUM values have significantly decreased for horizons up to and including 12 hours ahead, whilst for horizons from 24 hours ahead and beyond have remained relatively steady. Minimum FUM values have remained relatively steady.
- For VIC, average FUM values have significantly decreased for horizons up to and including 12 hours ahead, whilst for horizons 24 hours ahead and beyond have remained relatively steady. Maximum FUM values have significantly decreased for horizons up to and including 12 hours ahead, have slightly decreased at 60 hours ahead, and remain relatively steady for 24 to 48 hours ahead. Minimum FUM values have remained relatively steady.

The observed changes to the average FUM values for this reporting period are generally consistent with expected changes published in the Consultation on changes to the Reserve Level Declaration Guidelines¹².

¹² Refer to the Update Paper published during the Consultation: <http://aemo.com.au/Stakeholder-Consultation/Consultations/Changes-to-Reserve-Level-Declaration-Guidelines?Convenor=AEMO%20NEM>

Figure 1 NSW region: maximum, minimum and average FUM values for the reporting period.

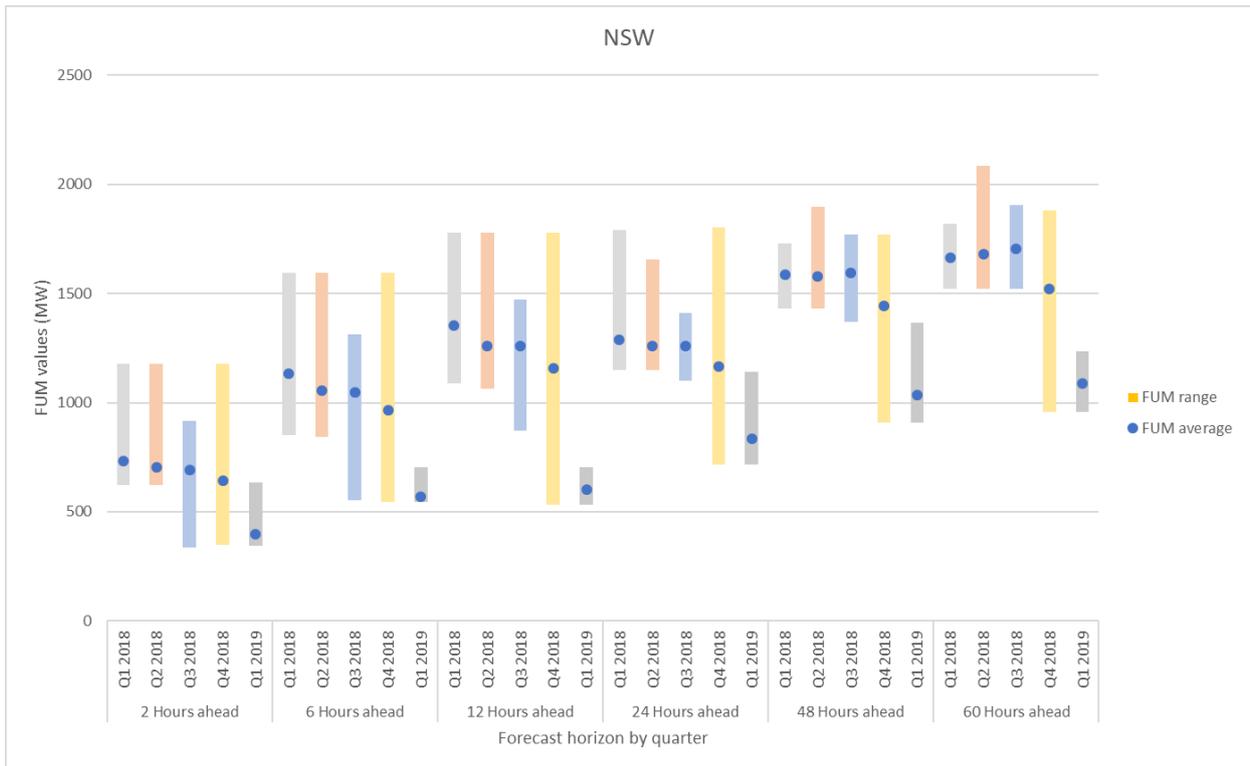


Figure 2 QLD region: maximum, minimum and average FUM values for the reporting period.

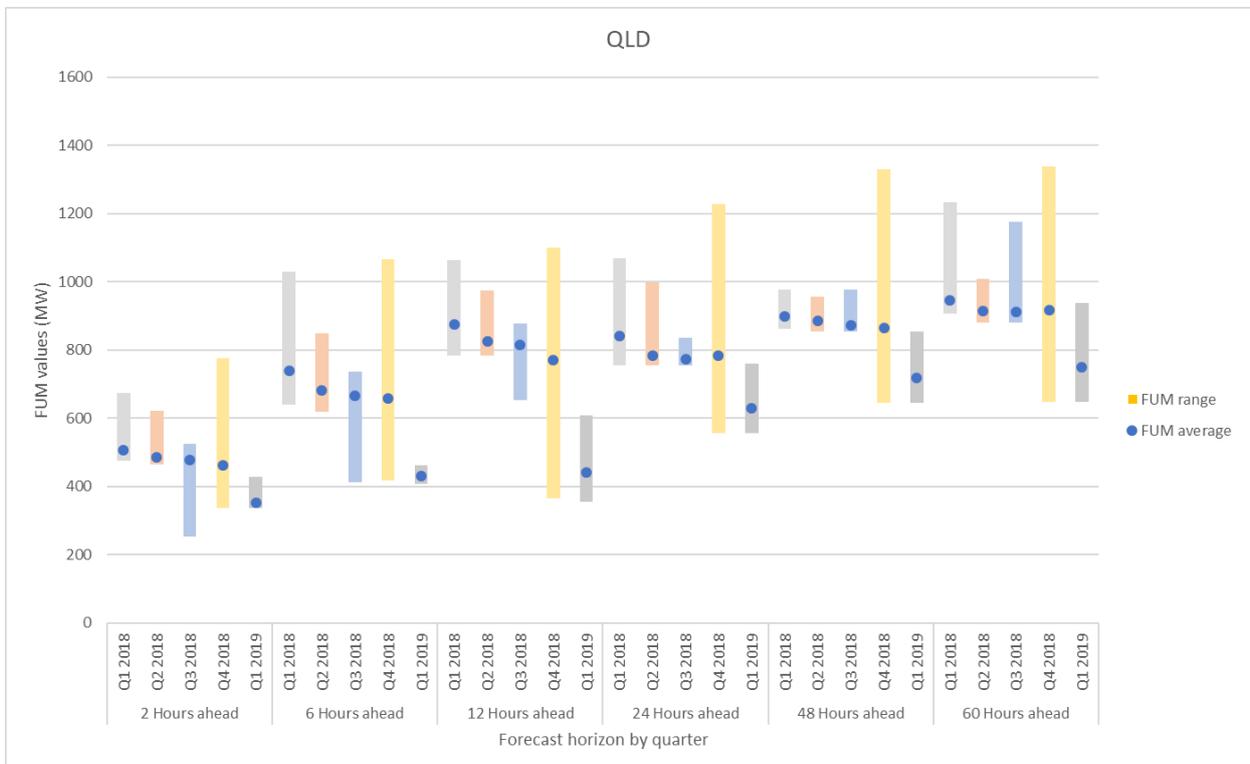


Figure 3 SA region: maximum, minimum and average FUM values for the reporting period.

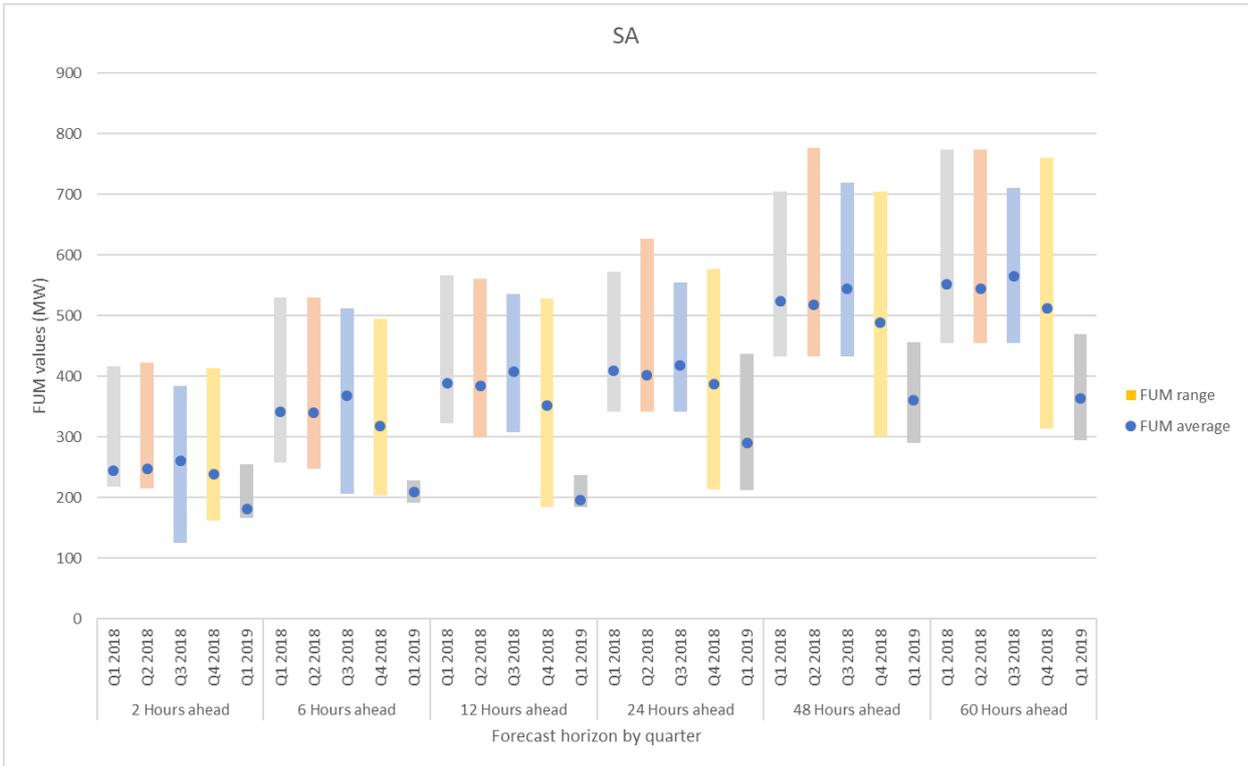


Figure 4 TAS region: maximum, minimum and average FUM values for the reporting period.

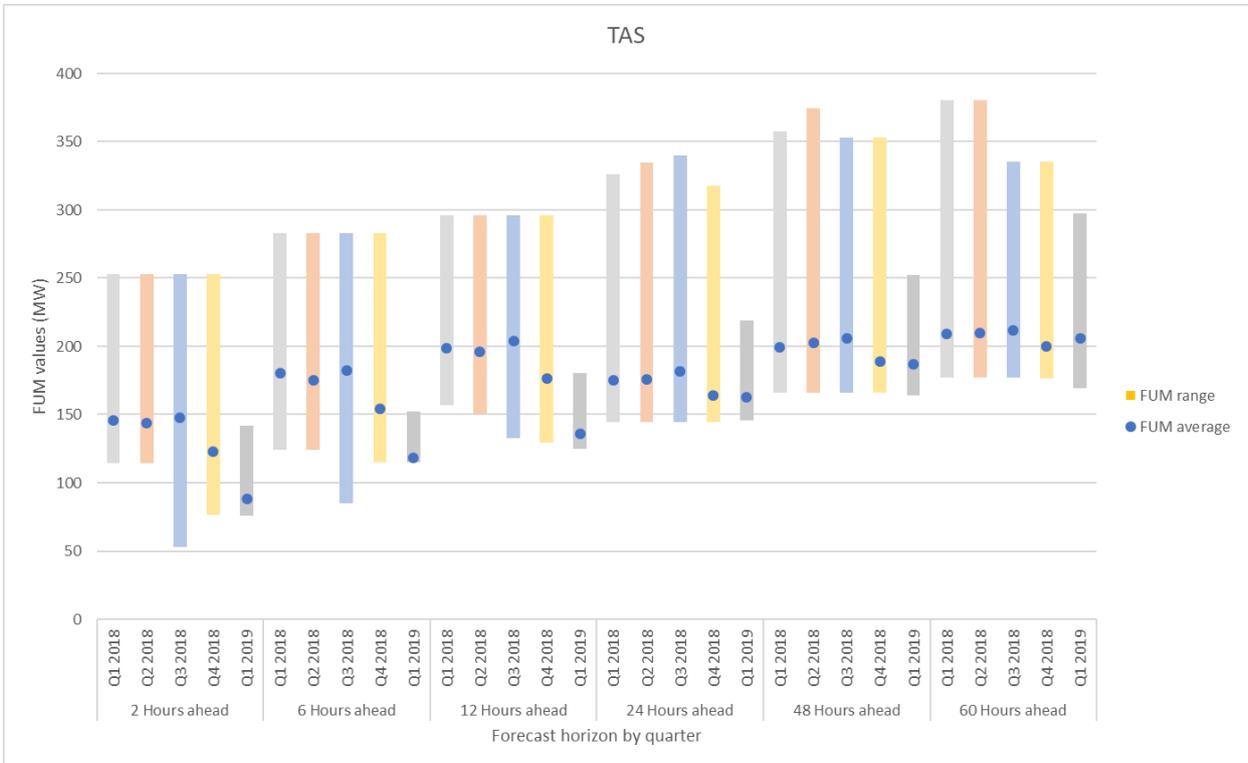
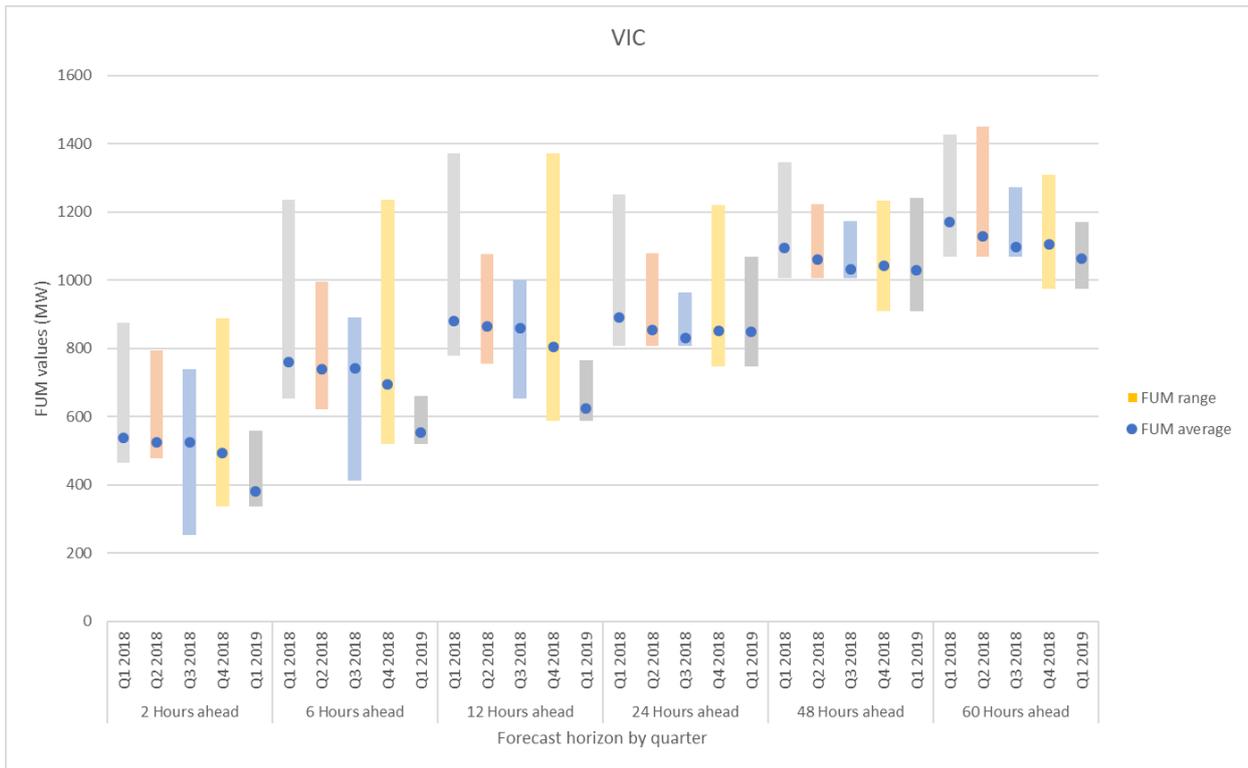


Figure 5 VIC region: maximum, minimum and average FUM values for the reporting period.



4.2 LOR declaration reserve requirements

A total of 27 forecast or actual LOR conditions were declared for the current reporting period (refer to Table 1). The reserve requirement was set by the FUM in 10 of the 27 cases representing approximately 37% of the LOR conditions where the reserve requirement was set by the FUM. In the remaining 17 cases, the reserve requirement was set by either the LCR or LCR2, representing approximately 63% of the LOR conditions where the reserve requirement was set by either the largest or two largest credible risks in the region.

The percentage of LOR conditions where the FUM set the reserve requirement has decreased relative to the prior quarter, from approximately 67% in the prior quarter to 37% in the current reporting period. This is consistent with the reduction in FUM values following the implementation of the updated Guidelines in December 2018. A comparison of this reporting period to the corresponding quarter of 2018 is of limited value, as all LOR conditions in quarter 1 2018 were declared prior to the implementation of the FUM.

All forecast LOR2 conditions were declared with the FUM setting the reserve requirement. All actual LOR2 conditions were declared with the LCR setting the reserve requirement. These two outcomes indicate that the newly-tuned FUM and the LCR mechanisms are operating as anticipated to effectively identify credible risk in the respective forecast and real-time timeframes.

All LOR1 conditions (forecast and actual) were declared with the LCR2 setting the reserve requirement.

All LOR3 conditions (forecast and actual) were declared when the available supply was unable to meet demand.

Table 3 LORs declared during the reporting period by trigger (FUM or LCR).

Yellow indicates the requirement was set by the LCR, and Orange indicates the requirement was set by the FUM.

Effective period	LOR1	LOR2	LOR3
New South Wales (NSW)			
16/01/2019	Forecast		
17/01/2019	Forecast then Actual	Forecast	
18/01/2019	Forecast	Forecast	
25/01/2019		Forecast	
30/01/2019	Forecast		
31/01/2019	Forecast then Actual	Forecast	
Queensland (QLD)			
12/03/2019	Forecast	Forecast	
South Australia (SA)			
03/01/2019	Forecast		
24/01/2019	Forecast	Forecast	Actual
Victoria (VIC)			
15/01/2019	Forecast	Forecast	
24/01/2019	Forecast then Actual	Forecast	Actual
25/01/2019	Forecast then Actual	Forecast	Actual
29/01/2019	Forecast		
30/01/2019	Forecast then Actual		
01/03/2019	Forecast then Actual	Forecast	

4.3 Forecast and actual LOR declarations

A total of three forecast LOR3 conditions were declared, with two of these subsequently being declared as actual LOR3 conditions. The remaining forecast LOR3 condition was subsequently declared as an actual LOR2 condition.

A total of 10 forecast LOR2 conditions were declared, with three of these subsequently being declared as actual LOR2 conditions. Of the remaining seven forecast LOR2 conditions, three were subsequently declared as actual LOR1 conditions.

A total of 14 forecast LOR1 conditions were declared, with six of these subsequently being declared as actual LOR1 conditions. Of the remaining eight forecast LOR1 conditions, one was declared as an actual LOR2 condition.

Where a forecast LOR did not develop into an actual LOR condition, on most occasions the primary reason for the cancellation was a market response following the issue of the forecast market notice. Market response generally took the form of increased available generation. Other reasons for cancelling the forecast LOR condition included: 1) a reduction in the FUM value, or 2) a decrease in forecast demand (revised forecast).

4.4 Number and cause of LOR declarations

A total of 27 forecast or actual LOR conditions were declared during the current reporting period. This number was significantly greater than the nine recorded in the previous reporting period (01 October – 31 December 2018) and greater than the 16 recorded in the corresponding quarter of 2018. The predominant factors or causes of LOR conditions during this period were reduced generation availability due to planned or unplanned plant outages, or capacity reductions, coincident with high demand due to hot weather.

The main reason for the noticeable increase in the number of LOR conditions is the extreme heat event on 24 and 25 January 2019. This event led to 10 forecast or actual LOR conditions; removing this event reduces the count of LOR conditions to 17.

Of the LOR conditions originally declared, six resulted in actual LOR1 conditions, three actual LOR2 conditions, and two were declared as an actual LOR3 condition. Where forecast conditions did not progress to actual LORs, this was mostly due to an increase in generation availability, following the publication of the forecast LOR market notice. In cases where there was insufficient generation response alone to prevent a forecast LOR developing into an actual LOR, revisions in demand or interconnector flow forecasts generally assisted to avert this outcome. On two occasions forecast LOR conditions developed into actual LOR3 conditions.

4.5 Load Shedding Events (24 and 25 January 2019)

A major event during the reporting period, which resulted in 10 LOR condition declarations, was the load shedding event of 24 and 25 January. AEMO has reported separately on this event, however a short summary of the event is provided below for context in reading this report.

Temperatures in VIC and SA regions reached record high levels on 24 January 2019, resulting in high electricity demand. Reductions in the availability of supply due to: 1) thermal inefficiencies, 2) unexpected equipment failures, 3) urgent maintenance activity, and 4) reduced generation capacity meant there was not enough power generation in the SA and VIC regions to meet demand. AEMO activated Reliability and Emergency Reserve Trader (RERT) contracts to reduce demand in VIC and SA as well as directing on a synchronous condenser in NSW, to maximise flows into VIC across the VIC–NSW interconnector. Once all supply and demand response options available to AEMO were exhausted, AEMO directed load shedding as a last resort option. This instruction was issued to balance the demand with available supply and maintain the power system in a secure operating state.

Further information on these load shedding events and actions leading up to them, including RERT activation, is available in AEMO's power system operating incident and RERT report, published on 16 April 2019.

Glossary

This document uses many terms that have meanings defined in the National Electricity Rules (NER). The NER meanings are adopted unless otherwise specified.

For each of the terms below, refer to the Guidelines for further information.

Term	Definition
FUM	Forecast Uncertainty Measure. The number of MWs representing the level of forecasting uncertainty.
Guidelines	The Reserve Level Declaration Guidelines published by AEMO under clause 4.8.4A of the NER
LCR	Largest Credible Risk. This is the single largest credible risk in the region.
LCR2	Largest Credible Risk 2. This is the sum of the two largest credible risks in the region.
LOR1	Lack of Reserve 1. The threshold for an LOR1 is determined by the larger value of either the Forecast Uncertainty Measure or the sum of the two largest credible risks in the region (i.e. LCR2).
LOR2	Lack of Reserve 2. The threshold for an LOR2 is determined by the larger value of either the Forecast Uncertainty Measure or the largest credible risk in the region (i.e. LCR).
LOR3	Lack of Reserve 3. The threshold for an LOR3 condition is when the forecast reserve for a region is at or below zero.