

NEM Lack of Reserve Framework Report

1 April to 30 June 2024

July 2024

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 from 1 April to 30 June 2024.

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Version control

Version	Release date	Changes
1	26/7/2024	Initial release



Executive summary

This report has been published in accordance with clause 4.8.4B of the National Electricity Rules (NER).

In the reporting period 1 April to 30 June 2024 (Quarter 2 2024), AEMO declared 65 individual Lack of Reserve (LOR) conditions in total in the National Electricity Market (NEM)¹.

Table 1 shows the number and type of LOR conditions declared in Quarter 2 2024.

Table 1 LOR conditions declared in Quarter 2 2024

LOR declarations		Total
LOR1	Actual	9
	Forecast	38
LOR2	Actual	0
	Forecast	18
LOR3	Actual	0
	Forecast	0
Total		65

This compares with 75 LOR conditions declared in the previous reporting period (Quarter 1 2024), and 88 LOR conditions declared in Quarter 2 2023.

Quarter 2 2024 covered the mid-to-late autumn months and the first month of winter:

- The LOR conditions in New South Wales, Queensland, and South Australia were mainly driven by decreased generation availability and increased demand.
- Many of the forecast LOR conditions did not eventuate into actual LOR conditions, mainly because additional generation was made available, or transmission network service providers (TNSPs) were able to reschedule planned transmission outages.
- There were no LOR conditions declared in Victoria and Tasmania.

Of the 65 LOR declarations in Quarter 2 2024:

- For all 47 LOR1 declarations, the reserve requirement was set by the sum of the two largest credible risks (LCR2).
- For all 18 LOR2 declarations, the reserve requirement was set by the Forecast Uncertainty Measure (FUM).
- There were no LOR3 conditions declared.

This means 28% of LOR conditions were declared when the reserve requirement was set by the FUM. For comparison, in Quarter 1 2024, 25 of the 75 LOR declarations were set by the FUM (33%), and in Quarter 2 2023, 19 of the 88 LOR declarations were set by the FUM (22%).

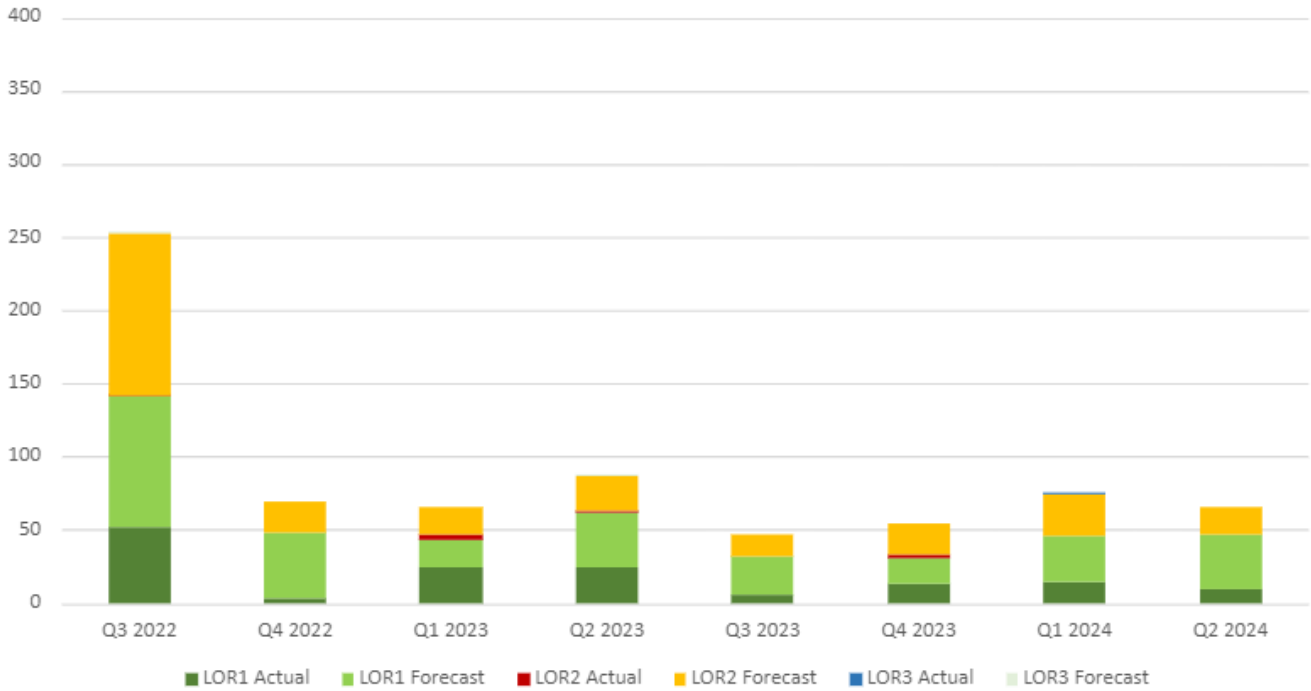
¹ Forecast or actual LOR1, LOR2, or LOR3. LOR is described in clause 4.8.4 of the NER. AEMO's considerations and methodology, and the LOR levels, are outlined in AEMO's Reserve Level Declaration Guidelines, at <https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Power-system-operation>.



Figure 1 below shows the historical trend of actual and forecast LOR conditions from Quarter 3 2022 to Quarter 2 2024. It shows that, as noted above:

- The total number of LOR declarations in this reporting period decreased compared to last quarter.
- Compared to the same period last year (Quarter 2 2023), the number of declarations and actual LOR conditions decreased.

Figure 1 Quarterly comparison of actual and forecast LOR conditions, Q3 2022 to Q2 2024



The next report on the NEM Lack of Reserve Framework, for the reporting period 1 July 2024 to 30 September 2024, will be published by 31 October 2024.

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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 (LOR) framework is operating. This report covers the period from 1 April to 30 June 2024 (Quarter 2 2024).

Unless otherwise noted, all times in this report are National Electricity Market (NEM) time (Australian Eastern Standard Time [AEST]).

The 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 Forecast Uncertainty Measure (FUM) Model.
- **LOR conditions declared** – details of all LOR conditions declared or revised during the past quarter (based on market notices [MNs]). For each condition declared, the report indicates the required reserve level and whether the requirement was set by the FUM, or the largest credible risk/s (LCR) in the region. The reserve requirement can be set by the largest credible risk (LCR, for LOR2 conditions) or the sum of the two largest credible risks (LCR2, for LOR1 thresholds). The FUM value for each relevant period is also provided.
- **Review of performance** – a review of the performance of the LOR 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 report on the NEM Lack of Reserve Framework, for the reporting period 1 July 2024 to 30 September 2024, will be published by 31 October 2024.

2 Reserve level declaration guidelines

2.1 Changes in the reporting period

On 20 February 2024, AEMO opened a consultation and published a draft report for proposed changes to the Guidelines². The final report was published on 2 May 2024, with an effective date of the updated Guidelines of 26 June 2024³.

The majority of the changes relate to the underlying Forecasting Uncertainty Measure (FUM) model and its inputs:

- Replacing the current Bayesian Belief Network (BBN) model with an alternative in-house Machine Learning (ML) model using Quantile Regression (QR) to calculate the FUM.
- Inclusion of a single input variable (timestamp) to calculate the FUM.

Neither change has any impact on the intent of the Guidelines; they only impact the detail surrounding the model and inputs used to create the FUM value as it currently stands, as outlined in Appendix A of the Guidelines.

In addition, minor drafting updates were made throughout the Guidelines for consistency and accuracy to reflect changes resulting from Five-Minute Settlement (5MS) and Semi-Scheduled Generator available capacity.

2.2 Training of the FUM Model

The FUM Model replaced the BBN and uses QR algorithms to determine the FUM, which in turn can determine LOR levels. This process is summarised in the Guidelines. The initial training of the FUM Model involved a three-stage process:

1. Extract-Transform-Load (ETL) stage, to extract historical data, perform data validation and cleansing, and compile the data into the structured format required to incorporate into the model.
2. Analysis and modelling stage, to train and validate the model.
3. Test and verification stage in the pre-production environment, to ensure the FUM model is suitable for production implementation.

2.2.1 Results from retraining

The implementation of the FUM Model occurred on 26 June 2024, so there is no comparison data for the FUM Model retraining results. For the Quarter 3 2024 LOR Framework Report, FUM Model retraining data will be available for comparison. AEMO will complete a backcast using the existing FUM Model and retrained FUM Model to verify the retraining. The intention of the backcast is to provide an indication of the magnitude of changes to future FUM values. This will include details on the changes in the 90th, 50th (median), and 10th percentile FUM values between the existing and retrained FUM Model backcasts.

² See <https://aemo.com.au/en/consultations/current-and-closed-consultations/2024-consultation-on-changes-to-reserve-level-declaration-guidelines>.

³ The Guidelines are at <http://aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Power-system-operation>.

3 Lack of Reserve conditions declared

Table 2 provides a high-level summary of the counts of forecast and actual LOR conditions for the reporting period (Quarter 2 2024) based on the declaration count principles.

Declaration count principles

For the reporting period, AEMO determined the total count for LOR conditions based on the following principles:

- All market notices (MNs) making the initial declaration of a forecast or actual LOR condition with an effective date during the reporting period were counted.
- Any MNs which updated previously issued forecast or actual LORs at the same level 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 were counted once. In Table 2, 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 was counted.
 - If the initial forecast was for a forecast LOR2 condition and this was later declared as an actual LOR1, this would be counted as two LOR conditions, due to the differing LOR levels.
- Continuous LOR conditions which spanned multiple periods throughout a day were counted as individual LOR declarations for each period covered. For this purpose, a NEM trading day was split into four 6-hour periods: morning peak covers 0400 hrs to 1000 hrs, mid-day covers 1000 hrs to 1600 hrs, evening peak covers 1600 hrs to 2200 hrs, and overnight covers 2200 hrs to 0400 hrs on the next day⁴. The maximum count allocated to each trading day was four.

⁴ This is due to trading day rather than calendar day to prevent double-counting of a continuous condition.

Table 2 Summary of forecast and actual LOR conditions, with causing factors

Effective date ^A	Region	LOR1		LOR2		LOR3		Cause and resolution
		Actual	Forecast	Actual	Forecast	Actual	Forecast	
2/5/2024	NSW	1						<p>A forecast LOR1 was declared, cancelled and redeclared with effective period 17:00-18:30 (three hours lead time) due to changes in generation availability (MN 116433, MN 116438, MN 116439).</p> <p>An actual LOR1 was declared and updated with effective period 17:00 – 18:30 due to decreased generation availability (MN 116440, MN 116443). The actual LOR1 was cancelled when the effective period elapsed (MN 116444).</p>
7/5/2024	NSW	1						<p>A forecast LOR1 was declared, cancelled, redeclared and updated with effective period 16:30 -19:00 (five days lead time) due to changes in generation availability (MN 116435, MN 116454, MN 116494, MN 116501).</p> <p>An actual LOR1 was declared with effective period 17:30 – 19:15 due to decreased generation availability (MN 116513). The actual LOR1 was cancelled when the effective period elapsed (MN 116514).</p>
8/5/2024	NSW	1	3		1			<p>Morning Peak:</p> <p>A forecast LOR1 was declared and cancelled with effective period 05:00 – 08:30 (six days lead time) due to decreased generation availability (MN 116436, MN 116467).</p> <p>Mid-day:</p> <p>A forecast LOR1 was declared and cancelled with effective period 15:30 – 16:00 (six days lead time) due to decreased generation availability (MN 116436, MN 116467).</p> <p>Evening Peak:</p> <p>A forecast LOR1 was declared and cancelled with effective period 16:00 – 22:00 (six days lead time) due to decreased generation availability (MN 116436, MN 116467). A forecast LOR1 was redeclared with effective period 17:00 – 18:00 (28 hours lead time) and cancelled due to changing generation availability (MN 116506, MN 116516). A forecast LOR1 was redeclared and updated with effective period 17:00 – 19:00 (three hours lead time) due to decreased generation availability (MN 116540, MN 116544).</p> <p>An actual LOR1 was declared with effective period 17:30 – 19:15 due to decreased generation availability (MN 116547). The actual LOR1 was cancelled when the effective period elapsed (MN 116548).</p> <p>A forecast LOR2 was declared and cancelled with effective period 17:00 – 18:00 (31 hours lead time) due to changes in generation availability (MN 116502, 116503).</p> <p>Overnight:</p> <p>A forecast LOR1 was declared and cancelled with effective period 22:00 – 02:00 (9/5/2024) (six days lead time) due to changes in generation availability (MN 116436, MN 116437, MN 116467, MN 116468).</p>
9/5/2024	NSW	1	1		1			<p>Mid-day:</p> <p>A forecast LOR1 condition was declared with effective period 14:30 – 16:00 (21 hours lead time) due to decreased generation availability (MN 116546). The forecast LOR condition improved due to changes in generation availability.</p>

Effective date ^A	Region	LOR1		LOR2		LOR3		Cause and resolution
		Actual	Forecast	Actual	Forecast	Actual	Forecast	
								<p>Evening Peak:</p> <p>A forecast LOR1 was declared, cancelled and redeclared as a forecast LOR2 with effective period 17:30 – 18:00 (29 hours lead time) due to decreased generation availability (MN 116531, MN 116545). Additional forecast LOR1 conditions were also declared and updated between 16:00 – 19:30 (21 hours lead time) due to decreased generation availability (MN 116546, MN 116552, MN 116555, MN 116556). The forecast LOR1 and LOR2 conditions were cancelled due to increased generation availability (MN 116558, MN 116549).</p> <p>A forecast LOR1 was redeclared and updated with effective period 16:30 – 19:00 (10 hours lead time) due to decreased generation availability (MN 116559, MN 116565).</p> <p>An actual LOR1 was declared with effective period 17:00 – 19:15 due to decreased generation availability (MN 116566). The actual LOR1 was cancelled when the effective period elapsed (MN 116567).</p>
18/5/2024	NSW	1						<p>A forecast LOR1 condition was declared and updated with effective period 17:00 – 19:00 (26 hours lead time) due to decreased generation availability (MN 116652, MN 116655, MN 116678).</p> <p>An actual LOR1 was declared with effective period 17:30 – 18:40 due to decreased generation availability (MN 116688). The actual LOR1 was cancelled when the effective period elapsed (MN 116689).</p>
19/5/2024	NSW		1		2			<p>Evening Peak:</p> <p>A forecast LOR2 condition was declared and updated with effective period 16:30 – 22:00 (47 hours lead time) due to decreased generation availability (MN 116654, MN 116658, MN 116659, MN 116666). The forecast LOR2 condition was cancelled due to increased generation availability and net import (MN 116670).</p> <p>A forecast LOR1 condition was declared and cancelled with effective period 17:30 – 19:00 (27 hours lead time) due to changes in generation availability (MN 116677, MN 116683).</p> <p>Overnight:</p> <p>A forecast LOR2 condition was declared, updated and cancelled with effective period 22:00 – 00:00 (20/5/2024) (47 hours lead time) due to changes in generation availability and net import (MN 116654, MN 116659, MN 116666, MN 116670).</p>
20/5/2024	NSW	1	2		3			<p>Morning Peak:</p> <p>A forecast LOR2 condition was declared and updated with effective period 6:00 – 8:30 (69 hours lead time) due to decreased generation availability (MN 116641, MN 116642, MN 116657, MN 116660, MN 116667).</p> <p>A forecast LOR1 condition was declared and updated with effective period 05:30 – 06:00 (61 hours lead time) due to decreased generation availability (MN 116650, MN 116679).</p> <p>The forecast LOR conditions improved due to changes in generation availability and net import.</p> <p>Evening Peak:</p> <p>A forecast LOR2 condition was declared and updated with effective period 16:00 – 22:00 (68 hours lead time) due to decreased generation availability (MN 116657, MN 116660, MN 116667, MN 116684, MN 116692, MN 116694, MN 116697).</p>

Lack of Reserve conditions declared

Effective date ^A	Region	LOR1		LOR2		LOR3		Cause and resolution
		Actual	Forecast	Actual	Forecast	Actual	Forecast	
								<p>A forecast LOR1 condition was declared with effective period 16:00 – 22:00 (71 hours lead time) due to decreased generation availability (MN 116650, MN 116700, 116725).</p> <p>An actual LOR1 was declared with effective period 17:00 – 19:10 due to decreased generation availability (MN 116730). The actual LOR1 was cancelled when the effective period elapsed (MN 116733).</p> <p>Overnight:</p> <p>A forecast LOR2 condition was declared and updated with effective period 22:00 – 00:00 (21/5/2024) (58 hours lead time) due to decreased generation availability (MN 116667, MN 116684, MN 116694).</p> <p>A forecast LOR1 condition was declared with effective period 22:00 – 22:30 (71 hours lead time) and 00:00 – 00:30 (57 hours lead time) due to decreased generation availability (MN 116650, MN 116680).</p> <p>The forecast LOR conditions improved due to changes in generation availability.</p>
21/5/2024	NSW		3		2			<p>Morning Peak:</p> <p>A forecast LOR2 condition was declared, updated and cancelled with effective period 06:30 – 08:00 (67 hours lead time) due to decreased generation availability (MN 116671, MN 116695, MN 116718).</p> <p>A forecast LOR1 was declared with effective period 06:30 – 07:30 due to decreased generation availability (MN 116702). The forecast LOR condition improved due to changes in generation availability.</p> <p>Evening Peak:</p> <p>Forecast LOR1 conditions were declared and updated between 16:00 – 22:00 (three days lead time) due to decreased generation availability (MN 116680, MN 116702).</p> <p>A forecast LOR2 condition was declared, updated and cancelled with effective period 16:30 – 21:30 (71 hours lead time) due to changes in generation availability (MN 116685, MN 116693, MN 116695, MN 116701, MN116717, MN 116718).</p> <p>A forecast LOR1 condition was redeclared and cancelled with effective period 17:30 – 18:00 (28 hours lead time) due to changes in generation availability (MN 116722, MN 116728).</p> <p>Overnight:</p> <p>A forecast LOR1 condition was declared and updated with effective period 22:00 – 01:00 (22/5/2024) (Three days lead time) due to decreased generation availability (MN 116680, MN 116702). The forecast LOR conditions improved due to changes in generation availability.</p>
22/5/2024	NSW		3		2			<p>Morning Peak:</p> <p>A forecast LOR1 condition was declared, updated and cancelled with effective period 05:30 – 08:30 (four days lead time) due to changes in generation availability (MN 116681, MN 116703, MN 116723, MN 116733).</p> <p>Forecast LOR2 conditions were declared and cancelled twice with effective period 06:00 – 08:00 (66 hours lead time) due to changes in generation availability (MN 116698, MN 116716, MN 116720, MN 116721).</p> <p>Evening Peak:</p>

Effective date ^A	Region	LOR1		LOR2		LOR3		Cause and resolution
		Actual	Forecast	Actual	Forecast	Actual	Forecast	
								<p>A forecast LOR1 condition was declared, updated and cancelled with effective period 16:00 – 22:00 (four days lead time) due to changes in generation availability (MN 116681, MN 116703, MN 116723, MN 116733).</p> <p>A forecast LOR2 condition was declared and cancelled with effective period 17:00 – 19:30 (53 hours lead time) due to changes in generation availability (MN 116720, MN 116721).</p> <p>Overnight:</p> <p>A forecast LOR1 condition was declared, updated and cancelled with effective period 22:00 – 02:00 (23/5/2024) (four days lead time) due to changes in generation availability (MN 116681, MN 116703, MN 116723, MN 116724, MN 116733, MN 116737).</p>
3/6/2024	NSW		1					<p>A forecast LOR1 condition was declared with effective period 17:30 – 18:30 (seven days lead time) due to decreased generation availability (MN 116822). The forecast LOR1 condition was cancelled due to increased generation availability (MN 116869).</p>
15/6/2024	NSW	1	3					<p>Morning Peak:</p> <p>A forecast LOR1 was declared with effective period 6:30 – 11:00 (39 hours lead time) due to decreased generation availability (MN 116975). The forecast LOR1 condition improved due to increased generation availability.</p> <p>Mid-day, Evening Peak and Overnight:</p> <p>A forecast LOR1 was declared, updated, and cancelled multiple times with effective period ranging 13:30 – 2:00 16/6 (56 hours lead time) due to decreased generation availability (MN 116975, MN 116976, MN 116990, MN 116997, MN 117011, MN 117015, MN 117020).</p> <p>An actual LOR1 was declared with effective period 17:00 – 19:00 due to decreased generation availability. The actual LOR1 was cancelled when the effective period elapsed (MN 117021).</p>
17/6/2024	NSW		1					<p>A forecast LOR1 was declared with effective period 17:00 – 21:00 (seven days lead time) due to decreased generation availability (MN 116926). The forecast LOR1 condition was cancelled due to increased generation availability (MN 116969).</p>
18/6/2024	NSW		3					<p>Morning Peak:</p> <p>A forecast LOR1 was declared, updated and cancelled multiple times with effective period ranging 06:30 – 09:30 (seven days lead time) due to decreased generation availability (MN 116942, MN 116977, MN 116999, MN 117017). The forecast LOR1 condition was cancelled due to increased generation availability (MN 116970, MN 117023).</p> <p>Evening Peak and Overnight:</p> <p>A forecast LOR1 condition was declared, updated and cancelled multiple times with effective period ranging 16:00 – 01:30 (19/6/2024) (seven days lead time) due to decreased generation availability (MN 116942, MN 116943, MN 116977, MN 116978, MN 116999, MN 117006, MN 117017, MN 117033, MN 117048). The forecast LOR1 condition was cancelled due to increased generation availability (MN 116970).</p>

Effective date ^A	Region	LOR1		LOR2		LOR3		Cause and resolution
		Actual	Forecast	Actual	Forecast	Actual	Forecast	
19/6/2024	NSW		4		3			<p>Morning Peak: A forecast LOR1 condition was declared and updated multiple times with effective period ranging 06:00 – 10:00 (seven days lead time) due to decreased generation availability (MN 116971, MN 116978, MN 117006, MN 117018, MN 117034, MN 117030). The condition worsened so a forecast LOR2 was declared and updated with effective period ranging 05:30 – 09:00 (31 hours lead time) due to decreased generation availability (MN 117034, MN 117035). The LOR conditions improved following the recall of a major transmission line outage in the region on request from AEMO and due to increased generation availability (MN 117053).</p> <p>Mid-day: A forecast LOR1 was declared and updated multiple times with effective period ranging 15:30 – 01:00 (20/6/2024) (seven days lead time) due to decreased generation availability (MN 117006, MN 117018, MN 117019). The forecast LOR conditions improved due to increased generation availability.</p> <p>Evening Peak and Overnight: A forecast LOR1 was declared and updated multiple times with effective period ranging 16:00 – 01:30 (20/6/2024) (seven days lead time) due to decreased generation availability (MN 116971, MN 116972, MN 116978, MN 116979, MN 117024, MN 117025, MN 117030, MN 117031, MN 117046, MN 117055, MN 117073). The forecast LOR1 condition was worsened and updated to a forecast LOR2 condition with effective period ranging 16:00 – 01:00 (20/6/2024) (41 hour lead time) due to decreased generation availability (MN 117034, MN 117035, MN 117038, MN 117039, MN 117045). The LOR conditions improved following the recall of a major transmission line outage in the region on request from AEMO (MN 117053). The forecast LOR2 condition was cancelled due to increased generation availability and increased net import (MN 117054).</p>
20/6/2024	NSW	1	3		4			<p>Morning Peak: A forecast LOR1 was declared and updated with effective period ranging 06:00 – 10:00 (seven days lead time) due to decreased generation availability (MN 116979, MN 117031). The condition worsened and a forecast LOR2 was declared and updated multiple times with effective period ranging 05:30 -10:00 (55 hours lead time) due to decreased generation availability (MN 117034, MN 117036, MN 117040). The condition was updated to a forecast LOR1 with effective period ranging 05:30 - 06:00 and 08:00 - 09:30 (41 hour lead time) due to increased generation availability (MN 117067). The LOR conditions improved following the recall of a major transmission line outage in the region on request from AEMO and due to increased generation availability (MN 117053).</p> <p>Mid-day, Evening Peak and Overnight: A forecast LOR1 was declared and updated multiple times with effective period ranging 15:30 – 01:30 (21/6/2024) (seven days lead time) due to decreased generation availability (MN 116979, MN 116980, MN 117031, MN 117032, MN 117050, MN 117067, MN 117074, MN 117080, MN 117084, MN 117086). The condition worsened and a forecast LOR2 was declared and updated multiple times with effective period ranging 15:30 – 01:00 (21/6/2024) (65 hour lead time) due to decreased generation availability (MN 117034, MN 117036, MN 117040, MN 117041, MN 117049). The LOR conditions improved following the recall of a major</p>

Effective date ^A	Region	LOR1		LOR2		LOR3		Cause and resolution
		Actual	Forecast	Actual	Forecast	Actual	Forecast	
								transmission line outage in the region on request from AEMO (MN 117053). The forecast LOR2 condition was cancelled due to increased generation availability and increased net import (MN 117057). An actual LOR1 was declared with effective period 18:00 – 19:00 due to decreased generation availability (MN 117086).The actual LOR1 was cancelled when the effective period elapsed (MN 117087).
21/6/2024	NSW		3					<p>Morning Peak: A forecast LOR1 was declared with effective period 06:00 – 10:00 (62 hours lead time) due to decreased generation availability (MN 117051). The forecast LOR1 condition improved due to increased generation availability.</p> <p>Evening Peak and Overnight: A forecast LOR1 was declared and updated multiple times with effective period ranging 16:00 – 01:00 (22/6/2024) (seven days lead time) due to decreased generation availability (MN 117008, MN 117051, MN 117052, MN 117071). The forecast LOR1 condition improved due to increased generation availability.</p>
24/6/2024	NSW		2					<p>Morning Peak: A forecast LOR1 was declared and updated with effective period ranging 06:30 – 09:30 (63 hours lead time) due to decreased generation availability (MN 117094, MN 117098).The forecast LOR1 condition was cancelled due to increased generation availability (MN 117107).</p> <p>Evening Peak: A forecast LOR1 was declared and updated with effective period ranging 16:00 – 22:00 (three day lead time) due to decreased generation availability (MN 117094, MN 117098). The forecast LOR1 was cancelled due to increased generation availability (MN 117107).</p>
14/5/2024	QLD	1						<p>A forecast LOR1 was declared with effective period range 17:30 – 18:00 (eight hours lead time) due to decreased generation availability and increased operational demand (MN 116609). The forecast LOR1 condition was cancelled due to increased generation availability (MN 116613).</p> <p>An actual LOR1 was declared with effective period 17:30 – 18:00 due to decreased generation availability (MN 116615). The actual LOR1 condition was cancelled at 18:15 (MN 116616).</p>
4/6/2024	SA		1					A forecast LOR1 was declared with effective period range 17:00 – 17:30 (one day lead time) due to decreased generation availability and increased operational demand (MN 116881). The forecast LOR1 condition was cancelled due to increased generation availability (MN 116882).
12/6/2024	SA		1					A forecast LOR1 was declared with effective period range 08:30 – 09:00 and 09:30 – 10:00 (20 hours lead time) due to decreased net import and decreased generation availability (MN 116933). The forecast LOR1 condition was cancelled due to increased generation availability (MN 116944).

Lack of Reserve conditions declared

Effective date ^A	Region	LOR1		LOR2		LOR3		Cause and resolution
		Actual	Forecast	Actual	Forecast	Actual	Forecast	
13/6/2024	SA		1					A forecast LOR1 was declared with effective period range 17:30 – 21:00 (seven days lead time) due to increased operational demand and decreased generation availability (MN 116905). The forecast LOR1 condition was cancelled due to increased net import and generation availability (MN 116910).
19/6/2024	SA		1					A forecast LOR1 was declared with effective period 17:30 – 21:00 (seven days lead time) due to increased operational demand and decreased generation availability (MN 116973). The forecast LOR1 condition was cancelled due to increased generation availability (MN 116974).
21/6/2024	SA		1					A forecast LOR1 was declared with effective period 18:00 – 21:30 (six days lead time) due to decreased generation availability (MN 117016). The forecast LOR1 condition was cancelled due to increased generation availability (MN 117022).
Total		9	38	0	18	0	0	

A. Effective date is the date on which the condition occurred or was expected to occur and may differ from the date on which a market notice advising of the forecast or actual condition was issued.

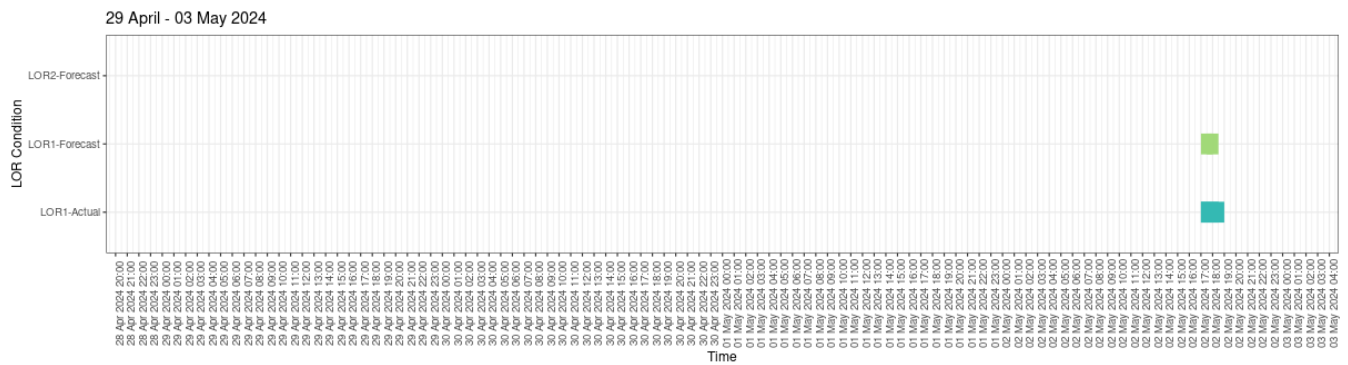
3.1 LOR declarations during the reporting period – Gantt chart

This section shows the LOR declarations during the reporting period 1 April to 30 June 2024 for each region using Gantt charts. Each Gantt chart covers a four-day period. Periods with no LOR declarations were omitted and not graphed.

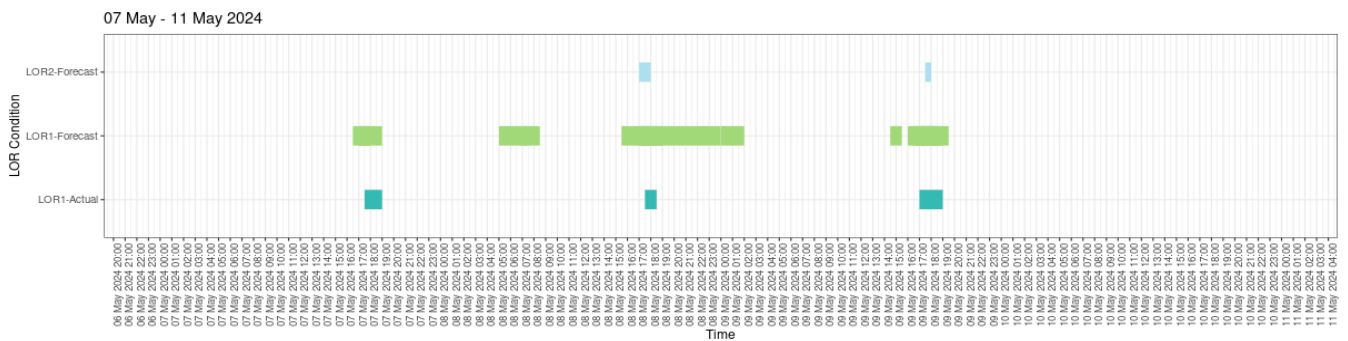
Forecast and actual LOR1, LOR2 and LOR3 conditions including updates are shaded according to the legend at the bottom of each page for the corresponding effective periods based on the market notices.

3.1.1 New South Wales

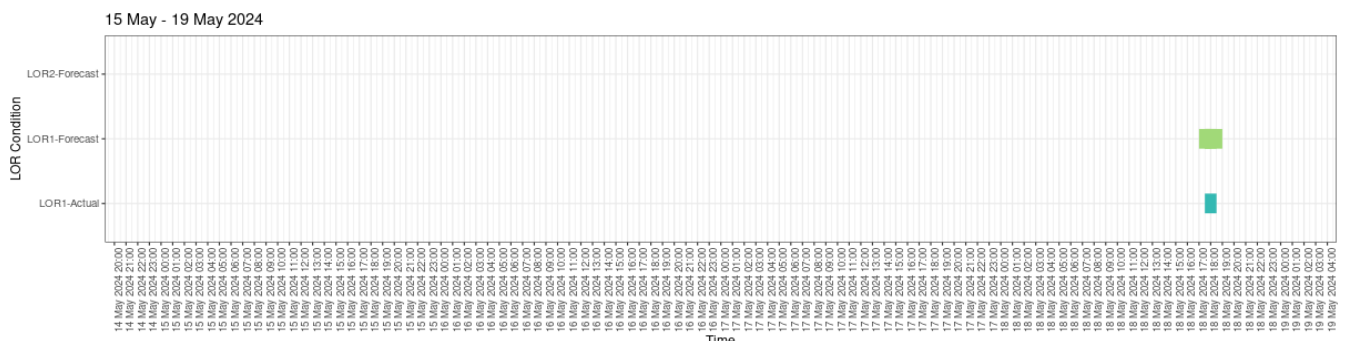
There were no LOR declarations in the period from 1 April to 28 April 2024.

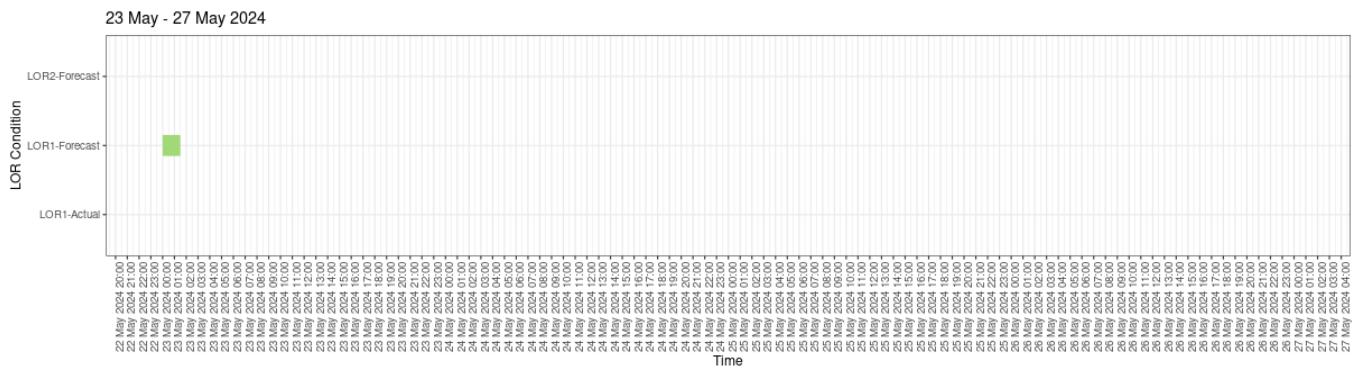
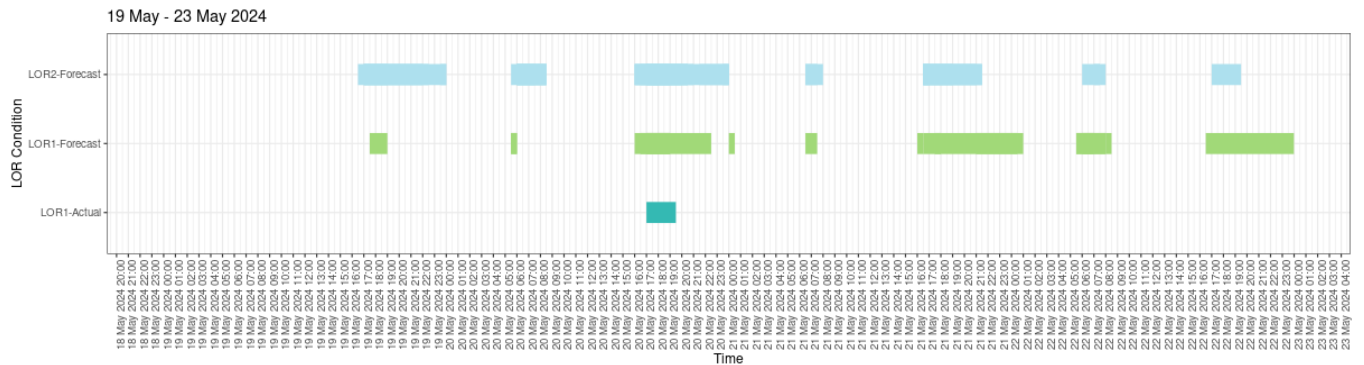


There were no LOR declarations in the period from 3 May to 6 May 2024.

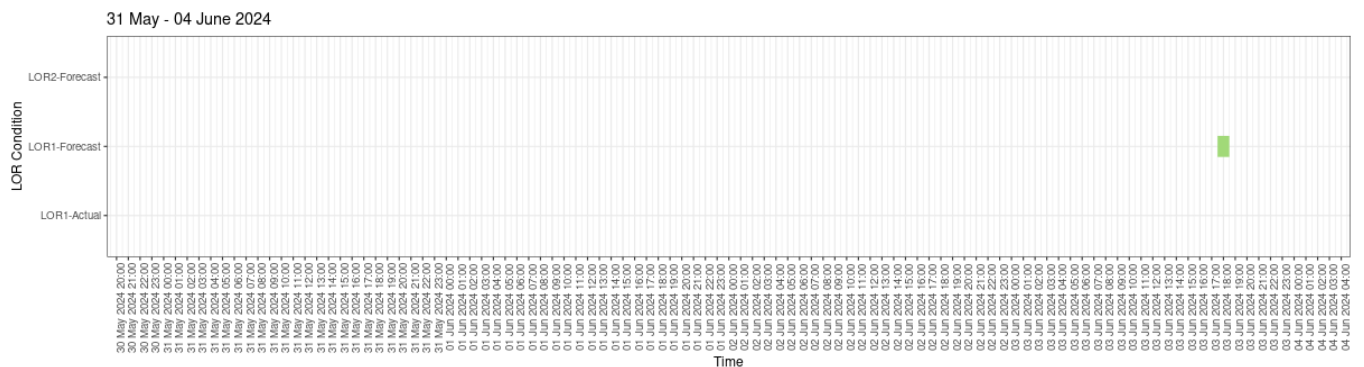


There were no LOR declarations in the period from 11 May to 14 May 2024.

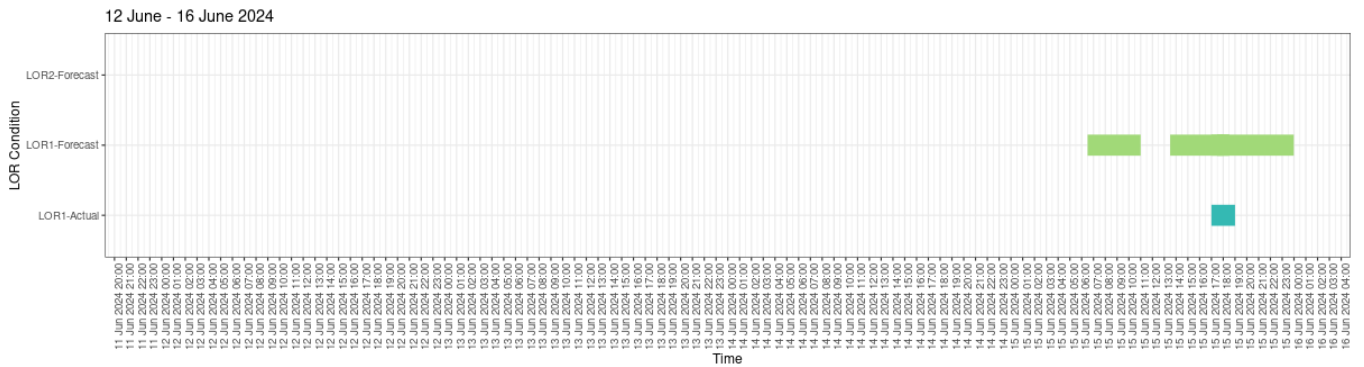


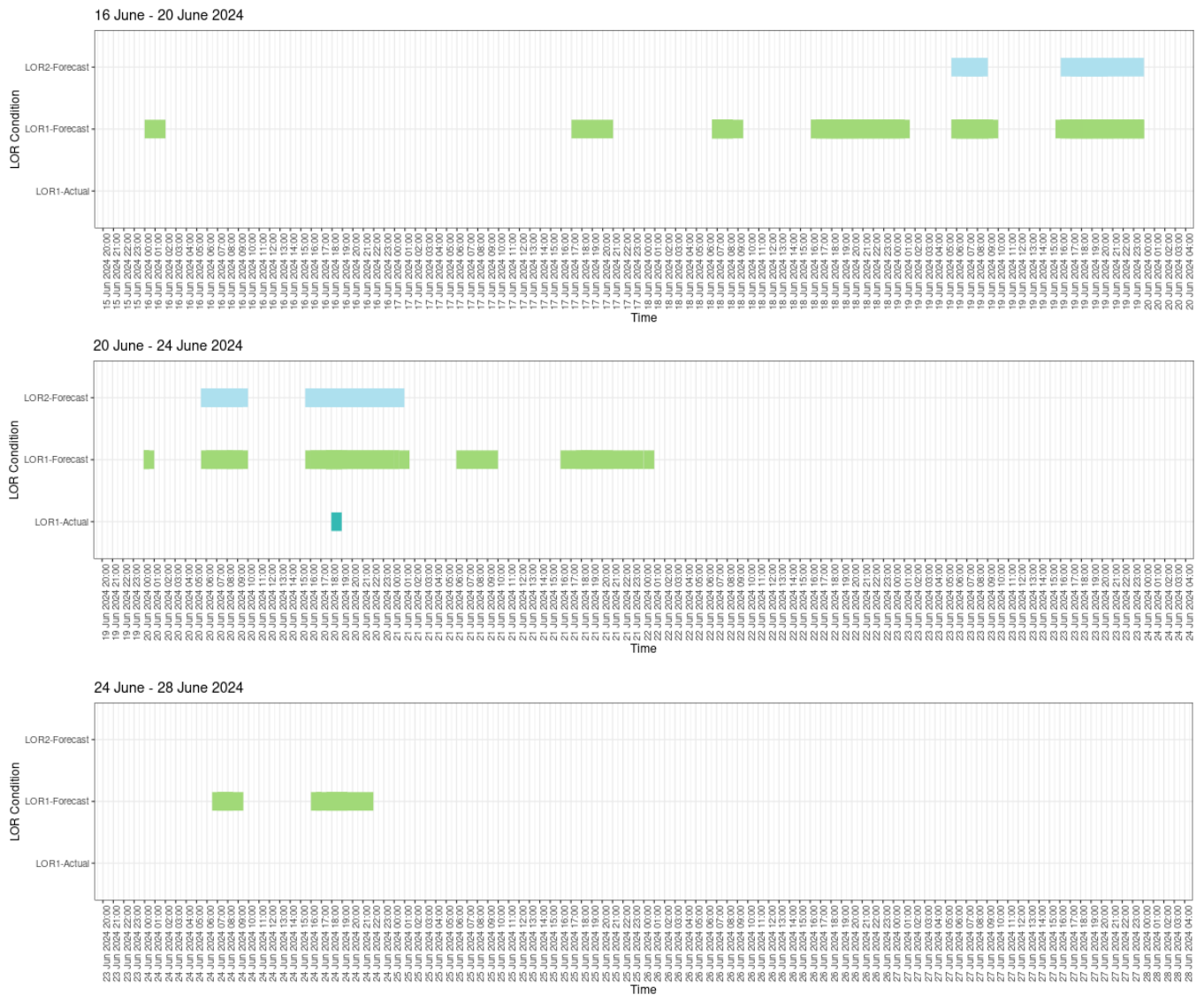


There were no LOR declarations in the period from 28 May to 30 May 2024.



There were no LOR declarations in the period from 5 June to 11 June 2024.

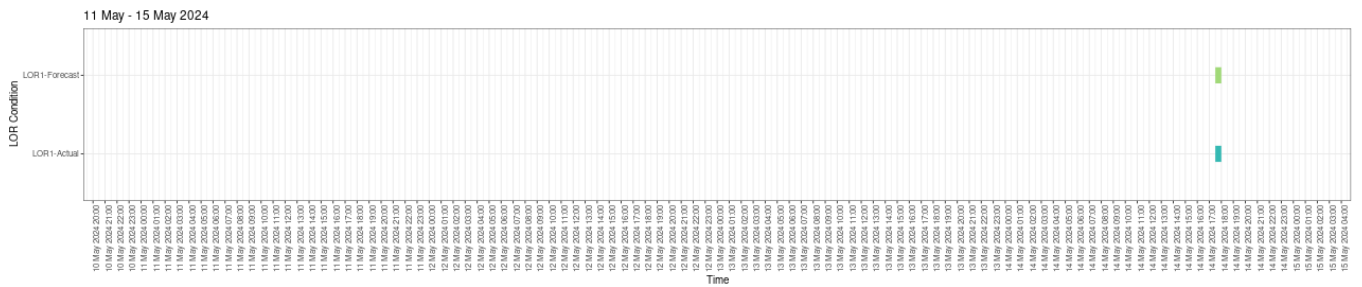




There were no LOR declarations in the period from 29 June to 30 June 2024.

3.1.2 Queensland

There were no LOR declarations in the period from 1 April to 10 May 2024.

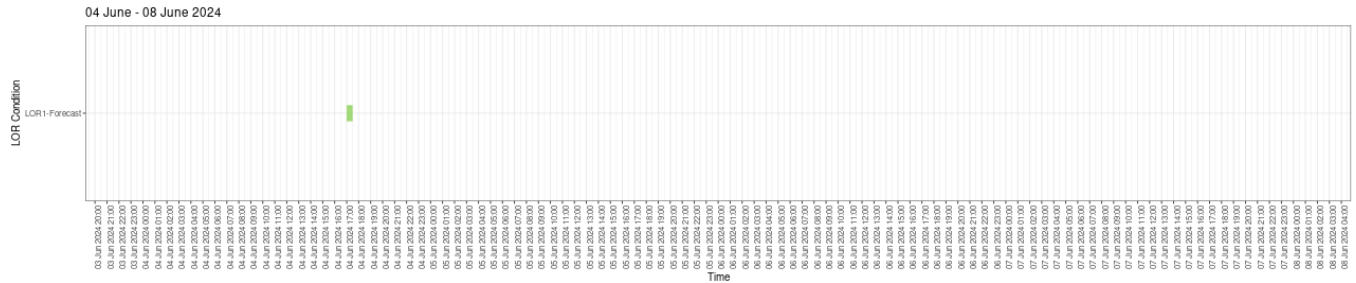


There were no LOR declarations in the period from 16 May to 30 June 2024.

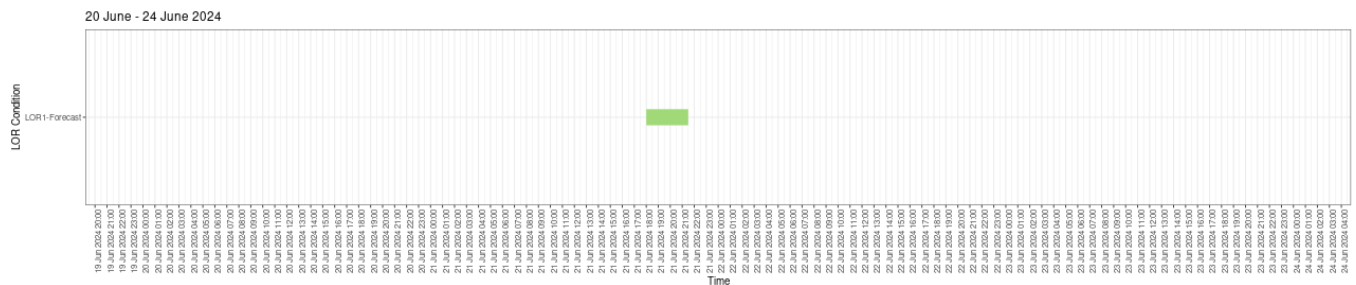
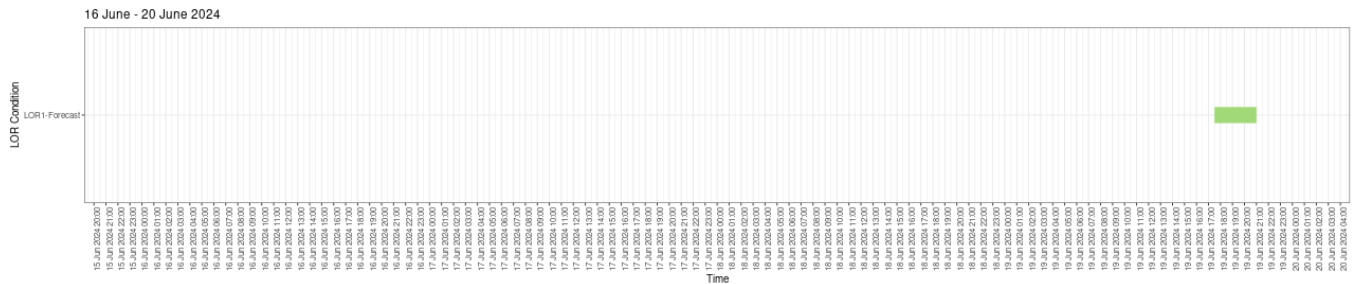
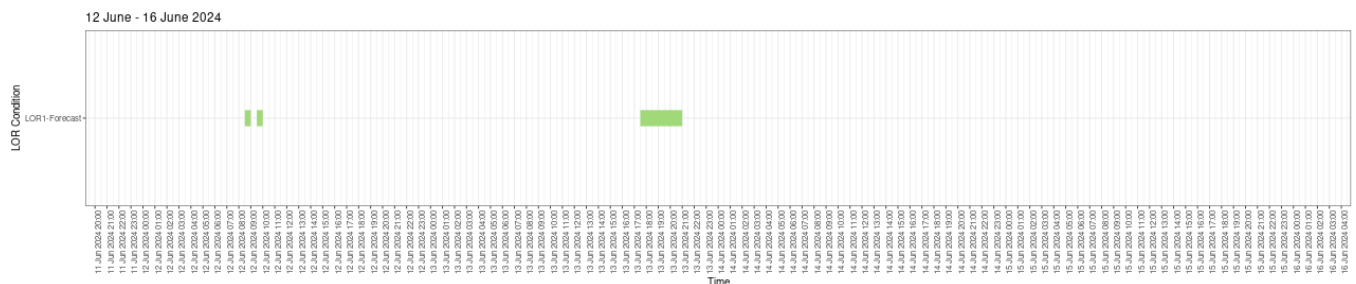


3.1.3 South Australia

There were no LOR declarations in the period from 1 April to 3 June 2024.



There were no LOR declarations in the period from 8 June to 11 June 2024.



There were no LOR declarations in the period from 25 June to 30 June 2024.

3.1.4 Victoria

There were no LOR declarations in the period from 1 April to 30 June 2024.

3.1.5 Tasmania

There were no LOR declarations in the period from 1 April to 30 June 2024.

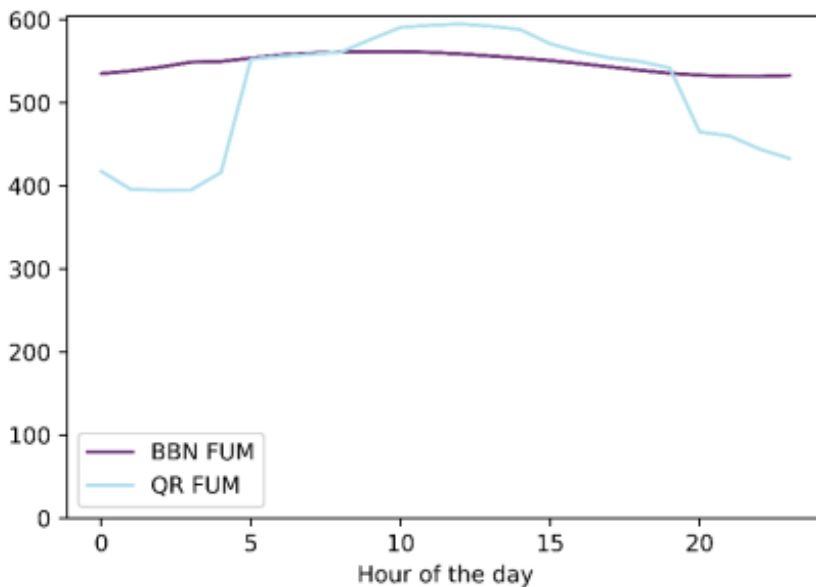


4 Review of performance

4.1 Forecast Uncertainty Measure values

As in Section 2.1, there is no FUM Model data prior to 26 June 2024 to conduct a FUM value comparison for each quarter from Quarter 2 2023 to Quarter 2 2024. For the Quarter 3 2024 LOR Framework Report, the 10th, 50th (median), and 90th percentile FUM values for the Quarter 3 2024 period will be compared to the values from Quarter 2 2024. Through the introduction of the single input variable (timestamp) in the FUM Model, it is expected that the FUM value range will have an increase due to lower average FUM values during the night compared to during the day, which better captures the uncertainty in predictions of solar generation from semi-scheduled generators and rooftop PV. Figure 2 (extracted from the Changes to Reserve Level Declaration Guidelines Final Report⁵) demonstrates this impact on the FUM range.

Figure 2 FUM value (in megawatts (MW)) across all NEM regions by hour of the day in 2023



4.2 Forecast and actual LOR declarations

A summary of the count and causes of declared forecast and actual LOR conditions can be found in Table 2 in Section 3 of this report.

Of the 65 LOR declarations in the reporting period, 56 were for forecast LOR conditions:

- 38 forecast LOR1 conditions were declared.
- 18 forecast LOR2 conditions were declared.
- No forecast LOR3 conditions were declared.

⁵ At https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/changes-to-reserve-level-declaration-guidelines/changes-to-reserve-level-declaration-guidelines---final-report-and-determination.pdf?la=en.

- 18 forecast LOR2 conditions were set by the FUM.

A total of nine actual LOR1 conditions were declared. All nine of these were observed as forecast LOR1 prior to being declared as an actual, therefore were not counted as forecast declarations based on the declaration count principles outlined in Section 3.

There were no actual LOR2 conditions declared.

Table 3 Summary of LOR conditions during reporting period, 1 April to 30 June 2024

Region	LOR1		LOR2		LOR3	
	Actual	Forecast	Actual	Forecast	Actual	Forecast
NSW	8	33	0	18	0	0
QLD	1	0	0	0	0	0
SA	0	5	0	0	0	0
TAS	0	0	0	0	0	0
VIC	0	0	0	0	0	0
Total	9	38	0	18	0	0

Reliability and Emergency Reserve Trader (RERT) activations

During the reporting period, no RERT services were activated⁶.

Table 4 LORs declared during the reporting period by trigger (FUM or LCR)

Effective period	LOR1	LOR2	LOR3
New South Wales (NSW)			
2/5/2024	Forecast then Actual		
7/5/2024	Forecast then Actual		
8/5/2024	Forecast		
	Forecast		
	Forecast then Actual	Forecast	
	Forecast		
9/5/2024	Forecast		
	Forecast then Actual	Forecast	
18/5/2024	Forecast then Actual		
19/5/2024	Forecast	Forecast	
		Forecast	
20/5/2024	Forecast	Forecast	
	Forecast then Actual	Forecast	
	Forecast	Forecast	
21/5/2024	Forecast	Forecast	

⁶ RERT reporting is at <https://aemo.com.au/energy-systems/electricity/emergency-management/reliability-and-emergency-reserve-trader-rert/rert-reporting>.

Effective period	LOR1	LOR2	LOR3
	Forecast	Forecast	
	Forecast		
22/5/2024	Forecast	Forecast	
	Forecast	Forecast	
	Forecast		
3/6/2024	Forecast		
15/6/2024	Forecast		
	Forecast		
	Forecast then Actual		
	Forecast		
17/6/2024	Forecast		
18/6/2024	Forecast		
	Forecast		
	Forecast		
19/6/2024	Forecast	Forecast	
	Forecast	Forecast	
	Forecast	Forecast	
	Forecast		
20/6/2024	Forecast	Forecast	
	Forecast	Forecast	
	Forecast then Actual	Forecast	
	Forecast	Forecast	
21/6/2024	Forecast		
	Forecast		
	Forecast		
24/06/2024	Forecast		
	Forecast		
Queensland (QLD)			
14/5/2024	Forecast then Actual		
South Australia (SA)			
4/6/2024	Forecast		
12/6/2024	Forecast		
13/6/2024	Forecast		
19/6/2024	Forecast		
21/6/2024	Forecast		
Tasmania (TAS)			
NIL			
Victoria (VIC)			
NIL			

Note. Yellow shading indicates the requirement was set by the LCR or LCR2, and orange indicates the requirement was set by the FUM.

4.3 Causes of LOR declarations

As summarised in Table 2 (in Section 3), a total of 65 LOR conditions were declared during the reporting period: 56 forecast and nine actual LOR conditions.

Based on Table 2:

- Of the 47 forecast LOR1 conditions declared, nine resulted in actual LOR1 conditions. These were counted as actual LOR1 conditions based on the declaration count principles outlined in Section 3.
- Of the 18 forecast LOR2 conditions declared, none resulted in an actual LOR2 condition.
- There were 38 forecast LOR1 conditions that did not develop into actual LOR1 conditions, and 18 forecast LOR2 conditions that did not develop into actual LOR2 conditions. The reasons were either a market response following the issue of the forecast market notice, changes to the net import or changes in forecast demand. The market response generally took the form of increased available generation or transmission network service providers (TNSPs) rescheduling planned transmission outages.
- As Table 4 above shows, during the reporting period there were no instances where an actual LOR1 condition occurred with no prior forecast.
- There were no LOR3 conditions declared.
- The LOR conditions in New South Wales, Queensland and South Australia were mainly driven by decreased generation availability and increased demand.
- There were no LOR conditions declared in Victoria and Tasmania.

4.4 Number of LOR declarations compared to previous quarters

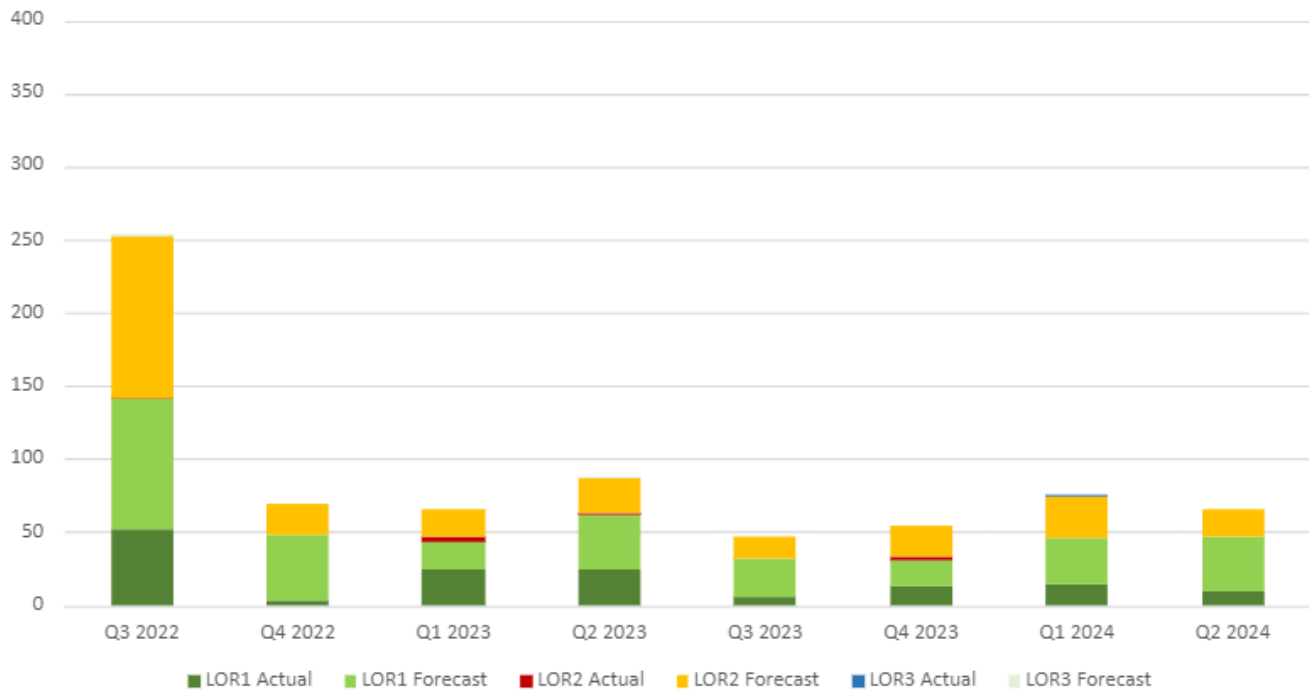
Quarter 2 2024 covered the mid to late autumn months and the first month of winter.

A total of 65 LOR conditions were declared during Quarter 2 2024 – 56 forecast and nine actual LOR conditions. This is lower than the 75 LOR declarations recorded in the previous reporting period (1 January to 31 March 2024), and lower than the 88 LOR conditions declared for the same period last year (Quarter 2 2023). Compared to the same period last year (Quarter 2 2023) the number of actual LOR conditions has decreased.

Figure 3 shows the historical trend of actual and forecast LOR conditions in past quarters from Quarter 3 2022 compared to Quarter 2 2024.



Figure 3 Quarterly comparison of actual and forecast LOR conditions, Q3 2022 to Q2 2024



Glossary

This document uses many terms that have meanings defined in the NER. The NER meanings are adopted unless otherwise specified.

For each of the terms below, refer to the Reserve Level Declaration Guidelines⁷ for further information.

Term	Definition
AEST	Australian Eastern Standard Time
BBN	Bayesian Belief Network ⁸
ETL	Extract-Transform-Load
FUM	Forecast Uncertainty Measure (the number of MW 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 – the single largest credible risk in the region
LCR2	Largest Credible Risk 2 – the sum of the two largest credible risks in the region
LOR1	Lack of Reserve level 1. The threshold for an LOR1 is determined by the larger value of either the FUM or the sum of the two largest credible risks in the region (LCR2).
LOR2	Lack of Reserve level 2. The threshold for an LOR2 is determined by the larger value of either the FUM or the largest credible risk in the region (LCR).
LOR3	Lack of Reserve level 3. The threshold for an LOR3 condition is when the forecast reserve for a region is at or below zero.
PASA	Projected Assessment of System Adequacy ⁹
RERT	Reliability and Emergency Reserve Trader ¹⁰
TNSP	transmission network service provider

⁷ See AEMO's reserve level declaration guidelines, at https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/power_system_ops/reserve-level-declaration-guidelines.pdf.

⁸ More detail regarding Bayesian Belief Networks is available in the Appendix of AEMO's reserve level declaration guidelines document in the link above.

⁹ See AEMO's Projected Assessment of System Adequacy (PASA) principles, at <https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/projected-assessment-of-system-adequacy>.

¹⁰ See AEMO's RERT guidelines, at <https://aemo.com.au/en/energy-systems/electricity/emergency-management/reliability-and-emergency-reserve-trader-rert>.