T-1 and T-3 Reliability Instruments

South Australia 2024 and New South Wales 2025-26

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AUSTRALIAN ENERGY REGULATOR

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1 AER decisions

In accordance with section 14K of the National Electricity Law (Electricity Law) the Australian Energy Regulator (AER) has made:

- a T-1 reliability instrument for South Australia for the forecast reliability gap period of 8 January 2024 to 29 February 2024 (reliability instrument), and
- a T-3 reliability instrument for New South Wales for the forecast reliability gap period of 1 December 2025 to 28 February 2026 (reliability instrument).

The AER is satisfied that the Australian Energy Market Operator's (AEMO) *forecast reliability gaps* in South Australia and New South Wales have been identified in accordance with the Rules. AEMO demonstrated it has used reasonable endeavours to prepare the reliability forecasts, which show no evidence of material errors in its inputs or assumptions. The AER therefore considers it is appropriate in the circumstances, having regard to the decision-making criteria set out in clause 4A.C.11 of the National Electricity Rules (Electricity Rules) to make the reliability instruments. The T-1 reliability instrument for South Australia can be found in Appendix A, while the T-3 reliability instrument for New South Wales can be found in Appendix B.

The AER is required to review the reliability instrument requests from AEMO in accordance with the decision-making criteria set out in clause 4A.C.11 of the Electricity Rules. Under the Electricity Rules, AEMO's inclusion of a forecast reliability gap in its Electricity Statement of Opportunities (ESOO) requires it to request the AER consider making an instrument with respect to the forecast gap. The AER's assessment of that request must be made by reference to the reliability forecast in the 2022 ESOO.

Our review of the reliability instrument requests found no material errors in AEMO's calculations or input data. We consider the assumptions that underpin AEMO's forecast data and their impact on unserved energy are accurate and represent the forecast future circumstances. We are satisfied that accuracy, comprehensiveness and lack of bias have been achieved.

We consider that AEMO has used reasonable endeavours to prepare its reliability forecast in accordance with the Forecasting Best Practice Guidelines. The inputs, assumptions and methodologies that underpin the forecast were disclosed to stakeholders and AEMO provided consultation opportunities throughout the development of the 2022 ESOO and subsequent reliability forecast.

Submissions from stakeholders did not support the reliability instrument being made for South Australia. Issues in submissions focussed on the classification status of specific generators in South Australia and the treatment of unplanned outages rates on the Heywood interconnector. Soon after the publication of the ESOO the AER requested and received additional information from AEMO, specifically on the issue of generator classification. Having had regard to this additional information, the AER considers it appropriate in the circumstances to make the T-1 South Australia reliability instrument. No submissions were received regarding the reliability instrument being made for New South Wales.

Since the commencement of the Market Liquidity Operation (MLO) in January 2021, liable entities have had opportunities to purchase appropriate qualifying contracts via the ASX. Table 1 highlights key dates liable entities should be aware of regarding the T-1 reliability

instrument in South Australia. We have set the contract position reporting day at the end of July to ensure liable entities have an appropriate amount of time to prepare their reports, prior to submission to the AER.

Table 1 – South Australia T-1 key dates

Forecasting Guideline	AER review
Contract Position Day	6 January 2023
Contract Position Reporting Day	31 July 2023
New Entrant Contract Position Day	9 January 2024
New Entrant Contract Reporting Day	30 April 2024

As the T-3 reliability instrument in New South Wales has been made, the MLO will commence in New South Wales in five business days on 31 October 2022. MLO generators for New South Wales — Snowy Hydro, AGL and EnergyAustralia — are required to perform the liquidity obligation and offer MLO products onto an approved MLO Exchange. There is now an additional incentive for liable entities in New South Wales to enter sufficient qualifying contracts to cover their share of one-in-two-year peak demand throughout the forecast reliability gap.

2 Background

AEMO regularly examines the 10-year outlook for supply and demand and publishes its results in the ESOO. If AEMO deems there will be insufficient capacity available to meet forecast demand resulting in forecast unserved energy greater than the prescribed reliability standard, AEMO will identify a reliability gap. AEMO must then request that the AER consider making a reliability instrument.[1]

In considering whether it is appropriate in the circumstances to make a reliability instrument, the AER must only have regard to the following criteria: [2,3]

- there are no material errors in AEMO's calculations or input data as it relates to the reliability forecast.
- AEMO has not made any assumptions underpinning its forecast data that are inaccurate and which have had a material impact on unserved energy outcomes in the reliability forecast; and
- AEMO has used reasonable endeavours to prepare the reliability forecast in accordance with the Forecasting Best Practice Guidelines.

Our review of AEMO's request has been completed under the interim Reliability Instrument Guidelines, which explain how the AER will have regard to the criteria on material errors and inaccurate assumptions when assessing whether to make a reliability instrument following the request from AEMO.[4]

Our assessment of whether AEMO has used reasonable endeavours to prepare the reliability forecast is referenced against the Forecasting Best Practice Guideline.[5]

The AER must make its decision to make or not make the reliability instrument and publish its reasons for the decision and, if applicable, the reliability instrument by 31 October 2022. [6]

[1] National Electricity Rules (NER), cl. 4A.C.1

[2] National Electricity Law (NEL), s. 14K (3)

[3] NER, cl. 4A.C.11

[4] AER, *'Interim Reliability Instrument Guidelines – Retailer Reliability Obligation'*, July 2019

[5] AER, *'Forecasting Best Practice Guidelines'*, August 2020

[6] NER, cl. 4A.C.9

3 Requirements for liable entities in South Australia

All liable entities in South Australia are required to submit a net contract position report.[7] A liable entity is defined in clause 4A.D.2 of the Electricity Rules.

Liable entities are required to record their net contract position for each trading interval in the forecast reliability gap period of 8 January 2024 to 29 February 2024 as it is on the contract position day (6 January 2023) or new entrant contract position day (9 January 2024). The report must be provided to the AER by reporting day (31 July 2023) or by new entrant reporting day (30 April 2024) where applicable.

Contracts that meet the definition of qualifying contract[8] are required to be firmness adjusted using either the standard firmness methodology or a bespoke firmness methodology, depending on the characteristics of the contract. The Contracts and Firmness Guidelines[9] provide guidance on firmness adjustment methodologies and net contract position reports.

An Independent Auditor must approve all bespoke firmness methodologies, in accordance with the guidance given in the Contracts and Firmness Guideline. The list of Independent Auditors is available on the AER website.[10] The AER is currently accepting applications from suitably qualified persons to join the independent auditor's panel. Information on how to apply is contained in the Auditors Panel Handbook.[11]

[7] NER, cl. 4A.E.6

[8] Section 14O(1) of the NEL

[9] AER, 'Interim Contracts and Firmness Guidelines', August 2019

[10] AER website, Net contract position reporting and panel of independent auditors

[11] AER, 'Auditors Panel Handbook', April 2021

4 AEMO reliability instrument request

On 31 August 2022 AEMO provided the AER with:

- A T-1 reliability instrument request for a forecast reliability gap in South Australia. The request set out the following details of the forecast reliability gap:
  - The size of the gap: 230 megawatts (MW)
  - The gap period: 8 January 2024 to 29 February 2024 (inclusive)
  - The gap region: South Australia
  - The one-in-two year peak demand forecast: 3,044 MW
  - The gap trading intervals: between 5:00 pm and 9:00 pm on working weekdays*.
- A T-3 reliability instrument request for a forecast reliability gap in New South Wales. The request set out the following details of the forecast reliability gap:
  - The size of the gap: 790 MW
  - The gap period: 1 December 2025 to 28 February 2026 (inclusive)
  - The gap region: New South Wales
  - The one-in-two year peak demand forecast: 13,133 MW
  - The gap trading intervals: between 2:00 pm and 9:00 pm on weekdays*.
- AEMO also provided the following documents as part of its reliability instrument request:
  - 2022 Electricity Statement of Opportunities (ESOO)
  - 2022 Forecasting Best Practice Approach Report
  - Demand side participation Forecast Methodology document
  - ESOO and Reliability Forecast Methodology document
  - Final 2022 Forecasting Assumptions Update (FAU)
  - Forecasting Approach Electricity Demand Forecasting Methodology document
  - Forecasting Assumptions Update workbook.

* National Electricity Market time

5 AER Review

The following sections detail the AER's review of the South Australia T-1 and New South Wales T-3 reliability instrument requests against the decision-making criteria as set out in clause 4A.C.11 of the Electricity Rules. Issues raised by stakeholders in submissions to the reliability instrument request were also considered.

In line with the guidance given in the interim Reliability Instrument Guidelines, we focused our assessment on a range of input parameters for which the determination of the level of reliability is most materially dependant. We also investigated parameters raised by participants in their submissions.

5.1 Whether there are material errors in AEMO's calculations, input data or inaccurate assumptions that materially impact the forecast reliability gap

In considering whether it is appropriate in the circumstances to make a reliability instrument, the AER had regard to whether:[12]

- there are material errors in AEMO's calculations or input data as it relates to the reliability forecast.
- AEMO has made any assumptions underpinning its forecast data that are inaccurate and which have had a material impact on unserved energy outcomes in the reliability forecast.

The 2021 Inputs, Assumptions and Scenarios Report (IASR) and the 2022 Forecasting Assumptions Update (FAU) workbook provided by AEMO, contains the data on which the reliability instrument request was created.[13] This was accompanied by a guide in the reliability instrument request for key inputs, calculations, assumptions, and methodologies used in the reliability forecast and number of accompanying methodology reports.

The outcome of our review, which included examining the 2021 IASR and 2022 FAU workbook and the reports accompanying the reliability instrument request, was that we did not identify any material errors or inaccurate assumptions that would have a material impact on unserved energy outcomes in the reliability forecast. The following sections summarise the information that was reviewed to assist in forming our decision on the reliability instrument request.

5.1.1 Distributed PV (including residential, commercial, and larger embedded and PV non-scheduled generation systems)

Data checked:

- Rooftop PV capacity (MW)[14] – ESOO 2022, 2021 and 2020

[13] The Reliability Forecast is based on AEMO's Step Change Scenario for all inputs and assumptions.

[14] Capacity of behind-the-meter rooftop PV

- Rooftop PV output (GWh)[15] – ESOO 2022, 2021 and 2020
- PV non-scheduled generation capacity (MW)[16] – ESOO 2022, 2021 and 2020
- PV non-scheduled generation energy (GWh) [17] – ESOO 2022, 2021 and 2020

The T-1 reliability instrument request states that estimated distributed PV generation output during forecast unserved energy for South Australia in 2024 is 190 MW of a forecast 2,407 MW installed capacity.

The AER considers this estimate reasonable when compared to the 243 MW of rooftop PV generation and 85 MW of PV non-scheduled generation observed in South Australia's peak demand trading interval in the 2022 summer period.

The T-3 reliability instrument request states that estimated distributed PV generation output during forecast unserved energy for New South Wales in 2025-26 is 804 MW of a forecast 7,744 MW installed capacity.

The AER considers this estimate reasonable when compared to the 610 MW of rooftop PV generation and 42 MW of PV non-scheduled generation observed in New South Wales's peak demand trading interval in the 2022 summer period.

AEMO's Rooftop PV forecasts are based on Green Energy Markets[18] trajectories that were developed in 2021. AEMO rebased the Rooftop PV forecasts in May 2022 using a combination of data from the Clean Energy Regulator (CER) and AEMO's DER Register.

5.1.2 Large Industrial Loads

Data checked:

- Electricity annual consumption – ESOO 2022, 2021 and 2020[19]

AEMO's 2023-24 forecast shows 3,503 GWh of consumption in South Australia related to large industrial loads (LIL), which represents approximately 29.4% of operational consumption. LIL forecasts contribute 13.5% to the maximum operational demand in summer 2023-24 in South Australia.

AEMO's 2025-26 forecast shows 15,662 GWh of consumption in New South Wales related to LILs, which represents approximately 24.2% of operational consumption. LIL forecast contribution to the maximum operational demand in New South Wales is approximately 14.2%

AEMO's process for forecasting LIL consumption involves:

- collecting and analysing historical National Metering Identifier metering data
- conducting confidential customer surveys (questionnaire), and

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[15] Amount of energy generated by behind-the-meter rooftop PV

[16] Capacity of small-scale non-scheduled generating PV systems

[17] Amount of energy generated by small-scale non-scheduled generating PV systems

[18] Green Energy Markets, '*Projections for distributed energy resources solar PV and stationary energy battery systems*', June 2020

[19] AEMO, https://forecasting.aemo.com.au/Electricity/AnnualConsumption/Operational

- interviewing personnel from key LILs.
- Media searches and company announcements.

AEMO engaged with stakeholders on its draft LIL forecasts at its May 2022 Forecasting Reference Group forum. The Forecasting Reference Group forums, which includes industry forecasting specialists, seeks to validate assumptions, share expertise, and explore new approaches to addressing the challenges of forecasting.[20]

LIL forecasts used in the reliability forecast have not been exhaustively reviewed because they are based on confidential data, aggregated data or AEMO calculations.

With no issues raised in AEMO's consultation, or by submissions to the reliability instrument request and when compared to previous ESOO forecasts, the AER considers the inputs used are reasonable.

5.1.3 Generator forced outage rates

Data checked:

- Full and partial outage rate data for existing generators
- Full and partial outage rate data for new entrant technologies

As generator forced outage rates are based on confidential data, the AER was only provided with the outputs from AEMO's calculations to consider in our review of the reliability instrument request.

No unexplainable changes in the dataset were identified. The full outage rate and partial outage rate for new entrant technologies were consistent with the Aurecon AEMO costs and technical parameter review report from October 2021[21].

For the 2022 ESOO, AEMO collected information from all generators on the timing, duration, and severity of unplanned forced outages, via its annual survey process. This included information on historical outages, and (for selected participants) outage projections across the 10-year forecast period. AEMO used this data to calculate the probability of full and partial forced outages in accordance with the ESOO and Reliability Forecasting Methodology[22].

The outage data was updated based on historical and forward-looking forced outage rates provided by registered participants in accordance with AEMO's Standing Information Request [23].

For the reliability forecast AEMO used a combination of information provided by participants and from AEP Elical[24].

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[20] AEMO, Forecasting Reference Group, 25 May 2022

[21] Aurecon, *'2021 Costs and Technical Parameter Review'*, October 2021

[22] AEMO, *'ESOO and Reliability Forecast Methodology Document'*, August 2022

[23] AEMO, *'Standing information request for 2022'*, January 2022

[24] AEP Elical, *'Assessment of Ageing Coal-Fired Generation Reliability'*, June 2020

5.1.4 Generation availability

Data checked:

- Summer seasonal rating for existing generators and committed projects
- Maximum capacity for existing generators and committed projects
- Firm capacity of existing thermal generators

No inexplicable changes in the dataset were identified. The summer seasonal ratings for existing generators and committed projects are consistent with the summer scheduled capacities recorded in the AEMO NEM Generator Information spreadsheet.[25] The maximum capacity for existing generators and committed projects is consistent with the capacities listed in the AEMO NEM Generator Information spreadsheet and the NEM Registration and Exemptions list.[26] The firm capacity of existing thermal generators is consistent with the summer ratings listed in the NEM Generator Information spreadsheet.

Submissions from AGL Energy, Energy Users Association of Australia (EUAA), and Shell Energy raised the issue of AEMO's assessment of Bolivar Power Station to be 'anticipated' rather than 'committed/committed*.' AGL Energy raised the same issue for Torrens Island Battery.

The AER engaged AEMO who reiterated that in addition to capacity forecasts, generation plant owners advise AEMO about the status of generation projects currently under development in each region. Generation projects can be at different stages of development (i.e., Project Commitment Status), which are assessed using AEMO's five commitment criteria, covering site acquisition, contracts for major components, planning and other approvals, financing, and construction. As a large part of this information is confidential, AEMO only publishes the result of its assessment.

A commitment criterion is deemed to be "satisfied" if all associated questions have been answered in the positive, making the category "green". A commitment criterion is deemed to have "progressed" if the category is "amber" or "green".

The Project Commitment criteria must have been satisfied to at least the minimum level of traffic light categorisation that is required for each Commitment Status classification. Anticipated projects are those that are sufficiently progressed towards meeting at least three (3) of the five (5) commitment criteria.

Clause 3.13.3A(a) of the NER requires AEMO to publish in the ESOO capabilities of existing generators and ones which have been formally committed. AEMO's framework for projects to be considered committed is set out in its Generation Information Workbook. The way that AEMO has taken this framework into account in the reliability forecast is set out the ESOO and Reliability Forecast Methodology Report.

[25] AEMO, NEM Generation Information August 2022

[26] AEMO, NEM Registration and Exemption List

AEMO informed us that at the ESOO cut-off date neither Bolivar Power Station nor AGL's Torrens Island Battery were sufficiently progressed. AEMO also provided further clarification that these projects are still not considered committed.

We therefore consider that AEMO has not made an error or inaccurate assumption with regards to the treatment of the Bolivar Power Station and Torrens Island Battery for the 2022 reliability forecast.

5.1.5 Maximum demand

Data checked:

- 50% probability of exceedance (POE) maximum demand input data (MW) – ESOO 2022, 2021, 2020, 2019
- Underlying consumption (GWh) input data – ESOO 2022 and 2021
- Operational demand (GWh) input data – ESOO 2022 and 2021
- Rooftop PV generation (GWh) input data – ESOO 2022 and 2021

The 2022 electricity demand forecast methodology information paper was reviewed. No issues were identified in the dataset. For South Australia, the maximum operational demand (MW) for the 2024 summer central scenario increased by 128 MW (4%) over the 2021 ESOO forecast. For New South Wales, the maximum operational demand (MW) for the 2025-26 summer central scenario increased by 238 MW (2%) over the 2021 ESOO forecast. The AER considers the changes from the previous year's forecast are consistent with the near-term COVID-19 impact and the expected economic recovery.

AEMO uses historical weather data sourced from the Bureau of Meteorology[27] for training the annual consumption and minimum and maximum demand models.

5.1.6 Behind-the meter battery storage installed capacity

Data checked:

- Battery power (MW) of Embedded battery installations (small-scale batteries) – ESOO 2022, 2021 and 2020
- Storage capacity (MWh) of Embedded battery installations (small-scale batteries) – ESOO 2022, 2021 and 2020 [28]
- Aggregated embedded energy stores (small-scale batteries) (MW) – ESOO 2022, 2021 and 2020
- Aggregated embedded energy stores (small-scale batteries) (MWh) – ESOO 2022, 2021 and 2020

[27] Bureau of Meteorology, http://www.bom.gov.au/climate/data/

[28] Embedded battery storages are the cumulative total of "aggregated" and "non-aggregated" battery installations in the NEM.

The reports from CSIRO[29] and Green Energy Markets (GEM) [30] which support ESOO input data were reviewed.

The energy generation capacity (MW) in the 2022 ESOO increased from the 2021 ESOO while energy generated (MWh) by the aggregated energy storages decreased.

The changes from previous year's forecast were consistent with CSIRO and GEM's projection that in the central (Step Change) scenario the virtual power plant (VPP) contract will be more common for small-scale battery storages. The AER considers that aggregated energy storage is a subset of embedded energy storage, and the change in the forecast for the aggregated energy storage alone would not have a material impact on the unserved energy outcomes in the reliability forecast.

5.1.7 Economic growth and population outlook

Data checked:

- Gross State Product – ESOO 2022, 2021 and 2020
- Household Disposable Income – ESOO 2022, 2021 and 2020

AEMO used Gross State Product and household disposable income forecasts based on BIS Oxford Economics' (BISOE) long term macroeconomic forecasts. BISOE uses forecasts produced by state Treasury departments to benchmark its projections. The figures used in the 2022 ESOO and reliability forecast were rebased using the ABS national account data, which more closely align with the state forecasts.

BISOE forecast the pace of economic growth[31] in South Australia to accelerate in 2021 before falling back towards trend. Over the three years to 2024 BISOE projects a more moderate GSP growth profile for South Australia than the state treasury. This may reflect more recent data which show a more balance position due to the vaccine rollout since the Budget release. [32]

In NSW BISOE forecast low economic growth in 2021 followed by three years of moderate growth. NSW Treasury projects negative economic growth in 2021 followed by three years of moderate growth comparable to that forecast by BISOE. [33]

As highlighted in the AEMO's reliability instrument request, economic growth is of medium materiality to the forecast and therefore the AER considers that minor discrepancies in the GSP forecast would not have a material impact on the unserved energy outcomes in the reliability forecast.

5.1.8 Electrification

Data checked:

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[29] CSIRO, *'Small-scale solar and battery projections 2021'* , May 2021

[30] Green Energy Markets, *'Projections for distributed energy resources solar PV and stationary energy battery systems*', June 2020

[31] As measured by Gross State Product (GSP)

[32] BIS Oxford Economics, *'Macroeconomic Projections Report'*, 27 April 2021, p. 71

[33] BIS Oxford Economics, *'Macroeconomic Projections Report'*, 27 April 2021, p. 71

- Electrification (TWh) – ESOO 2022, 2021 and 2020

AEMO's 2023-24 forecast shows 690 GWh of consumption in South Australia related to electrification, which represents approximately 5.8% of operational consumption. Electrification, particularly of businesses, and take-up of EVs are the primary drivers of operational consumption being forecast to grow by approximately 15% over the next 10 years.

AEMO's 2025-26 forecast shows 5,045 GWh of consumption in New South Wales related to electrification, which represents approximately 7.8% of operational consumption

The trend in AEMO's forecast is consistent with CSIRO's 2021 EV and Multi-sector studies[34]. With no issues raised in AEMO's consultation, or by submissions to the reliability instrument request, the AER considers the figures used are reasonable.

5.1.9 Energy Efficiency

AEMO forecasts a reduction of 361 GWh of consumption in South Australia by 2024 due to energy efficiency measures. This represents a reduction of approximately 3.0% of operational consumption.

AEMO forecast a reduction of 4,267 GWh of consumption in New South Wales by 2025-26 due to energy efficiency measures. This represents a reduction of approximately 6.6% of operational consumption.

An adjustment has been applied to the 2021 IASR energy efficiency forecasts to better reflect current energy efficiency trends. Energy efficiency forecasts are based on SPR's Energy Efficiency Forecasts[35].

AEMO's energy efficiency assessment that forms part of electricity demand forecasts considers federal and state-based policies that encourage investments in activities that will lower energy consumption, including the South Australian Retailer Energy Efficiency Scheme (SA REES).[36]

The trend in AEMO's forecast is consistent with SPR's forecasts. With no issues raised in AEMO's consultation, or by submissions to the reliability instrument request, the AER considers the figures used are reasonable.

5.1.10 Inter-regional network losses

AEMO's capacity outlook model[37] uses a topology which splits the five NEM regions into several sub-regions. Despite this, AEMO maintains a regional representation of losses for the transmission network; that is, inter-regional losses are the determined losses on a notional interconnector between two Regional Reference Nodes[38].

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[34] CSIRO, *'Multi-sector energy modelling'*, July 2021

[35] Strategy.Policy.Research, *'Energy Efficiency Forecasts'*, 22 July 2021

[36] AEMO, *'2021 Inputs, Assumptions and Scenarios Report'*, July 2021

[37] AEMO, *'ISP Methodology'*, August 2021, p. 12

[38] AEMO, *'Proportioning Inter-regional losses to regions'*, September 2009

In its 2021 ISP Methodology Issues paper AEMO asked whether the introduction of the sub-regional capacity outlook model raises the question of whether the representation of losses should be retained as inter-regional losses (losses between regional reference nodes) in line with existing NEM operation, or loss modelling should be modified to an inter-sub-regional approach (losses between sub-regions).[39]

Stakeholder responses indicated interconnector losses should reflect the existing regional Forward-Looking Transmission Loss Factors (FLLF) methodology and be based on power system modelling of new transmission projects. Differing views were provided on whether this should be calculated a regional or sub-regional level.

AEMO proposed maintaining a regional approach to modelling losses (i.e., losses are calculated between regional reference nodes and generator MLFs are referenced to the Regional Reference Nodes), for the following reasons:

- An inter-regional loss representation provides a reasonable representation of losses in the transmission network, and sub-regional augmentations can still influence those loss equations.
- Modelling losses between existing regions is consistent with the published FLLF methodology, so this approach is consistent with how losses are presently accounted for in the NEM.

The South Australia T-1 reliability instrument request states that approximately 30 MW interregional network losses are forecast during unserved energy periods in South Australia in 2023-24. The New South Wales T-3 reliability instrument request states that approximately 74 MW interregional network losses are forecast during unserved energy periods in New South Wales in 2025-26.

With no issues raised in AEMO's ESOO consultation, or by submissions to the reliability instrument request, the AER considers the figures used are reasonable.

5.1.11 Auxiliary loads

Data checked:

- Auxiliary load data – ESOO 2022, 2021 and 2020

Auxiliary loads used in the reliability forecast were based on scheduled and semi-scheduled generators providing self-reports of typical auxiliary load percentage to AEMO through the latest Generator Information surveys[40], which are published in aggregate form. New entrant data is consistent with the Aurecon AEMO costs and technical parameter review report from October 2021.[41]

With no issues raised in AEMO's consultation, or by submissions to the reliability instrument request, the AER considers the figures used are reasonable.

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[39] AEMO, *'ISP Methodology Issues Paper'*, February 2021

[40] AEMO, Generation information surveys

[41] Aurecon, *'2021 Costs and Technical Parameter Review'*, October 2021

5.1.12 Electric vehicle (EV) uptake

Data checked:

- Electric vehicle energy usage forecasts – ESOO 2022, 2021 and 2020
- Uptake (number) of electric vehicle forecasts – ESOO 2022, 2021 and 2020
- Charging profiles – ESOO 2022 and 2020

No issues were identified in the dataset and the charging profiles were consistent with published reports. Assumptions on the uptake of electric vehicles and energy usage figures were supported by other reputable sources such as CSIRO[42] and the Electric Vehicle Council.[43]

5.1.13 Demand side participation (DSP)

The reliability response data, which forms part of AEMO's demand side participation forecasts, is based on price response for trading intervals exceeding $7,500/MWh. AEMO's forecast is based on existing and committed DSP information provided by market participants, which is published in aggregated form. With no other issues raised by stakeholders and DSP forecasts similar to those used in previous ESOO/reliability forecasts, we consider the data reasonable.

5.1.14 Inter-regional transmission unplanned outage rates

AEMO's methodology for calculating inter-regional transmission unplanned outage rates is set out in the *ESOO and Reliability Forecast Methodology Document*.[44]

AEMO discussed and consulted on its unplanned transmission outage rate methodology at the January 2022 Forecasting Reference Group forum. [45] The focus of AEMO's consultation was around the appropriateness of its process for collecting data, and whether long duration unplanned outages observed on transmission elements are sufficiently different from long duration forced outages observed on generators that it would require special consideration.

At the June 2022 Forecasting Reference Group forum AEMO presented and discussed generator forced outage rates, and transmission unplanned outage rates impact on forecast reliability.[46]

Shell Energy submitted that it believes AEMO erred in its forecasting of forced outage rates on the Heywood interconnector. The issue raised by Shell Energy is discussed in section 5.2 (below). With no other issues raised by stakeholders and noting outage rates are similar to those used in previous ESOO/reliability forecasts, we consider the unplanned outage rates used reasonable.

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[42] CSIRO, *'Electric vehicle projections'*, May 2021

[43] Electric Vehicle Council, *'Submission to AEMO 2022 Integrated System Plan'*, February 2022

[44] AEMO, *'ESOO and Reliability Forecast Methodology Document'*, August 2022 pp. 15-16

[45] AEMO, Forecasting Reference Group, 27 January 2022

[46] AEMO, Forecasting Reference Group, 29 June 2022

5.2 Whether AEMO used reasonable endeavours to prepare the reliability forecast in accordance with the Forecasting Best practice Guideline

The Forecasting Best Practice Guideline (the Forecasting Guideline) provides guidance to AEMO on its forecasting practices and processes relating to a reliability forecast. NER clause 4A.B.5(b) states that the guidance within the Forecasting Guideline must have regard to the following principles:

- Forecasts should be as accurate as possible, based on comprehensive information and prepared in an unbiased manner.
- The basic inputs, assumptions and methodology that underpin forecasts should be disclosed.
- Stakeholders should have as much opportunity to engage as is practicable, through effective consultation and access to documents and information

The Forecasting Guideline also provides additional advice relevant to AEMO's reliability forecast and its consultation processes.

In this section we assess AEMO's forecasting approach it has undertaken to develop the 2022 reliability forecast.

5.2.1 Transparent forecasting methodology

The Forecasting Guideline sets out that AEMO should publish key elements of its Forecasting Approach which are transparent, fit-for-purpose and accessible to key stakeholders. AEMO should also provide sufficient detail in its reliability forecast guidelines to comply with NER clause 4A.B.4(b), including key forecasting streams on demand forecasts, supply forecasts and its assessment on whether the reliability standard will be met.

AER Assessment

For the 2022 reliability forecast AEMO provided the following documents that were used to create the reliability forecast:

- DSP Forecasting Methodology
- ESOO and Reliability Forecast Methodology
- Forecast Approach - Electricity Demand Forecasting Methodology

AEMO has also previously published its Reliability Forecast Guidelines, which set out its how it implements the Forecasting Guideline in preparing a reliability forecast.

AEMO chose not to consult on any of the methodologies it had previously provided as part of the reliability instrument requests and are relevant to the 2022 reliability forecast and ESOO. AEMO did, however, consult on its Forecasting Improvement Plan in late 2021/early 2022, which provides transparency to stakeholders of proposed improvements to its forecasting. AEMO undertook this consultation using a single stage consultation approach, along with presenting selected topics in forecasting reference group meetings.

In the 2022 ESOO and the 2022 Forecasting Best Practice Approach Report, AEMO highlighted that it did not strictly follow the methodology set out in its Reliability Forecast Methodology when determining the gap period for the South Australia T-1 Reliability Gap. When consulting with stakeholders on how best to calculate a Reliability Gap period, some stakeholders preferred narrowing the gap in terms of length of days and hours within a day. AEMO incorporated this feedback and set a methodology which applied a 10% loss of load probability threshold unless doing so made the reliability gap incalculable. If it were incalculable, AEMO would decrease the loss of load probability in 2% increments until it could be calculated.

For the South Australia T-1 reliability gap, AEMO states that strictly following this methodology would have resulted in using an 8% loss of load probability which only represented half of the forecast unserved energy periods. AEMO considered this was not consistent with parts of the NEL and NER which focus on setting a reliability gap to identify periods in which unserved energy is likely to occur. For this reason, AEMO adopted a lower loss of load probability (2%), which resulted in a wider reliability gap period than if it used 8% was used. AEMO stated that this issue with the South Australia gap period is a result of higher than anticipated uptake of variable renewable energy, from when the original methodology was developed.

We consider that while best practice forecasting would be to apply the methodology that was consulted on, in the way it was specified, flexibility in approach is sometimes required. While AEMO did vary slightly from its consulted-on approach to determining the gap size, it has thoroughly explained the reasoning for the variation. We agree that a gap period which only covers approximately 50% of the forecast unserved energy periods does not deliver on the intention of the reliability gap period. We also note that as this is a T-1 reliability gap, the duration of the gap is governed by what was set out by the South Australian minister at the T-3 stage, and AEMO's forecast reliability gap remains within these bounds. AEMO has also set out as part of its Forecasting Approach that it intends to consult on its Reliability Forecast Guidelines, which include the methodology for how a gap period is calculated, again in 2024. For these reasons we consider AEMO has reasonably adhered to the Forecasting Guideline in the way in which it has published, consulted on and implemented methodologies that relate to the reliability forecast.

5.2.2 Consultation

The Forecasting Guideline sets out the consultation process AEMO should undertake when developing the inputs and assumptions that underpin its reliability forecast. This is a single stage consultation process which gives stakeholders the ability to provide submissions.

AER assessment:

As AEMO highlighted in its Forecasting Best Practice Approach Report, the 2021 IASR was consulted on extensively using a combination of workshops and webinars along with a formal single stage process. The 2022 Forecast Assumptions Update was also consulted on with a formal single stage process which included the publication of a draft, a submission period for stakeholders, publishing a consultation summary report and the final Forecasting Assumptions update. Some specific components of the forecast update were also consulted on using AEMO's Forecasting Reference Group.

Shell Energy raised a concern in its submission to the South Australia T-1 reliability instrument request that AEMO did not meet forecasting best practice requirements, due to its response to an issue raised on the forecast treatment of forced outage rates on the Heywood Interconnector. Shell Energy's concerns, which it voiced during June 2022 Forecasting Reference Group meeting, focussed on AEMO's treatment of the reduction of Heywood interconnectors transfer limit to 50 MW for both a full forced outage and a line reclassification event.

AEMO consulted on its proposed modelling approach for unplanned transmission outages in January 2022, with no formal submissions received. AEMO's January 2022 Forecasting Reference Group meeting minutes verify this.[47] Its Forecasting Reference Group consultation report in August 2022 provide further context on the issue, which AEMO states was focussed on ensuring it had applied its consulted-on methodology correctly and was not discussing the merits of the approach itself at that point of the forecasting cycle.

We consider it reasonable for AEMO to remain with the consulted-on methodology for unplanned transmission outages as Shell Energy only raised the issue 2 months prior to the release of the ESOO, which is insufficient time for AEMO to implement changes. Further to this we note the low materiality unplanned transmission outages have to the reliability forecast as highlighted in AEMO's T-1 reliability instrument request.

Overall, we consider AEMO's consultation processes, and its final inputs and assumptions used for the 2022 ESOO and reliability forecast are reasonable. Stakeholders were provided with both formal and non-formal options to engage with AEMO's material and AEMO conducted the consultation processes in line with the single stage process set out in the Forecasting Guideline.

5.2.3 Other best practice forecasting matters

Table 2 highlights our review of other matters from the Forecasting Guideline relevant to the reliability forecast.

Table 2 – AER assessment of other matters

Forecasting Guideline	AER review
Reasonable inputs and assumptions and use and disclosure of data	The Forecasting Guideline states AEMO's forecasts should be based on as up-to-date and comprehensive data as practicable, considering publication timeframes. AEMO should also consider appropriate ways to use confidential information, which is relevant to key inputs for the reliability forecast. For the 2022 ESOO and reliability forecast, AEMO states it has used inputs, assumptions, and scenarios from the 2021 Inputs, Assumptions and Scenarios Report

[47] AEMO, Forecasting Reference Group, 25 May 2022

	(IASR) as well as the 2022 Forecasting Assumptions Update. With no material errors or inaccurate assumptions identified in our review and issues raised in submissions responded to in 5.1, we consider the inputs and assumptions used by AEMO in its forecasts as reasonable. We further note and consider AEMO's use of confidential information for its generation project committed status, auxiliary loads and large industrial load forecasts which is set out in its methodology documents as reasonable.
Transparent drivers of forecasts/effects on inputs	The Forecasting Guideline states AEMO should use a component based methodology, with components developed through consultation. AEMO should also identify key inputs and assumptions that drive forecasts so participants can see how changes will affect final forecasts. We consider AEMO's methodology for the ESOO and reliability forecast uses a component based methodology which they have consulted on with stakeholders. On AEMO's forecasting approach webpage it publishes a forecasting approach diagram, which highlights how individual components feed into the overall methodology and reliability forecast. The guidelines/documents that govern a large number of key methodologies, inputs and assumptions are also made available, which provide further context to how they impact AEMO's forecasts.
Scenario and sensitivity analysis for individual forecasts	The Forecasting Guideline sets out that AEMO's modelling approach should consider scenarios and identify key parameters for sensitivity analysis. We consider AEMO's modelling approach is in line with the Forecasting Guideline expectations in that the ESOO includes a number of future scenarios which are consulted on with stakeholders. We note for

	the 2022 ESOO and reliability forecast AEMO has used the step change demand scenario, as it considers it most likely to occur due to impacts from the energy transition.[48]

[48] AEMO, *'Electricity Statement of Opportunities (ESOO)'*, August 2022, p. 20.

Appendix A – The T-1 reliability instrument

The reliability instrument details are:

Reliability instrument for South Australia 2024	
Region	South Australia
Size of reliability gap	230 megawatts (MW)
Reliability gap period	8 January 2024 to 29 February 2024 (inclusive)
Trading intervals	Working weekdays for the half-hour ending 17:30, 18:00, 18:30, 19:00, 19:30, 20:00, 20:30 and 21:00[49]
AEMO's one-in-two year peak demand forecast	3,044 megawatts (MW)
Contract position day	6 January 2023
Reporting day	31 July 2023
New entrant contract position day	9 January 2024
New entrant reporting day	30 April 2024

[49] National Electricity Market time

Appendix B – The T-3 reliability instrument

The reliability instrument details are:

Reliability instrument for New South Wales 2025-26	
Region	New South Wales
Size of reliability gap	790 megawatts (MW)
Reliability gap period	1 December 2025 to 28 February 2026 (inclusive)
Trading intervals	Weekdays for the half-hour ending 14:30, 15:00, 15:30, 16:00, 16:30, 17:00, 17:30, 18:00, 18:30, 19:00, 19:30, 20:00, 20:30 and 21:00[50]
AEMO's one-in-two year peak demand forecast	13,133 megawatts (MW)

[50] National Electricity Market time