AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Reliability Instrument Request

November 2020

T-3 instrument request for New South Wales

A request to the Australian Energy Regulator

Important notice

PURPOSE

This document has been prepared by AEMO as required by section 14I of the National Electricity Law (Law) and clauses 4A.C.1, 4A.C.2 and 11.132 of the National Electricity Rules (Rules) and has effect only for the purposes set out in the Law and Rules.

This publication has been prepared by AEMO using information from its 2020 Electricity Statement of Opportunities (ESOO).

DISCLAIMER

This document might also contain information which is provided for explanatory purposes. That information does not constitute legal or business advice, and should not be relied on as a substitute for obtaining detailed advice about the Law, the Rules, or any other applicable laws, procedures or policies. AEMO has made every reasonable effort to ensure the quality of the information but cannot guarantee its accuracy or completeness.

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1. Background

In its 2020 Electricity Statement of Opportunities (ESOO)[1], AEMO identified a forecast reliability gap in New South Wales in 2023-24. The T-3 cut-off day for this reliability gap is 1 January 2021.

The National Electricity Amendment (Retailer Reliability Obligation trigger) Rule 2020 commenced on 26 November 2020, aligning the Forecast Reliability Gap with the new Interim Reliability Measure (of 0.0006% unserved energy [USE]).

Under clause 11.132.2 of the National Electricity Rules (Rules), "for the purposes of sections 14G(1) and 14(G)(5) of the *National Electricity Law*,

(a) the reliability standard is prescribed to be the *interim reliability measure*; and

(b) a *forecast reliability gap* occurs in a *region* in a *financial year* if identified in a *reliability forecast* and is material if it exceeds the *interim reliability measure*."

If a reliability forecast identifies a forecast reliability gap for a region, AEMO must request the Australian Energy Regulator (AER) to consider making a reliability instrument at least one month before the T-3 cut off day[2] for the relevant forecast reliability gap in accordance with section 14I of the National Electricity Law and the requirements of Part C, Division 1 of the Rules.

Once a decision has been made, the AER will publish the decision, the reasons supporting that decision, and, if applicable, the reliability instrument. The reliability instrument takes effect once published on the AER's website.

This request has been prepared in alignment with the AER's Interim Reliability Instrument Guidelines[3].

[1] Available at https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo.

[2] The T-3 cut-off day for a forecast reliability gap is the day that is three years before the day the forecast reliability gap period for the forecast reliability gap starts: refer section 14G(3) of the National Electricity Law.

[3] Available at https://www.aer.gov.au/system/files/Interim%20Reliability%20Instrument%20Guidelines%20-%20RRO%20-%20July%202019.pdf.

2. Reliability Instrument request

The reliability forecast published in the six months immediately preceding the T-3 cut-off day of 1 January 2021 identifies the forecast reliability gap. This reliability forecast was published in the 2020 ESOO.

The size of the **forecast reliability gap** is 154 megawatts (MW).

This reliability instrument request applies to the **forecast reliability gap period** of 1 January 2024 to 29 February 2024 inclusive.

The region in which the forecast reliability gap is forecast to occur is New South Wales.

AEMO's **one-in-two year peak demand forecast** for the forecast reliability gap period is 13,710 MW (reported on a 50% Probability Of Exceedance [POE], 'as generated' basis).

The **trading intervals** during the forecast reliability gap period are those that fall between 15:00 and 20:00 on weekdays in January and February 2024. For clarity, this means the trading intervals for the half-hour ending 15:30, 16:00, 16:30, 17:00, 17:30, 18:00, 18:30, 19:00, 19:30 and 20:00[4].

A sensitivity matrix to assist with understanding of the identified *forecast reliability gap* and related inputs and assumptions is provided below.

Table 1 Sensitivity matrix for forecast reliability gap

Additional capacity (MW)	0	50	100	150	154	200	250
USE (%)	0.000783%	0.000715%	0.000656%	0.000603%	0.000599%	0.000556%	0.000515%

The information in Table 1 shows how additional firm capacity (in megawatts) will affect USE. The additional capacity row of the table can be interpreted as either an increase in supply or a reduction in demand.

[4] All times are National Electricity Market (NEM) time.

3. Supporting information

AEMO has published information regarding the data inputs, calculations, assumptions and methodology used in the reliability forecast within the 2020 ESOO and accompanying documents[5].

Specifically, the reliability forecasts and indicative reliability forecasts published in accordance with the Retailer Reliability Obligation (RRO) constitute Chapter 5 of the 2020 ESOO. Key component forecasts and inputs include:

- Consumption and demand forecasts (see Sections 2.2, 2.3, and 2.4 of the 2020 ESOO).
- Supply forecasts (see Chapter 3 of the 2020 ESOO).
- The accompanying July 2020 Generation Information Page.
- The 2020 Inputs, Assumptions and Scenarios Report (IASR).

The below table serves as a guide to these documents, by each key input, to assist the AER and stakeholders with review of the assumptions underpinning its reliability forecast data.

The following should be noted for interpretation of this guide:

- Relevant sections of the 2020 ESOO and 2020 IASR are referred to in the "Description of input" column
- The Low, Medium or High rating in the column "Materiality to the reliability forecast in 2023-24" should be interpreted as an approximate guide to the magnitude of each input's contribution towards the reliability forecast for New South Wales in 2023-24, particularly in the period over which the forecast reliability gap period applies.
- Stakeholder consultation (on the inputs, calculations, assumptions, and methodologies used in the reliability forecast) was undertaken through AEMO's 2020 planning and forecasting consultation on scenarios, inputs and assumptions[6] and Forecasting Reference Group (FRG)[7] meetings. Summaries of stakeholder feedback and AEMO responses are in Appendix A1 of the IASR[8] and FRG meeting minutes.
- AEMO adopted the Central scenario for the purpose of developing its reliability forecast in the 2020 ESOO.

[5] All are available at https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo.

[6] See https://aemo.com.au/consultations/current-and-closed-consultations/2020-planning-and-forecasting-consultation-on-scenarios-inputs-and-assumptions/ for further information.

[7] See https://www.aemo.com.au/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/forecasting-reference-group-frg for further information.

[8] Available at https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/2020-forecasting-and-planning-inputs-assumptions-and-scenarios-report-iasr.pdf?la=en.

Table 2 Guide for inputs, calculations, assumptions and methodology used in the reliability forecast

Input	Description of input	Materiality to the reliability forecast in 2023 24[A,B]	Data input source – IASR Workbook location	Stakeholder consultation	Consultancy reports
Electric vehicle (EV) uptake	2020 ESOO Section 2.2 "Electrification of transport". 2020 IASR Section 3.1 Key components for forecasting energy consumption – Battery systems.	**Low** In 2023-24 AEMO's forecast projects 20 GWh of EV consumption in New South Wales, which represents less than 0.1% of operational consumption. Demand for EV charging is approximately 4 MW at time of maximum 50% POE demand in summer.	Electric Vehicles tab (Central scenario)	IASR submissions made by Tesla, Origin Energy, Energy Queensland. Electric Vehicle Modelling Roadmap, FRG Meeting 21, September 2019.	Figure 5-18 Projected electric vehicle electricity consumption of CSIRO "Projections for small-scale embedded technologies".
Behind-the-meter battery storage installed capacity	2020 IASR Section 3.1 Key components for forecasting energy consumption - Battery systems, including Figure 5: Behind-the-meter battery forecasts for the NEM. Electricity Demand Forecasting Methodology Information Paper (August 2020)[C], A3.2.2 Energy Storage System charge discharge profile used in minimum and maximum demand, including Figure 14 for New South Wales average daily February charge/discharge profile.	**Low** Approximately 0.3 GW of capacity forecast for New South Wales in 2023-24. Demand for behind-the-meter battery charging is approximately 8 MW at time of maximum 50% POE demand in summer.	Embedded energy storages tab (Central scenario)	IASR submissions made by Tesla, Victorian Government, Fluence, ERM Power (Shell), Energy Queensland, Energy Australia, Ausnet Services. Distributed Energy Resources (DER) forecasting and methodology overview, FRG Meeting 26, February 2020. DER forecasts, FRG Meeting 28, April 2020.	AEMO used an average of CSIRO's Central[D], and Green Energy Markets (GEM) Central[E] projections. GEM "Projections for distributed energy resources" report, in particular figures 5.18, 5.23 & 5.28. See CSIRO "Projections for small-scale embedded technologies" report Figure 5.8.
Distributed PV (including residential, commercial, and larger embedded and PV non-scheduled generation [PVNSG] systems[F])	2020 ESOO Section 2.1 Input drivers of demand – Distributed PV. 2020 IASR Section 3.1 Key components for forecasting energy consumption – Distributed PV.	**High** In 2023-24, AEMO's forecast rooftop PV contribution at the time of maximum 50% POE demand in summer is approximately 422 MW. Forecast PVNSG contribution at time of maximum 50% POE demand in summer is approximately 98 MW.	Rooftop PV and PVNSG tabs (Central scenario).	IASR submissions made by Powerlink, Origin energy, SunWiz, Victorian Government, Energy Queensland, Energy Australia, AusNet Services, and ElectraNet. DER forecasting and methodology overview, FRG Meeting 26, February 2020. DER forecasts, FRG Meeting 28, April 2020.	AEMO used an average of CSIRO[G], and GEM[H] projections. GEM's report figures 5.14, 5.20 & 5.24. CSIRO's report figures 5.1-5.4.

Input	Description of input	Materiality to the reliability forecast in 2023 24[A,B]	Data input source – IASR Workbook location	Stakeholder consultation	Consultancy reports
Economic growth and population outlook	2020 IASR 3.1.2 Economic forecasts, including the influence of COVID-19.	**Medium** As result of updated macro-economic assumptions, combined residential and business forecast contribution to maximum summer 50% POE demand in New South Wales in 2023-24 increased by 111 MW compared to the 2019 ESOO, from 12,332 MW to 12,444 MW.	Central scenario for each of Gross State Product, Energy Consumption, and Maximum demand tabs.	IASR submissions made by ERM Power (Shell), Energy Queensland. Macroeconomic Long-Term Forecasts, FRG Meeting 25, January 2020. COVID-19 Economic forecast update, FRG Meeting 28, April 2020.	BIS Oxford's COVID-19 Economic forecast update[I].
COVID-19 Impacts	2020 ESOO Section 2.1 Input drivers of demand, COVID-19's impact on the demand outlook. 2020 IASR 3.1.2 Economic forecasts, including the influence of COVID-19. 2020 ESOO Appendix A2, COVID-19 impacts on maximum/minimum demand.	**Medium** Forecast COVID-19 impacts on maximum demand in 2023-24 reflect general COVID-19 impacts on consumption (from changes to population and economic forecasts), that led to lower forecasts than would otherwise have been the case in absence of COVID-19.	Central scenario in Energy Consumption and Maximum demand tabs.	COVID-19 Update, FRG Meeting 27, March 2020. COVID-19 Impacts, FRG Meeting 29, May 2020. COVID-19 Impacts and adjustments to maximum and minimum demand, FRG Meeting 32, June 2020.	BIS Oxford's COVID-19 Economic forecast update[J].
Demand side participation (DSP)	2020 ESOO Appendix A3 Demand Side Participation forecast, including Table 19 for the reliability response estimate for New South Wales.	**High** The estimated DSP responding to reliability signals for New South Wales in summer 2023-24 is 285 MW.	Central scenario, NSW Summer reliability response for 2020-21, in DSP tab. Note that for ESOO purposes the 2020-21 reliability response is applied across the forecasting horizon.	IASR submissions made by ERM Power (Shell), Victorian Government. DSP Methodology, FRG Meeting 28, April 2020. DSP Forecasts, FRG Meeting 31, June 2020.	Not applicable.

Input	Description of input	Materiality to the reliability forecast in 2023 24[A,B]	Data input source – IASR Workbook location	Stakeholder consultation	Consultancy reports
Forced outage rates (FORs)	2020 ESOO Section 3.2.1 Forced outage rates. 2020 IASR Section 3.4.1 Generator operating parameters.	**Medium** Forecast FORs for New South Wales coal-fired generation in 2023-24 are at the lower end of historical range.	Generator Reliability Settings tab.	IASR submissions made by AusNet Services, ERM Power (Shell). Forced Outage Rates Forecasts, FRG Meeting 31, June 2020.	AEP Elical Forward looking outages report[K], Figure 5.2.
Generation availability	2020 ESOO Chapter 3 Supply forecasts.	**High** The reliability forecast in the 2020 ESOO considers existing and new generation and battery storage projects that meet the commitment criteria published in AEMO's Generation Information update on 31 July 2020. An updated version of AEMO's Generation Information was published on 12 November 2020, including changes to expected peak summer generation and storage capacity in New South Wales in 2023-24, relative to those assumed in the 2020 ESOO[L]. Subsequent analysis shows that the forecast reliability gap remains (despite these changes) and would reduce the size of the forecast reliability gap by approximately 50-100 MW.	Seasonal ratings tab of IASR workbook.	IASR submissions made by Ausnet Services, ERM Power (Shell). Standing data request – additional info required generator ratings, FRG Meeting 23, November 2019. Forecast Improvement Program, FRG Meeting 25, January 2020.	Not applicable.
Auxiliary loads	2020 ESOO Section 5.4.3. Note that auxiliary load has been determined based on confidential information provided by participants.	**High** To improve accuracy in the 2020 ESOO[M] AEMO requested scheduled and semi-scheduled generators to self-report their typical auxiliary load percentage. Forecast auxiliary load contribution to maximum summer 50% POE demand in New South Wales in 2023-24 decreased by 48 MW, from 468 MW to 420 MW. Auxiliary load forecasts remain relatively static over the next five years in New South Wales.	Auxiliary tab of IASR workbook.	Forecast Improvement Program, FRG Meeting 25, January 2020.	Not applicable.

Input	Description of input	Materiality to the reliability forecast in 2023 24[A,B]	Data input source – IASR Workbook location	Stakeholder consultation	Consultancy reports
Network losses	2020 ESOO Section 3.3. 2020 IASR Section 3.5.	**High** Forecast network losses in New South Wales at time of one-in-two year peak demand (50% POE) is 843 MW.	MLF tab of IASR workbook.	IASR submissions made by Engie (Simply Energy), Energy Australia. FRG Meeting 25, Forecast Accuracy Report Summary, January 2020.	Not applicable.
Weather & climate	2020 IASR Section 3.1.7 Applying historical climatic conditions to forecast years.	**Low** Weather and climate is a partial driver of the (POE) distribution of maximum demand. Given the way weather is sampled within the reliability assessment it is of low materiality since much of the uncertainty is already captured.	Central scenario of Maximum Demand tab of IASR workbook.	IASR submissions made by Powerlink, AusNet Services, Energy Queensland.	Not applicable.

A. Materiality is Low if complete removal of this input from the reliability forecast would result in negligible difference to the size of the reliability gap, Medium if complete removal of this input from the reliability forecast could result in a noticeable change to the forecast reliability gap, and High if complete removal of this input from the reliability forecast could result in either complete removal, or more than doubling of the forecast reliability gap.
B. As a general measure of materiality of demand related inputs to the reliability forecast, the estimated contribution (in MW) to forecast maximum 50% POE demand in NSW in 2023-24 has been provided. Note that the forecast contribution of these inputs during periods of forecast USE may differ from these figures.
C. Available at https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/2020-electricity-demand-forecasting-methodology-information-paper.pdf?la=en.
D. Available at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/csiro-der-forecast-report.pdf?la=en.
E. Available at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/green-energy-markets-der-forecast-report.pdf?la=en.
F. Residential and commercial systems are defined as systems smaller than or equal to 100 kW. PVNSG defines systems greater than 100 kW, up to 30 MW. Distributed PV covers all residential, commercial, and PVNSG systems.
G. Available at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/csiro-der-forecast-report.pdf?la=en.
H. Available at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/green-energy-markets-der-forecast-report.pdf?la=en.
I. Available at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/bis-oxford-economics-macroeconomic-central-scenario-and-downside-scenario-forecast.pdf?la=en.
J. Available at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/bis-oxford-economics-macroeconomic-central-scenario-and-downside-scenario-forecast.pdf?la=en.
K. Available at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/aep-elical-assessment-of-ageing-coal-fired-generation-reliability.pdf?la=en.
L. Available at https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information.
M. See Forecasting Accuracy Reporting at https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/forecasting-accuracy-reporting.

Reference publications

Publication	Location
AER Interim reliability instrument guidelines	https://www.aer.gov.au/system/files/Interim%20Reliability%20Instrument%20Guidelines%20-%20RRO%20-%20July%202019.pdf
2020 ESOO report, supplementary results, data files, methodologies and constraints, including: **ESOO and Reliability Forecast Methodology Document** **Electricity Demand Forecasting Methodology Information Paper** **Demand Side Participation (DSP) Forecasting Methodology** **Interim reliability forecast guidelines**	https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo
2020 IASR	https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/2020-forecasting-and-planning-inputs-assumptions-and-scenarios-report-iasr.pdf?la=en
Consultant reports	AEP Elical: https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/aep-elical-assessment-of-ageing-coal-fired-generation-reliability.pdf?la=en BIS Oxford Economics: https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/bis-oxford-economics-macroeconomic-central-scenario-and-downside-scenario-forecast.pdf?la=en CSIRO: https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/csiro-der-forecast-report.pdf?la=en Green Energy Markets: https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/green-energy-markets-der-forecast-report.pdf?la=en
2020 Planning and forecasting consultation on scenarios, inputs and assumptions	https://www.aemo.com.au/consultations/current-and-closed-consultations/2020-planning-and-forecasting-consultation-on-scenarios-inputs-and-assumptions
Forecasting Reference Group (FRG) records of meetings	https://www.aemo.com.au/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/forecasting-reference-group-frg
Responses provided by AEMO on 2020 Planning and forecasting consultation on scenarios, inputs and assumptions	Appendix A1 of https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/2020-forecasting-and-planning-inputs-assumptions-and-scenarios-report-iasr.pdf?la=en
Forecasting Accuracy Reporting	https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/forecasting-accuracy-reporting

Glossary

Term	Definition
committed and committed* projects	Generation that is considered to be proceeding under AEMO's commitment criteria, defined under the Background information tab on the Generation Information page at https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information.
distributed PV	Includes rooftop systems and other smaller non-scheduled PV capacity.
installed capacity	The generating capacity (in megawatts (MW)) of the following (for example): • A single generating unit. • A number of generating units of a particular type or in a particular area. • All of the generating units in a region. Rooftop PV installed capacity is the total amount of cumulative rooftop PV capacity installed at any given time.
generating capacity	Amount of capacity (in megawatts (MW)) available for generation.
generating unit	Power stations may be broken down into separate components known as generating units, and may be considered separately in terms (for example) of dispatch, withdrawal, and maintenance.
maximum demand (MD)	Highest amount of electrical power delivered, or forecast to be delivered, over a defined period (day, week, month, season, or year) either at a connection point, or simultaneously at a defined set of connection points.
non-scheduled generation	Generation by a generating unit that is not scheduled by AEMO as part of the central dispatch process, and which has been classified as a non-scheduled generating unit in accordance with Chapter 2 of the NER.
operational electrical consumption	The electrical energy supplied by scheduled, semi-scheduled, and significant non-scheduled generating units, less the electrical energy supplied by small non-scheduled generation.
Interim Reliability Measure (IRM)	The introduction of the Interim Reliability Measure (IRM) in 2020 was intended to reduce the risk of load shedding across the NEM by helping keep USE in each region to no more than 0.0006%. This interim measure is intended to support reliability in the system while more fundamental reforms are designed and implemented.
unserved energy	Unserved energy is the amount of energy that cannot be supplied to consumers, resulting in involuntary load shedding (loss of consumer supply). The USE that contributes to the reliability standard and the interim reliability measure excludes unserved energy resulting from multiple or non-credible generation and transmission events, network outages not associated with inter regional flows, or industrial action (NER 3.9.3C(b)).