INTERIM RELIABILITY FORECAST GUIDELINES

PREPARED BY:	AEMO Forecasting
VERSION:	[1.1]
EFFECTIVE DATE:	[2 December 2020]
STATUS:	Final

Approved for distribution and use by:

APPROVED BY:	NICOLA FALCON
TITLE:	Chief System Design & Engineering Officer (Acting)

DATE: 2/12/2020

VERSION RELEASE HISTORY

Version	Effective Date	Summary of Changes
1.0	19 December 2019	First Issue
1.1	2 December 2020	Update for introduction of the National Electricity Amendment (Retailer Reliability Obligation trigger) Rule 2020.

CONTENTS

1. INTRODUCTION 4
1.1. Purpose and scope 4
1.2. Definitions and interpretation 4
1.3. Required content of the Guidelines 5
1.4. Related documents 6

2. INDUSTRY ENGAGEMENT 6
2.1. Engagement cycle 6
2.2. Types of engagement 7
2.3. Levels of engagement 8

3. DATA INPUTS, ASSUMPTIONS AND METHODOLOGY 9
3.1. General principles 9
3.2. Forecast methodologies 10
3.3. Inputs and assumptions 11
3.4. Incorporating confidential information 13
3.5. Quality assurance 13

4. FORECAST IMPROVEMENTS 14
4.1. The forecast accuracy report 15
4.2. Forecast improvement plan 15

5. RELIABILITY FORECAST 15
5.1. Reliability forecast and indicative reliability forecast 15
5.2. Updating the reliability forecast 16

6. DEMAND 17
6.1. Demand definitions 17
6.2. One-in-two year peak demand forecast 17
6.3. Actual demand 18

APPENDIX A. MEANS OF CONSULTATION 19

TABLES

Table 1 List of consultation types 19

FIGURES

Figure 1 Engagement cycle 7
Figure 2 Levels of engagement 9
Figure 3 End to end high-level overview of reliability forecast process 10
Figure 4 Operational demand definition, sent out versus as generated 17

1. INTRODUCTION

1.1. Purpose and scope

These are the Interim Reliability Forecast Guidelines (**Guidelines**) made under clause 11.116.4(a) and amended under clause 11.132.5 of the National Electricity Rules (**NER**). They serve as the *Reliability Forecast Guidelines* under NER clause 4A.B.4 until final *Reliability Forecast Guidelines* are made (by 28 February 2021).

The purpose of the Guidelines is to:

(a) explain to *liable entities* and other interested parties how a *reliability forecast* is prepared, and the underlying procedures, information requirements and methodologies that govern its preparation and operation; and

(b) describe how AEMO will implement the Interim *Forecasting Best Practice Guidelines* produced by the Australian Energy Regulator (AER) in preparing a *reliability forecast*.

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

1.2. Definitions and interpretation

1.2.1. Glossary

Terms defined in the National Electricity Law and the NER have the same meanings in these Guidelines unless otherwise specified in this clause.

Terms defined in the NER (whether in Chapter 4A or Chapter 10) are intended to be identified in these Guidelines by italicising them, but failure to italicise a defined term does not affect its meaning.

The words, phrases and abbreviations in the table below have the meanings set out opposite them when used in these Guidelines.

Term	Definition
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
DSP	Demand Side Participation
ESOO	Electricity Statement of Opportunities
FAR	Forecast Accuracy Report
FBPG	Forecasting Best Practice Guidelines (AER)
FRG	Forecasting Reference Group
NEM	National Electricity Market
NEMWCF	NEM Wholesale Consultative Forum
NER	National Electricity Rules
POE	Probability of Exceedance
POLR	Procurer of Last Resort
RERT	Reliability and Emergency Reserve Trader
RIG	Reliability Instrument Guidelines (AER)
RRO	Retailer Reliability Obligation

1.2.2. Interpretation

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

1.3. Required content of the Guidelines

In accordance with NER clause 4A.B.4(b), these Guidelines include the components listed below, which can be found in the section(s) indicated:

(a) the methodology for determining *actual demand* for a *trading interval* [section 6.3];

(b) the manner in which information requests under NER clause 3.13.3A(d) can be made (which may include standing or individual requests) and the nature, scope and form of the information which can be requested [section 3.3.2];

(c) identification by *Registered Participants* of *confidential information* provided in response to an information request [section 3.4];

(d) the criteria for determining timeframes to respond to an information request, which must allow a reasonable time for *Registered Participants* to respond having regard to the nature of the information request [section 3.3.2];

(e) the consultation processes with relevant stakeholders in preparing a *reliability forecast* and *indicative reliability forecast* [section 2.3];

(f) the methodology, assumptions and inputs to be used for a *reliability forecast* and *indicative reliability forecast*, including:

  (i) a high level description of how the modelling assumptions and inputs are derived and sourced [sections 3.2 and 3.3];

  (ii) an explanation of how a *reliability forecast*, *indicative reliability forecast*, *forecast reliability gap* and *forecast reliability gap period* are determined [section 5.1]; and

  (iii) explanatory material about how demand forecasts (including the *one-in-two year peak demand forecast*) are calculated and produced [section 6.2];

(g) the supporting materials to be published for a *reliability forecast*, the form of the supporting materials and the timeframe for the publication of the supporting materials [section 3.5.2];

(h) the process for updates to a *reliability forecast* in accordance with NER clause 3.13.3A(b) [section 5.2];

(i) the process for AEMO preparing, reporting on and implementing its annual improvement program in accordance with its obligations under NER clause 3.13.3A(h) [sections 4.2 and 3.5.1]; and

(j) any other matters required to be provided for under NER Chapter 4A [none identified].

1.4. Related documents

Reference	Title	Location
AER Interim FBPG	AER Interim Forecasting Best Practice Guidelines	https://www.aer.gov.au/retail-markets/retail-guidelines-reviews/retailer-reliability-obligation-interim-forecasting-best-practice-guideline
AER Interim RIG	AER Interim Reliability Instrument Guidelines	https://www.aer.gov.au/retail-markets/retail-guidelines-reviews/retailer-reliability-obligation-interim-reliability-instrument-guidelines
DSP forecast and methodology	Demand Side Participation forecast and methodology	https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEM_ESOO/2019/Demand-Side-Participation-Forecast-Methodology-2019.pdf
Demand Forecasting Methodology Paper	Electricity Demand Forecasting Methodology Information Paper	https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEM_ESOO/2019/Electricity-Demand-Forecasting-Methodology-Information-Paper.pdf
ESOO and reliability forecast methodology document	ESOO and reliability forecast methodology document	https://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/NEM-Consultations/2019/Interim-reliability-forecast-guidelines/ESOO-and-RF-Methodology-Document.pdf.
RSIG	AEMO Reliability standard Implementation Guidelines	https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Reliability-Standard-Implementation-Guidelines

2. INDUSTRY ENGAGEMENT

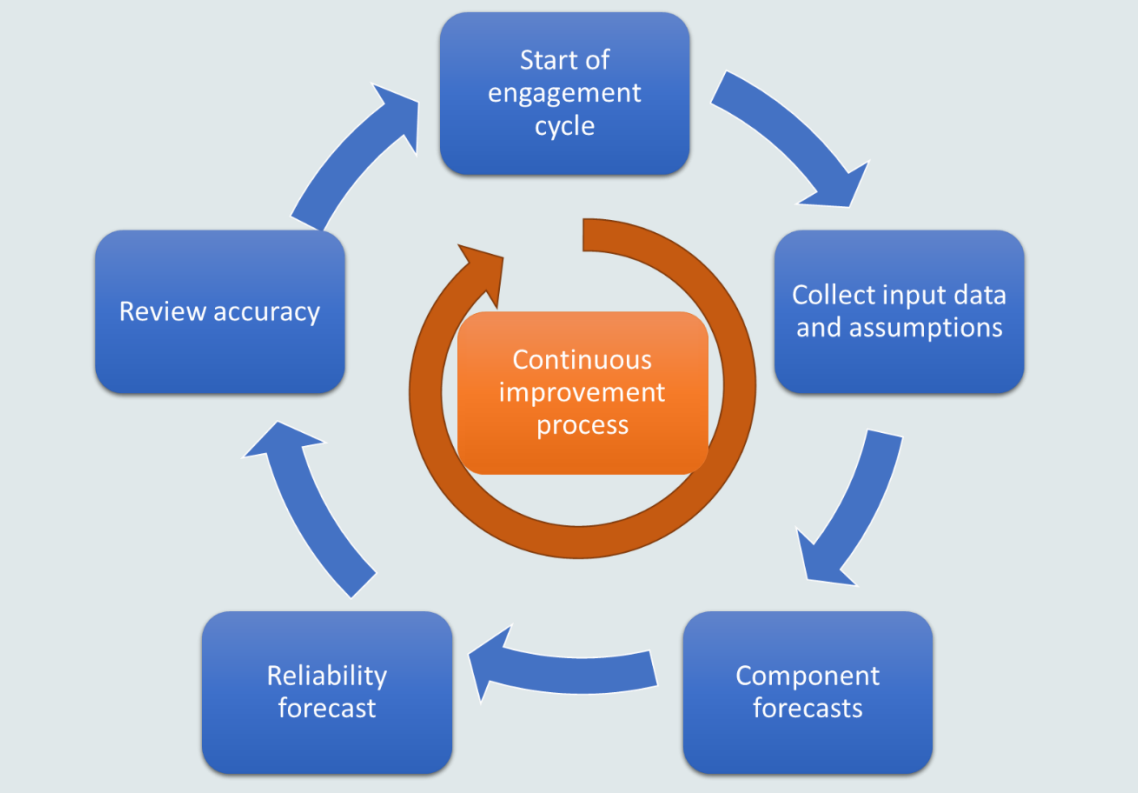
2.1. Engagement cycle

AEMO will engage with industry and interested parties regularly before, during and after the determination of *reliability forecasts*. This includes review of key input drivers, interim results for component forecasts and key processes, including demand and supply forecasts.

A timeline for the different phases along with planned industry engagement will be published at the beginning at each annual cycle (starting after completion of the previous forecast and the forecast accuracy assessment) along with the standing information request (as discussed in Section 3.3.2).

The annual engagement cycle is illustrated in Figure 1. It highlights the different phases of the *reliability forecast* process, some require industry engagement to validate inputs and assumptions, others are outcomes of component forecasts or the *resulting reliability* forecast. While these phases are sequential, AEMO will look for opportunities for improvements continually and engage with industry on these as early as practicable, when relevant.

Figure 1 Engagement cycle – commences fourth quarter of each calendar year



2.2. Types of engagement

2.2.1. Stakeholder engagement spectrum

The level of stakeholder engagement can be described though various frameworks, such as the five levels in the AER's Stakeholder Engagement Framework[1]. Table 1 below is based on these levels and shows how they may be used in the context of AEMO's stakeholder engagement.

Table 1 Stakeholder engagement spectrum

Type	Characteristic	Examples of likely use
Inform	One-way engagement	Website Written reports Email updates Certain agenda items at industry forums
Consult	Limited two-way engagement: we ask questions, stakeholders respond	Some agenda items at industry forums Surveys Some one-on-one meetings
Involve	Two-way or multi-way engagement: learning on all sides, stakeholders and AEMO act independently, AEMO is decision maker	Some agenda items at industry forums Advisory boards and technical working groups Long form written consultations Some one-on-one meetings
Collaborate	Two-way or multi-way engagement: joint decision making and actions	

[1] See: https://www.aer.gov.au/system/files/AER%20Stakeholder%20Engagement%20Framework_2.pdf.

Type	Characteristic	Examples of likely use
Empower	Decisions delegated to stakeholders; stakeholders play a role in governance	

2.2.2. Industry forums/workshops

AEMO convenes a number of forums which meet regularly. These are particularly useful for informing participants, seeking inputs, and facilitating discussion on various topics. These forums include:

(a) the Forecasting Reference Group (**FRG**) – meets monthly, specific to forecasting topics (both supply and demand); and

(b) the NEM Wholesale Consultative Forum (**NEMWCF**) – meets quarterly, broad coverage of NEM-related issues.

In addition, AEMO holds a number of ad hoc industry workshops, typically to facilitate discussion around ongoing consultation processes, seek input for major reports or encourage knowledge exchange.

Industry forums/workshops are expected to be AEMO's most frequent ongoing method of engagement with stakeholders on *reliability forecast* issues, being transparent, open to interested participants and allowing for efficient discussion between AEMO and all industry groups. Depending on needs, they can be used for the both informing, consulting and involving as per the spectrum above.

2.2.3. Technical working groups/advisory boards

AEMO may from time to time establish technical working groups or advisory boards to assist with the development of concepts for improvements in reliability forecasting, typically where the subject is complex and requires specialist knowledge. The technical working groups allow in-depth discussion and assessment of ideas for future implementation as characterised in the involvement spectrum.

2.2.4. One-on-one discussions

AEMO may need to engage with stakeholders individually, for the purpose of obtaining, verifying or discussing relevant *confidential information* that is essential for the accuracy of the *reliability forecasts*. Typically it would be either for consulting or involving (Table 1).

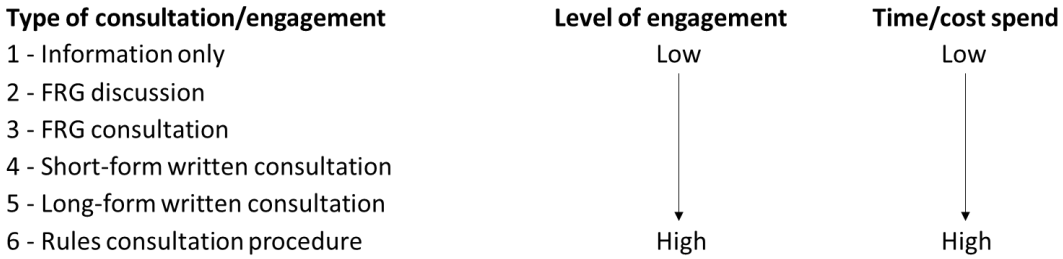
2.2.5. Written consultation

Significant changes to forecasting methodologies and major reviews require more extensive consultation, in some cases as prescribed by the NER or the Interim Forecasting Best Practice Guidelines (**FBPG**). Written consultations will generally be flagged through the FRG or the NEMWCF. AEMO will publish consultation papers and invite written submissions from *Registered Participants* and interested parties. Consultations can be for either for consulting or involving.

2.3. Levels of consultation

For the purpose of these guidelines, AEMO has identified six different levels of engagement, to facilitate effective consultation commensurate with the materiality of the subject. These are summarised in Figure 2 and explained in detail in Appendix A.

Figure 2 Levels of engagement



The level of consultation will be guided by the risk/materiality of the issue under consideration:

(a) Examples of high risk/materiality:

- New/novel technologies or trends, currently with limited experience and understanding – potential to have significant impact in a 10 year horizon.
- Significant changes to data, assumptions or methodologies proposed, for example in response to FAR recommendations.

(b) Examples of medium risk/materiality:

- Minor updates to inputs, assumptions and methodologies that may have significant impact in *reliability forecast* outcomes, but are generally well understood, or new/novel technologies and trends, which are unlikely to have significant impact within 10 years.

(c) Examples of low risk/ materiality:

- Minor updates to inputs, assumptions and methodologies that will have a negligible impact on *reliability forecast* outcomes, correction of obvious errors.

3. DATA INPUTS, ASSUMPTIONS AND METHODOLOGY

3.1. General principles

Producing a *reliability forecast* requires:

(a) Input data – all data that is required to calculate the *reliability forecast*, including the individual components required to produce the overall forecast.

(b) Assumptions – the assumptions made, for example which historical years of forced outage rates best represent expected future years' outage rates.

(c) Methodologies – how input data is transformed into intermediate forecasts (such as forecast demand, forecast supply availability) and how these component forecasts are used in producing the overall *reliability forecast*.

In preparing these, AEMO has regard to the principles for accuracy, transparency, and engagement in NER clause 4A.B.5(b), as reflected in the Interim FBPG.

(d) **Accuracy** will be delivered through:

(i) following best practice methodologies and sources of data and assumptions (see Sections 3.2 and 3.3);

(ii) ensuring thorough quality assurance processes (see Section 3.5);

(iii) applying continuous learning through the Forecast Accuracy Report (FAR) and associated forecast improvement plan (see Section 4); and

(iv) following completion of an electricity *statement of opportunities* (ESOO), reporting to the AER on how AEMO has followed the Interim FBPG in developing the *reliability forecast*.

(e) **Transparency** will be delivered through:

(i) published and consulted on methodologies (see Section 3.2); and

(ii) openness around inputs and assumptions, including how data is sourced, cut-off times, management of *confidential information* (see Section 3.3) and mechanism for release of data, including processed results (see Section 3.5.2).

(f) **Engagement** will be delivered through formal and informal information-gathering and consultative processes before, during, and after the *reliability forecast* process using different forms and levels of engagement (see sections 2 and 3.3.2).

3.2. Forecast methodologies

The process for producing a *reliability forecast* can be split into three overall components:

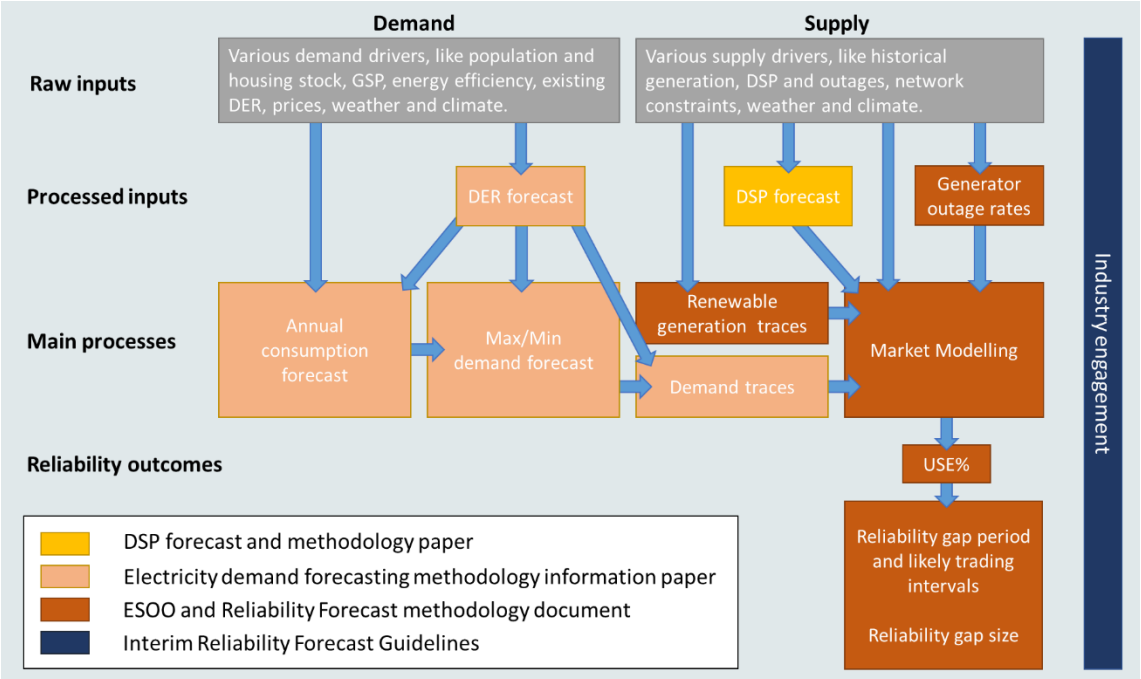
(a) Demand forecasts – the forecast load to be met for the NEM.

(b) Supply forecasts – the operational parameters applied for generators, demand side participation (DSP), large-scale storage, and transmission network elements.

(c) *Reliability forecast* – the assessment of the ability of available supply to meet demand.

Each of these comprises various components and needs different inputs. Figure 3 provides an overview of the end-to-end process and highlights the different methodology documents that explain the different processes and their inputs.

Figure 3 End to end high-level overview of reliability forecast process



In addition to these Guidelines, the three documents listed in the Figure 3 legend describe the detailed methodologies applied by AEMO. The latest versions of these documents are available on the AEMO's NEM Electricity Statement of Opportunities web page[2].

As discussed in Section 4, AEMO will, at least annually, assess the forecast accuracy of its previous *reliability forecast* and forecast components. This will highlight any need for improvement of data, assumption, or methodologies, which will be outlined in a forecast improvement plan, as explained further in Section 4.2.

AEMO will develop and consult on a Forecast Accuracy Methodology Paper during 2020 to supplement the methodology papers listed in Figure 3.

3.3. Inputs and assumptions

3.3.1. General principles

As shown in Figure 3, AEMO needs a wide range of data inputs and assumptions in the preparation of an ESOO and the associated *reliability forecast*. In identifying the inputs and assumptions to be used in a *reliability forecast*, AEMO will:

(a) source the input data and assumptions from the most recent and accurate sources of information reasonably available, and where practicable from the *Registered Participant* or other person most closely associated with the data (see Section 3.4);

(b) validate material inputs and assumptions, where reasonably practicable, for example through a second opinion (consultant) or engagement with the FRG;

(c) include data up till at least 30 April (later if practical) for the demand components and 30 June for the supply components to be used for the *reliability forecast* to be produced by the end of August that year;

(d) unless AEMO itself is the subject matter expert, seek expert advice from consultants with recognised expertise for new or novel technologies or trends that are yet not well understood, and for subjects that require specialist expertise; and

(e) be transparent about all inputs and assumptions sourced and the process for collecting and validating them, subject to AEMO's obligations in respect of *confidential information* under the National Electricity Law.

(f) apply the Forecasting Best Practice Consultation Procedures outlined in AERs Interim FBPG at least once every four years to determine:

  (i) the fundamental methodologies needed in the forecasting processes;

  (ii) the components on which the forecasts are to be based, and the way they are to be determined and used;

  (iii) the stakeholder engagement process for determining the forecasting methodologies, inputs and assumptions.

(g) Appendix B summarises the broad source and validation approach for key data input components as at the date of these Guidelines, including the role stakeholders have in the process.

[2] See: https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Statement-of-Opportunities.

3.3.2. Information requests

(a) To facilitate the accuracy of the ESOO, including the *reliability forecast*, for the benefit of stakeholders overall, AEMO will request information from *Registered Participants* in accordance with NER clause 3.13.3A(d)-(e).

(b) AEMO may request any information, including *confidential information*:

(i) that is relevant to ensure the quality of the matters required to be included in the ESOO; and

(ii) that is not already available to AEMO, unless AEMO considers there is a need for multiple sources to validate data, having regard to the relative reliability of sources and historical data quality.

(c) AEMO will request information from those *Registered Participants* who are reasonably expected to hold that information, either because it relates directly to their business or because their functions or obligations are likely to require it. By way of example only, and subject to subsequent changes to the NER, AEMO may request:

(i) *Generators* to provide current and forecast information about the operation or alteration of their *generating systems*;

(ii) *Network Service Providers* to provide current and forecast information about planned *network augmentations*, upgrades and maintenance, *connection enquiries* and *connection applications*;

(iii) *Network Service Providers* and *Market* Customers to provide current and forecast information about changes in *load* and demand side participation; and

(iv) *Intending Participants* to provide current and forecast information about proposed connection projects.

(d) Information requests can take the form of a standing request or an individual (ad hoc) request.

(e) Standing requests will be published by AEMO once a year, typically around the end of January for the preparation of the ESOO by the end of August, and will include:

(i) a detailed description of the forecast information requested for that calendar year;

(ii) the *Registered Participant* categories required to provide the specified information; and

(iii) the timeline for provision of the information to AEMO, including where applicable the grounds and deadline for requesting an extension.

(f) AEMO will consult on any changes to this list from year to year using the FRG consultation process, as outlined in Section 2. Changes may be driven by learnings from one year's ESOO process, the subsequent assessment of forecast accuracy of the previous year's forecast, or changes to legislation or rules that require AEMO to collect new data.

(g) Individual (ad hoc) requests to one or a broader group of *Registered Participants* may be necessary, for example to seek clarification of information already provided or to address an emerging issue. AEMO will use the FRG discussion process outlined in Section 2 where reasonably practicable, before formally requesting the information. For requests to individual entities, AEMO will discuss one-on-one ahead of the request. In either case, whenever reasonably practical, AEMO will seek to give at least 20 business days for *Registered Participants* to provide the data, once requested.

3.3.3. Responding to information requests

(a) *Registered Participants* must respond to AEMO's information requests within the period specified in the request or as agreed and, where information is requested in a particular form, in that form.

(b) Consistent with NER clause3.13.3A(g) *Registered Participants* must take care to ensure the information they provide is not misleading and has been carefully checked for accuracy or, in the case of forecasts, represents the *Registered Participant's* current best estimate and intentions in relation to the relevant information.

(c) *Registered Participants* must specifically identify any *confidential information* provided in response to a request for information.

3.4. Incorporating confidential information

(a) AEMO will at times ask for and receive *confidential information*. This is to improve the accuracy of the *reliability forecast*, in line with the accuracy principle, but it involves a trade-off with the transparency principle.

(b) To ensure the forecast is accurate, AEMO will use the *confidential information* in its modelling but seek to publish sufficient aggregated information to retain a high degree of transparency of inputs.

3.5. Quality assurance

The end-to-end process in Figure 3 showed a number of inputs, and processes using those inputs, creating outputs that may be used as inputs into other processes.

3.5.1. Quality assurance processes

There are a number of quality assurance processes in place to help to ensure results are accurate and correct.

(a) **Before** the reliability forecasting process, AEMO must consult on planned changes to assumptions and methodologies (typically driven by the forecast improvement plan, as outlined in Section 4.2) using FRG consultation or written consultation.

(b) **Throughout** the reliability forecasting process, AEMO will:

(i) undertake validation of data and assumptions, for example through the use of reputable sources, validation against other available sources and explaining changes from previous versions;

(ii) undertake verification of model implementations underpinning each subprocess; and

(iii) engage with industry on interim results, both by individual component and demand and supply forecasts overall, though FRG discussion and FRG consultation.

(c) **After** the reliability forecasting process, AEMO will publish final methodology documents and supporting material as defined in Section 3.5.2.

3.5.2. Supporting material

(a) No later than the publication date of the ESOO, AEMO must publish supporting material to allow participants to verify or use the data in their own processes, (noting that confidential data will only be available in aggregate form, though the level of aggregation will be limited to what is essential to maintain confidentiality).

(b) Supporting material includes:

(i) input data series to the forecast components;

(ii) component forecast outputs, including demand forecasts and generator outage rates;

(iii) model files or description of model formulations in cases where model files cannot be provided; and

(iv) consultant reports, detailing inputs, assumptions, methodology, and results of any consultancy work used in the *reliability forecast*.

3.5.3. Information provided in a Reliability Instrument request

(a) Should AEMO need to submit a *reliability instrument* request as per Section 5.1 (c), it will, at a minimum, provide the information required by National Electricity Law Section 14I and any further information listed in the AER Interim RIG.

(b) As an indication, AEMO will provide the following:

(i) The NEM *region* in which the *forecast reliability gap* is forecast to occur.

(ii) The *forecast reliability gap*, in megawatts (MW).

(iii) The additional reserves required to reduce expected unserved energy (USE) to below the *interim reliability measure*[3], assuming these reserves are available in all hours of the financial year (for information purposes only).

(iv) First and last days of the *forecast reliability gap period*.

(v) The trading intervals during the *forecast reliability gap period* where supply shortfalls are most likely to occur, which will consist of the specification of weekends/weekdays and the time-of-day range within the *forecast reliability gap period*.

(vi) AEMO's *one-in-two year peak demand forecast* (see Section 6.2).

(vii) The sensitivity of USE to additional capacity available during the *forecast reliability gap period*.

(viii) Additional information that helps illustrate observed USE in the simulations, including but not limited to the distribution of USE across months, and the distribution of USE duration.

4. FORECAST IMPROVEMENTS

(a) In accordance with NER clause 3.13.3A(h) AEMO will, no less than annually, prepare and publish on its website information related to the accuracy of its demand and supply forecasts, and any other inputs determined by AEMO to be material to its *reliability forecasts*. This requirement will be met by the publication of the forecast accuracy report (**FAR**).

(b) At least every four years, AEMO will consult on its FAR methodology in accordance with Section 3.3.1 (f). This will discuss proposed variations in report structure and accuracy metrics. AEMO will consider feedback in the design of future reports and analysis.

[3] Clause 11.132 of the National Electricity Rules provides that, until 30 June 2025, for the purposes of sections 14G(1) and 14G(5) of the National Electricity Law, the reliability standard is prescribed to be the *interim reliability measure*. The measure is specified in clause 3.9.3C(a1) of the Rules.

4.1. The forecast accuracy report

(a) The FAR will include:

(i) an examination of the performance of each forecast component, per NEM *region*, including:

(A) input drivers of demand;

(B) energy consumption (annual assessment);

(C) maximum and minimum demand;

(D) input drivers of supply;

(E) supply availability; and

(F) reliability.

(ii) an explanation of the results and any material deviation of trend in differences; and

(iii) a list of actions undertaken, or to be undertaken, to improve the accuracy of the forecast and forecast components as part of AEMO's forecasting improvement plan.

(b) AEMO will typically publish forecast and observed values alongside forecast accuracy metrics for all forecast components. Values may be published in either graph or tabular format. Where an input is subject to confidentiality requirements, AEMO may choose to either aggregate or not publish updated data.

(c) AEMO develops a new *reliability forecast* at least annually. Within a five-year period of consideration, there may therefore be greater than five forecasts to evaluate for each new observed year. AEMO will evaluate and examine the performance of the most recent *reliability forecast* in the most detail, typically including forecast and observed values. Earlier forecasts may be based on methodologies that have since been updated and assessments of them would only be considered where this is found sufficiently relevant to warrant the additional effort. This could be to examine material variations to the overall trends.

4.2. Forecast improvement plan

(a) The FAR will include information related to proposed improvements to the forecasting processes that will apply to the next ESOO, with a particular focus on those arising from forecast deviations.

(b) Stakeholder consultation on the improvements may begin before or after the FAR publication, with AEMO seeking to engage with stakeholders as early as possible rather than wait for actual publication schedules. Consultation on the improvement plan will follow the short-form written consultation process outlined in Appendix A as well as FRG discussion.

(c) Upon implementation, improvements will be documented in methodology documents and the ESOO.

5. RELIABILITY FORECAST

5.1. Reliability forecast and indicative reliability forecast

(a) The *reliability forecast* covers the first five years of the ESOO time horizon while *the indicative reliability forecast* covers the remaining five years of the ten-year ESOO outlook.

(b) The expected USE is calculated in accordance with the RSIG and as explained in the ESOO and Reliability Forecast Methodology Document[4]. It is compared against the *interim reliability measure*[5]. As per NER clause 11.132.2(b), if the expected USE exceeds the *interim reliability measure*, the *forecast reliability gap* is material.

(c) If there is a *forecast reliability gap:*

(i) Additional reporting of the *forecast reliability gap* (size in MW), *forecast reliability gap period* and likely *gap trading intervals* must be provided to meet the requirements in NER 4A.B.2(b) and (c). The calculation of those are explained in the ESOO Methodology Document[6].

(ii) AEMO will also publish the *one-in-two year peak demand forecast* for each *region* (see Section 6.2) in accordance with NER 4A.A.3(b).

(iii) Following the publication of the ESOO, AEMO will submit a *reliability instrument* request to the AER. Section 3.5.3 outlines the information AEMO will publish as part of a *reliability instrument* request.

(d) While AEMO may assess the reliability gap under a range of scenarios, the *forecast reliability gap* that triggers a *reliability instrument* request will be based on the scenario AEMO considers most likely to eventuate, that is, a neutral or central scenario.

5.2. Updating the reliability forecast

5.2.1. Information provided in a Reliability Forecast update

(a) Should AEMO publish an update to a previously published *reliability forecast*, on becoming aware of new information that is material to the ESOO outcomes in accordance with NER clause 3.13.3A(b), AEMO will reassess the *reliability gap*.

(b) In the event that a *forecast reliability gap* is identified for T-1 or T-3, AEMO will also publish the *forecast reliability gap period* and likely *gap trading intervals* as well as the *forecast reliability gap*.

5.2.2. Industry engagement and timeline for publication

(a) Where there is a need to update the *reliability forecast*, AEMO must balance the extent of the engagement with industry against the speed with which it can publish the update.

(b) Any material change arising from updates to well understood drivers (such as announced large load or generator commitment/closure) will trigger a *reliability forecast* update simply using the existing approach.

(c) Should there be any new trends or information not well understood or consulted on, AEMO will, where reasonably practical, consult with industry before finalising any update, in particular if this could trigger a *reliability instrument* request (see Appendix A).

[4] See: https://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/NEM-Consultations/2019/Interim-reliability-forecast-guidelines/ESOO-and-RF-Methodology-Document.pdf.

[5] Clause 11.132 of the National Electricity Rules provides that, until 30 June 2025, for the purposes of sections 14G(1) and 14G(5) of the National Electricity Law, the reliability standard is prescribed to be the *interim reliability measure*. The measure is specified in clause 3.9.3C(a1) of the Rules.

[6] See: https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Statement-of-Opportunities.

6. DEMAND

6.1. Demand definitions

(a) Demand can be measured at different points in the electricity *network*. AEMO's reliability modelling is based on operational consumption/demand. This represents demand delivered from the *transmission network* as produced by all *scheduled generating units*, *semi-scheduled generating units*, and significant *non-scheduled generating units*[7].

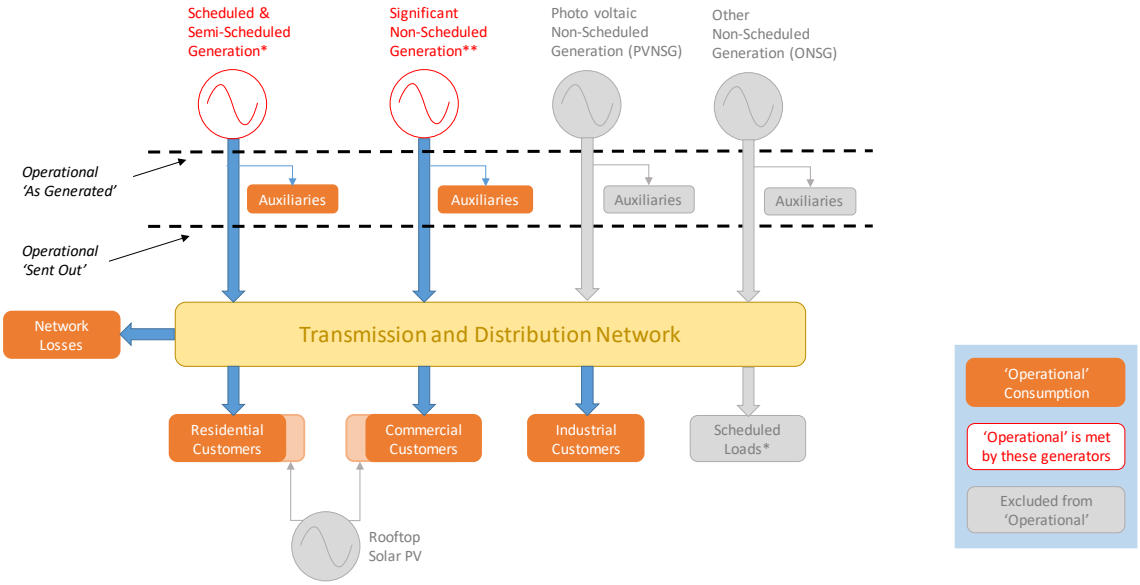
(b) Operational demand can be defined in two different ways depending on where the *generation* delivered to the *transmission network* is measured:

(i) **As generated** – this definition reflects the total generation produced by the *generating system* before subtracting any internal consumption at that site, known as the auxiliary load or auxiliaries.

(ii) **Sent out** – this definition reflects the *generation* actually delivered to the *transmission network*.

This is illustrated in Figure 4.

Figure 4 Operational demand definition, sent out versus as generated



6.2. One-in-two year peak demand forecast

(a) For the purpose of the RRO, AEMO uses its 50% Probability of Exceedance (POE) operational 'as generated' forecast as the *one-in-two year peak demand forecast* defined in NER clause 4A.A.3. This forecast is produced following the methodology outlined in AEMO's most recent Demand Forecasting Methodology Information Paper[8].

[7] For a full explanation of AEMO's demand definitions, see http://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Dispatch/Policy_and_Process/Demand-terms-in-EMMS-Data-Model.pdf.

[8] See: https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Statement-of-Opportunities.

(b) The use of 'as generated' for the *one-in-two year peak demand forecast* allows stakeholders to readily compare against demand in real time, because actual historical demand is reported ongoing by AEMO using this point of measurement[9].

(c) Allowing comparison of forecast against *actual demand* in near to real time should provide *liable entities* with the opportunity to take action to reduce load when *actual demand* approaches the *one-in-two year peak demand forecast*.

6.3. Actual demand

(a) The AER only assesses RRO *liable entities*' compliance in *trading intervals* in which actual demand exceeds the *one-in-two year peak demand forecast* during the published *reliability gap period* and likely *gap trading intervals* for a declared T-1 *reliability instrument*.

(b) The actual demand is the measured operational demand 'as generated' for the *trading interval* adjusted only for the impact of the actions specified in NER clause 4A.A.4(b), namely:

(i) *directions* by AEMO;

(ii) *RERT* contracts activated/dispatched by AEMO; or

(iii) *load shedding* directed by AEMO.

(c) AEMO must, as soon as practical after a *trading interval*, publish the actual demand for that *trading interval* for all *regions* on its website.

[9] See: https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Data-dashboard#operational-demand.

APPENDIX A. MEANS OF CONSULTATION

For the purpose of consulting on the development of the *reliability forecast*, including the methodologies used, AEMO has defined five types of engagement that balance the need for engagement with the cost and speed of undertaking the engagement. These are shown in Table 2, ordered from the least to most engagement. Under type, the bold text highlights the corresponding engagement spectrum as discussed in Table 1.

Table 2 List of consultation types

Type	Process	Examples of likely use
1 – Information only [INFORM]	• AEMO will advise industry of the change, e.g. through FRG meetings, and update documentation when reissued.	Minor administrative updates to methodology descriptions, use of more recent data from existing data sources.
2 – FRG discussion [CONSULT]	• Topic listed on FRG meeting agenda. • Presentation (if practically possible) should be circulated ahead of the FRG meeting as per the FRG Terms of Reference. • Presentation and discussion at FRG meeting. • Outcomes and actions arising to be listed in FRG meeting minutes.	Discussion of ideas to be implemented seeking suggestions for improvements or presentation of draft results of component forecasts of lesser importance.
3 – FRG consultation [CONSULT/ENGAGE]	• Topic listed on FRG meeting agenda. • Presentation (if practically possible) should be circulated ahead of the FRG meeting as per the FRG Terms of Reference and include background, proposed change and justification. • Presentation and discussion at FRG meeting. • Opportunity for verbal/written feedback for two weeks following the FRG meeting. • Conclusion summarised at the following FRG meeting. • Conclusion and submissions received to be published on AEMO's website.	Discussion of draft component forecasts with significant implications to the *reliability forecast* or changes to data source/methodology changes that do not require a major update to the methodology documents.
4 – Short form written consultation [ENGAGE]/CONSULT]	• Single round of written consultation, allowing no less than 20 business days for participants to submit their responses. Final determination published.	Typically used for continuous improvement initiatives, annual inputs and assumptions consultation and improvement plan (other than administrative or to correct an error).
5 – Long form written consultation [ENGAGE]	• As outlined in AER Interim FBPG - Appendix A,	Consulting on material changes to methodology documents or forecasting framework. Must be undertaken at least every four years.
6 – Rules Consultation Procedure [ENGAGE]	• As outlined in NER clause 8.9.	*Reliability forecast guidelines*

APPENDIX B. INPUTS AND ASSUMPTIONS VALIDATION

The *reliability forecast* is based on a number of key inputs.

All inputs and assumptions are generally sourced in one of three ways:

(a) Directly from participants and key stakeholders via surveys

(b) Through research and analysis conducted internally by AEMO

(c) Through engagement of expert consultants.

The table below highlights how the various inputs and assumptions may be sourced and validated though reviews and consultation, or through feedback from regular publication. As forecast components may change over time, not all may be used in any given year, and additional components and sources may be added where they become relevant, in accordance with the processes in the Guidelines. Table 3 should therefore be considered an indicative list only.

Table 3 Key forecast components, their source and main process of validation/consultation.

Component	Component	Source	Validation/Consultation
Demand	Connections	Internal AEMO + ABS	FRG-Discussion
	Economic forecast	Consultant	FRG-Consultation
	DER (PV, EV, ESS)	Consultant(s) / DER register	FRG-Consultation
	Energy Efficiency	Consultant	FRG-Consultation + Jurisdictions
	Appliance uptake	Dept Energy and Environment	FRG-Consultation
	Retail prices	Internal AEMO + AEMC	FRG-Discussion
	Large Industrial Loads	Large consumers / NSPs	FRG-Discussion
Supply	Capacities	Participants (Gen Info portal)	Qtly publication
	Operating characteristics	Participants (Gen Info portal)	Qtly publication
	Commissioning year	Participants (Gen Info portal)	Qtly publication
	Decommissioning year	Participants (Gen Info portal)	Qtly publication
	Fuel prices	Consultant	FRG-Discussion
	Forced outages	Participants (Email survey)	FRG-Discussion + Participant review
	Wind + solar traces	Consultant / Weather data	Periodic peer review
	Hydro traces	Participants / Weather data	GELF portal
	Demand Side Participation	Participants (DSPI portal)	FRG-Discussion
Networks	Constraints	Internal AEMO + TNSP advice	Annual publication
	Interconnector loss function	Internal AEMO + TNSP advice	Annual publication
	MLFs	Internal AEMO	Qtly publication

In addition, any key input assumptions made will be consulted on at the beginning of each forecast cycle. This consultation may be retrospective where revised inputs are not yet available, or are dependent on other components under consultation.