



Forecasting Best Practice Guidelines

August 2020

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1 Nature and authority

Consistent with clause 4A.B.5 of the National Electricity Rules (NER), these forecasting best practice guidelines (FBPG) provide guidance for the Australian Energy Market Operator's (AEMO's) forecasting practices and processes as they relate to:

- a reliability forecast. In this regard, these FBPG replace the interim FBPG for the retailer reliability obligation (RRO)¹; and
- the integrated system plan (ISP) and the process to be used for an ISP update.²

1.1 Authority

Under NER clause 4A.B.5, we must produce the FBPG to provide guidance for AEMO's forecasting practices and processes in developing a reliability forecast, which is included in AEMO's electricity statement of opportunities (ESOO) and is integral for the functioning of the RRO. NER clause 4A.B.5(b) states that this guidance 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.

Under NER clause 4A.B.4, AEMO's reliability forecast guidelines must explain how it will implement these FBPG in preparing a reliability forecast.

The NER also provide authority for the FBPG with respect to the ISP. Specifically, under NER clause 5.22.5(i), the FBPG must provide guidance for AEMO's forecasting practices and processes as they relate to the ISP and the process (including consultation) to be used for an ISP update.

Moreover, NER clause 5.22.5(j) allows us to specify which parts of the FBPG are binding on AEMO. This clause applies to components of the FBPG that relate to the ISP, including elements that apply to both the ISP and other processes (such as the Forecasting Approach). Appendix C summarises the requirements and considerations in the FBPG that are binding, versus the areas that include non-binding guidance. As such, throughout this document, we have:

- highlighted binding requirements by words in italics – *required* or *requirement*;
- highlighted binding considerations by words in italics – *must have regard to* or *must consider*. AEMO must have regard to elements of the FBPG classified as

¹ AER, *Interim forecasting best practice guidelines: Retailer reliability Obligation*, September 2019.

² NER, clause 5.22.5(i).

considerations when making decisions. Provided AEMO has regard to the relevant consideration when making its decision, it will not be in breach of the FBPG if it decides not to give any weight to that consideration, or to favour one consideration over another. However, to demonstrate compliance, AEMO would need to explain, in writing, how it has had regard to each consideration, including the weight it has given to the consideration in making its decision (if any); and

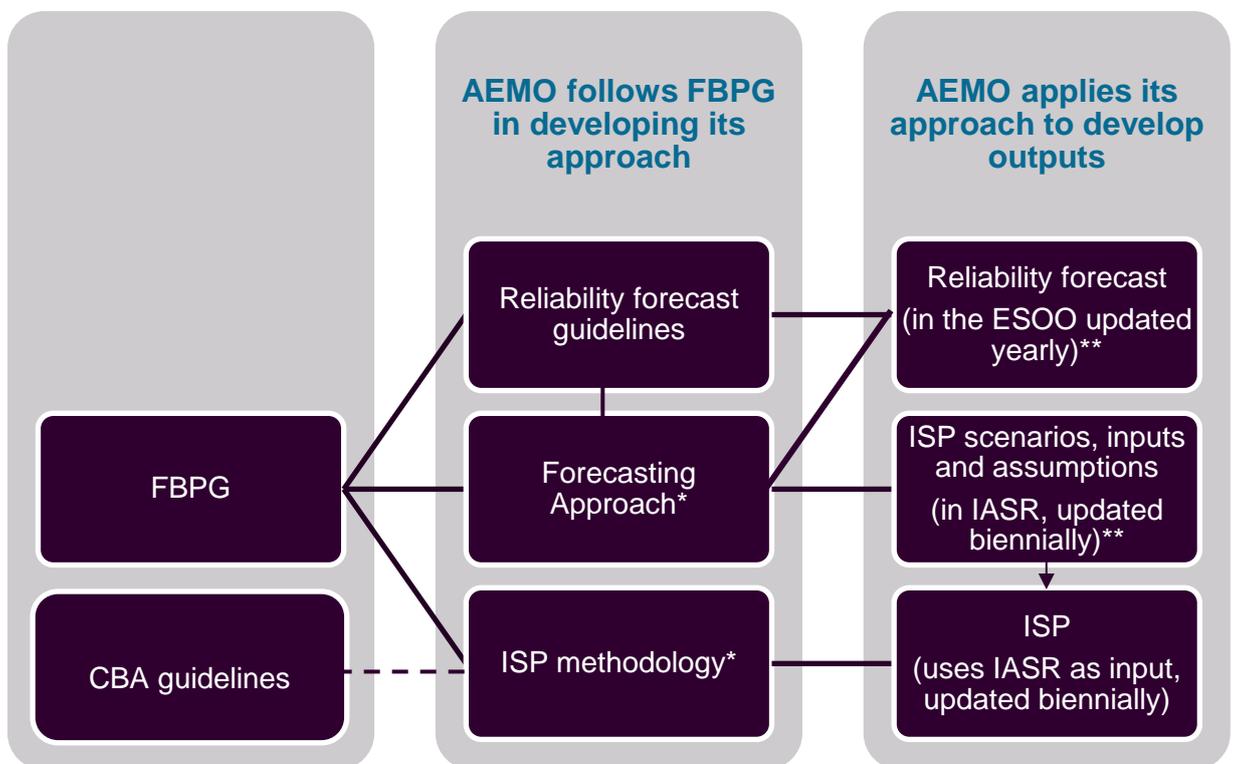
- included discretionary elements that do not bind AEMO, but rather provide guidance for best practice. A discretionary element in the FBPG is any information that is not identified as a requirement or consideration.

Moreover, under NER clauses 5.22.8(a) and (d), AEMO must, in accordance with the ISP timetable and the FBPG, develop, consult and publish a:

- report on the inputs, assumptions and scenarios to be used for the ISP— an ‘inputs, assumptions and scenarios report’ (IASR); and
- cost benefits analysis (CBA) and modelling methodology to be used for the ISP that is consistent with the CBA guidelines— an ‘ISP methodology’.

Figure 1 illustrates the relationship between the FBPG, reliability forecast guidelines, and reliability forecasts in the ESOO that are relevant to the RRO. It also illustrates the relationship between the FBPG, ISP methodology, and the ISP scenarios, inputs and assumptions in the IASR.

Figure 1: Use of the FBPG



* AEMO is *required* to update this at least every four years as per this FBPG.

** The ESOO and IASR include similar information. The IASR may be included in a document that also provides for the assumptions and inputs to be used in preparing other AEMO publications (such as the ESOO), and follow a joint consultation process. See NER clause 5.22.8(c).

1.2 Purpose

The purpose of the FBPG is to provide procedural guidance to promote transparency and stakeholder confidence in the forecasting practices and processes that AEMO undertakes in developing a reliability forecast and the ISP.

When assessing a request from AEMO to make a reliability instrument, NER clause 4A.C.11 directs us to have regard to, among other things, whether AEMO has used reasonable endeavours to prepare the reliability forecast in accordance with the FBPG.

The FBPG set out various principles that are relevant to developing reliability forecasts and forecasts for the ISP (such as the inputs, assumptions and scenarios to be used in the ISP), that may be suitable for more general application. Given this, AEMO may use the FBPG more broadly to inform its forecasting approaches for other applications so that industry and stakeholders benefit from a consistent approach.

1.3 Definitions and interpretation

In the FBPG, words and phrases have the meaning given to them in the NER and Glossary.

1.4 Process for revision and version control

We may, from time to time, amend the FBPG in accordance with the Rules consultation procedures. However, we need not comply with the Rules consultation procedures when making minor or administrative amendments.

A version number and an effective date of issue will identify every version of the FBPG. Each version of the FBPG commences on the date it is published on the AER website. The version of the FBPG that is in force when AEMO begins a forecasting process will apply to that forecasting process.

2 Consultation processes

This section of the FBPG sets out the consultation processes for:

- AEMO's Forecasting Approach (section 2.1);
- AEMO developing scenarios, inputs and assumptions for the IASR and a reliability forecast in the ESOO (section 2.2);
- out of cycle updates to the reliability forecast (section 2.3);
- AEMO's ISP methodology (section 2.4); and
- ISP updates (section 2.5).

For completeness, NER clause 4A.B.4(e) provides that AEMO must follow the Rules consultation procedures when making or amending the reliability forecast guidelines, unless it is making minor or administrative amendments.

2.1 Consultation on AEMO's Forecasting Approach

AEMO's Forecasting Approach is its set of detailed forecasting methodologies. AEMO is *required* to consult on, and make available on its website, its Forecasting Approach. AEMO's Forecasting Approach (further described in section 4.1) should align with AEMO's high-level forecasting methodology in its reliability forecast guidelines.³ However, compared to the high-level methodology in the reliability forecast guidelines, AEMO's Forecasting Approach will provide methodologies that are relatively detailed and can be updated more regularly in response to continuous improvement initiatives. AEMO should present its Forecasting Approach to facilitate engagement and clear communication with relevant stakeholders. For example, this may entail maintaining a set of specialised documents on a 'Forecasting Approach' landing page on its website.

AEMO is *required* to use the forecasting best practice consultation procedures in Appendix A to review its Forecasting Approach at least every four years. If doing so better facilitates targeted and effective stakeholder engagement, AEMO may stagger its four yearly review by reviewing discrete components of its Forecasting Approach at different times—as long as AEMO still reviews each component at least every four years. In any case, AEMO is *required* to make its Forecasting Approach and associated review schedule clearly available on its website. It is also best practice for AEMO to maintain an issues register on its website alongside its Forecasting Approach. This issues register will aid AEMO in transparently tracking issues raised by stakeholders when it reviews different components of its Forecasting Approach, including how it responds to or resolves such issues.

AEMO is *required* to use the forecasting best practice consultation procedures in Appendix A to review its Forecasting Approach more frequently than every four years if

³ As AEMO must provide under NER clause 4A.B.4(b)(6).

a material change in circumstances justifies an earlier review. A material change in circumstances might include the introduction of new and improved modelling techniques, material changes to the underlying drivers of some component of the forecast, or evidence to suggest that an approach it has been applying is no longer best practice. If a material change in circumstances within the four yearly review cycle is isolated to a discrete component of AEMO's Forecasting Approach, AEMO is only *required* to apply the shorter single stage process in Appendix B.

2.2 Consultation for the IASR and reliability forecast

AEMO is *required* to follow the single stage process in Appendix B when developing, consulting on and publishing the scenarios, inputs and assumptions in its IASR, which it updates as part of the ISP development process (that is, at least biennially).⁴ AEMO should also follow the single stage process in Appendix B when developing the inputs and assumptions underpinning a reliability forecast to include in the IASR. For avoidance of doubt, the single stage process meets the minimum consultation that AEMO must follow in developing the IASR as set out in NER clause 5.22.8(b), which includes having a submission period at least 30 calendar days.

For completeness, if AEMO combines the IASR and associated consultation process with another AEMO publication and consultation process, it is still *required* to meet the single stage process in Appendix B of this FBPG. Given the overlap between the assumptions used for the ESOO and IASR, we recommend that AEMO combine these documents wherever practicable (noting that while AEMO must publish a new ESOO annually and a new IASR biennially, it can issue updates to these documents more frequently).

When developing any ESOO/IASR, AEMO should facilitate active AER involvement to improve our knowledge of the inputs and consultation that AEMO has undertaken with a view to streamlining subsequent dependent processes. Active involvement should not be limited to sharing ISP outputs, but should allow the AER to see that AEMO has properly considered stakeholder input and followed the processes in this FBPG to engage with stakeholders. Seeing this when AEMO develops each IASR will enable a straightforward and expeditious transparency review of the IASR under NER clause 5.22.9. Moreover, our oversight of AEMO when developing each ESOO should give AEMO greater confidence that we would accept a reliability instrument request that it puts forward.

We also acknowledge that active AER involvement should not be limited to AEMO's processes around developing any ESOO/IASR, but should apply to AEMO's consultation and internal development processes in developing forecasts and ISPs more broadly. Facilitating AER involvement will assist us in maintaining a public issues register to track and report on compliance issues that stakeholders, RIT-T proponents, AEMO, and we identify concerning binding provisions of the CBA guidelines and this

⁴ NER clause 5.22.10(a)(3).

FBPG. Facilitating active AER involvement will minimise scope for misunderstandings and allow us to respond to any concerns expeditiously. With respect to issuing IASR updates:

- AEMO may issue IASR updates outside of the biennial ISP development process to incorporate updates in market data and associated forecasts. AEMO's ISP database must include the most recent IASR and the inputs it used in preparing the most recent ISP or ISP update.⁵ While these pieces of information will generally align, they can differ if AEMO updates the IASR outside of the biennial process and the update is insufficiently material to warrant an ISP update.
- AEMO is *required* to follow the single stage process when issuing IASR updates unless AEMO is implementing:
 - a specific data update that it had pre-emptively set out in the IASR. This would have entailed, when consulting on developing the IASR, AEMO consulting on indicative values, the methodology for updating and the timeline for updating. Where applicable, AEMO would also flag where additional consultation would occur through its forecasting reference group; or
 - an update to improve the IASR, which has been made in response to submissions on the draft ISP.
- The AER's transparency review under NER clause 5.22.9 and the ISP consumer panel's report under NER clause 5.22.7(a)(1) apply to the IASR that AEMO will use to prepare the draft ISP (that is, these processes are not intended to apply to IASR updates).
- Under NER clause 5.22.4(b)(1), AEMO must set out when it will publish the IASR in its ISP timetable. If AEMO expects to issue an IASR update before finalising the ISP (due to when important data releases occur), AEMO's ISP timetable should include the expected ISP update.

2.3 Out of cycle updates to reliability forecasts

NER clause 3.13.3A(b) provides that if, after the publication of the ES00, AEMO becomes aware of significant new information, it must publish that information as soon as practicable. Under this provision, AEMO must publish that information in a descriptive form consistent with the ES00, and if appropriate, publish an updated reliability forecast on its website in accordance with the reliability forecast guidelines.

New information might relate to a change in circumstances that has a material impact on the reliability forecast. Changes in circumstances might affect critical inputs/assumptions or have a widespread effect by affecting a majority of inputs. Changes in circumstances that would initiate an 'out of cycle' update may include, but are not limited to:

⁵ In line with NER clause 5.22.16(a)(1)–(2).

- a significantly out of trend uptake of a new technology affecting the National Electricity Market;
- a material change to the supply-demand outlook;
- a new government energy or environmental policy;
- the commitment to build a significant new generator or transmission element;
- an announcement of a generator closure; and/or
- significant changes in forecast demand.

If a change in circumstances materially affecting the reliability forecast occurs out of cycle, AEMO should consider whether it is appropriate to run the single stage process in Appendix B to update the relevant components of the forecast and reissue an updated ESOO as soon as practicable. Where the change in circumstances affects the reliability forecast but does not require a fulsome update of the ESOO, AEMO should still update the reliability forecast to match the changed inputs in a form that is consistent with that presented in the ESOO and publish an updated reliability forecast on its website.⁶ It would be best practice for AEMO to set this process out in its reliability forecast guidelines.

2.4 Consultation process for the ISP methodology

AEMO *is required to* follow the forecasting best practice consultation procedures in Appendix A when developing its ISP methodology and when reviewing the ISP methodology at least every four years.

AEMO *is required to* review its ISP methodology more frequently than every four years if AEMO considers a material change in circumstances justifies an earlier review. For instance, a material change in circumstances might include the introduction of new and improved modelling techniques, material changes to the underlying drivers of some component of the forecast or evidence to suggest the approach set out in the ISP methodology is no longer best practice.

When reviewing its ISP methodology outside of the four yearly process, AEMO *is required to* run the shorter single stage process in Appendix B. This shorter process better accommodates AEMO in identifying continuous improvement initiatives. This process also meets AEMO's consultation obligations under NER clause 5.22.8(b) for developing the IASR and ISP methodology, which specify that AEMO must:

- invite submissions as set out in a published notice within a specified timeframe of not less than 30 days (that is, calendar days) from the date of the invitation;
- consider the submissions received within the specified timeframe; and
- publish an issues summary on material issues and its response to each issue.

⁶ NER, clause 3.13.3A (b).

For avoidance of doubt, if AEMO wants to use a different CBA and modelling methodology to that set out in its existing ISP methodology, it will need to review and update its published ISP methodology. This is because NER clause 5.22.10(b)(1) requires AEMO to use its published ISP methodology (which includes its CBA and modelling methodology⁷) in preparing an ISP.

For completeness, if AEMO is not using an existing ISP methodology, the ISP timetable must set out the publication date for the ISP methodology.⁸

2.5 Updates affecting the ISP

Under NER clause 5.22.15(c), AEMO must consult on new information and its impact on the optimal development path in accordance with this section of the FBPG if AEMO:

- must publish an ISP update under NER clause 5.22.15(a); or
- has made an assessment under NER clause 5.22.15(b) that determines there has been a material change to the need for, or the characteristics of, a current actionable ISP project. This is where a NER clause 5.22.15(b) assessment entails AEMO assessing the impact of new information on the optimal development path under the current ISP if that new information:
 - relates to the content of the ISP and⁹, in AEMO's reasonable opinion, may materially change the outcome of the regulatory investment test for transmission (RIT–T) for an actionable ISP project that has either commenced or is due to commence under the current ISP; or
 - is that an actionable ISP project does not satisfy the RIT–T.

AEMO is *required* to follow the single stage process in Appendix B when running the consultation set out above. The draft and final reports referred to in clauses (b) and (f) of the single stage process are draft and final decisions concerning an ISP update. NER clause 5.22.15(e) states that after AEMO runs this consultation, it must publish on its website:

- summaries of each issue, that AEMO reasonably considers to be material, contained in valid written submissions received during the single stage process;
- AEMO's response to each such issue; and
- subject to its confidentiality obligations under section 54 of the National Electricity Law, copies of those written submissions.

⁷⁷ NER, clause 5.22.8(d).

⁸ NER, clause 5.22.4(b)(2).

⁹ Specifically, matters set out in NER clause 5.22.6, which specify the content of the ISP.

3 Consultation principles and practices for the ISP

This section of the FBPG also sets out several consultation principles and practices that AEMO *must have regard to* when developing the ISP.

The AER's 'consumer engagement guideline for network service providers' sets out useful, best practice principles. AEMO *must have regard to* the principles in the most recent version of these guidelines when developing the ISP. These principles revolve around providing clear, accurate and timely communication; being accessible and inclusive; being transparent; and measuring the impact of engagement activities. When applying these principles in developing the ISP, AEMO *must consider* how it can run its consultation processes to most effectively:

- facilitate effective discussion at workshops, public forums and to individual stakeholders by providing sufficient time to digest any materials or information provided to them beforehand. This aligns with the principle of recognising that adequate time and resources are necessary for consumers to engage effectively¹⁰;
- account for the time and resource constraints that consumer groups and other stakeholders face when developing a consultation strategy or program. For example, it might be valuable to facilitate consumer engagement by dedicating specialist internal resources to this task or by resourcing a consumer panel/consultative committee.¹¹ This aligns with the principle of proactively building consumers' capacity when a matter's complexity is hindering engagement.¹² Capacity building, in this context, should recognise the importance of long lasting relationships with consumers to improve their skills and understanding of the material;
- be aware of when more stakeholder involvement or collaboration is warranted, rather than relying too heavily on more base-level forms of consultation (such as informing/reporting), so AEMO can tailor its engagement approach to achieve desired objectives. Ideally, these factors would form part of a consumer engagement strategy developed in consultation with stakeholders.¹³ In any case, it is best practice to be clear about which engagement approach is being adopted and why (for example, by applying the IAP2 spectrum explicitly by stating when consultations aim to inform, involve or collaborate).
- employ a wide range of engagement strategies to receive appropriate feedback from individual stakeholders with unique detailed perspectives up to and potentially

¹⁰ AER, *Better regulation: Consumer engagement guideline for network service providers*, 2013, p. 8.

¹¹ Moreover, under NER clause 5.22.7, AEMO must establish and support an ISP consumer panel.

¹² AER, *Better regulation: Consumer engagement guideline for network service providers*, 2013, p. 8.

¹³ AER, *Better regulation: Consumer engagement guideline for network service providers*, 2013, p. 9.

including large facilitated workshops. In doing so, AEMO should be flexible about how it engages, with a view to meaningfully bring stakeholders into the process;

- seek regular considered feedback from stakeholders on the efficacy of the engagement process; and
- make relevant and timely information available to stakeholders with a view to achieving stakeholder-centric objectives. For instance, information provision in the ISP context should be with the view to:
 - allow stakeholders to understand the key inputs and assumptions driving the results, so that they are capable of replicating and/or interrogating the results;
 - provide accountability by ensuring the mechanics and assumptions behind AEMO's analysis are transparent;
 - provide stakeholders with the opportunity to provide timely input throughout the process, so they are capable of positively influencing the results; and
 - subject to confidentiality obligations, allow stakeholders to have access to similar data to promote balanced discussion where otherwise some stakeholders would have materially more influence than others.

In addition to following the forecasting best practice consultation procedures or single stage process, in general, AEMO *must have regard to* how it can employ the following consultation practices when developing the ISP:

- Engage effectively and meaningfully with stakeholders at all key stages of the ISP development process—including, but not limited to, scenarios workshops, the draft ISP and public forum on the draft ISP. The best practice consultation principles above should guide what effective and meaningful engagement should entail.
- Consult on key modelling outputs and their drivers in a way that allows stakeholders to relate those inputs to the outputs of the ISP. AEMO should consider whether additional forums would be more accessible and inclusive and/or provide stakeholders with more timely access to information. For example, it might be valuable to share preliminary modelling outcomes with stakeholders before publishing the draft ISP.
- Transparently disclose all key inputs. While the optimal development path is an output of the ISP, specific network investment options are also modelling inputs that are developed out of the joint-planning process between AEMO and transmission network service providers. As such, this information should be publicly available, preferably in the IASR. Including this information in the IASR would allow AEMO to consider whether reasonable network and non-network options proposed by stakeholders could form part of the optimal development path before it publishes the draft ISP.

4 Best practice forecasts

Under NER clause 4A.B.5(b), the FBPG must provide guidance for AEMO's forecasting practices and processes as they relate to a reliability forecast, having regard to the following principles:¹⁴

- 1) Forecasts should be as accurate as possible, based on comprehensive information and prepared in an unbiased fashion.
- 2) The basic inputs, assumptions and methodology that underpin forecasts should be disclosed (section 4.1).
- 3) Stakeholders should have as much opportunity to engage as is practicable.

These three principles should apply across AEMO's forecasting activities, including for forecasts underpinning the ISP. To achieve this, AEMO *must consider* the following factors when developing its forecasting practices and processes, which are relevant to the ISP, reliability forecasts, and AEMO's forecasts in general:

- **Transparent forecasting methodology:** To achieve transparency and align with the second principle above, AEMO should publish:
 - the key elements of its Forecasting Approach, as listed in section 4.1. AEMO should present this information in a way that is transparent, fit-for-purpose and accessible to key stakeholders. This might entail providing detailed elements of AEMO's Forecasting Approach in separate documents.
 - sufficient detail in its reliability forecast guidelines to comply with NER clause 4A.B.4 (b)— that is, the supporting materials, methodology, assumptions and inputs for developing a reliability forecast and indicative reliability forecast. To achieve this, AEMO should detail its approach to each primary forecasting analytical stream for reliability forecasts. These streams include preparing:
 - demand forecasts – the load for the National Electricity Market to meet;
 - supply forecasts – the operational performance parameters applied to the generators, dispatchable loads and transmission elements; and
 - an assessment of the demand and supply balance that determines whether the reliability standard will be met.
- **Consultation:** By adhering to the consultation processes described in section 2 (and the consultation principles and practices for the ISP described in section 3), AEMO's forecasts should align with principle three set out above. That is, AEMO should provide stakeholders with as much opportunity to engage as is practicable, through effective consultation and access to documents and information.

¹⁴ NER, clause 4A.B.5 (b).

- **Reasonable inputs and assumptions:** AEMO must comply with the requirements and considerations in our CBA guidelines on selecting reasonable inputs and assumptions, and should also follow the non-binding guidance in our CBA guidelines.¹⁵ Internal consistency, plausibility, verifiable sources and relevance promotes reasonable inputs and assumptions. Moreover, the most accurate and relevant data available for inputs might include confidential data and AEMO must consider how to utilise such information while maintaining confidentiality. Inputs and information should be as up-to-date and comprehensive as practicable, considering publication timeframes and time needed for consultation.
- **Transparent drivers of forecasts/effects of inputs:** AEMO should use a component-based methodology as part of its forecast methodology to facilitate stakeholder examination, with the components developed through consultation. AEMO should identify any critical inputs or assumptions that are driving forecasts. To allow stakeholders to see how changes in inputs affect the final forecasts, AEMO should publish indicative samples of the output of each component, and their contribution to the overall result so stakeholders can more readily discern how components interact. AEMO should publish this data in a manner that will facilitate stakeholder engagement without breaching confidentiality.
- **Scenario and sensitivity analysis for individual forecasts:** Best practice forecasting involves considering a range of forecast outcomes to take into account different future scenarios. AEMO's modelling approach should consider scenarios and identify the key parameters for sensitivity analysis. This approach will allow stakeholders to understand the sensitivity of individual forecast results to change. In particular, this can be achieved by stating the accuracy of forecasts (for example, the accuracy of forecast capital expenditure in terms of +/- %) and then using the stated accuracies as a basis to test sensitivities.
- **Constructing scenarios:** AEMO should develop scenarios (including ISP scenarios) to explore uncertainty. In doing so, AEMO should consider a range of scenarios, and should publish information on the construction of the scenarios to clarify how the scenarios feed into the outcomes of its forecasts/analysis.¹⁶
- **Use and disclosure of data:** Under the NER, the reliability forecast guidelines must provide for the publication of supporting materials, having regard to the FBPG, obligations regarding confidential information and the best form of information for this purpose.¹⁷ As such, AEMO should use the most accurate and relevant data available when preparing forecasts, including, where appropriate, confidential data. AEMO should use its powers to access more granular and accurate information to prepare reliability forecasts.¹⁸ AEMO should publish:

¹⁵ Under NER clause 5.22.5(c), we may specify parts of the CBA guidelines that are binding on AEMO. Inputs and assumptions are set out under AER, *CBA guidelines*, August 2020, section 3.2.1.

¹⁶ See also AER, *CBA guidelines*, August 2020, section 3.2.2.

¹⁷ NER clause 4A.B.3(b).

¹⁸ These new powers are set out under NER clause 3.13.3A.

- Subject to its obligations to protect confidential information, all key data and parameters, including the inputs, assumptions, scenarios and modelling methodology used for forecasts. When using confidential data, AEMO should determine the most appropriate aggregation approach so it can publish non-confidential representative information.
- Sample output of key non-confidential parameters so the impact of the combined inputs can be discerned.
- **Post-period performance reviews:** By comparing previous forecast events against observed events as described in section 4.2, AEMO and stakeholders can examine historical forecast performance. Examining historical performance contributes to the first principle above by demonstrating the replicability of AEMO's forecasts and exposing potential forecasting errors or biases. Examination of the results over different periods and the performance of the overall forecast and its components will allow stakeholders to more fully engage with the process. While this approach may not fully explain deviations from forecasts, considering the performance of the respective components of the forecast should assist in identifying areas for improvement or additional components to consider.

4.1 Details for the Forecasting Approach

As discussed in section 2.1, the Forecasting Approach refers to AEMO's detailed forecasting methodologies that it consults on and makes available on its website. AEMO will apply its Forecasting Approach when developing the ISP, reliability forecasts, and other forecasting work as it considers relevant. When developing its Forecasting Approach, AEMO *must consider* how it can best explain and present its:

- suite of models it will use to perform its forecasting activities;
- approach to determining its modelling inputs, which may include AEMO's:
 - method for determining or sourcing the values for the forecast horizon. This would include AEMO's internal analysis and data processing, its engagement with qualified consultants, and consultation with relevant industry or government bodies; and
 - stakeholder engagement approach for examining the actual input values for each component and assumptions used when making a forecast. This might also detail how AEMO will match its stakeholder consultation approach with the complexity of the task;
- approach to incorporating data, including how it will distribute or publish data. This should include the cut-off timeframe after which changes made to inputs cannot be accommodated without jeopardising the forecast publication date. AEMO should set out its approach to using confidential data and process for releasing data. As part of this, AEMO should set out the most appropriate aggregation approach for publishing non-confidential representative information when using confidential data;
- approach to reporting the uncertainties around forecasts, such as how measures of confidence and certainty will be communicated to stakeholders clearly and accessibly.

- approach to incorporating exogenous factors;
- approach to representing resource and network constraints affecting energy delivery;
- method for allowing stakeholders to engage with the interim (if appropriate) and final results of the analytical stream; and
- internal process for verifying its approach and results.

4.2 Annual forecast performance review

Under NER clause 3.13.3A(h) and in accordance with the reliability forecast guidelines, AEMO must, no less than annually, prepare and publish on its website information on:

- the accuracy of its demand and supply forecasts, and any other inputs that AEMO determines to be material to its reliability forecasts; and
- any improvements made by AEMO, or other relevant parties, to the forecasting processes used in the next ESOO.

At minimum, the reliability forecast guidelines should set out that AEMO's performance analysis for publication will include:

- an examination of the performance of each component;
- an explanation of any material deviation or trend in differences; and
- actions undertaken or to be undertaken to improve the accuracy of each component in the forecast. This improvement plan:
 - must, to comply with NER clause 3.13.3A (h)(2), describe any improvements made by AEMO, or other relevant parties, to the forecasting processes used in the next ESOO; and
 - should be informed by AEMO's stakeholder engagement activities from, including but not limited to, developing the ESOO and reliability forecast guidelines.

In general, where there are material changes to relevant forecast input data, AEMO should publish an updated dataset on its website, subject to its confidentiality obligations. Where AEMO has updated its forecasting inputs or methodology, this dataset should show how demand forecasts using the updated inputs/methodology would have performed against the previous five years of corresponding data. In providing its forecast performance review, AEMO should consider the reporting metrics and methods recommended by external experts that it may engage from time to time. At a more detailed level, this information may be able to correlate a lower or higher than expected outcome with variations of some input parameters from their expected ranges.

When AEMO publishes forecast performance information related to its reliability forecasts and associated improvement plans, it should also consider whether this information is relevant to the ISP. It should also consider whether there is additional information relevant to the accuracy of inputs, assumptions and forecasts used in its

ISP that would be valuable to report. Given the ISP is produced every two years, AEMO may consider extending its forecast performance analysis to the ISP biennially.

5 Compliance

The NER allow us to specify which parts of the FBPG are binding on AEMO.¹⁹ Binding elements of the FBPG only apply to the ISP. However, since the same inputs, assumptions and forecasts will underpin the ISP and ESOO, the binding elements that apply to ISP forecasts will effectively extend to the content in the ESOO insofar as this content flows through to the ISP.

Throughout this document, we have:

- highlighted binding requirements from the FBPG by words in italics – *required* or *requirement*;
- highlighted binding considerations from the FBPG by words in italics – *must have regard to* or *must consider*. AEMO must have regard to elements of the FBPG classified as considerations when making decisions; and
- otherwise included discretionary elements that do not bind AEMO, but rather provide guidance for best practice.

Appendix C summarises the requirements and considerations in the FBPG that are binding, versus the areas that include non-binding guidance.

5.1 Compliance and reliability forecasts

When assessing a request from AEMO to make a reliability instrument, NER clause 4A.C.11 directs us to have regard to, among other things, whether AEMO has used reasonable endeavours to prepare the reliability forecast in accordance with the FBPG. For clarity, we may have regard to both binding and non-binding components of the FBPG when making that assessment, given the FBPG include best practice principles for developing and applying forecasting processes and practices under section 4.

Moreover, when publishing each ESOO, AEMO should provide a report to us describing how it has, and where it has not, prepared a reliability forecast in accordance with the FBPG. This report will help us expeditiously assess a request to make a reliability instrument. It will also increase stakeholders' confidence in AEMO's forecasts, contributing to the principle that forecasts should be as accurate as possible, based on comprehensive information and prepared in an unbiased fashion above.

5.2 Compliance reporting for the IASR and ISP methodology

AEMO, when preparing an IASR and ISP methodology, *is required* to provide us with a compliance report. AEMO *is required* to submit this compliance report to us no later than 20 business days after the publication of an IASR or ISP methodology.

¹⁹ NER, clause 5.22.5(j).

It is a *requirement* that AEMO demonstrate in writing in its compliance reports that it has:

- complied with applicable requirements;
- had regard to applicable considerations (including providing reasons for the weight they attach to each consideration); and
- resolved key issues raised by the AER through the AER's issues register.

If a compliance report contains confidential information, AEMO is also *required* to provide a non-confidential version of the report in a form suitable for publication. We may publish the compliance report (or the non-confidential version of the compliance report, if applicable) on our website.

These compliance reports should increase stakeholders' confidence in the ISP and facilitate a straightforward and expeditious transparency review of the IASR under NER clause 5.22.9.

Appendix A. Forecasting best practice consultation procedures

We have broadly based the forecasting best practice consultation procedures off the Rules consultation procedures.²⁰ For avoidance of doubt, where fit for purpose, AEMO may combine multiple consultation processes as long as it meets the minimum requirements for consultation that apply to each of those processes.²¹

Forecasting best practice consultation procedures

- (a) AEMO must give a notice to all Consulted Persons.²² AEMO must give particulars of the matter under consultation, by publishing the notice on its website and notifying the members of its subscriber list.
- (b) The notice must invite interested Consulted Persons to make written submissions to AEMO concerning the matter.
- (c) A written submission may state whether a Consulted Person considers that a meeting is necessary or desirable in connection with the matter under consultation and, if so, the reasons why such a meeting is necessary or desirable. To be valid, a Consulted Person must provide AEMO with a submission no later than the date specified in the notice. This date must be at least 20 business days after AEMO publishes the notice referred to in paragraph (b).
- (d) AEMO must consider all valid submissions within a period of not more than a further 20 business days. If AEMO, after having considered all valid submissions, concludes that it is desirable or necessary to hold any meetings, AEMO must use its best endeavours to hold such meetings with Consulted Persons who have requested meetings within a further 20 business days.
- (e) Following the conclusion of all meetings (if any) held in accordance with paragraph (d), and AEMO's consideration of the matter under consultation, AEMO must publish a draft report in accordance with paragraph (f), to be made available to all Consulted Persons, setting out:
 - 1) its conclusions and any determinations on the matter under consultation;
 - 2) its reasons for those conclusions or determinations;
 - 3) the procedure it followed in considering the matter;

²⁰ Notable timing differences in corresponding sections of the Rules consultation procedures include: paragraph (c) would state 25 business days, the second timeframe under paragraph (d) would be 25 business days, and paragraph (g) would state 10 business days. See NER, clause 8.9(e), (f) and (i).

²¹ For example, if AEMO were to combine a process that had to follow the forecasting best practice consultation procedures with a process that had to follow the Rules consultation procedures, the Rules consultation procedures could apply as long as AEMO also met the 20 business day requirement in paragraph (g) of the forecasting best practice consultation procedures.

²² See Appendix D for a definition of Consulted Persons.

- 4) summaries of each issue, that it reasonably considers to be material, contained in valid written submissions received from Consulted Persons or in meetings, and its response to each such issue; and
 - 5) in a notice at the front of the draft report, an invitation to Consulted Persons to make written submissions on the draft report. Subject to its confidentiality obligations, AEMO must make available to all Consulted Persons, on request, copies of any material it received in submissions.
- (f) AEMO must, as soon as possible, publish the draft report referred to in paragraph (e) on its website.
- (g) To be valid, a submission invited in a notice referred to in paragraph (e)5) must be received not later than the date specified in the notice. This date must be at least 20 business days after the publication of the draft report pursuant to paragraph (f), or such longer period as is reasonably determined by AEMO having regard to the complexity of the matters and the issues under consideration.
- (h) AEMO must consider all valid submissions within a period of not more than a further 30 business days.
- (i) Following the conclusion of AEMO's consideration of all valid submissions, AEMO must publish a final report in accordance with paragraph (j), available to all Consulted Persons, setting out:
- 1) its conclusions and any determinations on the matter under consultation;
 - 2) its reasons for those conclusions or determinations;
 - 3) the procedure it followed in considering the matter;
 - 4) summaries pursuant to paragraph (b)4); and
 - 5) summaries of each issue, that it reasonably considers to be material, contained in valid written submissions received from Consulted Persons on the draft report and its response to each such submission. As part of its response, AEMO should explain whether and how it has incorporated specific input from submissions. Subject to its confidentiality obligations, AEMO must also make available to all Consulted Persons, on request, copies of any material it received in submissions.
- (j) AEMO must, as soon as possible, publish the final report referred to in paragraph (i) on its website.
- (k) AEMO must not make the decision or determination in relation to which the forecasting best practice consultation procedures apply until AEMO has completed all the procedures set out in this consultation process.
- (l) Notwithstanding paragraph (k), substantial compliance by AEMO with the forecasting best practice consultation procedures is sufficient.

Appendix B. Single stage process

- (a) AEMO must use reasonable endeavours to hold meetings with Consulted Persons on the matter under consultation with a view to informing and providing stakeholder confidence in the draft report in paragraph (c). These meetings may take the form of workshops, bilateral meetings, working groups, public forums, webinars, or any other form that AEMO finds relevant.
- (b) Following the conclusion of all meetings held in accordance with paragraph (a), and AEMO's consideration of the matter under consultation, AEMO must publish a draft report, to be made available to all Consulted Persons, setting out:
 - 1) its conclusions and any determinations on the matter under consultation;
 - 2) its reasons for those conclusions or determinations;
 - 3) the procedure it followed in considering the matter;
 - 4) summaries of each issue, that it reasonably considers to be material, contained in meetings with Consulted Persons, and its response to each such issue; and
 - 5) in a notice at the front of the draft report, an invitation to Consulted Persons to make written submissions on the draft report within a specified timeframe of not less than 30 calendar days.
- (c) AEMO must, as soon as possible after holding meetings referred to in paragraph (a), publish the draft report referred to in paragraph (b) on its website.
- (d) To be valid, a submission invited in a notice referred to in paragraph (b)(5) must be received not later than the date specified in the notice. This date must be at least 30 calendar days after the publication of the draft report pursuant to paragraph (c), or such longer period as is reasonably determined by AEMO having regard to the complexity of the matters and the issues under consideration.
- (e) AEMO must consider all valid submissions within a period of not more than a further 30 business days.
- (f) Following the conclusion of AEMO's consideration of all valid submissions, AEMO must publish a final report in accordance with paragraph (g), available to all Consulted Persons, setting out:
 - 1) its conclusions and any determinations on the matter under consultation;
 - 2) its reasons for those conclusions or determinations;
 - 3) the procedure it followed in considering the matter;
 - 4) summaries pursuant to paragraph (b)4); and
 - 5) summaries of each issue, that it reasonably considers to be material, contained in valid written submissions received from Consulted Persons on the draft report and its response to each such submission. As part of its response, AEMO should explain whether and how it has incorporated specific input from submissions. Subject to its confidentiality obligations, AEMO must also make

available to all Consulted Persons, on request, copies of any material it received in submissions.

- (g) AEMO must, as soon as possible, publish the final report referred to in paragraph (f) on its website.

Appendix C. List of requirements and considerations for AEMO

This appendix summarises the binding requirements (table 1) and binding considerations (table 2) that the FBPG places on AEMO when developing a reliability forecast or ISP.

Table 1: List of binding requirements

Section – Area	Requirement
2.1 – Forecasting Approach consultation	<p>AEMO is <i>required</i> to:</p> <ul style="list-style-type: none"> • Make its Forecasting Approach and associated review schedule clearly available on its website. • Follow the forecasting best practice consultation procedures in Appendix A every four years to review its Forecasting Approach (or more frequently if a material change in circumstances justifies an earlier review). If a material change in circumstances within the four yearly review cycle only affects a discrete component of AEMO’s Forecasting Approach, AEMO is <i>required</i> to apply the shorter single stage process in Appendix B to review the component.
2.2 – IASR consultation	<p>AEMO is <i>required</i> to follow the single stage process in Appendix B when developing and updating scenarios, inputs and assumptions in its IASR, which it updates as part of the ISP development process. For completeness, if AEMO combines the IASR and associated consultation process with another AEMO publication, it is still <i>required</i> to meet the minimum requirements in Appendix B. AEMO is <i>required</i> to follow the single stage process when issuing IASR updates unless it is implementing:</p> <ul style="list-style-type: none"> • a specific data update that it had pre-emptively set out in the IASR. This would have entailed AEMO consulting on indicative values, the methodology for updating and the timeline for updating. Where applicable, AEMO would also flag where additional consultation would occur through its forecasting reference group; or • an update to improve the IASR, which has been made in response to submissions on the draft ISP.
2.4 – ISP methodology consultation	<p>AEMO is <i>required</i> to follow the forecasting best practice consultation procedures in Appendix A when developing its ISP methodology and when reviewing its ISP methodology every four years (or more frequently if a material change in circumstances justifies an earlier review). When reviewing its ISP methodology outside of the four yearly process, AEMO is <i>required</i> to run the shorter process in Appendix B.</p>
2.5 – ISP update consultation	<p>AEMO is <i>required</i> to follow the single stage process in Appendix B when consulting on new information and its impact on the optimal development path under NER clause 5.22.15(c).</p>
5.2 –	No later than 20 business days after publishing an IASR or ISP

Compliance reporting for IASR and ISP methodology

methodology, AEMO is *required* provide a report to the AER demonstrating that it has complied with the applicable requirements and considerations in the FBPG. AEMO is *required* to demonstrate in its compliance reports that it has (a) complied with applicable requirements; (b) has had regard to applicable considerations (including reasons for the weight it attached to each consideration); and (c) resolved key issues raised by the AER through the AER’s issues register.

If a compliance report contains confidential information, AEMO is *required* to provide a non-confidential version of the report in a form suitable for publication.

Table 2: List of binding considerations

Section – Area	Consideration
<p>3 – ISP consultation principles and practices</p>	<p>AEMO <i>must have regard</i> to the principles in the most recent version the AER’s ‘consumer engagement guideline for network service providers’ when developing the ISP. When applying these principles, AEMO <i>must consider</i> how it can run its consultation processes to most effectively:</p> <ul style="list-style-type: none"> • facilitate effective discussion by providing stakeholders with sufficient time to digest any materials before workshops or public forums; • account for constraints that stakeholders face when developing a consultation strategy or program, including by proactively building stakeholders’ skills and understanding of the material; • be aware of when more stakeholder involvement or collaboration is warranted, including clarifying which engagement approach is being adopted and why; • employ a wide range of engagement strategies to receive appropriate feedback, taking a flexible approach with a view to meaningfully bring stakeholders into the process; • seek regular considered feedback from stakeholders on the efficacy of the engagement process; and • make relevant and timely information available to stakeholders with a view to achieving stakeholder-centric objectives.
<p>3 – ISP consultation principles and practices</p>	<p>AEMO <i>must have regard</i> to how it can employ the following consultation practices when developing the ISP:</p> <ul style="list-style-type: none"> • Engage effectively and meaningfully with stakeholders at all key stages of the ISP development process. • Consult on key modelling outputs in a way that allows stakeholders to see the key outputs of the ISP, as well as the key drivers of those outputs. • Transparently disclose all key inputs, noting that specific network investment options are modelling inputs.
<p>4 – Best practice</p>	<p>AEMO <i>must have regard</i> to the three principles NER clause 4A.B.5(b) when developing its forecasting practices and processes, which are relevant to the</p>

forecasts

ISP, reliability forecasts, and AEMO's forecasts in general. To achieve this, AEMO *must consider* incorporating the following factors as part of its forecasting practices and principles:

- Publish all key elements of its Forecasting Approach (as set out in section 4.1).
- Facilitate stakeholder engagement.
- Apply the CBA guidelines when selecting reasonable inputs and assumptions.
- Use a component-based methodology and identify critical inputs/assumptions driving forecasts.
- Consider a range of forecast outcomes to take into account different future scenarios and identify the key parameters for sensitivity analysis.
- Apply the CBA guidelines when developing scenarios. Publish information on the construction of the scenarios to clarify how these feed into the ISP outcomes.
- Specify how it will use and disclose data, including how it will use the most accurate and relevant data available, and how it will handle confidential data.
- How it will examine and report on its historical forecast performance.

4.1 – Details for the Forecasting Approach

When developing its Forecasting Approach, AEMO *must consider* how it can best explain and present its:

- Suite of models for to use.
- Approaches to: determining modelling inputs, incorporating/publishing data, reporting uncertainties around forecasts, incorporating exogenous factors, and representing resource/network constraints affecting energy delivery
- Method for allowing stakeholders to engage with the results of the analytical stream.
- Internal process for verifying its approach and results.

Appendix D. Abbreviations and definitions

Table 3: Abbreviations and definitions

Shortened form	Extended form
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CBA	cost benefit analysis
Consulted Persons	<ul style="list-style-type: none"> all persons nominated (including Intending Participants in the class of persons nominated) by the relevant provision as those with whom consultation is required; or if no persons are specifically nominated, all Registered Participants, and interested parties; and in either case, any other persons who register or express interest, either in response to a public notice calling for expressions of interest or through having previously participated in similar consultations.
ESOO	electricity statement of opportunities
FBPG	forecasting best practice guidelines
Forecasting Approach	AEMO's detailed forecasting processes, practices and methodologies that underpin the ISP, reliability forecasts and other relevant AEMO material. This approach includes the details set out in section 4.1 of the FBPG
forecasting best practice consultation procedures	the procedures set out in Appendix A of the FBPG
IASR	inputs, assumptions and scenarios report
ISP	integrated system plan
NER	National Electricity Rules
POE	probability of exceedance
RIT-T	regulatory investment test for transmission
RRO	retailer reliability obligation
single stage process	the process set out in Appendix B of the FBPG