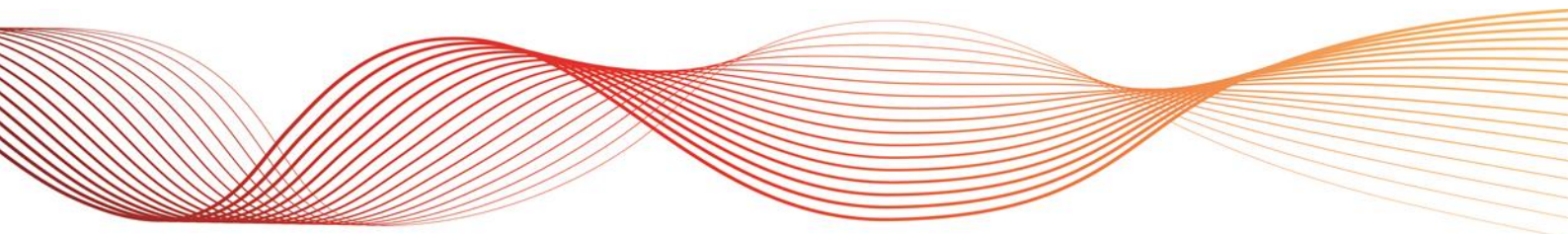




# RELIABILITY STANDARD IMPLEMENTATION GUIDELINES

DRAFT REPORT AND DETERMINATION

Published: **16 June 2017**





# NOTICE OF SECOND STAGE CONSULTATION – RELIABILITY STANDARD IMPLEMENTATION GUIDELINES

## National Electricity Rules – Rule 8.9

### Date of Notice: 16 June 2017

This notice informs the *Reliability Panel*, all *Registered Participants* and *interested parties* (Consulted Persons) that AEMO is commencing the second stage of its consultation to amend the Reliability Standard Implementation Guidelines.

This consultation is being conducted under clause 3.9.3D (c) of the National Electricity Rules (NER), in accordance with the Rules consultation requirements detailed in rule 8.9 of the NER.

### Invitation to make Submissions

AEMO invites written submissions on this Draft Report and Determination (Draft Report).

Please identify any parts of your submission that you wish to remain confidential, and explain why. AEMO may still publish that information if it does not consider it to be confidential, but will consult with you before doing so.

Consulted Persons should note that material identified as confidential may be given less weight in the decision-making process than material that is published.

### Closing Date and Time

Submissions in response to this Notice of Second Stage of Rules Consultation should be sent by email to [Suzette.Lizamore@aemo.com.au](mailto:Suzette.Lizamore@aemo.com.au), to reach AEMO by 5.00pm (Australian Eastern Standard Time) on 3 July 2017.

All submissions must be forwarded in electronic format (both pdf and Word). Please send any queries about this consultation to the same email address.

Submissions received after the closing date and time will not be valid, and AEMO is not obliged to consider them. Any late submissions should explain the reason for lateness and the detriment to you if AEMO does not consider your submission.

### Publication

All submissions will be published on AEMO's website, other than confidential content.

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## EXECUTIVE SUMMARY

The publication of this Draft Report and Determination (Draft Report) commences the second stage of the Rules consultation process conducted by AEMO on proposed amendments to the *reliability standard implementation guidelines* (RSIG or Guidelines) under the National Electricity Rules (NER).

These Guidelines set out how AEMO implements the *reliability standard* and the approach and assumptions used. The *reliability standard* measures the effectiveness, or sufficiency, of installed capacity to meet demand, and targets no more than 0.002% of expected unserved energy (USE) for any region in any financial year.

Ernst & Young (EY) were engaged last year to recommend improvements to the Medium Term Projected Assessment of System Adequacy (MT PASA) methodology. EY identified the need to replace the existing methodology with a probabilistic approach that can better capture the intermittent generation impacts on supply adequacy, amongst other improvements.

AEMO is committed to improving the MT PASA methodology to more accurately assess potential *reliability standard* breaches in the next two years. Improvements to the MT PASA methodology, related to the reliability assessment, therefore require these Guidelines to be amended.

AEMO began the first stage of consultation on the Guidelines on 30 March 2017. An Issues Paper outlined how AEMO proposed to implement EY's recommendations and sought feedback on outstanding issues for resolution. In broad terms, two modelling processes were proposed:

- A Dispatch Run, ignoring unplanned generation outages, to provide weekly regional transfer limits and system capabilities with and without network outages.
- A Reliability Run, to be conducted at least monthly, using EY's recommended probabilistic approach to assess whether *reliability standard* breaches are likely in the next two years.

Both processes were to consider participant information about planned generation and network availability, network constraints, and weekly and annual energy constraints.

Two submissions were received, from Energy Australia and ERM Power, in response to the consultation. Both were generally in support of the move to a probabilistic modelling approach although more details were requested. Feedback received has been considered in preparing this draft determination. Key developments following the stage one consultation are summarised below:

- AEMO has released an amended MT PASA Process Description document which provides details on the proposed MT PASA redevelopment.
- After taking into account feedback from the submissions and internal testing, AEMO will now run the probabilistic Reliability Run weekly, rather than monthly, removing the need for a Dispatch Run.
- An additional Loss of Load Probability (LOLP) run has been included. The LOLP Run will indicate days at highest risk of loss of load and will enable participants to schedule outages outside high-risk periods.
- Feedback received from the Reliability Panel has re-emphasised the need for additional stakeholder information, including a full set of annual energy constraints when assessing reliability. AEMO will seek further information from participants through voluntary or regulatory means about annual energy constraints and auxiliary loads.

After considering the submissions received, AEMO's draft determination is to **amend the *reliability standard implementation guidelines*** in the form published with this Draft Determination.



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# 1. STAKEHOLDER CONSULTATION PROCESS

As required by clause 3.9.3D(c) of the NER, AEMO is consulting on proposed amendments to the *reliability standard implementation guidelines* (RSIG or Guidelines) in accordance with the *Rules* consultation process in rule 8.9.

AEMO's indicative timeline for this consultation is outlined below. Future dates may be adjusted depending on the number and complexity of issues raised in submissions.

Deliverable	Indicative date
Draft Report & Notice of second stage consultation published	Friday 16 June 2017
Submissions due on Draft Report	Monday 3 July 2017
Final Report published	Tuesday 15 August 2017

The publication of this Draft Report marks the commencement of the second stage of consultation.

Note that there is a glossary of terms used in this Draft Report at **Appendix A**. A list of publications is included at **Appendix B**.



## 2. BACKGROUND

### 2.1 NER requirements

The Guidelines are made under clause 3.9.3D of the *Rules*. They outline how AEMO will implement the *reliability standard*. AEMO is required to amend the Guidelines in accordance with the *Rules consultation procedures*.

AEMO's proposed Guideline amendments relate to redevelopment of the Medium Term Projected Assessment of System Adequacy (MT PASA) process.

### 2.2 Context for this consultation

The *reliability standard* is a measure of the effectiveness, or sufficiency, of installed capacity to meet demand. It is defined in clause 3.9.3C of the *Rules* as the maximum expected *unserved energy* (USE), in a *region* of 0.002% of the total *energy* demanded in that *region* for a given *financial year*.

MT PASA assesses the adequacy of expected electricity supply to meet demand across a two-year horizon through regular assessment of any projected failure to meet the *reliability standard*. The MT PASA process includes collection of accurate information, analysis and disclosure of power system security and predicted supply reliability that helps *Registered Participants* make decisions about supply, demand and transmission network outages for two years ahead.

MT PASA incorporates two separate functions:

1. A high frequency three-hourly information service that gives a regional breakdown of the supply situation over the two-year horizon, taking into account participant submissions on availability – not a *Rules Requirement*.
2. A weekly assessment of system reliability, including provision of information on demand, supply and network conditions – *Rules Requirement* (clause 3.7.2).

In 2016, AEMO began a review of MT PASA as part of continuous improvement and to ensure the process used to assess the *reliability standard* was robust in light of the accelerated rate of industry change. External consultants, Ernst & Young (EY), were engaged to assess whether current MT PASA processes were fit for purpose and provide a suite of recommendations to remediate gaps.

EY recommended that:

- AEMO should implement the MT PASA reliability assessment using a probabilistic modelling approach to better capture the impact of stochastic inputs such as demand, generation outages or availability of intermittent generation. The *reliability standard* is probabilistic, and therefore it is appropriate to capture the distribution of outcomes under a range of possible supply and demand conditions when determining the expected level of unserved energy.
- The modelling should be done at a half-hourly resolution.
- At least five reference traces for demand, solar and wind should be sampled for each demand scenario (10% Probability of Exceedance (POE) and 50% POE) to capture historically observed variations in intermittent generation availability and coincidence of demand between regions.
- 200 iterations should be run for each reference year and demand case combination to capture the expected impact of unplanned generation outages. This equates to a total of 2,000 simulations per year.
- There be a change from weekly to at least quarterly frequency for reliability assessment due to the intense computational requirements of the probabilistic modelling.



- The three-hourly supply-demand run should continue as it provides valuable information to help participants optimise their operations. Reporting aggregate MT PASA bids at a more granular level, would improve the service.

EY's recommended solution was independently assessed by GHD through a gap analysis of the recommendation, and review of information on relevant international practices. GHD concluded that EY's solution could address the identified limitations and issues with the existing MT PASA. Stakeholders were offered the opportunity to participate in the review process through two workshops held in May and December 2016, and generally supported the proposed changes.

AEMO is committed to improving the MT PASA reliability assessment and is progressing implementation of the MT PASA redevelopment. This includes this consultation on proposed amendments to the Guidelines to reflect changes to modelling frequency, approach, input assumptions and outputs used to implement the *reliability standard*.

## 2.3 First stage consultation

AEMO issued a [Notice of First Stage Consultation](#) on **30 March 2017** with an [Issues Paper](#) and the [Guidelines Draft](#). The Issues Paper discussed the proposed changes to the Guidelines.

AEMO received two written submissions in the first stage of consultation. AEMO also discussed the proposed changes at the following meetings/forums:

Meeting/Forum	Date
Reliability Panel Meeting	Wednesday 8 March 2017
National Electricity Market (NEM) Wholesale Consultative Forum	Wednesday 29 March 2017
Forecasting & Planning Reference Group	Tuesday 18 April 2017

Copies of all written submissions, minutes of meetings and issues raised in forums (excluding any confidential information) have been published on AEMO's website at:

<https://www.aemo.com.au/Stakeholder-Consultation/Industry-forums-and-working-groups/Other-meetings/Forecasting-and-Planning-Reference-Group>

<https://www.aemo.com.au/Stakeholder-Consultation/Industry-forums-and-working-groups/Wholesale-meetings/NEM-Wholesale-Consultative-Forum>



### 3. SUMMARY OF MATERIAL ISSUES

The key material issues arising from the proposal and raised by Consulted Persons are summarised in the following table:

No.	Issue	Raised by
1.	Change to probabilistic modelling process	AEMO
2.	Additional information from participants	AEMO / Reliability Panel
3.	Frequency of regular runs and conditions for ad hoc runs	AEMO
4.	Use of information reported through 3.7.2(f)(6)(i),(iv),(v)	AEMO
5.	Granular reporting of aggregate generation capacity	AEMO
6.	Transparency and access to data	Energy Australia, ERM Power
7.	Reference years	ERM Power
8.	Selection of POE Demand Curves	ERM Power

A detailed summary of issues raised by Consulted Persons in submissions and at meetings/forums, together with AEMO's responses, is contained in Sections 4 and 5.



## 4. DISCUSSION OF MATERIAL ISSUES

### 4.1 Change to probabilistic modelling process

#### 4.1.1 Issue summary and submissions

AEMO sought feedback in the Issues Paper on whether the proposed probabilistic modelling approach would provide sufficient information to implement the *reliability standard* and adequate information for planning purposes, outage scheduling and for considering whether AEMO should enter into *Reliability and Emergency Reserve Trader (RERT)* contracts.

Energy Australia Submission: *We believe the new method will produce more reliable results and that this will assist all parties in positively identifying and taking action on system adequacy issues.*

ERM Power Submission: *ERM Power is encouraged by AEMO's proposed changes to the MT PASA process to fill the void in market information left by changes to EAAP reporting timeframe. However, to have full confidence in the proposal we require further detail than what is currently published by AEMO.*

#### 4.1.2 AEMO's assessment

AEMO recognises the need to provide further details on the proposed process to participants.

#### 4.1.3 AEMO's conclusion

AEMO has provided further details on the modelling process via updated drafts of the RSIG and MT PASA Process Description documents accompanying this second stage consultation.

AEMO will continue with the implementation of a probabilistic MT PASA methodology.

### 4.2 Additional information from participants

#### 4.2.1 Issue summary and submissions

At the Reliability Panel's March meeting, it was noted that focus should be directed to coal and gas restrictions and their possible impact on generator availability over a year. The Panel asked whether it would be possible for participants to supply information on contracted fuel sources if they were aggregated on a regional basis for commercially sensitive reasons.

AEMO is seeking to gain a better understanding of annual energy constraints. Currently under clause 3.7.2(d)<sup>1</sup> Scheduled Generators or Market Participants are required to provide information on their weekly energy constraints for each scheduled generating unit or scheduled load. The *reliability standard* is assessed over an annual period, but currently these annual constraints can only be estimated by summing the weekly energy constraints provided by participants. This method may not accurately represent the annual constraint.

AEMO also receives information on annual energy constraints through the Generator Energy Limitation Framework (GELF). This information is provided at least once a year for Energy Adequacy Assessment

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<sup>1</sup> NER clause 3.7.2(d) The following medium term PASA inputs must be submitted by each relevant Scheduled Generator or Market Participant in accordance with the timetable:

(1) PASA availability of each scheduled generating unit, scheduled load or scheduled network service for each day taking into account the ambient weather conditions forecast at the time of the 10% probability of exceedance peak load (in the manner described in the procedure prepared under paragraph (g)); and

(2) Weekly energy constraints applying to each scheduled generating unit or scheduled load.

Projections (EAAP), so for MT PASA, energy constraint information is available one-to-two years ahead, depending on the length of time since the last GELF update.

AEMO sought feedback in the Issues Paper about whether AEMO should seek additional information from participants to more accurately implement the *reliability standard*, and whether there was benefit in using information received through GELF for MT PASA modelling. No submissions were received on this issue.

AEMO has also identified a need to obtain information from participants on auxiliary load. Demand forecasts (through the National Electricity Forecasting Report (NEFR)) are made on a “sent out” basis, while MT PASA generation bids are provided on an “as generated” basis. AEMO currently estimates the auxiliary load and adds this to the “sent out” demand forecasts to estimate “as generated” demand for use in MT PASA modelling.

AEMO would like to increase the accuracy in accounting for auxiliary load in the MT PASA process by obtaining information from participants about the proportion of “as generated” output used for auxiliary load.

#### 4.2.2 AEMO’s assessment

Annual fuel or emission restrictions may impact generation availability and AEMO considers that this information is an essential input for conducting accurate reliability assessments.

In addition to the weekly energy constraints provided through MT PASA, AEMO will use the following information, where applicable or relevant, to model energy constraints in MT PASA:

1. Annual energy constraints provided through GELF. AEMO proposes to use the “short-term average rainfall scenario” for hydro constraints unless otherwise advised. AEMO recognises that this information may not cover the full two-year MT PASA horizon.
2. Additional energy constraints provided by participants beyond the GELF period, submitted voluntarily.

AEMO considers that provision of more accurate and comprehensive annual constraint information from participants would benefit the market through improved reliability assessments.

Further, provision of regular auxiliary load information by participants would enable AEMO to more accurately account for the effect of auxiliary load in MT PASA reliability assessments.

#### 4.2.3 AEMO’s conclusion

AEMO will use information supplied through weekly MT PASA energy constraints, the GELF and generator surveys to ensure that the most accurate annual generation limits from available information are considered during MT PASA modelling.

AEMO will pursue means to acquire annual constraint and auxiliary load information that covers the full two-year period, either voluntarily or through regulatory changes.

### 4.3 Frequency of regular runs and conditions for ad hoc runs

#### 4.3.1 Issue summary and submissions

In the Issues Paper, AEMO detailed the intention to produce two sets of MT PASA runs:

- MT PASA Dispatch Run – to be executed weekly with and without planned network outages. This assessment would be used to identify and quantify most MT PASA outputs.
- MT PASA Reliability Run – to be executed monthly using over 2,000 Monte Carlo simulations to assess the likelihood of *reliability standard* breaches. From this Reliability Run, AEMO would also indicate the days most at risk of supply shortfalls.

AEMO also indicated that both sets of runs would include detailed network constraints, energy constraints and at least five reference traces for demand, solar and wind generation. AEMO proposed a list of factors it would consider if an additional MT PASA Reliability Run were to be conducted within a month.

AEMO sought feedback in the Issues Paper on the proposed plan to review and publish reliability assessments weekly, but only conduct the Reliability Run monthly in the absence of significant changes to model inputs. AEMO also asked participants to give feedback on proposed factors to consider in assessing the need for additional runs.

*Energy Australia submission: Energy Australia expressed strong reservations about reducing the update frequency and expressed a preference for no less frequent than fortnightly projections. Failing this they would like AEMO to retain capacity to perform ad hoc projections in the event of a major market event and would like the threshold for conducting ad hoc runs to form part of the guidelines.*

*ERM Power submission: ERM Power raised no objections about the frequency of runs, and supported the proposed factors for conducting ad hoc runs subject to the inclusion of an additional factor – AEMO’s intention to contract for the provision of medium term Reliability and Emergency Reserve Trader services.*

### 4.3.2 AEMO’s assessment

Following preliminary model design and testing, AEMO is now planning to conduct the following MT PASA modelling runs weekly:

1. MT PASA Reliability Run. The MT PASA reliability run aims to assess the level of unserved energy and likelihood of *reliability standard* breaches through probabilistic modelling. AEMO will conduct Monte Carlo simulations on a set of base cases designed to provide a range of demand and supply conditions across a set of different historical weather years. Planned network outage impacts will be included in the simulations, and stochastic variation on intermittent generation traces and generation forced outages will be simulated.

In total about 3000 Monte Carlo simulations incorporating possible variations in demand and supply conditions will be run for each year of the two-year horizon to produce a distribution of annual USE expectations.

Results from the Reliability Run will also be used to determine MT PASA output data on constrained and unconstrained generation capacity, transfer capabilities under various supply and demand conditions, and system constraints.

2. MT PASA Loss of Load Probability (LOLP) Run. This is a newly proposed run to help maintenance scheduling and operational planning, including informing decisions to enter into *reserve contracts* during the *RERT* process. It assesses the days most at risk of load shedding if 10% POE demand conditions were to occur on that day. The LOLP is calculated using a mathematical operation<sup>2</sup> that considers the likely capacity available to meet demand given the probability of generation outages and intermittent generation availability in each half-hour period. AEMO will publish the maximum half-hourly LOLP for each day in the horizon alongside the forecast 10% POE demand and available capacity - including scheduled, semi scheduled and large non-scheduled availability.

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<sup>2</sup> This operation is known as a convolution of load and involves iterating through individual units, assessing their forced outages rates and accumulating the outages to calculate the probability of overall system outages. Intermittent generators will be represented as a single generator with a probability distribution for each region.

Further details on both MT PASA modelling runs can be found in the MT PASA Process Description document.

AEMO recognises that there is a need to provide updated guidance more frequently in changing conditions and is guided by clause 3.7.2 (b) *AEMO may publish additional updated versions of the medium term PASA in the event of changes which, in the judgment of AEMO, are materially significant.*

Ad hoc capability for additional runs will be available should changing market conditions necessitate updates.

#### 4.3.3 AEMO's conclusion

AEMO now plans to conduct the Reliability Run at least weekly, consistent with current operations, removing the need for the Dispatch Run. Given the frequency of these runs, the risk of a reliability assessment being out of date is low and AEMO therefore considers it no longer necessary to specifically list the factors it will consider before publishing any updated version of the MT PASA.

## 4.4 Use of information on network transfer capabilities and constraints reported through 3.7.2(f)(6)(i),(iv),(v)

### 4.4.1 Issue summary and submissions

AEMO sought responses from participants about whether the proposed Dispatch Run would cover required information on transfer capabilities and constraints.

ERM Power submission: *ERM Power supported the ongoing publication of a weekly dispatch run with forecast interconnector limits, based on the inclusion of any planned network outages.*

### 4.4.2 AEMO's assessment

AEMO acknowledges the request to continue providing information on interconnector limits in respect of clause 3.7.2(f)(6)(iv). Under this clause AEMO is required to publish details of:

- Interconnector transfer capability, and
- The discrepancy between interconnector transfer capability and the capacity of the relevant interconnector in the absence of outages on the relevant interconnector only.

AEMO considers it important to note that this current Rule requirement appears to pre-date the introduction of fully co-optimised constraints where interconnector terms may be included in a number of constraints. As a consequence of this, it is no longer possible to calculate this output in the MT PASA process without incurring significant computational cost. It would require running the Reliability Run multiple times, with and without the relevant interconnector constraints removed.

Moreover, the transfer capabilities are highly dependent on dispatch conditions at any point in time, and would vary wildly across the Monte-Carlo simulations. Flow on an interconnector can be in one of two directions which would potentially result in a bi-modal distribution of flows resulting from the simulations. This distribution would not be well represented by a single overall estimate. Provision of a minimum and maximum band from the simulations could span the entire range of flows possible in both directions.

This required information is most accurately and comprehensively provided through the Constraint Library and Network Outage Scheduler (NOS) rather than any market simulations. Market participants currently receive this information through the same data library that supplies the MT PASA reports.

AEMO remains interested in understanding participant needs for information on transfer capabilities and constraints to see whether changes are needed to the current information requirements specified in *the Rules*.

### 4.4.3 AEMO's conclusion

AEMO will provide outputs specified in clause 3.7.2(f)(6) as follows:

- (i) information on projected violations of power system security will be provided by reporting any constraint violations assessed across simulations in the Reliability Run.
- (ii) projected failure to meet the *reliability standard* will be assessed via the Reliability Run.
- (iii) previously deleted
- (iv) information on transfer capabilities with and without network outages will be provided through the Constraint Library and NOS. AEMO will also provide a range of estimated transfer capabilities from the Reliability Run (with network outages included only).
- (v) AEMO will estimate when and where network constraints may become binding on dispatch of generation or load, based on the multiple Reliability Run simulations, albeit assuming units are dispatched based on short-run marginal cost bidding.

AEMO notes that only 3.7.2(f)(6)(ii) directly pertains to the *reliability standard*.

AEMO remains committed to providing the market with valuable information. As part of the broader MT PASA consultation process, AEMO is interested in understanding if AEMO's obligations under 3.7.2(f)(6)(i), (iv) and (v) are delivering value for participants. AEMO asks participants to provide feedback on the value of this information to their business, whether the obligation to provide this information is considered an efficient use of AEMO's resources (noting the difficulty in providing accurate information), or if this requirement should be removed from the Rules and more relevant information provided.

## 4.5 Granular reporting of aggregate generation capacity

### 4.5.1 Issue summary and submissions

AEMO sought responses from participants in the Issues Paper about whether more granular reporting of aggregate generation capacity would help participants operate their businesses and promote the national electricity objective. The reporting could range from merely distinguishing between energy constrained and unconstrained generation to identifying each MT PASA bid by Dispatch Unit Identifier (DUID).

*Energy Australia: At this stage we do not support this change, considering it does not provide any further detail related to system adequacy and thus is not relevant to the MT PASA. We do not consider that any substantive arguments have been raised that demonstrate that this level of detail would otherwise promote the NEO. It is our opinion that this detail is sought by some participants to assist with their trading process, which we consider is outside the scope of the NEO.*

*ERM Power: ERM Power supports AEMO's proposed rule change to allow publication of reported generation availability on a DUID basis. Individual DUID data is already provided by participants as part of their MTPASA data submission, therefore the data is currently available to AEMO, the only process change that would be required is with regard to the publication of this data.*

*Currently this information is generally only known between major NEM participants due to their sharing of plant overhaul resources, specialist contractors and strategic spares. Hence there is a large asymmetry in information between some participants, often to the detriment of smaller NEM participants and intermediaries. The current MTPASA review process provides the opportunity to correct this information imbalance.*

*ERM Power also asked that AEMO provide Forecast energy constrained and energy unconstrained generation availability data on an aggregate regional basis – note, this data should not include the impact of network constraints on generation availability as per the current weekly MTPASA.*



#### 4.5.2 AEMO's assessment

AEMO is bound by the *National Electricity Law* and the Rules in terms of information disclosure. Clauses 3.7.2(f)(5A) and (5B) of *the Rules* provide for AEMO to publish aggregate constrained and unconstrained capacity for each region, after allowing for the impact of *network constraints*. AEMO is obligated to protect information not covered under *the Rules* such as individual DUID bids, or even the constrained and unconstrained capacity for each region unrelated to *network constraints*.

Any potential rule change proposal to authorise AEMO to publish constrained/unconstrained information or report bids at DUID level would need to demonstrate that the change promotes the NEO<sup>3</sup>.

AEMO recognises that opinion is divided on the matter and that there may be an asymmetry of information between large and small participants.

#### 4.5.3 AEMO's conclusion

AEMO acknowledges the submissions received from ERM Power and Energy Australia. AEMO's current position is that there is not enough support for any changes to the current Rules obligations. Any consideration to move forward with a potential rule change for more granular reporting of generation capacity requires more substantive responses from participants about how this would help participants' business operation efficiency and promote the NEO.

### 4.6 Transparency and access to data

#### 4.6.1 Issue summary and submissions

While not specifically discussed in the Issues Paper, both Energy Australia and ERM Power expressed concerns around potential for reduced transparency and access to data in their submissions:

*Energy Australia: We consider that the proposed change to a probabilistic methodology is likely to result in improved outcomes; however we are also concerned that there exists the risk of reduced transparency in the process.*

*We would support the change to a probabilistic methodology as long as a level of access to substantially the same data can be retained. This includes inputs such as the demand trace and availability trace. The new methodology must provide enough visibility on these inputs that participants have confidence in the outputs, including retaining the current 3 hourly resolution.*

*ERM Power: ERM Power's acceptance and support of AEMO's proposal to amend the publication of the weekly MTPASA to a weekly MTPASA Dispatch run, and a MTPASA Reliability run published at least monthly would be conditional on an effort by AEMO to maintain data and provide improvements to a number of detailed outputs of the current weekly MTPASA.*

#### 4.6.2 AEMO's assessment

AEMO acknowledges the need for transparency in modelling and the requirement to provide relevant input data to participants. AEMO recognises that participants value the data provided in the three-hourly report as well as input data for modelling purposes. The aim is not to remove valuable data but to improve the quality and timeliness of the information provided.

Inevitably, changes will be made to MT PASA outputs in line with its redevelopment. Specifically, information related to Minimum Reserve Levels and reserve shortfalls will no longer be provided. Instead, more detailed information will be provided around the distribution, frequency and magnitude of

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<sup>3</sup> The National Electricity Objective aims: *to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to – price, quality, safety, reliability, and security of supply of electricity; and the reliability, safety and security of the national electricity system.*



projected unserved energy under various conditions, and the days most at risk. AEMO will engage with participants regarding these changes during workshops and as part of the regular Electricity Market Management System (EMMS) change process.

#### 4.6.3 AEMO's conclusion

AEMO will continue to publish the three-hourly report in the current format.

AEMO will publish all half-hourly input traces used for MT PASA modelling, including demand, intermittent generation, and demand side participation. AEMO will only publish generation availability to the extent specified in *the Rules*.

More detailed information on the proposed MT PASA model runs can be found in the attached MT PASA Process Description. AEMO may amend the process document to account for participant feedback received during the consultation process as well as changes to the modelling process that may be made as part of the ongoing model development and testing phase currently underway.

## 4.7 Reference Years

### 4.7.1 Issue summary and submissions

The proposed use of multiple historic reference years to capture weather-related variations in demand and supply was commented on in the ERM Power submission: *We support the proposal to change how demand curves and forecast intermittent generation are derived to the use of at least 5 reference years. The use of a single reference year, as per current methodology is not supported as it fails to represent the naturally occurring variability in outcomes that are historically observable.*

### 4.7.2 AEMO's assessment

AEMO acknowledges ERM Power's support of the proposed methodology.

### 4.7.3 AEMO's conclusion

AEMO will conduct the MT PASA reliability assessment using at least five reference years.

## 4.8 Selection of POE Demand Curves

### 4.8.1 Issue summary and submissions

At a minimum, AEMO proposes to use both 10% POE and 50% POE demand traces in the reliability assessment. In its submission, ERM Power raised the issue of including an additional POE demand representation in modelling:

*With regards to AEMO proposed use of 10% and 50% probability of exceedance (POE) demand curves for the calculation of Unserved Energy (USE) in this MTPASA Reliability run, we are concerned that this will result in a systemic bias to calculate a higher average USE value than that which would naturally occur.*

*The expected actual demand profile by its nature will result in outcomes that may vary from 0 to 100% POE, where each of these outcomes has the same probability of occurring. There is a high probability that for the higher POE levels, those between 60 to 100% the USE will be zero. In calculating an average annual USE outcome based on only 10 and 50% POE demand curves, the proposed process ignores all those POE outcomes where zero USE results. Statistically, in calculating an average annual USE outcome, AEMO's calculation process should represent the full range of expected USE outcomes, not just those outcomes where there is a higher probability of USE occurring. This could reasonably be*

*achieved by the inclusion of 90% POE demand curves, or should AEMO determine that a slightly more conservative outcome is required, use of the 80% POE demand curve could be acceptable.*

*The weighting applied in the average USE calculation to the 90% POE outcomes should be equal to that applied to the 10% POE outcome, as each has the same probability of occurring.*

#### **4.8.2 AEMO's assessment**

AEMO notes the topic of weighting POE results has been examined previously. A summary of the development of the methodologies can be found in the [ROAM Consulting report to the AEMC](#)<sup>4</sup>. The application of weightings is also discussed in Section 7.1.1 of AEMO's [Market Modelling Methodology and Input Assumptions](#)<sup>5</sup> document.

The weightings that would be used should a 90% POE demand be added to the current 50% and 10% POE demand curves would be 30.4% (90% POE) – 39.2% (50% POE) – 30.4% (10% POE). Historically, the USE resulting from 90% POE and 50% POE has been very close to zero, and convention has been to aggregate the weightings and use a 69.6% / 30.4% weighting on the 50% POE / 10% POE estimates of USE.

AEMO acknowledges that there is merit in considering other POEs, particularly if USE levels in the 50% POE case are materially above zero, leading to potential overestimation of USE. The MT PASA design includes functionality to add any additional POE demand traces that AEMO may require for reliability assessments. AEMO will publish the appropriate weightings for alternative configurations of demand traces in the MT PASA Process Description document at the time they are incorporated into the MT PASA assessments.

#### **4.8.3 AEMO's conclusion**

AEMO recognises that to get a representative distribution of unserved energy, it is useful to look at a range of POE levels. AEMO will use a minimum of 10% POE and 50% POE in modelling and may include additional POE demand traces (for example, 90% POE) if, in AEMO's estimation, this would produce a materially different result.

As part of a continuous improvement process, AEMO is considering developing a broader range of POE traces for use in modelling. Further information will be provided when these become available.

<sup>4</sup> <http://www.aemc.gov.au/Media/docs/Appendix%20D%20-%20ROAM%20Consulting%20%E2%80%93%20MPC%20Modelling%20Report-f3f8e903-a331-4d14-b1b5-b47f4af2c71b-0.pdf>

<sup>5</sup> [http://aemo.com.au/-/media/Files/Electricity/NEM/Planning\\_and\\_Forecasting/NTNDP/2016/Dec/Market-Modelling-Methodology-And-Input-Assumptions.pdf](http://aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NTNDP/2016/Dec/Market-Modelling-Methodology-And-Input-Assumptions.pdf)



## 5. OTHER MATTERS

Other matters raised in the submissions are presented and discussed in the table below.

No.	Consulted person	Issue	AEMO response
1	ERM Power	Section 2.2.2 of the revised Reliability Standards Information Guidelines indicates that with regards to intermittent generation forecast used in the EAAP, only one of the multiple Electricity Statement of Opportunities (ESOO) reference traces is used for EAAP, we believe that the intermittent generation forecast used in the EAAP should match those used in the MT PASA Reliability run. This would maintain a consistent approach and remove the potential for conflict in outcomes between the EAAP and the proposed MT PASA Reliability reports.	<p>AEMO acknowledges the need for consistency in modelling approaches between ESOO, EAAP and MT PASA.</p> <p>The proposed change to Section 2.2.2 has been removed, allowing AEMO the flexibility to better align EAAP with other processes.</p> <p>Where appropriate, AEMO will maintain consistency across different modelling functions.</p> <p>Changes to 2.1.2 and 2.1.4 of the Guidelines have also been made to clarify the current use of multiple reference traces in the ESOO.</p>



## 6. DRAFT DETERMINATION

Having considered the matters raised in submissions AEMO's draft determination is to amend the **Reliability Standard Implementation Guidelines** in the form of **Attachment 1**, in accordance with clause **3.9.3D(c)** of the NER and to amend the MT PASA Process Description in the form of **Attachment 2** in accordance with clause 3.7.2(g) of the NER.



## APPENDIX A - GLOSSARY

Term or acronym	Meaning
ESOO	Electricity Statement of Opportunities
GELF	Generator Energy Limitation Framework
MT PASA	Medium Term Projected Assessment of System Adequacy
NER	National Electricity Rules
NEO	National Electricity Objective
POE	Probability of Exceedance
RSIG	Reliability Standard Implementation Guidelines



## APPENDIX B. ATTACHMENTS

- Attachment 1 – Reliability Standard Implementation Guidelines (Draft)
- Attachment 2 – MT PASA Process Description Document (Draft)