RELIABILITY STANDARD IMPLEMENTATION GUIDELINES: PROPOSED AMENDMENTS

ISSUES PAPER

PUBLISHED: 30 MARCH 2017

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

EXECUTIVE SUMMARY

The publication of this Issues Paper commences the first stage of the *Rules consultation* process conducted by AEMO on proposed amendments to the *reliability standard implementation guidelines* (RSIG or Guidelines) in accordance with Clause 8.9 of the National Electricity Rules (Rules).

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.

AEMO is committed to improving the Medium Term Projected Assessment of System Adequacy (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.

Ernst & Young (EY) were engaged last year to recommend improvements to the MT PASA methodology. They 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.

A probabilistic MT PASA modelling approach would:

- Provide stakeholders with more accurate information about the projected reliability of the National Electricity Market (NEM) in the medium term.
- Provide more consistency of information between AEMO's MT PASA, Energy Adequacy Assessment Projections (EAAP) and Electricity Statement of Opportunities (ESOO) reports.
- Improve interpretation of the potential consequences of any Low Reserve Conditions (LRC) reported.

Registered Participants are guided by MT PASA information when making decisions about supply, demand and *transmission network* outages for two years ahead. Timeliness, accuracy and transparency of information are therefore critical for these decision makers.

Due to the intensive computational and analytical nature of a probabilistic assessment, AEMO proposes to conduct future MT PASA reliability assessments monthly rather than weekly, but will assess weekly whether the latest advice remains valid, or whether an additional ad hoc run is required. AEMO will continue to publish the three-hourly supply demand information that is part of the MT PASA suite.

AEMO has prepared this Issues Paper to facilitate informed debate and feedback by industry on:

- Aspects of the probabilistic MT PASA modelling approach and types of outputs that will be most useful in providing the information required to implement the *reliability standard* over a two-year time frame.
- Whether additional information from participants in relation to annual energy constraints would improve reliability assessment.
- Potential factors that may be considered for conducting additional ad hoc MT PASA assessments.
- Whether reporting MT PASA bids by Dispatchable Unit Identifier (DUID) would better promote the national electricity objectives.

Stakeholders are invited to submit written responses on the issues and questions identified in this paper and the proposed amendments to the RSIG by **5.00 pm (Australian Eastern Standard time) on 10 May 2017**, in accordance with the Notice of First Stage of Consultation published with this paper.

Contents

1 Stakeholder Consultation Process

AEMO is consulting on proposed amendments to the *reliability standard implementation guidelines* (RSIG or Guidelines) in accordance with the *Rules* consultation procedures in rule 8.9 of the National Electricity Rules (Rules).

AEMO's indicative timeline for this consultation is outlined below. Dates may be adjusted depending on the number and complexity of issues raised in submissions and any meetings with stakeholders.

DELIVERABLE	INDICATIVE DATE
Issues Paper published	Thursday 30 March 2017
Submissions due on Issues Paper	Wednesday 10 May 2017
Draft Report published	Thursday 8 June 2017
Submissions due on Draft Report	Friday 23 June 2017
Final Report published	Monday 7 August 2017

Before the submissions due date, stakeholders can request a meeting with AEMO to discuss the issues and proposed changes raised in the Issues Paper.

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. Clauses 3.7.2, 3.9.3D, 4.2.7, 4.3.1(l)(m) and 4.8.4 of the *Rules* (Version 89) address requirements for the Guidelines and MT PASA.

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 the 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 to provide a suite of recommendations to remediate gaps.

EY recommended[1] 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.
- A change from weekly to at least quarterly frequency for reliability assessment due to the intense computational requirements of the probabilistic modelling. Feedback from the December stakeholder workshop indicated at least a monthly frequency would be preferred.
- The three-hourly supply-demand run should continue as it provides valuable information to assist participants to optimise their operations. Additional information, reporting aggregate MT PASA bids at a more granular level, would improve the service.

EY's recommended solution was independently assessed by GHD who provided a gap analysis of the recommendation, and information on relevant international practices. GHD[2] concluded that EY's solution could address the limitations and issues identified by EY 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 has now commenced the implementation phase of the MT PASA redevelopment. This includes this consultation on proposed amendments to the Guidelines to reflect the recommended changes to modelling frequency, approach, input assumptions and outputs used to implement the *reliability standard*.

3 Proposed changes to Guidelines and MT PASA Process Description Documents

The sections below summarise and discuss the proposed Guideline amendments to reflect the new MT PASA process. For more details, please refer to the published draft of the Guidelines incorporating the proposed changes. The change-marked version is available at:

http://www.aemo.com.au/Stakeholder-Consultation/Consultations/Reliability-Standard-Implementation-Guidelines-Consultation.

The MT PASA Process Description document will also be rewritten to reflect the new methodology.

[1] Available: http://www.aemo.com.au/-/media/Files/Electricity/NEM/Data/MMS/2016/EY-MTPASA-Final-Report-2016-11-23C.pdf
[2] Available: http://www.aemo.com.au/-/media/Files/Electricity/NEM/Data/MMS/2016/GHD-Reports.zip

3.1 Proposed amendments to the Guidelines

3.1.1 Medium Term PASA methodology

The improvements to MT PASA methodology necessitate changes to Section 2.3.1 of the Guidelines which cover the MT PASA process. The fundamental difference in switching from the current deterministic[3] approach based on Minimum Reserve Levels (MRLs) to a probabilistic[4] approach lies in how we assess the *reliability standard*.

MT PASA is used by AEMO to assess when a Low Reserve Condition (LRC) occurs. Clause 4.8.4(a) of the *Rules* defines a LRC as:

> *"Low Reserve Condition - when AEMO considers that the balance of generation capacity and demand for the period being assessed does not meet the reliability standard as assessed in accordance with the reliability standard implementation guidelines".*

In the current MT PASA approach, MRLs are periodically established by running many simulations of the electricity system to determine the appropriate level of reserve in each region required to meet the *reliability standard*. Then, weekly, capacity reserves over the next two years are compared against these MRLs, conservatively assuming a low contribution from intermittent generation (with 90% confidence of exceedance)[5]. If capacity reserve levels on a given day are projected to fall below the MRL, it indicates potential for a *reliability standard* breach to occur, and AEMO will declare a LRC.

The proposed probabilistic modelling approach removes the need for MRLs. Each simulation analyses the electricity system under a different set of demand and supply conditions (including variations in intermittent generation), and records the resulting amount of USE. The full set of USE from these individual simulations provides insight into the distribution of potential USE across the two-year horizon.

The annual average USE from these simulations can be compared directly against the *reliability standard* (as opposed to indirectly assessing the *reliability standard* through use of estimated MRLs). This will allow AEMO to give a much more accurate indication of the likelihood that the *reliability standard* can be met. AEMO will declare a LRC if the annual USE, averaged across all simulations, exceeds the *reliability standard*[6]. AEMO will also identify any days of particularly high risk of USE, to help stakeholders with outage planning.

Given the computationally and analytically intensive nature of probabilistic modelling, AEMO proposes to conduct the reliability assessments at least monthly. Clause 3.7.2(a) of the *Rules* requires that every week, AEMO must review and *publish* MT PASA outputs in accordance with the *timetable*. To meet this requirement, AEMO is proposing to review the need to conduct a reliability assessment weekly, and either advise the market that the previous assessment is unchanged, or provide a new assessment if it has received new information that is likely to materially impact reliability. Section 3.1.4 lists the factors AEMO proposes to consider when determining whether an updated assessment is warranted.

3.1.2 Medium Term PASA Inputs

The Guidelines will be updated to reflect changes to inputs required for modelling intermittent generation, energy constraints, network constraints and demand. AEMO currently conducts probabilistic modelling for ESOO[7] and EAAP[8]. For the two-year planning horizon, AEMO will use the same inputs across all three processes where appropriate (as summarised in Table 1 below). This will enable AEMO to offer a consistent view across all three reliability assessments.

MT PASA and EAAP are run over a two-year horizon, while ESOO is run over a ten-year horizon. It is intended that, in future, ESOO will use MT PASA generator availability submitted by participants for the first

[3] In a deterministic model, a single set of fixed inputs is used and the process run once.
[4] In a probabilistic model, some inputs are identified as having random characteristics. The process is run with multiple simulations of this randomness.
[5] This means that intermittent generation capacity is heavily discounted (by up to 95%) in this calculation.
[6] The reliability standard refers to USE across a financial year. AEMO will identify an LRC if expected unserved energy across the year exceeds the reliability standard.
[7] https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Statement-of-Opportunities
[8] https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Energy-Adequacy-Assessment-Projection

two years of the ten-year horizon, offering further modelling consistency. Where relevant, the latest variable Generator Energy Limitation Framework (*GELF*) paramaters, provided for EAAP, may also be used in all three processes to represent energy constraints.

Table 1: Comparison of inputs for different reliability assessment models

	ESOO	EAAP	Current MT PASA	New MT PASA
How is the Reliability Standard Implemented	Directly assess USE expectations based on probabilistic modelling	Directly assess USE expectations based on probabilistic modelling	Calculate minimum reserve levels to approximate the point at which USE would exceed 0.002%. Assess whether capacity reserves less MRL exceeds demand across assessment period.	Directly assess USE expectations based on probabilistic modelling.
Demand	Sampling 10% POE and 50% POE hourly profiles based on NEFR and historical reference years.	10% POE and 50% POE hourly profiles based on NEFR and historical reference year.	10% POE daily peak load based on NEFR and past trends, day type and special events.	Sampling 10% POE and 50% POE half-hourly profiles based on NEFR and historical reference years.
Intermittent generation	Sampling hourly profiles based on historical reference years.	Hourly, 90% POE based on AWEFS[9] and ASEFS.	Daily 90% POE based on AWEFS and ASEFS.	Sampling half hourly profiles based on historical reference years.
Scheduled generation capacity and outages	Annual Survey.	MT PASA offers.	MT PASA offers.	MT PASA offers.
Energy Constraints	Monthly inflow of water assumed for hydro plants based on historical observations.	Provided through GELF.	Weekly energy constraints submitted by participants.	Weekly energy constraints submitted by participants. These are summed to provide an annual estimate unless a separate annual estimate is provided. GELF information may also be used where appropriate to assist in more accurate modelling of energy constraints.
Network Constraints	System normal constraints.	System normal constraints.	MT PASA type constraints and outage information from the Network Outage Schedule. Interconnectors also limited by reserve sharing constraints as recommended by latest MRL assessment.	System normal constraints. Planned outages from the Network Outage Schedule. Reserve sharing constraints not used.

[9] AWEFS is the Australian Wind Energy Forecasting System, ASEFS is the Australian Solar Energy Forecasting System

Energy Constraints

Registered Participants are required under the *Rules* to submit PASA availability and weekly energy constraints for each *scheduled generating unit* or *load.*[10]

The increasing interdependence of gas and electricity has been identified by AEMO and the Reliability Panel as a particularly important issue affecting future system reliability. AEMO intends to use information supplied through *GELF* to help set appropriate monthly or annual energy constraints for MT PASA modelling that reflect constraints on fuel source, but this information may be of limited use if not updated regularly.[11]

Provision of annual energy constraints on a more frequent basis, potentially through a more regular Generator Survey, would allow for more accurate modelling of the electricity system. Each year AEMO conducts a Generator Survey to gather crucial information for our planning publications, including the ESOO and the National Transmission Network Development Plan. This information is required to be provided by participants under the *Rules* and is key to AEMO providing relevant and accurate market information for our stakeholders.

3.1.3 Medium Term PASA outputs

Clause 3.7.2(a) specifies that *"every week, AEMO must review and publish the outputs of the medium term PASA in accordance with the timetable*". These MT PASA outputs are stipulated in clause 3.7.2(f) of the *Rules*. Table 2 (found in the Appendix) lists each MT PASA output specified in the *Rules* and the manner in which AEMO proposes to deliver the information moving forward. Several of these outputs could be provided through the high frequency three-hourly report, while others can only be derived from market modelling.

Outputs from three-hourly report

During workshops held last year, stakeholders requested extra fields in the three-hourly report. These additional fields, largely related to demand and non-sheduled generation assumptions, cover requirements in clause 3.7.2(f)(1) to (5) of the *Rules.* As part of the MT PASA redevelopment, AEMO will include this information in the three-hourly report, while also continuing to make it available on the data dashboard.

Stakeholders also requested that AEMO distinguish between energy constrained and unconstrained aggregate capacity in the three-hourly reporting. This information is currently provided weekly, after allowing for the impact of *network constraints* and therefore requires modelling to assess. Due to the frequency of the three-hourly report, it is not presently possible to provide this information in that time frame.

AEMO runs the risk of revealing confidential participant information if it were to report separately on energy constrained and unconstrained aggregate capacity without assessing the impact of network constraints. A rule change proposal would therefore be required before more granular categorisation of bids (potentially down to DUID level) can be provided. AEMO intends to submit a rule change proposal if, after evaluating feedback from this consultation, it considers that the change would promote the national electricity objective.

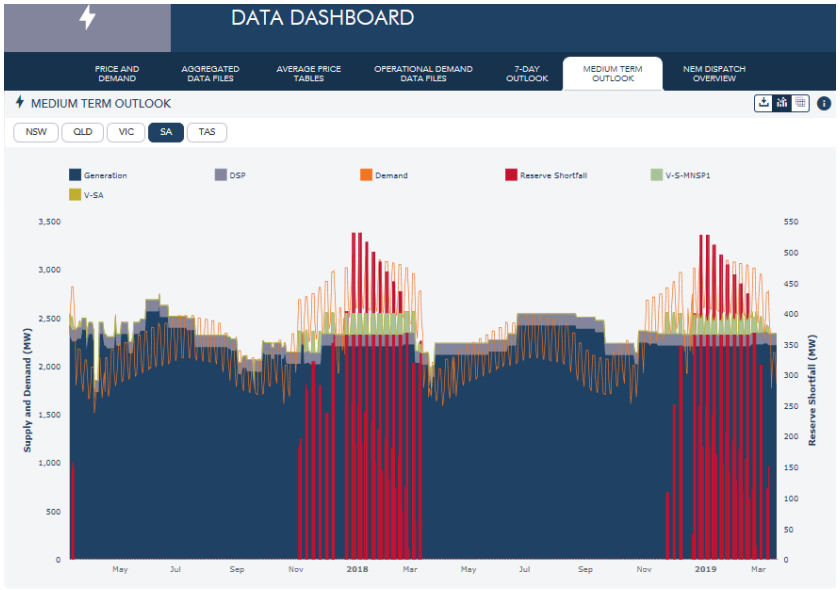
Outputs related to the reliability standard

As the new MT PASA version will no longer specify MRLs or calculate a deterministic capacity reserve, the notion of capacity reserves and reserve shortfalls is no longer relevant. Therefore, AEMO intends to remove the reserve shortfall graph from the Data Dashboard and the chart produced for outage planning (see Figure 1) and replace them with a series of graphs that detail the distribution of annual and daily USE across the simulations (see Figure 3 for examples). An indicator of days at highest risk of USE will also be provided.

Figure 2 shows the current table format of MT PASA output on the data dashboard. This will remain, with the reserve shortfall column to be replaced with expected USE information shown alongside.

[10] *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.

[11] At a minimum, the *GELF* is updated by participants once every 12 months, for a two-year period. If, say, the 'latest' GELF data was provided 11 months prior, then energy constraint information would only be available for the next 13 months of the 24 month horizon.



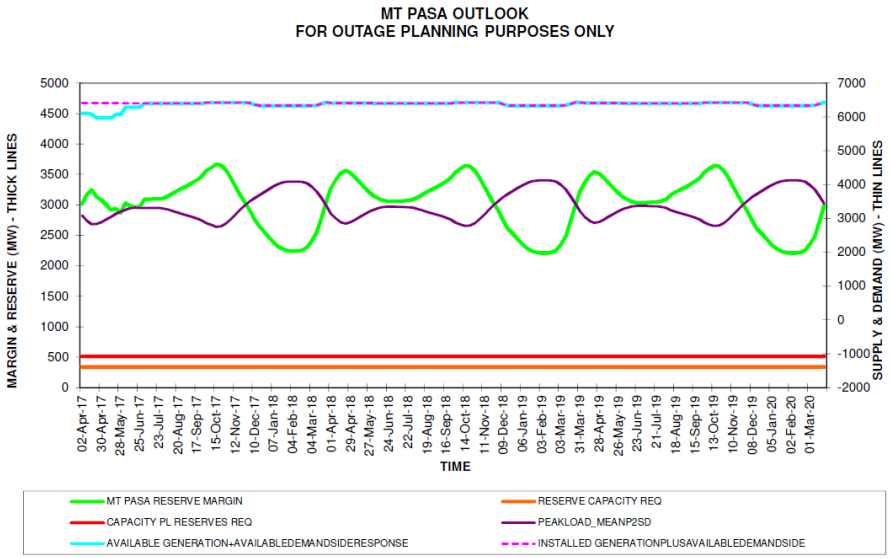
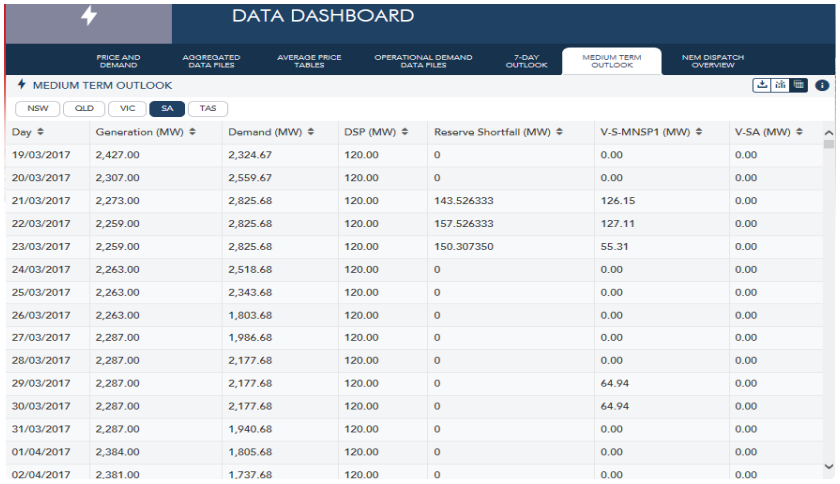


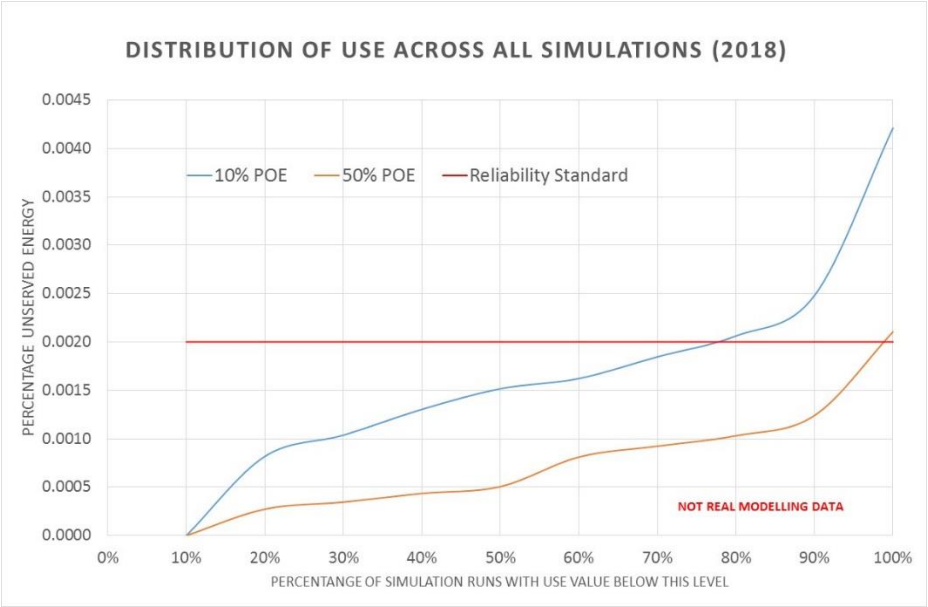
Figure 1: Current Charts to be discontinued

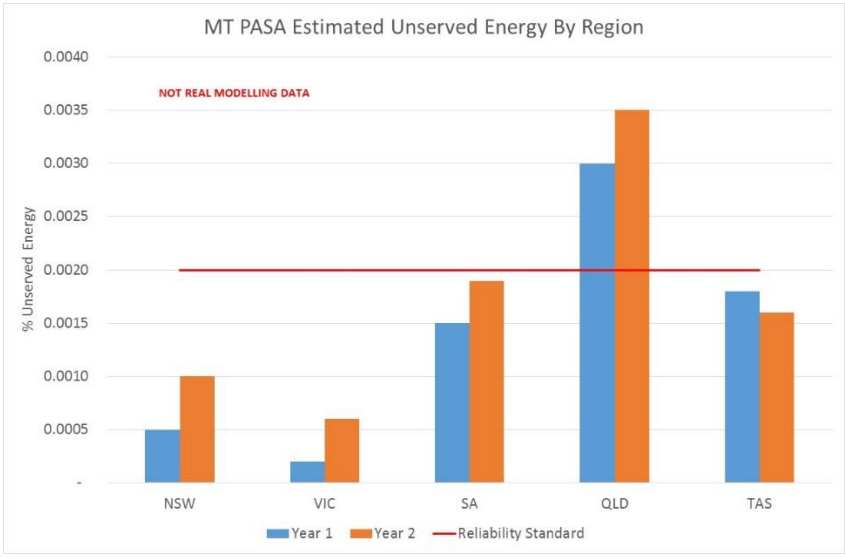


Day	Generation (MW)	Demand (MW)	DSP (MW)	Reserve Shortfall (MW)	V-S-MNSP1 (MW)	V-SA (MW)
19/03/2017	2,427.00	2,324.67	120.00	0	0.00	0.00
20/03/2017	2,307.00	2,559.67	120.00	0	0.00	0.00
21/03/2017	2,273.00	2,825.68	120.00	143.526333	126.15	0.00
22/03/2017	2,259.00	2,825.68	120.00	157.526333	127.11	0.00
23/03/2017	2,259.00	2,825.68	120.00	150.307350	55.31	0.00
24/03/2017	2,263.00	2,518.68	120.00	0	0.00	0.00
25/03/2017	2,263.00	2,343.68	120.00	0	0.00	0.00
26/03/2017	2,263.00	1,803.68	120.00	0	0.00	0.00
27/03/2017	2,287.00	1,986.68	120.00	0	0.00	0.00
28/03/2017	2,287.00	2,177.68	120.00	0	0.00	0.00
29/03/2017	2,287.00	2,177.68	120.00	0	64.94	0.00
30/03/2017	2,287.00	2,177.68	120.00	0	64.94	0.00
31/03/2017	2,287.00	1,940.68	120.00	0	0.00	0.00
01/04/2017	2,384.00	1,805.68	120.00	0	0.00	0.00
02/04/2017	2,381.00	1,737.68	120.00	0	0.00	0.00

SOUTH AUSTRALIAN PREDICTED UNSERVED ENERGY (MWh)				
Date	Minimum	Average	Maximum	% of simulations showing USE
09/01/2017	6	934	2,337	36%
23/01/2017	37	235	472	11%
07/02/2017	333	333	333	4%
09/03/2017	76	76	76	4%
06/11/2017	54	173	390	25%
08/11/2017	22	291	1,351	50%
09/11/2017	73	73	73	4%
10/11/2017	67	67	67	4%
13/12/2017	537	537	537	4%
14/12/2017	403	893	2,037	50%
21/12/2017	591	591	591	4%
03/01/2018	87	1,170	3,060	11%
08/01/2018	4,039	5,305	8,316	50%
10/01/2018	224	720	1,216	7%
16/01/2018	25	727	2,782	29%

Figure 2: Dashboard Data - current version and additional data





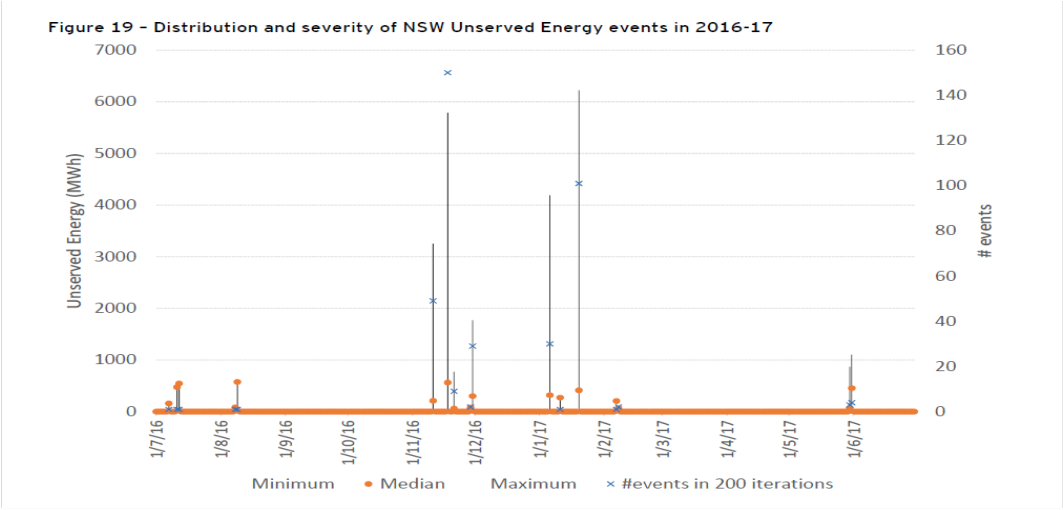


Figure 3: Sample of proposed replacement charts (mock data)

Other MT PASA outputs

Clause 3.7.2(f)(6)(ii) provides AEMO with the flexibility to identify and quantify any projected failure to meet the *reliability standard* in accordance with the Guidelines. Through these Guideline amendments, AEMO proposes to continue reviewing and publishing a reliability assessment weekly, although the probabilistic model used to produce this assessment might only be run monthly if no new information is considered to have materially altered the latest assessment.

AEMO does not have this same timing flexibility with respect to identifying, quantifying and publishing the other MT PASA outputs. Namely:

- energy constrained and unconstrained capacity in the presence of *network constraints* (clause 3.7.2(f)(5A) and (5B))
- projected *violations* of *power system security* (clause 3.7.2(f)(6)(i))
- forecast *interconnector* transfer capabilities, with and without *outages* (clause 3.7.2(f)(6)(iv))
- impact of binding *network constraints*, (clause 3.7.2(f)(6)(v)).

This information can only be determined through detailed market modelling, although AEMO does not consider that probabilistic modelling would be required. Instead, AEMO proposes to use a MT PASA Dispatch Run, excluding unplanned outages, to determine this output. By avoiding running multiple simulations of unplanned outages, the run can be executed very quickly enabling weekly publication of the outputs listed above.

In effect, this means that AEMO will be producing two sets of MT PASA runs:

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

Both sets of runs will include detailed network constraints, energy constraints, and at least five reference traces for demand, solar and wind generation.

3.1.4 Factors to be considered for additional MT PASA Reliability Runs

AEMO proposes to consider the following factors in determining whether an additional MT PASA Reliability Run should be conducted within the month:

- Material change in data provided by market participants in comparison with the data used to conduct the previous assessment (assessed weekly).
- Advice from a market participant informing AEMO of an event or circumstances it considers may result in a material change to PASA availability or additional energy constraints.
- A major transmission limitation or prolonged interconnection outage that results in a major restriction in energy transfers between regions within the NEM.
- A major change in operational consumption.
- Any other events or emerging events that may materially impact reliability by way of capacity or energy limitation.

3.1.5 Feedback

Questions for Consultation

- In your view, will the proposed probabilistic modelling approach provide the information required to:
  - Better implement the reliability standard over a two-year time frame? If not, why not?
  - Inform decision makers to allow appropriate market responses where required?
  - Provide adequate information for planning purposes, outage scheduling and for considering whether AEMO should enter into *reserve contracts* as part of the Reliability and Emergency Reserve Trader (RERT) process?
- Is there additional information AEMO should be seeking from participants to more accurately implement the *reliability standard* in the two-year timeframe? Do you see benefit in AEMO using data provided through GELF to assist with formulating energy constraints for MT PASA probabilistic modelling? How else could AEMO obtain this information?
- How will monthly rather than weekly reporting of the MT PASA Reliability Run (specifically clause 3.7.2(f) (6)(ii)) impact your business? Do participants consider as reasonable the potential factors AEMO proposes to consider in determining whether an additional MT PASA Reliability Run is required? What other factors should be considered?
- How do you currently use the information reported through clauses 3.7.2(f)(6)(i), 6(iv) and 6(v)? Will the proposed MT PASA Dispatch Run adequately cover your information requirements with respect to these clauses? If not, how else could AEMO provide this information for you?
- How would more granular reporting of aggregate generation capacity – either distinguishing between energy constrained and unconstrained generation, or identifying each MT PASA bid by DUID – assist you in operating your business, and promote the national electricity objective?

3.2 Proposed amendments to the MT PASA Process Description document

Most of the MT PASA Process Description[12] document will need to be rewritten pending development and testing of the new probabilistic model. Intended changes to each section are summarised below:

- **Section 3: MT PASA Inputs**. All references to MRLs will be removed including the whole of 3.2.3.
- **Section 4: MT PASA Solution Process**. To be updated to include information on the new probabilistic model for the MT PASA Reliability Run with details on the methodology for assessing USE and LRC using the new probabilistic modelling approach. Details to be provided on the proposed MT PASA Dispatch Run which will be used to provide many of the outputs required in 3.7.2(f) of the *Rules.* Table 3 to be updated to reflect the new model. Further information on the probabilistic modelling techniques already used by AEMO for EAAP and ESOO can be found in the existing Guidelines[13], ESOO[14], and EAAP[15] process documents.
- **Section 5: MT PASA Outputs**. Will be updated to reflect any changes arising from the new probabilistic modelling approach.
- **Appendix A: MT PASA Architecture**. To be updated to reflect automation and integration of the new MT PASA process into AEMO systems. AEMO inputs for demand, intermittent generation, and

[12] https://www.aemo.com.au/-/media/Files/Electricity/NEM/Data/MMS/2016/MT_PASA_Process_Description.pdf
[13] https://aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2016/EAAP/Reliability-Standard-Implementation-Guidelines.pdf
[14] https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Statement-of-Opportunities
[15] https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Energy-Adequacy-Assessment-Projection

transmission constraints will be taken directly from AEMO databases. Automated outputs are still to be designed and developed. No changes are currently expected to be made to participant input processes, except perhaps to the extent that additional energy constraint information is collected.

- **Appendix B: MT Demand Forecasting Process**. To be updated to reflect a half-hourly demand profile developed through the use of historical demand data with projections of future demand, as per ESOO modelling for use in the probabilistic model.
- **Appendix C: Reserve Sharing Example**. Remains the same.
- **Appendix D**: **Pain Sharing Example.** Remains the same.
- **Appendix E: Formulae for Reserve Calculations**. To be removed.
- **Appendix F: LOR Calculation**. To be removed – replaced with USE estimate.

Appendix

Table 2: MT PASA Outputs Specified in NER 3.7.2(f)

MT PASA OUTPUT SPECIFICATIONS NER 3.7.2(f)	MT PASA PUBLICATION	OUTPUT DETAILS
(1) Forecasts of the 10% probability of exceedance peak load and most probable peak load, excluding the relevant aggregated MW allowance referred to in (2) and adjusted to make allowance for scheduled load	Can be provided directly based on AEMO demand forecasts	Peak operational demand - 10% POE and 50% POE demand
(2) The aggregated MW allowance (if any) to be made by AEMO for generation from non-scheduled generating systems in each of the forecasts of the 10% probability of exceedance peak load and most probable peak load referred to in (1)	Can be provided directly based on AEMO demand forecasts	Non Scheduled Generation at times of 10% POE and 50% POE peak operational demand
(3) In respect of each of the forecasts of the 10% probability of exceedance peak load and most probably peak load referred to in (1), a value that is the sum of that forecast and the relevant aggregated MW allowance referred to in (2)	Derived from (1) and (2)	Peak native demand
(4) Forecasts of the most probable weekly energy for each region	Can be provided directly based on AEMO demand forecasts	Total Weekly Energy
(5) Aggregate generating unit PASA availability for each region	3 Hourly Report	Data Fields: PasaAvailabilityScheduled
(5A) Aggregate capacity for each region, after allowing for the impact of network constraints, that can be generated continuously, calculated by adding the following categories: (i) The capacity of scheduled generating units in the region that are able to operate at the PASA availability (ii)The forecast generation of semi-scheduled generating units in the region as provided by the unconstrained intermittent generation forecasts	MT PASA Dispatch Run	This can only be assessed during the market modelling process.
(5B) Aggregate capacity for each region, after allowing for the impact of network constraints, that cannot be generated continuously at the PASA	MT PASA Dispatch Run	The impact of weekly energy constraints on dispatch can only be assessed through the modelling process as generation will be optimised over the week in line with energy constraints.

availability of the scheduled generating units in the region due to specified weekly energy constraints; and		
(6) Identification and quantification of:		
(i) Any projected violations of power system security	MT PASA Dispatch Run	The current MTPASA process has constraint solution outputs which identify binding and violating constraints. If any constraints are violated, it indicates that there is a projected violation of power system security. There will be a similar identification of constraint violation in the new MT PASA Dispatch Run.
(ii) Any projected failure to meet the reliability standard assessed in accordance with the RSIG	MT PASA Reliability Run	Estimated USE for each day in each region Identify days where there is a high risk of USE Identify LRC based on expected annual USE
(iii) Deleted		
(iv) Forecast interconnector transfer capabilities and the discrepancy between forecast interconnector transfer capabilities and the forecast capacity of the relevant interconnector in the absence of outages on the relevant interconnector only	MT PASA Dispatch Run	Interconnector capabilities with and without planned network outages These can also be derived from the Network Outage Schedule. AEMO is looking at potential methods of providing this information outside of the MT PASA Dispatch Run.
(v) When and where network constraints may become binding on the dispatch of generation or load	MT PASA Dispatch Run	Binding constraints can only be assessed through modelling as it is dependent on generation dispatch. Constraints may bind at different times, depending on the demand and intermittent generation reference trace used.