AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Reliability Standard Implementation Guidelines, MT PASA Process Description and EAAP Guidelines

July 2020

Draft determination

Executive summary

This Draft Determination is AEMO's draft response to issues raised and written submissions received in the first stage of its 2020 consultation on its Reliability Standard Implementation Guidelines (RSIG or Guidelines), Medium Term Projected Assessment of System Adequacy (MT PASA) Process Description, and Energy Adequacy Assessment Projection (EAAP) Guidelines. This determination also necessarily includes changes to the Spot Market Operations Timetable which were driven by changes to MT PASA. The consultation follows the National Energy Rules (NER) consultation procedure detailed in rule 8.9 of the NER.

This consultation is to inform the industry of changes to how AEMO implements the reliability standard, driven by:

- Updates to the Procedure for the Exercise of Reliability and Emergency Reserve Trader (RERT).
- The introduction of the National Electricity Amendment (Improving transparency and extended duration of MT PASA) Rule 2020 No. 1.

The issues paper[1] detailed the impact of these changes on the following AEMO publications:

- RSIG.
- MT PASA Process description.
- EAAP Guidelines.
- Spot Market Operations Timetable

The changes to the above publications also include various improvements to the underlying processes, and ongoing efforts to ensure consistent methodologies and assumptions are applied.

In this document, AEMO addresses stakeholder feedback on AEMO's Issues Paper. In addition to various clarifications, the feedback topics included procurement of reliability reserves, modelling, the treatment of reliability changes, and additional scenario development consultation.

Alongside this draft determination, revised RSIG, MT PASA process description, EAAP Guidelines, and Spot Market Operations Timetable documents are published on AEMO's website[2], reflecting any updates to the approach as result of the consultation.

[1] Amendments to Reliability Standard Implementation Guidelines and Various AEMO Procedures: Issues Paper, May 2020, at https://www.aemo.com.au/consultations/current-and-closed-consultations/rsig-mtpasa-process-description-eaap-guidelines-and-spot-market-operations-timetable.

[2] At https://aemo.com.au/consultations/current-and-closed-consultations/rsig-mtpasa-process-description-eaap-guidelines-and-spot-market-operations-timetable.

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1. Introduction

1.1 Context for this consultation

AEMO's 'Enhancement to the Reliability and Emergency Reserve Trader' procedure changes were effective 26 March 2020[3] and allow the Electricity Statement of Opportunities (ESOO) to inform RERT contracts.

In May 2020, the Energy Security Board (ESB) released a draft version of the Interim Reliability Measure rule. Part of this rule requires AEMO to update the RSIG to take into account the amendments, noting that AEMO is not required to comply with Rules consultation procedures in relation to these amendments. AEMO has proposed amendments to the RSIG that reflect the detail provided in the draft rule. Any changes to the RSIG related to the Interim Reliability Measure would apply from the time that rule commenced. A final rule determination of the National Electricity Amendment (Improving transparency and extended duration of MT PASA) Rule 2020 No. 1 was made on 20 February 2020[4]. According to the original rule change submission, the changes were designed to:

- Improve transparency of the MT PASA process, reduce asymmetry of generation availability information in the market, and extend the period generation availability is published from two to three years, and
- Better inform the market at a granular level on projected assessments of reliability and generation availability, enabling participants to make more effective and efficient decisions in how they interact with the market.

AEMO's Issues Paper detailed the impact of the RERT enhancements and the MT PASA changes on the RSIG, MT PASA Process description, EAAP Guidelines and AEMO Spot Market Operations Timetable. Additionally, AEMO made various improvements to the underlying processes, including ongoing efforts to ensure consistent methodologies and assumptions are applied.

This Draft Determination responds to submissions received on the above changes.

1.2 Consultation process

As outlined above, this consultation is being conducted in accordance with rule 8.9 of the NER.

On 25 May 2020, AEMO initiated the first stage of the consultation with the publication of its RSIG, MT PASA Process Description, and EAAP Guidelines Issues Paper, which explained how AEMO have amended these documents.

Through this consultation, AEMO is seeking feedback on the amendments to inform any changes to be applied in 2020 and beyond.

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

[3] See https://www.aemo.com.au/consultations/current-and-closed-consultations/enhancements-to-rert-rule-change-update-to-procedures.

[4] See https://www.aemc.gov.au/rule-changes/improving-transparency-and-extending-duration-mt-pasa.

Table 1 Indicative timeline for consultation

Deliverable	Indicative date
RSIG, EAAP and MT PASA issues paper published	Completed
Submissions to issues paper due	Completed
Draft determination published	14 August 2020
Submissions to draft determination due	28 August 2020
Final determination published	31 August 2020

The publication of this Draft Determination marks the commencement of the second stage of consultation. Development of this document was somewhat delayed due to the original submissions remaining open for a longer period, and fully addressing the large number of points raised throughout the informal and formal feedback.

In May 2020, AEMO published the market bodies regulatory prioritisation advice that proposed December 2020 as the start date of MT PASA changes, due to Covid-19 resource priorities and alignment with AEMO's internal technology upgrade.

AEMO will release an interim solution for one of these changes on or after 20 August 2020, this change being to publish generation availability of individual scheduled generating units. The published generation availability horizon for this interim solution is two years. A full solution for publishing generation availability of individual scheduled generating units, and remaining changes yet to be implemented, will be released by the proposed alternative go-live date of December 2020.

2. Issues raised in consultation

2.1 Topics raised in the issues paper

AEMO's RSIG, MT PASA Process Description, and EAAP Guidelines Issues Paper asked stakeholders about the appropriateness of the amendments to the RSIG, EAAP Guidelines and MT PASA process.

The box below outlines the amendments.

Consultation outline

- The amendments to the RSIG are minor in nature and are primarily to align the RSIG with other guidelines and procedures such as the most recent Reliability and Emergency Reserve Trader Guidelines and to reflect the changes in the proposed Interim Reliability Measure draft rule. The other changes to the document align the RSIG with current procedures and methodologies.
- The updates to the MT PASA Process Description are predominantly to align with the MT PASA rule change. Other amendments are provided to clarify existing processes and published data. The document also outlines an amended approach to the calculation of daily peak demands as required in clause 3.7.2(f). The MT PASA methodology changes focus on the calculations of daily maximum demands, and adjustments used to weight the unserved energy (USE) outcomes from the 10% and 50% probability of exceedance (POE) simulations. Regarding the MT PASA inputs, generators are required to provide daily MW capacity for the next 36 months, updated from 24 months. MT PASA outputs are adjusted to reflect the rule change.
- The amendments to the EAAP Guidelines are more minor in scope with changes to reflect current processes, additional clarifications and minor corrections such as updating the name of input data sources.

2.2 Feedback received from stakeholders

AEMO received written submissions from ERM Power, Energy Users Association of Australia (EUAA) and Major Energy Users (MEU). The EUAA and MEU both referenced ERM Power's comprehensive submission, indicating their support for it. AEMO would like to thank these stakeholders for their feedback.

Additionally, AEMO consulted with the Reliability Panel as it is required to do for the RSIG.

Stakeholder submissions are summarised in Appendix A1.

Key issues raised by stakeholders are summarised under the following headings:

- RSIG:
  - Changing the purpose of the ESOO to procuring reliability reserves.
  - Using the ESOO for directions and instructions.
  - Reliability trends in historical data.
  - Documenting meteorological variables.
  - Hydro modelling.
  - System normal constraints.

  - Considering both positive and negative impacts.
  - Inclusion of additional POEs.
  - Additional EAAP Reporting.
  - Low Reserve Condition (LRC).
  - Resulting increased costs of Interim Reliability Measure.
- MT PASA process:
  - Demand side participation (DSP).
  - Hydro issues.
  - Clarifications of the loss of load probability (LOLP) methodology.
  - Demand definitions.
  - Including aggregate scheduled generating unit PASA.
  - Number of demand profiles.
- EAAP Guidelines:
  - Including reference to DSP in Guidelines.
  - Maximum demand capacity.
  - Additional scenario development.

The material issues under these categories are discussed in Chapters 3-5 of this document.

3. Discussion of material issues raised regarding the RSIG

The following sections discusses the material issues raised by stakeholders along with AEMO's considerations and conclusions. Appendix A1 summarises all issues raised.

3.1 Interaction with the Interim Reliability Measure

Issue summary and submissions

ERM noted its understanding that if the proposed rules to implement the Interim Reliability Measure were not made or altered, the proposed amendments to the Guidelines related to the Interim Reliability Measure would be modified or withdrawn.

ERM also noted that:

> *The proposed Interim Reliability Measure has an expiry date of 31 March 2025 and that the last date AEMO can enter into a 3-year contract for Interim Reliability Reserve will be 2022 for the 2024/25 summer. For clarity, we believe these details should also be included in section 1.5 of the Guideline.*

Assessment and conclusion

AEMO agrees that the proposed amendments to the Guidelines related to the interim reliability measure are based on the draft rule in its current form. The final guidelines published in this consultation will reflect any changes or amendments to the rule when finalised. AEMO has amended the guidelines to clearly delineate those amendments that relate to the interim reliability measure and to state that the amendments related to the interim reliability measure apply from the date the National Electricity Amendment (Interim Reliability Measure) Rule 2020 commences.

3.2 Interim Reliability Measure

Issue summary and submissions

MEU noted its concern that the proposed Interim Reliability Measures and/or reducing the trigger point impose unnecessary costs on consumers when "*The reliability they see at their connection points is sufficient for their nee*ds".

Assessment and conclusion

AEMO notes that the MEU has already made its submission to the ESB on this matter, and it is not the subject of this consultation. The changes proposed to the RSIG are those required if the rule change is implemented.

3.3 Changing the purpose of ESOO to procuring reliability reserves

Issue summary and submissions

ERM Power interpreted the RSIG amendments to be AEMO changing the purpose of the ESOO from 'inform the National Electricity Market of potential reliability issues in the future and request a retailer reliability obligation (RRO) reliability instrument if required' to 'AEMO may procure interim reliability reserves'. The submission included:

> *The proposed amendments to the RSIG seek to activate market interventions not defined within the RRO and could be potentially based on out of date information.*

ERM Power believes that decisions to procure or activate RERT (as opposed to interim reliability reserves) and issue a clause 4.8.9 instruction or direction should remain subject to a breach of the reliability standard as identified in the MT PASA, EAAP or Short Term (ST) PASA. ERM Power supports the inclusion of the currently deleted words in the amended Guideline, that being "Interim Reliability Reserves" as the appropriate Second Action.

Assessment and conclusion

AEMO disagrees with ERM Power's interpretation of the RSIG amendments. AEMO is not seeking to replace the purpose of the ESOO. The amendments to the RSIG add to the roles the ESOO already performs in that the USE forecasts are used as an input to the procurement of RERT. AEMO has previously responded to a similar argument from ERM Power in the Enhancements to the RERT consultation which detailed AEMO's reasons for using the ESOO in addition to other tools such as MT PASA and EAAP in the procurement of RERT[5].

3.4 Using ESOO for directions and instructions

Issue summary and submissions

AEMO received submissions that did not support AEMO's proposal to issue Clause 4.8.9 directions or instructions from the ESOO due to its infrequent publication updates.

MEU submitted:

> *In the time between ESOOs, significant change might have occurred in the wholesale market. Use other forecasting processes (e.g.; MTPASA, EAAP and STPASA) that would provide a more up-to-date assessment and/or more detail for action to deliver wholesale market reliability to meet the Reliability Standard.*

Assessment and conclusion

AEMO understands the concerns raised by the MEU submission. As a result, AEMO has amended the Guidelines such that the secondary action of a 4.8.9 instruction, RERT or direction is shared across all four processes, and added an additional point that AEMO will consider the most up to date relevant information when considering whether to take a secondary action.

3.5 Reliability trends in historical data

Issue summary and submissions

ERM Power noted the potential for different treatment between improving and deteriorating generator reliability implied by AEMO's proposed amendment:

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[5] See section 4.1.2: https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2019/enhancements-to-rert-rule-change/second-stage/draft-decision-and-notice-of-second-round-of-consultation.pdf?la=en&hash=9F5D481F8790FA375E086901F2C38223.

The historical information may not be considered suitable in instances where a deteriorating or improving trend in reliability is evident in the historical data and there are reasonable grounds to indicate that this trend may continue.

ERM Power was also concerned by a perceived willingness by AEMO to further insert modelling bias in the form of the proposed provision "AEMO may further validate these assumptions through consultant peer review". ERM Power recommended this sentence be excluded from the Guidelines, as it implied that when AEMO does not agree with requested information, it engages additional consultants to amend the information provided by the registered participant. ERM Power's secondary recommendation (if the first was not accepted) was that an additional amendment is made to ensure the modelling inputs satisfy best practice:

AEMO should fully document the reasons for this and undertake stakeholder consultation prior to implementing this substitution.

Assessment and conclusion

AEMO agrees that its proposed change regarding historical information inadvertently implied an imbalanced treatment of generator reliability, and agrees with ERM Power's suggested wording to include the 'or improving' and 'reasonable grounds' in the sentence.

AEMO may engage consultants because it:

- Needs expert judgement to assess whether the evidence provided by participants supports the proposed rate, and/or
- Finds participants are unable to provide their own forward-looking assessment of forced outage rates, and/or
- Seeks to cost effectively supplement its own team when needed.

It is inappropriate for AEMO to consult with participants on each decision to engage consultants, as this would increase delivery timeframes and add further cost. Furthermore, such consultation with participants would be ineffective given the need to maintain strict confidentiality of participant information.

AEMO believes ERM Power's proposed amendment is redundant, as all work undertaken as part of the ESOO must satisfy the interim/final Forecasting Best Practice Guidelines.

3.6 Documenting meteorological variables

Issue summary and submissions

ERM Power suggested documenting the reasons for AEMO's decision to depart from historical profiles for intermittent generation profiles when the reasons are based on meteorological variables. It suggested amending the guidelines with:

Where AEMO determines that historical intermittent generator profiles are to be substituted by profiles based on meteorological variables, AEMO will fully document the reasons for this and the level of expected improvement.

Assessment and conclusion

AEMO replaces historical traces for intermittent generation with traces derived from meteorological variables using power curves for many reasons. Historical traces are often missing entirely for new facilities, or compromised for existing facilities, due to commissioning hold points, asset failures, network constraints or market responsive behaviour. Missing data and compromised traces are too numerous for exhaustive reporting. Doing so would incur costs disproportionate with the benefit.

AEMO does not believe the RSIG to be an exhaustive list of all assumptions used in implementing the reliability standard. As with other processes, AEMO will continue to document methodologies and assumptions which it considers material and valuable.

3.7 Hydro modelling

Issue summary and submissions

ERM Power's submission included:

> *We question this input assumption to the ESOO as historical data for hydro plant storages indicates that storage levels will fluctuate between months and years with storages not aligning around a reference starting point on either a monthly or yearly basis. Please refer to Attachment 1. Requiring hydro storage levels to return to a designated reference starting point on a monthly or yearly basis for the ESOO modelling could result in outcomes where USE is forecast which would not occur in practice, as registered participants would allow storage levels to fluctuate based on prevailing energy market prices and the calculated opportunity cost of water.*

The submission also stated:

> *It is also unclear from the RSIG and the ESOO Methodology Document how the ESOO reliability forecast calculation includes the use of pumped storage hydro to supplement natural water inflows. It is also unclear that the calculation methodology allows for all hydro plant to be at rated capacity whenever USE is forecast. We believe these points should be made clearer in both the RSIG and the ESOO Methodology Document.*

Assessment and conclusion

AEMO wishes to clarify that although the inflows to hydro storages are based on a monthly input, there is no reliability modelling requirement to return to the starting point at a monthly interval. AEMO has amended Table 4 in the RSIG to clarify that the optimisation of hydro storages is over an annual period. AEMO observes the same type of model outcomes as noted by ERM Power where the level of energy in storage varies over the year, often with significant differences between seasons.

All storage modelling considers the use of pumped loads, both in isolated systems (such as Shoalhaven or Wivenhoe) and where the pump is used to supplement natural inflows (for example, Lower Tumut).

In all modelling of hydro schemes, AEMO's forecasts are based on "perfect foresight", such that where possible, water is used at the optimal time. Although there is no explicit assumption that hydro will always be at rated capacity, in almost all circumstances, water would be available in the modelling to minimise the level of USE. An example of water unavailability is a pumped hydro scheme with limited head storage; for example, if a storage could only provide four hours of generation at maximum capacity, but a load shedding period extended for six hours.

AEMO does not consider the RSIG requires amendments to reflect these modelling details, but will seek to provide greater clarity in the upcoming release of the ESOO methodology document.

3.8 System normal constraints

Issue summary and submissions

ERM Power recommended that the RSIG be amended to indicate that the ESOO modelling uses system normal constraints only on the basis that planned network outages are not modelled, as it is assumed that they can be scheduled at times of surplus supply.

ERM Power went on to recommend that the Guidelines be amended to state that:

> *Unplanned network outages of designated inter-regional transmission elements may be modelled as set out in the ESOO Methodology Document.*

Assessment and conclusion

AEMO agrees with ERM's statement regarding the exclusion of planned network outages in the ESOO and has amended the Guidelines accordingly.

AEMO also agrees that the RSIG should specify the inclusion of inter-regional transmission elements but does not agree that this needs to refer to the ESOO Methodology document. AEMO has amended the Guidelines to describe the inclusion of outages of transmission network elements that significantly impact the ability to transfer power between regions.

3.9 Considering both positive and negative impacts

Issue summary and submissions

ERM Power recommended that Section 2.1.6 of the RSIG be amended to provide stakeholders confidence that the ESOO will be updated for both positive and negative material changes to the reliability forecast.

Assessment and conclusion

AEMO considers the existing wording "As per clause 3.13.3A(b), AEMO is required to update the *statement of opportunities* when information becomes available that in AEMO's opinion materially changes the *statement of opportunities*. " sufficient.

3.10 Inclusion of additional POEs

Issue summary and submissions

ERM Power submitted that the RSIG wording be amended to:

> *At a minimum, a combination of the most probable daily peak load (50% POE) and 10% POE demand profiles are sampled probabilistically in the Monte-Carlo simulations to develop the expected USE. At AEMO's discretion and following consultation with stakeholders, more POE demand profiles (such as 90% POE) may be included, if USE outcomes are expected to be materially different from 50% POE outcomes.*

ERM Power further recommended that for clarity in the USE calculation methodology the following amendment to the ESOO, MT PASA and EAAP be made:

> *The 90% POE demand profiles are not normally modelled, as USE values are assumed to be zero*

Assessment and conclusion

AEMO has considered ERM Power's suggestion, but has opted to retain the existing wording, because:

- The 50% POE demand profiles are not the most probable daily peak load, but a profile whose maximum value will be exceeded on average every second year. Daily peak load has a special meaning in the context of MT PASA, which is different from this.
- If material, AEMO will include the contribution from the modelling of the 90% POE profile to the expected USE. The delivery timeframes associated with the ESOO make it impractical to consult on this matter.

AEMO considers that the documentation in the ESOO, EAAP and MT PASA processes already explains the typical application of a zero forecast for the 90% POE demands, but has made minor modifications of the wording for clarity, stating:

> *If not explicitly modelled, the USE values included in the probability weighted calculation of expected USE arising from 90% POE demand profiles are assumed to be zero.*

3.11 Additional EAAP reporting

Issue summary and submissions

ERM Power recommend that the following factors in RSIG Section 2.2.7 be amended to:

- *A significant increase or decrease in Hydro storage levels.*
- *A major positive or negative change in operational consumption.*
- *Any other events or emerging events that may materially impact the reliability forecast by way of energy limitations.*

ERM Power also queried the reason for the following factor, and recommended its deletion:

- *The requirement for AEMO to exercise the RERT under rule 3.20.*

Assessment and conclusion

AEMO does not consider that the proposed addition of "a significant increase or decrease in…" is required in relation to the consideration of hydro storage levels. The Guidelines already state that hydro storage levels are a consideration in whether an update is required and this already takes into account a consideration of the impact of higher or lower storage levels.

AEMO agrees that both positive and negative changes in demand could be factors to be taken into consideration and has now added words to clarify this in the Guidelines.

AEMO does not agree with the amendment to adjust the Guidelines such that an EAAP update is based on an event that materially changes the reliability forecast, as the term *reliability forecast* has specific meaning under the NER which is inconsistent with the forecast undertaken in the EAAP.

AEMO does not consider it appropriate to remove the consideration of RERT from the factors considered when determining whether an EAAP update may be required, as EAAP analysis may help inform decisions around RERT procurement.

3.12 Clarifying response to Low Reserve Condition

Issue summary and submissions

ERM Power noted concern regarding separate reserve assessments being applied for MT PASA and ST PASA processes. MT PASA identifies LRC (as does the ESOO *and EAAP*) while ST PASA identifies LOR conditions based on determined capacity reserve levels.

ERM Power further noted that:

> *AEMO's response to projected LRC identified in MT PASA may be to take direct action in the form of directions – for example, directing a Generator to reschedule an outage – or contracting for RERT under rule 3.20. AEMO is able to dispatch these contracted reserves to manage power system reliability and, where practicable, security noting that AEMO may not specifically contract reserves for the purpose of maintaining power system security.*

Assessment and conclusion

AEMO accepts these amendments and has amended the Guidelines.

4. Discussion of material issues raised regarding the MT PASA process

4.1 Demand Side Participation

Issue summary and submissions

ERM Power's submission queried the use of the word 'committed' in the DSP section of the process document, where AEMO states "*MT PASA uses the committed amounts of DSP…*", as this could imply that only scheduled wholesale demand response is included in MT PASA.

Assessment and conclusion

AEMO agrees simply referring to 'committed' can be misleading and has updated text to refer to 'existing and committed' instead. AEMO has furthermore updated the wording to make clear it will use its most recent DSP forecast. This updated text has been moved to the RSIG, to consolidate where DSP assumptions are described.

4.2 Hydro Issues

Issue summary and submissions

ERM Power stated that the requirement in modelling for hydro storages at the end of the year to be equal to or great than the storage at the start of the year should be removed and instead to be the lower limit supplied as part of the ESOO data collection process.

ERM Power also raised a number of questions related to hydro modelling, summarised below:

- Whether the setting of weekly "optimal storage targets" for hydro storages are subject to consultation with the registered participant.
- Whether the constraints on hydro generation apply to only capacity availability or include energy constraint bids.
- Whether hydro generation would be fully dispatched during a modelling period when the model recorded USE.
- Whether there was a need for optimal weekly storage targets given the weekly energy consumption targets provided in MT PASA submissions.

Assessment and conclusion

AEMO disagrees with ERM Power's assessment that the methodology is conservative. In order to model hydro generation with realistic annual generation levels and seasonal variations, AEMO's model sets "soft" targets on each hydro storage at the end of each weekly optimisation. These targets account for inflows and system conditions over the entire MT PASA modelling horizon, and therefore result in natural seasonal behaviour such as increasing water in storage in the months preceding periods where water is more valuable.

The weekly energy limits provided by some (not all) hydro generators would result in unrealistic generation levels from hydro if applied in every week of the year. Some hydro generators may not provide weekly energy

constraints as there is no limit (beyond their capacity) to their weekly generation, although this would be unmaintainable for extended periods.

The model's soft targets allow storages to finish below the target in a given week if it is valuable to do so, for example, if adhering to the soft target would increase the level of USE. Please refer to Section 3.7Error! Reference source not found. of this document for further discussion on this matter.

AEMO will clarify in the MT PASA Process Description that hydro generation is constrained according to both the PASA availability bid into MT PASA and any weekly energy constraints that are submitted.

4.3 Clarifications of the LOLP methodology

Issue summary and submissions

ERM raised a number of issues related to the LOLP Run, summarised below:

- That the Process document contains no definition for variable renewable energy (VRE) generation availability.
- That the MT PASA Process Description is not clear on the treatment of interconnector support.
- That the inclusion of VRE seems inconsistent with the definition of the LOLP daily maximum demand.

Assessment and conclusion

AEMO notes that the term VRE is defined within the Process Description as both a general term to describe generation from VRE sources and also as the demand met by semi-scheduled and a subset of non-scheduled generators. AEMO will adjust the latter definition to clarify that this is generation excluding any impact of network constraints.

As previously communicated to ERM Power, the visualisations provided to assist in interpreting LOLP results exclude interconnector flows or limits, as they add confusion to the figures given these are based on stochastic outcomes. The visualisation illustrates the key process inputs, namely the demand, scheduled capacity and contribution from VRE. Interconnector support is considered in the same way in the simulations as for all AEMO modelling, that is, interconnector flows are optimised to minimise the objective cost.

AEMO disagrees with the view that including VRE is inconsistent with the Process Description's methodology. As described in Appendix B, "Ex VRE demand" is used to build the abstract operational demand traces. The input demand remains on an operational basis, and therefore includes demand met by the VRE generation modelled in MT PASA. This is also described in the legend on the LOLP visualisation.

4.4 Demand definitions

Issue summary and submissions

With regards to demand traces prepared to meet the requirements of clause 3.7.2(f)(1A) in Appendix B page 31 of the Process document, AEMO indicates that:

> b) "The published values are net of all non-scheduled generation based on the assumed profiles of large non-scheduled generation within each region in each reference year, whereas in the reliability run large non-scheduled generation (and associated demand) is modelled explicitly".

ERM Power queried whether the published values are scheduled demand on an as-generated basis to be met by scheduled and semi-scheduled generation.

Assessment and conclusion

The demand data published does not fully match the definition of "Scheduled Demand". AEMO defines Scheduled Demand[6] as including load from scheduled loads, however scheduled loads are not included in the demand published in the REGION_AVAILABILITY report.

As the REGION_AVAILABILITY report excludes scheduled loads, it may differ from Scheduled Demand, but only for regions which have scheduled loads which are operating at the time of daily maximum.

4.5 Including aggregate scheduled generating unit PASA

Issue summary and submissions

ERM Power noted AEMO's proposal to supply three additional adjusted aggregate scheduled generating unit PASA availability values for each region, and said it was unclear why the additional values had been included or the reasoning for their inclusion.

Assessment and conclusion

AEMO has previously noted during the MT PASA rule change consultation that publishing the minimum aggregate scheduled capacity across all stochastic iterations is of limited value, because this value is inherently an outlier. MT PASA models up to 2,000 stochastic simulations to capture the full distribution of capacity outcomes and does not consider the single extreme minimum to be informative.

Therefore, in the interest of improving transparency, AEMO is publishing information on the range of scheduled capacity which better reflects the impact of forced outage rates, using the same percentile methodology applied to a range of other MT PASA outputs.

4.6 Number of demand profiles

Issue summary and submissions

ERM Power believed there was inconsistency with the number of profiles, in that the MT PASA document said "at least ten different annual demand profiles" whereas the RSIG indicated the use of eight different historical load profiles.

Assessment and conclusion

AEMO agrees and will update the Process Description to be consistent with the RSIG in the number of historical load profiles used.

[6] At https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/dispatch/policy_and_process/2020/demand-terms-in-emms-data-model.pdf?la=en.

5. Discussion of material issues raised regarding the EAAP Guidelines

5.1 Include reference to DSP in EAAP Guidelines

Issue summary and submissions

ERM Power requested that AEMO include DSP assumptions in the EAAP Guidelines.

Assessment and conclusion

AEMO sees it as appropriate to have assumptions described in only one document. This approach avoids potential inconsistencies and the need to consult on multiple documents if a change is required. Thus, AEMO will continue to describe DSP assumptions in the DSP Forecasting Methodology. The DSP assumptions have been updated to be consistent with the changes suggested for MT PASA too.

5.2 Maximum demand capacity

Issue summary and submissions

ERM Power submitted that:

> *We are concerned that use of the MT PASA submission values may understate capacity to meet forecast demand for average summer days and potentially unnecessarily consume energy from hydro power schemes that could otherwise be used to reduce forecast USE.*
>
> *We recommend consideration be given to incorporating higher capacity values for average summer days based on the process to be utilised for the 2020 ESOO.*

Assessment and conclusion

As stated in clause 3.7C(b)(6)(A), the EAAP should take into account, where relevant, the information and MT PASA inputs referred to in clauses 3.7.1 and 3.7.2. As described in the Guidelines, this means that the EAAP uses MT PASA capacities for the purpose of its assessment. As is the case with MT PASA, the inclusion of the typical summer capacity used in the ESOO is difficult. MT PASA capacity offers can deviate from normal seasonal capacity offers due to the impact of partial outages. Furthermore, MT PASA offers are at a Dispatchable Unit Identifier (DUID) level, whereas the seasonal capacity information is provided at a physical unit level. These two factors mean that it difficult to differentiate between temperature derating effects and partial outage and full outages of units within a DUID. AEMO therefore considers that the over-riding of MT PASA offers with average summer deratings would be inconsistent with the rules.

5.3 Additional scenario development

Issue summary and submissions

ERM Power requested that AEMO develop additional simulation scenarios in consultation with stakeholders. The suggested amendment was:

If the need arises, AEMO following consultation with stakeholders with regards to additional scenario development will conduct simulations of additional scenarios as appropriate in future using the GELF information provided by Scheduled Generators in accordance with these EAAP guidelines.

Assessment and conclusion

AEMO agrees stakeholder consultation should be done when time allows and stakeholders are directly affected. The intent of the EAAP guidelines was to allow AEMO to create sensitivities and scenarios, which during the modelling phase are found to provide additional insight, although still based on data already being submitted to AEMO.

Given the timetable imposed on the EAAP process it would not be possible to consult on such sensitivities and scenarios. In other cases, however, it could be useful to have the ability to study more diverse scenarios – including the need to obtain additional data from participants and AEMO may therefore consult on these scenarios, time permitting.

A1. Summary of issues raised

Table 2 Submissions on RSIG amendments

Organisation(s)	Comment	AEMO response
ERM Power	ERM Power understand that if the proposed rules to implement the Interim Reliability Measure is not made, the proposed amendments to the Guideline associated with the Interim Reliability Measure would be modified or withdrawn. We also note that the proposed Interim Reliability Measure has an expiry date of 31 March 2025 and that the last date AEMO can enter into a 3-year contract for Interim Reliability Reserve will be 2022 for the 2024/25 summer. For clarity, we believe these details should also be included in section 1.5 of the Guideline.	Refer to Section 3.1
MEU	The IRM will impose unnecessary costs on consumers for little additional reliability of supply seen at consumers' connection points with the NEM.	Refer to Section 3.2.
MEU	Reducing the trigger point will increase costs to consumers. "The reliability they see at their connection points is sufficient for their needs."	Refer to Section 3.2.
ERM Power	The proposed amendments to the RSIG seek to activate market interventions not defined within the RRO & could be potentially based on out of date information. We do not support this proposed change and believe that decisions to procure or activate RERT, as opposed to interim reliability reserves, and issue a Clause 4.8.9 instruction or direction should remain subject to a breach of the reliability standard as identified in the MT PASA, EAAP or Short Term PASA. We would support the inclusion of the currently deleted words in the amended Guideline, that being "Interim Reliability Reserves" as the appropriate Second Action.	Refer to Section 3.3.
EUAA	EUAA does not support AEMO's proposal to issue Clause 4.8.9 Directions or Instructions from the ESOO. The ESOO is only updated infrequently and information from the ESOO may be out of date at the time a Direction or Instruction is issued. The EUAA only supports actions to tender for Interim Reliability Reserves based on information contained in the ESOO	Refer to Section 3.4.
MEU	In the time between ESOOs, significant change might have occurred in the wholesale market. Use other forecasting processes (eg MTPASA, EAAP and STPASA) that would provide a more up-to-date assessment and/or more detail for action to deliver wholesale market reliability to meet the reliability standard.	Refer to Section 3.4.
ERM Power	We note AEMO proposed amendment; "The historical information may not be considered suitable in instances where a deteriorating trend in reliability is evident in the historical data and there are concerns that this trend may continue." We are concerned that this inserts a modelling bias where improvements in generator reliability is not treated in the same way. We suggest alternative wording for the proposed amendment as follows; "The historical information may not be considered suitable in instances where a deteriorating or improving trend in reliability is evident in the historical data and there are reasonable grounds to indicate that this trend may continue.	Refer to Section 3.5.

Organisation(s)	Comment	AEMO response
	"AEMO may further validate these assumptions through consultant peer review." Creates a modelling bias in that when AEMO does not agree with requested information, AEMO will engage additional consultants to amend the information provided by the registered participant. We recommend that this proposed amendment not be included in the Guideline. If AEMO determines that in their view inclusion of these words is appropriate, then we consider that an additional amendment is appropriate to ensure the modelling inputs satisfy best practice; AEMO should fully document the reasons for this and undertake stakeholder consultation prior to implementing this substitution.	
ERM Power	We believe the use of intermittent generation profiles based on meteorological variables should be subject to documentation of reasoning behind AEMO's decision to depart from historical profiles when these are available. We offer the following additional amendment to the Guideline. "Where AEMO determines that historical intermittent generator profiles are to be substituted by profiles based on meteorological variables, AEMO will fully document the reasons for this and the level of expected improvement."	Refer to Section 3.6.
ERM Power	"We question this input assumption to the ESOO as historical data for hydro plant storages indicates that storage levels will fluctuate between months and years with storages not aligning around a reference starting point on either a monthly or yearly basis. Please refer to Attachment 1. Requiring hydro storage levels to return to a designated reference starting point on a monthly or yearly basis for the ESOO modelling could result in outcomes where USE is forecast which would not occur in practice, as registered participants would allow storage levels to fluctuate based on prevailing energy market prices and the calculated opportunity cost of water."	Refer to Section 3.7.
ERM Power	It is unclear from the RSIG and the ESOO Methodology Document how the ESOO reliability forecast calculation includes the use of pumped storage hydro to supplement natural water inflows. It is also unclear that the calculation methodology allows for all hydro plant to be at rated capacity whenever USE is forecast. We believe these points should be made clearer in both the RSIG and the ESOO Methodology Document.	Refer to Section 3.7.
ERM Power	We also recommend that section 1.3 be amended to indicate that the ESOO modelling uses system normal constraints only on the basis that planned network outages are not modelled, as it is assumed, they can be scheduled at times of surplus supply. We recommend that the Guideline be amended to state that: "Unplanned network outages of designated *inter-regional transmission elements* may be modelled as set out in the ESOO Methodology Document." This will align NERs definition of USE.	Refer to Section 3.8.
ERM Power	We consider that the section should be amended to provide confidence to stakeholders that the ESOO will be updated for material changes with the potential to both positively and negatively impact the reliability forecast.	Refer to Section 3.9.
ERM Power	At a minimum, a combination of the most probable daily peak load (50% POE) and 10% POE demand profiles are sampled probabilistically in the Monte-Carlo simulations to develop the expected USE. At AEMO's discretion and following consultation with stakeholders, more POE demand profiles (such as 90% POE) may be included, if USE outcomes are expected to be materially different from 50% POE outcomes.	Refer to Section 3.10.

Organisation(s)	Comment	AEMO response
ERM Power	For clarity in the USE calculation methodology we recommend the following amendment to the ESOO, MT PASA and EAAP to that proposed by AEMO; The 90% POE demand profiles are not normally modelled, as USE values are assumed to be zero	Refer to Section 3.10.
ERM Power	We recommend that the following factors in section 2.2.5 be amended to • A significant increase or decrease in Hydro storage levels • A major positive or negative change in operational consumption. • Any other events or emerging events that may materially impact the reliability forecast by way of energy limitations We also recommend that AEMO consider deleting the following factor as it is unclear as to the purpose of inclusion of this factor. We are also unaware as to when an update to the EAAP report has been released due to this factor. • The requirement for AEMO to exercise the RERT under rule 3.20.	Refer to Section 3.11.
ERM Power	Separate reserve assessments are applied for MT PASA and ST PASA processes. MT PASA identifies LRC (as does the ESOO *and EAAP*) while ST PASA identifies LOR conditions based on determined capacity reserve levels.	Refer to Section 3.11.
ERM Power	AEMO's response to projected LRC identified in MT PASA may be to take direct action in the form of directions – for example, directing a Generator to reschedule an outage – or contracting for RERT under rule 3.20. AEMO is able to dispatch these contracted reserves to manage power system reliability and, where practicable, security noting that AEMO may not specifically contract reserves for the purpose of maintaining power system security.	Refer to Section 3.12.
ERM Power	ERM Power recommends that the forecast demand data published in the ESOO be based on the operational as generated definition to align with other AEMO data.	AEMO already provides this.
ERM Power	In the amended Guideline, Table 3 under the area of Second Action, the words Interim Reliability Reserve have been replaced with the words 4.8.9 Instruction, RERT or Direction. It is unclear to ERM Power where the deleted words Interim Reliability Reserve have been derived from as the current version of the Guidelines indicates a blank space in this area.	"Interim Reliability Reserve" was incorrectly crossed out and has now been included.
ERM Power	Links to referenced AEMO documents in the RSIG	Links have been updated.

Table 3 Submissions to MT PASA process amendments

Organisation(s)	Comment	AEMO response
ERM Power	Where AEMO determines that historical intermittent generator profiles are to be substituted by profiles based on meteorological variables, AEMO will fully document the reasons for this determination, and the level of expected improvement.	Refer to Section 3.6.

Organisation(s)	Comment	AEMO response
ERM Power	We query the use of the word 'committed' as this could imply that only scheduled wholesale demand response is included.	Refer to Section 4.1.
ERM Power	It is unclear from the Process document if the setting of these weekly "optimal storage targets" are subject to consultation with the registered participant.	Refer to Section 4.2.
ERM Power	"In addition to the storage targets, hydro generation is also constrained according to any MT PASA weekly bids submitted." It is unclear if this applies only to capacity availability or includes energy constraint bids.	Refer to Section 4.2.
ERM Power	It is unclear if available hydro generation would be fully dispatched during a half hour modelling period when the model recorded USE, and therefore record forecast USE in periods, where in actual dispatch no USE would be recorded. ERM Power is of the view that the modelling process should not prevent the full dispatch of available hydro plant at times where forecast USE could be recorded.	Refer to Section 4.2.
ERM Power	We question the requirement in the modelling that "the storage at the end of the year must be equal to or greater than the storage at the start of the year." We see no valid reasoning for this to be the case and recommend that this be amended to; "Energy limits are implemented through the requirement that the storage at the end of each modelled year must be above the lower storage limit and levels must also remain within upper and lower limits supplied by the registered participant as part of the ESOO data collection request. Monthly inflows to the modelling are to be based on historical average monthly inflows across the modelling period."	Refer to Section 4.2.
ERM Power	In addition, we question the need to apply an AEMO determined weekly "optimal storage targets" on the basis that the registered participant already supplies weekly energy consumption targets as part of their MT PASA submission. We believe the current process is overly conservative and could result in forecast USE being higher that is warranted. We recommend that the process be simplified to; In addition to the application of a yearly lower storage limit, hydro generation is also constrained according to any MT PASA weekly available capacity and energy constraint bids submitted by the registered participant.	Refer to Section 4.2.
ERM Power	The document is less clear as to the application of support from an interconnected region and contribution from large non VRE non-scheduled generation The example LOLP graph supplied in Appendix E – Figure 14 and graphs available from AEMO's Market Portal do not include data with regards to flow limits from interconnected regions or large non VRE non-scheduled generators for the LOLP calculation. It does however include the output contribution from Intermittent (VRE) generation which seems at odds with the definition of the LOLP daily maximum operational sent out demand values.	Refer to Section 4.3.
ERM Power	The Process document contains no definition for VRE generation availability The term could be defined as AEMO's semi-scheduled uninterrupted intermittent generation forecast (UIGF) appropriately extended for large non-scheduled VRE generation output which are also included in the current operational demand definition.	Refer to Section 4.4.
ERM Power	Would it be reasonable to assume that the published values are scheduled demand on an as-generated basis to be met by scheduled and semi-scheduled generation? If that is the case, we request that this be clearly indicated in the process document by the addition of the following;	Refer to Section 4.4.

Organisation(s)	Comment	AEMO response
	The published values represent scheduled demand on an as generated basis.	
ERM Power	AEMO has proposed to supply three additional adjusted aggregate scheduled generating unit PASA availability values for each region. It is unclear to ERM Power why the additional values have been included or the reasoning for their inclusion.	Refer to Section 4.5.
ERM Power	There's an inconsistency with the number of profiles: "at least ten different annual demand profiles" seems to be in conflict with other areas of the document and the RSIG which indicate eight different historical load profiles are used Recommend amending to: "To capture the impact of weather variations on demand, at least sixteen different annual demand profiles We also suggest that Table 1 in section 4.3 be amended to indicate "At least 8 reference years"	Refer to Section 4.6.

Table 4 Submissions to EAAP guidelines amendments

Organisation(s)	Comment	AEMO response
ERM Power	Include assumptions about DSP in EAAP Guidelines	Refer to Section 5.1.
ERM Power	We are concerned that use of the MT PASA submission values may understate capacity to meet forecast demand for average summer days and potentially unnecessarily consume energy from hydro power schemes that could otherwise be used to reduce forecast USE. We recommend consideration be given to incorporating higher capacity values for average summer days based on the process to be utilised for the 2020 ESOO.	Refer to Section 5.2.
ERM Power	We recommend that additional simulation scenarios be developed in consultation with stakeholders. Suggested amendment: "If the need arises, AEMO following consultation with stakeholders with regards to additional scenario development will conduct simulations of additional scenarios as appropriate in future using the GELF information provided by Scheduled Generators in accordance with these EAAP guidelines."	Refer to Section 5.3.
ERM Power	We are not aware that AEMO continues to publish an Annual National Transmission Statement. We understand the requirements of NER clause 5.6.5 were deleted in NER Version 30 commencing 1 July 2009.	This was removed from the EAAP.
ERM Power	The following scenarios must be included in the first EAAP to be published by 31 March 2010:	This is not a requirement.

Organisation(s)	Comment	AEMO response
ERM Power	"Use/enabling of control schemes, NSCAS and Network Support Agreements to achieve maximum power transfer capability levels;" This would be consistent with the Term as set out in Appendix A – Glossary, to the Issues Paper.	The document has been updated to include "support."

Table 5 Other issues raised

Organisation(s)	Comment	AEMO response
ERM Power	We recommend that AEMO also consider a review of the ESOO Methodology Document to provide consistency with the RSIG, the MT PASA process and the EAAP Guidelines.	AEMO has consulted on the methodology and assumptions used in the ESOO throughout the year. The rule changes that have prompted updates to documents under this consultation do not impact the ESOO methodology. The ESOO methodology will be consulted on as per the requirements of the Forecasting Best Practice Guidelines.