Wholesale Electricity Market Rule Change Proposal Submission

RC_2019_03
Method used for the assignment of Certified Reserve Capacity to Intermittent Generators

Submitted by

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1. Please provide your views on the proposal, including any objections or suggested revisions.

The Australian Energy Market Operator (**AEMO**) welcomes the opportunity to submit a response to the Rule Change Panel (**RCP**) on the Draft Rule Change Report for Rule Change Proposal RC_2019_03 - Method used for the assignment of Certified Reserve Capacity (**CRC**) to Intermittent Generators (**Rule Change Proposal**).

AEMO appreciates the RCP's efforts to consult with AEMO on the Rule Change Proposal draft decisions. AEMO recognises that the RCP's amended Relevant Level Methodology (**RLM**) (to be called the Relevant Level Method under the proposed RLM Amending Rules) in the Draft Change Report (**Amended RLM**) provides a framework that can more accurately assess the capacity contribution of the fleet of Intermittent Generators (**IG**) (**capacity value**) to the system reliability of the South West interconnected system (**SWIS**) in comparison to the current RLM.

In particular, the Amended RLM:

- Adopts the effective load carrying capability (**ELCC**) measure[1] to determine the capacity value of IGs on a fleet basis. The ELCC assessment is a well-recognised and an increasingly widely-applied framework that can effectively account for interactive effects among IGs to provide benefits for the system reliability.
- Calculates the ELCC of the IG fleet based on the whole seven-year reference period and adjusted Capacity Outage Probability Tables (**Adjusted COPT**)[2]. This accounts for all relevant high-demand Trading Intervals that occurred in the reference period in the calculation and ensures that the Loss of Load Expectation (**LOLE**) derived by the Adjusted COPT has a low risk of overestimating the capacity contribution of IGs. This improves the alignment of the method with the Planning Criterion specified in clause 4.5.9 of the Wholesale Electricity Market Rules (**WEM Rules**)

AEMO, therefore, supports the intent of the Draft Rule Change Report and agrees with the framework proposed for assessing the ELCC for the fleet of IGs. However, AEMO considers that there is an opportunity to improve the method used to allocate the ELCC of the fleet of IGs to individual IGs. This is discussed in Section A.1 along with matters AEMO wishes to highlight as part of this submission. Section B provides comments on the RCP's specific questions; Section C outlines potential drafting issues that AEMO has identified with the RLM Amending Rules.

A. Highlighted matters

A.1 Using the Delta Method to allocate the fleet ELCC to individual Candidates

The Amended RLM uses the Delta Method to allocate the fleet ELCC to individual Candidates by calculating the values of each IG's First-In ELCC[3] and the Last-In ELCC[4]. The delta of the First-In and Last-In ELCC values represents the overall impact of interactions within the fleet on the IG's contribution to the system reliability. In principle, AEMO agrees with the RCP that:

- The Delta Method is a pragmatic approach for allocating the fleet ELCC of IGs to individual Candidates which could potentially account for synergistic, antagonistic, and neutral interactions between IGs in the fleet.
- It could more appropriately account for the capacity contribution of IGs whose performance is better correlated with high system demand as a result of their geographical locations.

The RCP provides the results of applying the Amended RLM to calculate the Relevant Level for the 2020 Reserve Capacity Cycle in Table 3 under Section 6.1.8 of the Draft Rule Change

[1] The ELCC of a resource is the amount of additional demand the system can cover after the addition of the resource while maintaining the reliability target of the power system. See page 62 of the RC_2019_03 Rule Change Proposal, available at: https://www.erawa.com.au/cproot/21666/2/RC_2019_03----Rule-Change-Notice-and-Proposal.pdf.

[2] The Adjusted COPT ensures that the total number of Certified Reserve Capacity (**CRC**) of all non-intermittent Facilities included in the COPTs is scaled to equal the Reserve Capacity Requirement (**RCR**).

[3] It is the ELCC of the individual Candidate Facility assuming the other Candidate Facilities do not exist (i.e. as if the individual Candidate Facility was the first Candidate Facility used to meet system demand). See page 44 of the RC_2019_03 Draft Rule Change Report, available at: https://www.erawa.com.au/cproot/21873/2/RC_2019_03-Draft-Rule-Change-Report.pdf.

[4] It is the ELCC of the individual Candidate Facility including the other Candidate Facility (i.e. as if the other Candidate Facility have already reduced demand). See page 44 of the RC_2019_03 Draft Rule Change Report, available at: https://www.erawa.com.au/cproot/21873/2/RC_2019_03-Draft-Rule-Change-Report.pdf.

Report. The results suggest that the Delta Method allocates a higher ELCC to the wind farms in the south of Perth and a lower ELCC to the wind farms in the north of Perth. These results are largely in line with the analysis provided in AEMO's first submission to the Rule Change Proposal which shows that wind farms located in the south of Perth perform better than those in the north during periods of high air temperatures in Perth when system demand is likely to be high.

However, the Delta Method also allocates a higher ELCC to wind farms in the east of Perth which does not appear to be in line with AEMO's analysis provided in its first submission. AEMO has reviewed the RCP's modelling results and observed that over the seven-year reference period of the Scaled Demand, there are only 31 Trading Intervals with the Loss of Load Probability (**LOLP**) larger than zero[5] and only 10 Trading Intervals with the LOLP larger than 0.005. The number of Trading Intervals of significance is even lowered using the Ex-Committed Scaled Demand, with only 14 Trading Intervals with LOLP larger than zero and none larger than 0.005.

A limited number of Trading Intervals with LOLP is due to a limited number of extremely high demand periods in the SWIS historically. A higher ELCC allocated by the Delta Method to a wind farm in the east might be largely driven by its relatively high average performance level during 10 or less Trading Intervals that have the highest LOLPs. AEMO is concerned that calculation of ELCC based on the IGs' performance for a limited amount of Trading Intervals that have the highest LOLPs may not sufficiently account for the variability in the performance of IGs. Therefore, this may result in high volatility in the ELCC allocated by the Delta Method to individual Candidates from year to year[6].

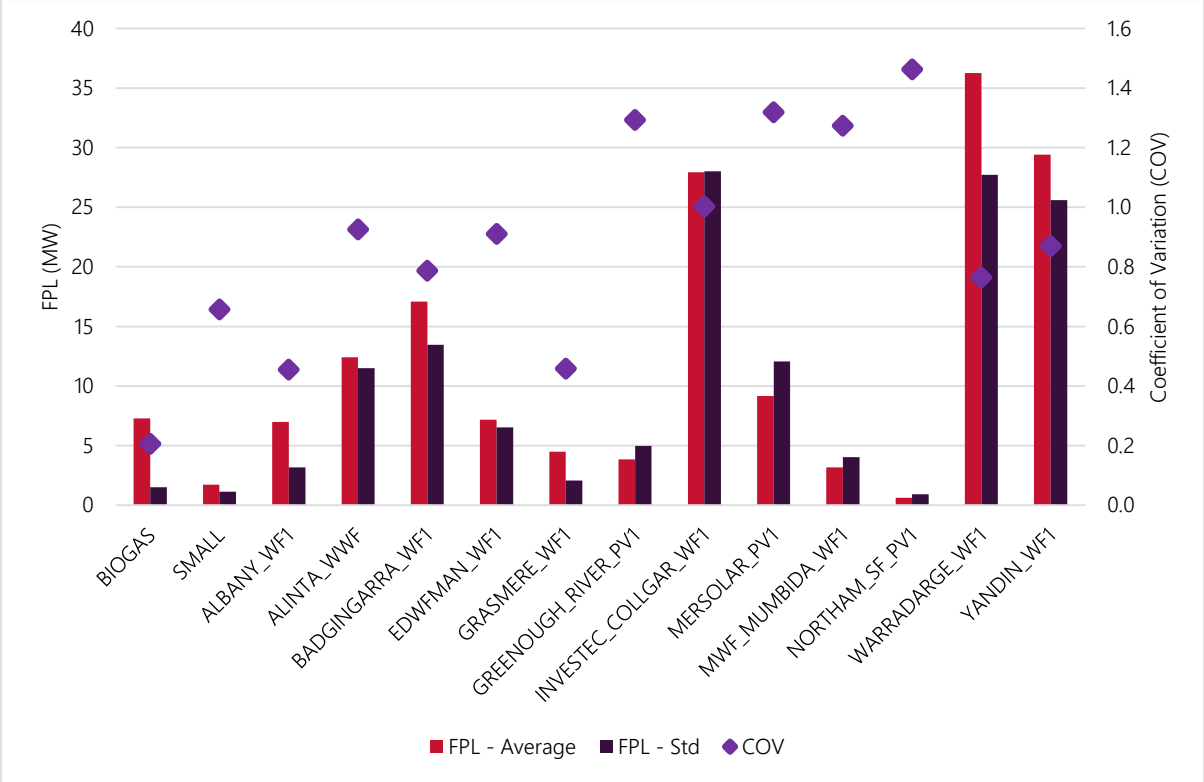
AEMO encourages the RCP to explore solutions to mitigate this potential volatility in the ELCC of individual Candidates. This would essentially yield a more stable locational price signal for the investment in IGs in the SWIS. AEMO proposes two potential approaches for the RCP to investigate to assist with its final decision:

1) Considering the ELCC of individual Candidates allocated by the Delta Method as a baseline and adjusting this baseline based on the concepts of the average and standard deviation of the Candidate's performance level during a selected number of Trading Intervals with the highest Scaled Demand and Net Demand[7]. Candidates that have shown a relatively stable historical output that is above this baseline during these relevant Trading Intervals would be rewarded (i.e. high average and low standard deviation) and vice versa. Both variables could be accounted for by using the coefficient of variation[8]. This approach may provide a solution that retains the consideration of the interactive effects using the Delta Method while still considering the performance of IGs over a larger number of Trading Intervals with high system stress.

[5] Rounded to three decimal places.
[6] A similar concern was raised by the Economic Regulation Authority (**ERA**) and Alinta at the RC_2019_03 RCP workshop held on 10 May 2021.
[7] Net Demand is calculated as Scaled Demand minus the combined historical output of Candidates.
[8] It is a measure of relative variability which is calculated as the ratio of the standard deviation to the mean.

Figure 1 shows the average and standard deviation of Candidate Facilities' performance level calculated based on the 100 Trading Intervals[9] and the coefficient of variation. As shown in Figure 1, wind farms in the south (Albany and Grasmere) show relatively small coefficients of variation compared to those wind farms in the north and east. This suggests that wind farms in the south can maintain relatively less variable output compared to other wind farms during high system stress periods.

Figure 1. Average and Standard Deviation of Facility Performance Level (FPL) [A]



A. The average and standard deviation of FAL is calculated based on output during 50 Trading Intervals with the highest LOLP using the Scaled Demand Profile and the Ex-Committed Demand Profile

Source: Rule Change Panel

2) Considering grouping Candidate Facilities by location (eg. Perth, south, east, and north) and technology type and class (eg. wind, solar, Non-Scheduled Facility) and applying the Delta Method to allocate the fleet ELCC to individual groups. The group ELCC is then allocated to individual Candidate Facilities in the groups based on their average performance level during a selected amount of Trading Intervals with the highest LOLP. This could potentially consider IGs' performance over a large number of Trading Intervals while not distorting the result of the ELCC of individual Candidate Facilities by allocating the fleet ELCC to the group based on locations first. AEMO recognises that this approach may require an increase in the precision for the Delta Method calculation which would increase the implementation costs (see Section 3 for further discussion).

[9] 50 Trading Intervals in the reference period with the highest LOLP using the Scaled Demand Profile and 50 Trading Intervals in the Reference period with the highest LOLP using the Ex-Committed Demand Profile were applied.

A.2 Adjusting COPT to reflect the LOLE implied by the Planning Criterion

The RCP's draft decision is to adjust the COPT by scaling the total amount of CRC of individual Facilities in the COPT to meet the RCR (**Adjusted COPT**). The RCP states that the ERA's proposed target LOLE of four hours (eight Trading Intervals) in 10 years is inconsistent with the Planning Criterion and that the LOLE derived based on this Adjusted COPT (**Derived LOLE**)[10] would reflect the LOLE implied by the Planning Criterion for any reference system demand.

AEMO agrees with the RCP that the Planning Criterion does not specify a target LOLE, and that setting a target LOLE of four hours in 10 years lacks alignment with the Planning Criterion and potentially overestimates the capacity contribution of the fleet of IGs in meeting the forecast one-in-ten-year year peak demand (10% probability of exceedance [**POE**])[11].

In the absence of a target LOLE specified by the Planning Criterion, AEMO considers a LOLE calculated based on the Adjusted COPT and a system demand profile with a 10%POE peak demand may appropriately reflect the Planning Criterion (**10% POE LOLE**). However, the SWIS has seldom experienced a 10% POE peak demand event. Therefore, it is highly challenging to accurately calculate a 10% POE LOLE.

The Derived LOLE may be higher than this 10% POE LOLE when the system peak demand is higher than 10% POE or vice versa. This may have a risk of over- or underestimating the ELCC of the IG fleet. However, AEMO recognises that this risk is relatively low as the seven-year reference period would likely include historical demand with the highest demand that is close to a 10% POE peak demand. Therefore, the Derived LOLE may be an acceptable proxy of the 10% POE LOLE.

AEMO also notes that the Derived LOLE may be sensitive to changes in the Forced Outage Rates of Facilities included in the Adjusted COPT calculation. When Facilities with higher or lower Forced Outage Rates that are included in the Adjusted COPT calculation, the Derived LOLE is likely to be higher or lower, assuming no changes in the demand profiles and the RCR. This may result in a higher or lower ELCC for the IG fleet and would introduce volatility in the fleet ELCC assessment. However, AEMO recognises that this volatility cannot be mitigated unless there is an explicit target LOLE specified by the Planning Criterion and used for the calculation. This will require a review of the Planning Criterion which is out of scope for this Rule Change Proposal.

A.3 Adjusting the historical system demand for distributed energy resources (DER)

The RCP's draft decision is to apply the adjustment to historical demand to account for the impact of behind-the-meter photovoltaic (**PV**) generation, but not for the impact of other DER including the operation of behind-the-meter battery energy storage systems (**BESS**) and electric vehicles (**EV**). AEMO recognises that this is a pragmatic and reasonable approach to account only for the impact of behind-the-meter PV on changing demand profiles, considering that the DER uptake in the SWIS has been predominantly behind-the-meter PV systems.

[10] The RCP calculated the Derived LOLE for the 2020 Reserve Capacity Cycle which was equivalent to approximately 0.25 Trading Intervals. See Table 2 in Section 6.1.6 (page 39) of the Draft Rule Change Report, available here: https://www.erawa.com.au/cproot/21873/2/RC_2019_03-Draft-Rule-Change-Report.pdf.
[11] A higher target LOLE would be likely to result in a higher ELCC, assuming other inputs remain unchanged.

While AEMO does not expect EVs to have a material influence on the system demand profiles prior to 2025 due to an anticipated slow uptake, AEMO observes that the uptake of behind-the-meter BESS has experienced significant growth since 2018. The rate of behind-the-meter BESS installations in the SWIS is accelerating and this growth is expected to follow an exponential uptake trajectory in the next five years. The extent of the impact of behind-the-meter BESS operation on changing the demand profiles of the SWIS is uncertain and depends on various factors such as the extent of behind-the-meter BESS installations with PV systems, residential and business energy consumption level, and government's policy and tariffs incentives. As such, AEMO notes that behind-the-meter BESS operation is likely to change the demand profile of the SWIS in the next few years as uptake of behind-the-meter BESS increases.

The Western Australian (**WA**) Government Energy Transformation Taskforce's DER Roadmap[12] aims to integrate DER fully into the operation of the SWIS with a target to enable the Distribution System Operator and Distribution Market Operator to go live by 1 July 2023, with DER able to respond to meet network needs as well as be dispatched into the WEM and be compensated appropriately. Implementing the DER Roadmap is expected to impact the future demand profiles in the SWIS.

While the magnitude of the impact will only be better understood post the implementation of the DER Roadmap, AEMO encourages the Rule Change Panel to include provisions in the WEM Rules to amend the RLM if the uptake of behind-the-meter BESS has a major impact on future demand profiles.

B. Feedback on the RCP's questions

The RCP specifically requested stakeholder feedback on the following three questions in the Draft Rule Change Report:

B.1 What is the latest acceptable time for the publication of CRC and Capacity Credit assignments, and why?

In its first submission to the Rule Change Proposal, AEMO noted that it would need at least an additional seven to nine Business Days for the assessment of CRC using the RLM proposed by the ERA. AEMO estimates that at least a similar amount of additional time would be required for the CRC assessment using the Amended RLM. The complexity of the Amended RLM has not reduced compared to the ERA's proposed RLM. The Amended RLM may potentially require more time to process due to the additional steps associated with proposed Facilities and the calculation of multiple COPTs.

AEMO notes the RCP agrees with AEMO that the ERA's proposed RLM and the RCP's Amended RLM is more complex and will likely increase the amount of time that AEMO needs for the CRC assessment. The RCP outlines three approaches to provide AEMO with more time to process the RLM in section 6.1.12 of the Draft Rule Change Report, including[13]:

[12] See: https://www.wa.gov.au/sites/default/files/2020-04/DER_Roadmap.pdf.
[13] See page 61 of the RC_2019_03 Draft Rule Change Report, available at: https://www.erawa.com.au/cproot/21873/2/RC_2019_03-Draft-Rule-Change-Report.pdf.

1) moving the deadline for notifying applicants of their CRC assignments to a later date, and adjusting the timeframes for subsequent events, up to and including the publication of CRC and Capacity Credit assignments, accordingly;
2) processing the new RLM in the given timeframe, which may require additional resourcing; and;
3) moving the date for the publication of the CRC and the related timeframes of the RCM to a later date.

AEMO considers Approach 3 would be the preferred approach for the following reasons:

- This would require moving the deadline for the Capacity Credits assignment specified in clause 4.1.16A of the Wholesale Electricity Market Amendment (Tranches 2 and 3 Amendments) Rules 2020[14] (**Tranches 2 and 3 Amendments**) from a date falling on or before 30 September to 12 October of Year 1 of a Reserve Capacity Cycle. This will provide an additional nine Business Days required for AEMO to process the Amended RLM.
- As stated in AEMO's first submission in response to the Rule Change Proposal, the timeline extension to the CRC assessment timeframe is a better approach than acquiring additional short-term resources with associated cost implications.
- AEMO does not support the suggested approach of moving the deadline for notifying applicants of their CRC assignments to a later date and to shorten the timeframes for the publication of CRC and the Capacity Credit assignments for the following reasons:
    - The timeframe between the date that AEMO must notify each applicant for certification of Reserve Capacity specified in clause 4.1.12 and the date that AEMO must publish the CRC for each Facility specified in clause 4.1.15A under the Tranches 2 and 3 Amendments will be 15 days. This includes 13 days for Market Participants to provide Reserve Capacity Security (**RCS**). Shortening this timeframe may increase the risk that Market Participants will be unable able to provide RCS by the deadline. In that scenario, AEMO must reject trade declarations submitted by those Market Participants, which is not an effective market outcome.
    - The timeframe between the date that AEMO must publish the CRC for each Facility specified in clause 4.1.15A under the Tranches 2 and 3 Amendments and the date that AEMO must assign Capacity Credits specified in clause 4.1.16A under the Tranches 2 and 3 Amendments is 34 days, or approximately 23 Business Days. AEMO is required to collect inputs and run the Network Access Quantity Model to determine how much of the Facility's assigned CRC can be accommodated by the network and assign Capacity Credits based on that analysis. Shortening this timeframe will create operational challenges for AEMO.

[14] See: https://www.erawa.com.au/cproot/21670/2/Wholesale-Electricity-Market-Amendment-Tranches-2-and-3-Amendments-Rules-2020.pdf

B.2 Is the proposed 10 MW nameplate capacity threshold appropriate for grouping small Facilities for the allocation of the Fleet ELCC, and if not, why and what alternative do you suggest?

In the Amended RLM, the RCP proposes to allocate small Candidate Facilities that is registered or proposed to be registered as Non-Scheduled Facilities (with a nameplate capacity below 10 MW) into a biogas group or a non-biogas group. The other Candidate Facilities are considered as stand-alone Candidate Facilities. The fleet ELCC is allocated among stand-alone Candidate Facilities and the groups. The allocated group ELCC is then assigned to individual small Candidate Facilities in the groups based on their average performance level during Trading Intervals with the highest LOLP.

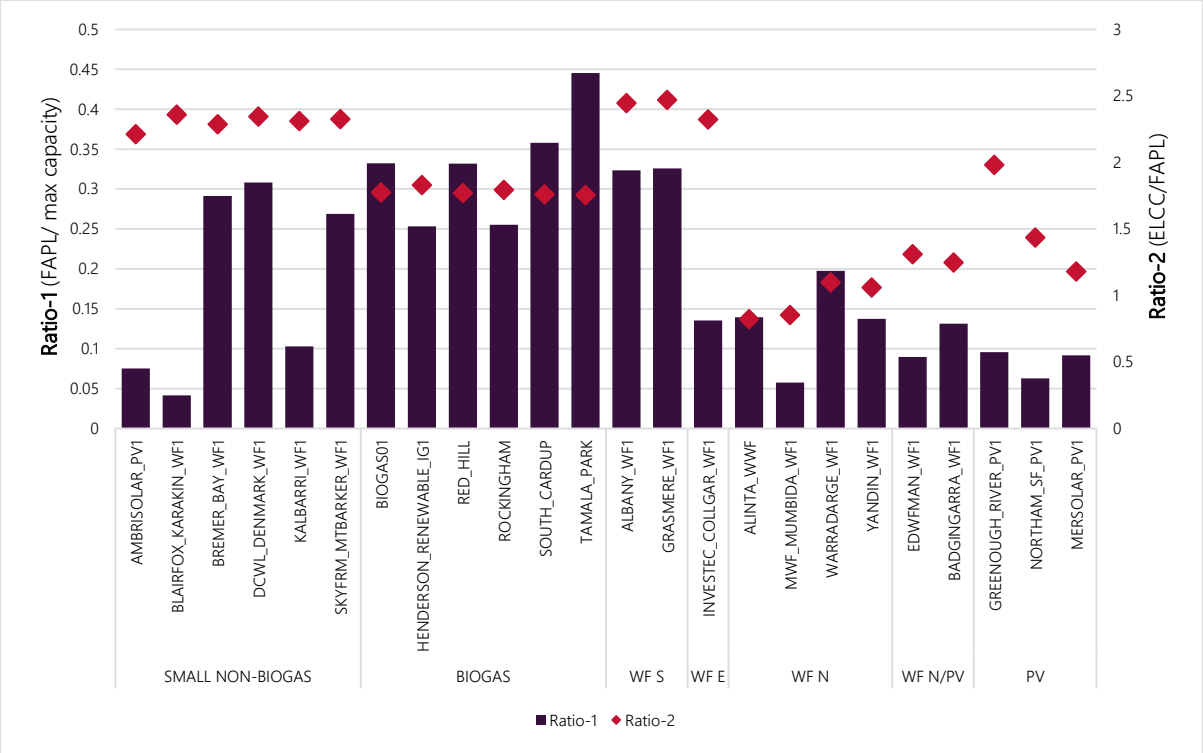
AEMO considers that it is important to consider whether using a threshold of 10 MW to group small Facilities results in an inequitable allocation of the group ELCC to individual small Facilities in the group[15].

Figure 2 presents the ratio of the Facility average performance level (**FAPL**)[16] over the maximum capacity (**Ratio-1**) and the ratio of the Delta Method allocated ELCC over the FAPL (**Ratio-2**) for each individual Candidate Facility. The Candidate Facilities are grouped into categories, namely, the non-biogas and biogas groups (<10 MW[17]) as well as other groups based on technology and geographical locations (for wind farms). Figure 2 shows that:

- Ratio-1 of the small Candidate Facilities in the non-biogas group vary greatly, while they are similar within the biogas group.
- For wind farms located in the north, the Ratio-2 of small wind farms that are included in the non-biogas group (BLAIRFOX_KARAKIN_WF1 and KALBARRI_WF1) are noticeably higher than the Ratio-2 of large wind farms.
- For wind farms located in the south, the Ratio-2 of small wind farms that are included in the non-biogas group are slightly lower than the Ratio-2 of the two wind farms that are not included in the non-biogas group (ALBANY_WF1 and GRASMERE_WF1).

[15] AEMO notes that a selection of the capacity threshold for grouping small Facilities does not impact the calculation of the fleet ELCC.
[16] FAPL represents Facility average output during the 50 Trading Intervals with the highest LOLP using each of the Scaled Demand Profile and the Ex-Committed Demand Profile.
[17] The non-biogas group considered in the RCP's analysis for the 2020 Reserve Capacity Cycle in the Draft Rule Change Report does not include NORTHAM_SF_PV1 which has a maximum capacity of 9.8 MW.

Figure 2. Delta Method allocated ELCC, average performance level, maximum capacity of Candidate Facilities



Data source: Rule Change Panel

These observations suggest that the grouping may disadvantage small wind farms located in the south while benefit small wind farms located in the north. AEMO encourages the RCP to carry out further analysis to confirm whether:

- Variability among individual small Candidate Facilities in the non-biogas group would have any material impact on the allocation of the group ELCC to the individual small Facilities.
- It is feasible to group small Candidate Facilities using a smaller threshold while considering their geographical locations.

B.3 Is it appropriate to allow AEMO to include any small Facilities with a nameplate capacity above a selected threshold in the small Facility groups for the purpose of allocating the Fleet ELCC, if AEMO considers that the Facility may otherwise not be assessed appropriately due to rounding issues?

Similar to the discussion provided in Section B.2, AEMO considers that scenario analysis is required to understand the potential impact of including any small Facilities in the small Facility groups when allocating the ELCC of the Fleet. AEMO encourages the RCP to provide a calculation example to illustrate the rounding issues that might occur using the Amended RLM.

AEMO suggests that a set of criteria be specified either in the WEM Rules (or in a WEM Procedure) that can guide AEMO on when to make such inclusions, thus providing clarity and transparency in this process.

C. Other comments on the RLM Amending Rules

AEMO outlines other potential issues, associated with the Amended RLM and other relevant rule clauses in Table 1. AEMO notes that some of these issues were raised by AEMO at the RC_2019_03 Workshop held by the RCP on 11 May 2021, and that the RCP noted the issues for its further review. AEMO encourages the RCP to review the issues and amend the proposed rules as required and would welcome additional discussion on these issues if further clarification or consideration is required. AEMO will advise the RCP if other issues are identified post this submission.

Table 1. AEMO comments on steps of Appendix 9 and other clauses of the WEM Rules

Item	Reference	Content	Issue Type and description	Comment
1	Cl. 4.9.5(c)	*"4.9.5. If AEMO assigns Certified Reserve Capacity to a Facility for a future Reserve Capacity Cycle under section 4.11 ("Conditional Certified Reserve Capacity"):* *……* *(c)…… that were previously conditionally assigned, set or determined by AEMO, ~~subject to~~ except that the Certified Reserve Capacity for an Intermittent Generating System ~~being~~ must be redetermined and assigned in accordance with clause 4.11.2(b) for the current Reserve Capacity Cycle; and* *……"*	**Issue Type: consistency with the Tranches 2 and 3 Amendments** This requirement appears inconsistent with clause 4.10.2 of the Tranches 2 and 3 Amendments which specifies components of Semi-Scheduled Facilities (**SSF**) that are Intermittent Generating Systems (**IGS**) to be assessed under clause 4.11.2(b) by the RLM. If an IGS is a component of a Scheduled Facility (**SF**), it is not eligible to be assessed by the RLM under clause 4.11.2(b).	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021. The issue was added to the Energy Policy WA (EPWA) Issues Log for review.
2	Cl. 4.10.2	*"4.10.2. The types of Facilities eligible to use the method~~ology~~ described in clause 4.11.2(b), for the purpose of assigning Certified Reserve Capacity or Conditional Certified Reserve Capacity to the Facility are:* *(a) components of Semi-Scheduled Facilities that are Intermittent Generating Systems;* *……".*	**Issue Type: The Tranches 2 and 3 Amendments drafting** The types of Facilities eligible to use the RLM do not include; components of SF that are IGS or Non-Intermittent Generating Systems (**NIGS**).	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021. AEMO has added this potential drafting issue to the issue log for EPWA for review.
3	Cl. 4.10.3	*"4.10.3. An application for certification of Reserve Capacity for a Facility, or component of a Facility, that is to be assessed using the method~~ology~~ described in clause 4.11.2(b) for a Facility, or relevant component of a Facility, that:* *……*	**Issue Type: The Tranches 2 and 3 Amendments drafting** The step refers to clause 4.10.1(dA). The configuration under clause 4.10.1(dA) could include components not being assessed under Appendix 9, such as a	AEMO suggests amending this step as below: "…… *(d) has not operated with the relevant configuration outlined in clause 4.10.1(dA) for the full period of performance assessment identified in step 1(a) of the Relevant Level*

		(d) has not operated with the configuration outlined in clause 4.10.1(dA) for the full ~~period of performance assessment identified in step 1(a) of the Relevant Level Methodology~~ RLM Reference Period for the current Reserve Capacity Cycle, *……"*	hybrid SSF including an Electric Storage Resource.	*Methodology RLM Reference Period for the current Reserve Capacity Cycle,* *……"* AEMO has added this draft issue to the issue log for EPWA to resolve.
4	Cl. 4.10.3A(a)	*"4.10.3A. A report provided under clause 4.10.3 must include:* *(a) for each Trading Interval during the ~~period identified in step 1(a) of the Relevant Level Methodology,~~ RLM Reference Period for the current Reserve Capacity Cycle a reasonable estimate of the expected energy that would have been sent out by the Facility or the component of the Facility assessed using the method~~ology~~ described in clause 4.11.2(b) had it been in operation. This estimate must factor in the effect of Planned Outages or Forced Outages on the sent out energy;* *……"*	**Issue Type: Methodology** 'Planned Outage' and 'Forced Outage' are WEM Rules defined terms relating to AEMO's outage management process. Therefore, the terms are only applicable to existing Facilities. The planned and forced outages included under this clause need to be given general meanings that are applicable to both new and existing Candidates. Therefore, the WEM Rules defined terms Planned Outage and Forced Outage should not be used in this context.	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.
5	Cl. 4.11.3C	*"4.11.3C. For each three year period, beginning with the period commencing on 1 January ~~2015~~ 2024, the Economic Regulation Authority must, by 1 April of the first year of that period, conduct a review of the Relevant Level Method~~ology~~. In conducting the review, the Economic Regulation Authority ~~must~~:* *(a) must examine the effectiveness of the Relevant Level Method~~ology~~ in meeting the Wholesale Market Objectives; and* *……".*	**Issue Type: RLM Amending Rules drafting** It is not clear if the ERA is required to commence or complete the RLM reviews by 1 April of the first year of each relevant three year period.	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.

6	Step A.1	*"This Appendix 9 presents the method for determining the Relevant Levels for Facilities or parts of Facilities ("Candidates") for which:* *……"*	**Issue Type: RLM Amending Rules drafting** To be consistent with the Tranches 2 and 3 Amendments drafting, parts of Facilities should be referred to as components of Facilities.	AEMO has identified this draft issue and added it to the issue log for EPWA to resolve.
7	Step A.1(b)	*"……* *(b) the Market Participants' applications include all required supporting information and are deemed by AEMO to be complete; and* *….."*	**Issue Type: RLM Amending Rules drafting** All required supporting information for the applications for certification of Reserve Capacity is described in section 4.10 of the WEM Rules and for the applications for Early Certified Reserve Capacity is described in clause 4.28C.2 of the WEM Rules To avoid doubt, this Step needs to refer to section 4.10 and clause 4.28C.2 of the WEM Rules as reference points for all required supporting information.	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.
8	StepA.2(d)(i)	*"……* *(d) the full operation date of a Candidate for the Reserve Capacity Cycle ("Full Operation Date") is:* *i. the date provided under clause 4.10.1(c)(iii)(7) or revised in accordance with clause 4.27.11A, where at the time the application is made the Facility, or part of the Facility (as applicable) is yet to enter service (excluding a part of a Facility that is an Electric Storage Resource for which Certified Reserve Capacity is not being assessed in*	**Issue Type: The Tranches 2 and 3 Amendments drafting** The term "Electric Storage Resource Metering" will be replaced by "Facility Sub-Metering" as a subsequent amendment to the Tranches 2 and 3 Amendments.	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.

		accordance with the methodology in this Appendix 9); or *ii. the date most recently provided for a Reserve Capacity Cycle under clause 4.10.1(k) otherwise;"*		
9	Step A.2(e)	*"(e) a "Committed Candidate" is a Candidate which is the subject of an application for Certified Reserve Capacity for the Current Reserve Capacity Cycle and is deemed by AEMO to be committed;"*	**Issue Type: RLM Amending Rules drafting** • The Reserve Capacity Facility status includes proposed, committed, and in Commercial Operation. The definition of "Committed Candidate" for Appendix 9 calculation purposes, should also include a Candidate that is deemed by AEMO to be in Commercial Operation. • In Appendix 9, the terms "Committed Small Candidates" and "Standalone Committed Candidate" are used but not defined.	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.
10	Step A.2(f)	*"(f) a "Proposed Candidate" is a Candidate which is the subject of an application for Certified Reserve Capacity for the Current Reserve Capacity Cycle and is deemed by AEMO to not be committed;"*	**Issue Type: RLM Amending Rules drafting** The Reserve Capacity Facility status includes proposed, committed, and Commercial Operation. The definition of *"Proposed Candidate"* for Appendix 9 calculation purposes should also exclude a Candidate that is deemed by AEMO to be in Commercial Operation.	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.

11	Step 1.1	*"1.1. Determine the Candidate Type of each Candidate as follows:* *(a) if the Candidate is (or is proposed to be) registered as a Non-Scheduled Facility, then the Candidate is a "Small Candidate" and:* *……;* *(b) each other Candidate is a "Standalone Candidate" and is classified as having the Candidate Type "standalone".*	**Issue Type: methodology** This Step is to determine the Candidate Type. If the Candidate is (or is proposed to be) registered as a Non-Scheduled Facility, then the Candidate is a "Small Candidate". Each other Candidate is a "Standalone Candidate. • It is not clear how to determine the Candidate Type for an upgrade that is a component of a SSF but is smaller than 10 MW. • For a new Facility, clause 4.8A.1 of the Tranches 2 and 3 Amendments requires AEMO to determine and assign an indicative Facility Class and an indicative Facility Technology Type. The Facility's registered Facility Class may change from its indicative Facility Class. Therefore, this clause should be referred to under this Step for Facilities that are proposed to be registered.	AEMO has raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021. .
12	Step 2.1(a)	*"For each Candidate, determine:* *(a) for each Trading Interval (if any) in the Reference Period that falls after 8:00 AM on the Full Operation Date for the Candidate, the quantity of energy (in MWh) sent out by the Candidate using Meter Data Submissions, which, for a Candidate that is a Semi-Scheduled Facility containing an Electric Storage Resource, must exclude any generation or consumption measured by the Electric Storage Resource Metering required*	**Issue Type: methodology** • "A Candidate *that is a Semi-Scheduled Facility containing an Electric Storage Resource….." should be referred to as "a Candidate that is a component of a Semi-Scheduled Facility containing an Electric Storage Resource……".* • The term "Electric Storage Resource Metering" will be replaced by "Facility Sub-Metering" as a subsequent	AEMO suggests that the RCP reviews and updates this step when required.

		to be installed in accordance with clause 2.29.12; and"	amendment to the Tranches 2 and 3 Amendments. • AEMO needs to be given discretion: ○ to determine not to use the Facility Sub-Metering data if AEMO reasonably considers the metering data is inaccurate. ○ to estimate the Facility Sub-Metering Metering data if the Market Participant does not provide the data or provides incomplete data.	
13	Step 2.1(a), Step 2.2, and Step 2.7(a)	*"2.1(a) for each Trading Interval (if any) in the Reference Period that falls after 8:00 AM on the Full Operation Date for the Candidate, …"* *"2.2 For each Candidate, identify any Trading Intervals in the Reference Period that fall after 8:00 AM on the Full Operation Date for the Candidate where: …"* *"2.7(a) for Trading Intervals that fall after 8:00 AM on the Full Operation Date for the Candidate, …"*	**Issue Type: RLM Amending Rules drafting and current RLM Rules drafting** The reference "fall after 8:00 AM" should be revised as "fall on or after 8:00 AM" to include the Trading Interval starting at 8:00 AM.	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.
14	Step 2.2	*"2.2. For each Candidate, identify any Trading Intervals in the Reference Period that fall after 8:00 AM on the Full Operation Date for the Candidate where:* *(a) the parent Facility, ……; or* *(b) the parent Facility, …… or* *(c) the parent Facility was ……; or* *(d) the parent Facility was ……"*	**Issue Type: RLM Amending Rules drafting** It is not clear what the parent Facility is in relation to a Candidate.	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.

15	Step 3.1	*"3.1. Identify all:* *(a) Non-Intermittent Generating Systems that are Facilities or components of Facilities that are registered (or proposed to be registered) as Scheduled Facilities or Semi-Scheduled Facilities;* *(b) Demand Side Programmes; and* *(c) Electric Storage Resources that are Facilities or components of Facilities that are registered (or proposed to be registered) as Scheduled Facilities or Semi-Scheduled Facilities,* *that AEMO intends to assign Certified Reserve Capacity for the Current Reserve Capacity Cycle and deems to be committed ("Non-Intermittent Facilities")."*	**Issue Type: RLM Amending Rules drafting** • Demand Side Programmes should include ones that are registered or proposed to be registered. • The Reserve Capacity Facility status includes proposed, committed, and Commercial Operation. The definition of "Committed Candidate" for Appendix 9 calculation purposes should also include a Candidate that is deemed by AEMO to be in Commercial Operation. • For a new Facility, clause 4.8A.1 of the Tranches 2 and 3 Amendments requires AEMO to determine and assign an indicative Facility Class and an indicative Facility Technology Type. The Facility's registered Facility Class may change from its indicative Facility Class. Therefore, this clause should be referred to under this step for Facilities that are proposed to be registered.	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.
16	Step 3.5(a)	*"Determine the "Default Capacity Obligation Quantity" for each Non-Intermittent Facility f identified in Step 3.1 for each Trading Interval t in the Reference Period as follows:* *(a) If:* *……* *iii. Non-Intermittent Facility f is a Demand Side Programme and Trading Interval t falls*	**Issue Type: methodology** The ROUND() function does not specify whether it rounds a number up or down to one decimal place**.**	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.

		between 8:00 AM and 8:00 PM on a Business Day, then: *DCOQ(f,t) = ROUND(CRC(f) x DCOQ_Adj)* *where: iv. the ROUND() function rounds a number to one decimal place;* *……"*		
17	Step 4.1(a)	*"4.1. Determine the Observed Demand (in MW) for each Trading Interval in the Reference Period as follows:* *Observed_Demand = (Total_Generation + DSP_Reduction + Interruptible_Reduction + Involuntary_Reduction) x 2* *where:* *(a) Total_Generation is the total sent out generation of all Registered Facilities, as determined from Meter Data Submissions;* *……"*	**Issue Type: Current WEM Rule drafting** • "total sent out generation" used in the step should be the defined term, "Total Sent Out Generation". • Incorrect reference of "Meter Data Submission" as the Total Sent Out Generation is determined from each Facility's Sent Out Metered Schedule, which is converted from the Metered Scheduled including both the Meter Data Submission and the SCADA substitution when the Meter Data Submission is not available.	AEMO suggests amending this step as below: "……. *where:* *(a) Total_Generation is the ~~total sent out generation~~ Total Sent Out Generation of all Registered Facilities, ~~as determined from Meter Data Submissions;"~~*
18	Step 4.2	*"4.2. Determine the DER Adjusted Demand Profile for the Reference Period by adjusting the Observed Demand for each Trading Interval determined under Step 4.1 to account for the change in behind-the-meter photovoltaic capacity in the SWIS over time, so that the resulting system demand is equal to AEMO's best estimate of what the Observed Demand would have been in that Trading Interval if the level of behind-the-meter photovoltaic capacity had been equal*	**Issue Type: RLM Amending Rules drafting** AEMO should not account for behind-the-meter photovoltaic capacity that is a Candidate or a component of a Candidate in adjusting the Observed Demand.	AEMO encourages the RCP to review and update this step accordingly.

		to the level that AEMO expects to exist on 1 October in Year 3 of the Current Reserve Capacity Cycle."		
19	Step 4.3	*"4.3. Determine the Scaled Demand Profile for the Reference Period by adjusting the DER Adjusted Demand Profile to reduce the system demand for each Trading Interval in the Reference Period that would meet the criteria for an Electric Storage Resource Obligation Interval published by AEMO for the Current Reserve Capacity Cycle under clause 4.11.3A(a) by the total quantity of Certified Reserve Capacity that AEMO intends to assign to Non-Scheduled Facilities that are not Candidates for the Current Reserve Capacity Cycle."*	**Issue Type: RLM Amending Rules drafting** • It is unclear what Non-Scheduled Facilities are referred to under this step for adjusting the DER Adjusted Demand Profile. • It should be made clear that the DER Adjusted Demand Profile is the Scaled Demand Profile, when the following condition occurs: when all Non-Scheduled Facilities are Candidates for the current Reserve Capacity Cycle.	AEMO suggests amending this step by splitting the step into two sub-steps as below: "4.3 *Determine the Scaled Demand Profile for the Reference Period:* *(a) by adjusting the DER Adjusted Demand Profile to reduce the system demand for each Trading Interval in the Reference Period that would meet the criteria for an Electric Storage Resource Obligation Interval published by AEMO for the Current Reserve Capacity Cycle under clause 4.11.3A(a) by the total quantity of Certified Reserve Capacity that AEMO intends to assign to Non-Scheduled Facilities under clause 4.11.1(bD)(ii) ~~that are not Candidates~~ for the Current Reserve Capacity Cycle; or* (b) *as the DER Adjusted Demand Profile if there are not Non-Scheduled Facilities for which AEMO intends to assign Certified Reserve Capacity under clause 4.11.1(bD)(ii) for the Current Reserve Capacity Cycle.*
20	Steps 6.1 and 6.2	*"6.1. Identify the 50 Trading Intervals in the Reference Period with the highest loss of load probability determined in accordance with Step C.1 using the following input:*	**Issue Type: RLM Amending Rules drafting** It is possible that two or more Trading Intervals are tied with respect to the	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.

		(a) for "Demand Profile" use the Scaled Demand Profile. *6.2. Identify the 50 Trading Intervals in the Reference Period with the highest loss of load probability determined in accordance with Step C.1 using the following input:* *(a) for "Demand Profile" use the Ex-Committed Demand Profile."*	selection of the 50th Trading Interval referred in step 6.1 or step 6. 2. A rule should be specified to accept the tied Trading Intervals following a prioritisation order.	
21	Step 7.2(a)	*"The fleet of Committed Candidates comprises:* *(a) each Standalone Committed Candidate; and"*	**Issue Type: RLM Amending Rules drafting** The Standalone Committed Candidate should be referred to as "Committed Standalone Candidate". This is because "Standalone Candidate" is defined under step 1.1(b).	AEMO suggests amending this step as below: *"The fleet of Committed Candidates comprises:* *(a) each Committed Standalone ~~Committed~~ Candidate; and"*
22	Step 11.1(i)(iii)	*"……* *iii. the Historical Output values determined in Step 2.7 for each Trading Interval in the Reference Period;"*	**Issue Type: RLM Amending Rules drafting** The Historical Output values determined in step 2.7 include Meter Data Submission, AEMO's estimates under clauses 7.13.1. (eF), 7.13.1C(a), 7.13.1. (cC), and 7.13.1C(e) of the WEM Rules, and the estimates in the expert reports provided by Candidates under clause 4.10.3 of the WEM Rules. Step 11.1(i)(iii) requires AEMO to publish this information on the WEM Website. This is in conflict with the confidentiality status of this information which is classified by AEMO under clause 4.10.2 of the WEM Rules as either Rule Participant Market Restricted information	AEMO raised this issue at the RC_2019_03 RCP Workshop held on 11 May 2021.

			or System Management Confidential information.	
23	Step D.4. to D.6.	*"D.4. Increment the system demand specified for each Trading Intervals in the Net Demand Profile by 0.1 MW.* *….."*	**Issue Type: methodology** Steps D.4. to D.6. requires AEMO to carry out iterations on the MW increase on the Net Demand Profile using a 0.1 MW increment until the LOLE in the amended Net Demand Profile (which includes the MW increase) is equal to or closest to the LOLE of the Baseline Demand Profile determined in step D.1. The approach to arrive to the final MW increase (i.e. ELCC) should not be limited to a specified incremental value at a time. AEMO suggest that it be given discretion to decide on the approach to the iteration process that would maximise computational efficiency and the approach could be included in a WEM Procedure.	AEMO suggests amending step D.4. to D.6. as below: *"D.4. Carry out an iteration process to increase the system demand (with a precision of one decimal place of MW) using the subroutine in Part C such that the loss of load expectation of the amended Net Demand Profile is equal or closest to the loss of load expectation determined in Step D.1 for the Baseline Demand Profile."* D.7. could be renumbered to D.5.

2. Please provide an assessment whether the change will better facilitate the achievement of the Wholesale Market Objectives.

AEMO considers that improving the method used to allocate the ELCC of the fleet of IGs to individual IGs as discussed in Section A.1 will better facilitate the achievement of the Wholesale Market Objectives outlined in clauses 1.2.1(a), (b), (c), and (d) of the WEM Rules.

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3. Please indicate if the proposed change will have any implications for your organisation (for example changes to your IT or business systems) and any costs involved in implementing these changes.

AEMO estimates that:

- While a similar level of development activities is required to implement the RCP's Amended RLM in comparison with the ERA's proposed RLM, a better understanding of the project scope has reduced the original contingency estimate.
- The proposed Delta Method and an incremental precision of 0.1 MW will incur hardware costs associated with data storage. Increasing iterations to:
    - 0.01 MW incremental steps is estimated to increase the hardware cost by a range of $25,000 to $40,000.
    - 0.001 MW incremental steps is estimated to increase the hardware cost by a range of $295,000 to $390,000.
- Additional steps associated with calculating the adjusted COPTs, the Relevant Level for Proposed Candidates, Early CRC, and Conditional CRC Candidates have increased the costs associated with procedure changes.

AEMO estimates the cost of this Draft Rule Change Proposal to be $565,820.

Table 3. Implementation cost estimation

	Item	Cost ($)	Contingency ($)	Total ($)
1	RCM Changes - Relevant Level tool development	334,830	198,350	533,180
2	Hardware (iterations with 0.1 MW incremental steps)	5,000	5,000	10,000
3	Procedure changes	17,640	5,000	22,640
	Total	357,470	208,350	565,820

4. Please indicate the time required for your organisation to implement the change, should it be accepted as proposed.

AEMO estimates that it will require six to eight months to implement the proposed RLM Amending Rules, including the development of a WEM Procedure.

A delay in the Final Rule Change Report publication post 1 July 2021 would present challenges for AEMO to deliver the implementation required for the 2021 CRC assessment process that is to commence in February 2022. Further publication delays would require the

Reserve Capacity timetables for the 2021 and 2022 Reserve Capacity Cycles[18] to be amended that would require industry wide consultation.

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[18] 2021 and 2022 Reserve Capacity timetables, available here: https://aemo.com.au/-/media/files/electricity/wem/reserve_capacity_mechanism/timetable/2021-and-2022-reserve-capacity-timetables.pdf?la=en.