Rule Change Extension Notice: Method used for the assignment of Certified Reserve Capacity to Intermittent Generators (RC_2019_01)

This notice of extension is given under clause 2.5.12 of the WEM Rules.

Submitter: Sara O'Connor, ERA

Date submitted: 17 December 2020

Date of extension: 30 June 2021

In accordance with clause 2.5.10 of the WEM Rules, the Rule Change Panel has extended the timeframe for the publication of the Final Rule Change Report for the Rule Change Proposal titled "Method used for the assignment of Certified Reserve Capacity to Intermittent Generators" (RC_2019_03) until **5:00 PM on Friday 31 December 2021.**

Dates for subsequent steps of the rule change process have been adjusted accordingly.

Reason for the Extension

The Rule Change Panel considers that additional analysis and consultation is required to develop the final decision and the Final Rule Change Report for RC_2019_03. However, responsibility for administration of the WEM Rules will be transferred from the Rule Change Panel to the Coordinator of Energy (**Coordinator**) on 1 July 2021, so the Rule Change Panel is not in the position to undertake the required analysis and consultation.

Therefore, the Rule Change Panel has extended the timeframe for the publication of the Final Rule Change Report until 31 December 2021 to give the Coordinator time to:

- assess the Rule Change Proposal, first period submissions, Draft Rule Change Report, the discussions at the Market Advisory Committee (MAC) workshops for RC_2019_03 and the second period submissions; and
- undertake any further analysis and consultation needed to develop the Final Rule Change Report.

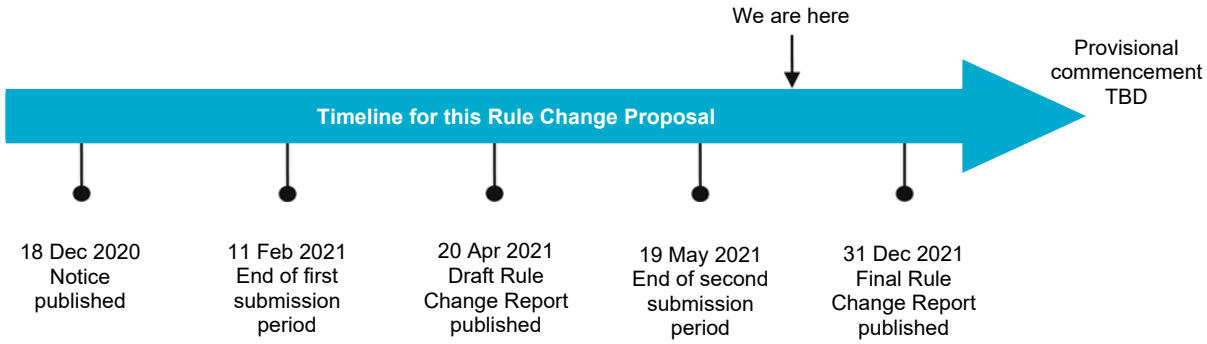
The attachment to this notice explains the implications of the Rule Change Panel's decision to extend the deadline for this Rule Change Proposal and outlines the status of the Rule Change Panel's assessment of the Rule Change Proposal at the time of the handover of the proposal to the Coordinator.

Proposed Work Program

- The Coordinator undertakes any required consultation and analysis.
- The Coordinator presents its final decision in the Final Rule Change Report.
- If approved, the Amending Rules commence.

Extended Timeline

The projected timeline for processing this proposal, including the extension, is:



Attachment: Implications of the Extension and Further Assessment of the Rule Change Proposal

1. Implications of the Extension

The Rule Change Panel notes that, because the extension of the timeframe for publication of the Final Rule Change Report is beyond 1 July 2021, it is unlikely that AEMO will be able to implement any changes resulting from this Rule Change Proposal for the 2021 Reserve Capacity Cycle. Therefore, the Certified Reserve Capacity (**CRC**) for Intermittent Generators for the 2021 Reserve Capacity Cycle will likely be determined using the current Relevant Level Method (**RLM**).

The Rule Change Panel notes that, under the current WEM Rules, including any known changes that the Minister for Energy has published in the Gazette:

- the CRCs determined for the 2021 Reserve Capacity Cycle will not affect how initial Network Access Quantities (**NAQs**) are assigned to Intermittent Generators; but
- the CRCs for the 2022 Reserve Capacity Cycle will affect how initial NAQs are assigned to Intermittent Generators.

The Rule Change Panel notes that the Coordinator will become responsible for processing this Rule Change Proposal after 30 June 2021 and will decide how to process the proposal and when to commence any resulting Amending Rules.

2. The Rule Change Panel's Further Assessment of the Rule Change Proposal

Section 2 of this notice is drafted on the basis that the reader has read all the relevant documents, including the Rule Change Proposal, the first period submissions, the Draft Rule Change Report, the minutes from the MAC workshops on RC_2019_03 and the second period submissions. All documents related to this Rule Change Proposal can be found on the Rule Change Panel's website at Rule Change: RC_2019_03 – Economic Regulation Authority Western Australia.

The Rule Change Panel's draft analysis of the Rule Change Proposal and its assessment of the proposal against clauses 2.4.2 and 2.4.3 of the WEM Rules is provided in section 6 of the Draft Rule Change Report.

The Rule Change Panel's assessment of the Rule Change Proposal has not fundamentally changed since the publication of the Draft Rule Change Report.

However, the Rule Change Panel acknowledges that the draft decision may increase the volatility of the CRC values that will be assigned to Intermittent Generators from year to year and that Rule Participants have expressed a view that this is a risk to both system reliability and investors.

The Rule Change Panel has undertaken some additional analysis of its draft decision since publication of the Draft Rule Change Report. The remainder of this section 2 discusses the results of this work and outlines some possible improvements and areas for further analysis and consultation.

2.1 The Capacity Value of Intermittent Generators

The Rule Change Panel considers that, as outlined in the ERA's final report for its 2018 review of the Relevant Level Method (**ERA Final Report**), the CRC for an Intermittent Generator should be based on its contribution to system reliability.[1]

The Rule Change Panel considers that the method used to determine the CRC for an Intermittent Generator in the South West interconnected system (**SWIS**) should account for the following:

- The Facility's expected performance during periods of system stress.

  As outlined in the Draft Rule Change Report, the Rule Change Panel considers that the performance of wind and solar farms and the occurrence of system stress events are related because they are both driven by weather. Therefore, the Rule Change Panel considers that the CRC of an Intermittent Generator should be based on its performance during high stress Trading Intervals.

- The variability of the Facility's performance during periods of system stress.

  The Rule Change Panel considers that, if there were two Facilities with the same average performance in periods of high system stress and all other aspects of these Facilities are equal but one had less variable performance, the Facility with the less variable performance should have a higher capacity value than the Facility with more variable performance.

- The interaction of the Facility with the other Intermittent Generators.

  The expected interaction of the Facility's contribution to system reliability with the contribution of other Intermittent Generators, which will be influenced by the Facility's technology and location.

The Rule Change Panel agrees that a method that produces stable results from year to year is highly desirable because it would provide greater certainty to investors.

However, the Rule Change Panel also notes that if a Facility cannot provide firm (or near firm) capacity and needs to be assessed using a method like the RLM, then the Facility's capacity value is related to changes in system demand and performance of other Facilities. Therefore, the Facility's capacity value can vary over time for reasons unrelated to annual weather fluctuations, so that the risk of volatility for Market Participants cannot be completely eliminated. This has always been the case for Intermittent Generators in the SWIS (e.g. the capacity value of solar farms has been constantly reduced by the growth of behind the meter PV, wind farms may be affected by another similar facility locating nearby, and all Intermittent Generators may be affected by increased penetration of Electricity Storage Resources and Distributed Energy Resources (**DER**) in the future).

2.2 The Current RLM

The Rule Change Panel's assessment of the current RLM has not changed since the publication of the Draft Rule Change Report. However, in this section 2.2, the Rule Change Panel provides some additional observations about the current RLM that are relevant to some of the issues raised by stakeholders regarding the draft decision.

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[1] The ERA Final Report is published on the ERA website at https://www.erawa.com.au/electricity/wholesale-electricity-market/methodology-reviews/review-of-method-used-to-assign-capacity-to-intermittent-generators-2018.

The Rule Change Panel notes that the current RLM represents an approximation of the marginal (or 'Last-In') ELCC for each individual Facility. This approach has limitations in that it does not reflect that the capacity value of the fleet of Intermittent Generators (**Fleet**) may differ from the sum of the marginal capacity values of the individual Intermittent Generators in that fleet. Therefore, the current RLM may under- or over-value the capacity value of individual Facilities.

However, the Rule Change Panel notes that the current RLM accounts for the benefits of diversity and the disadvantages of saturation by basing a Facility's Relevant Level on its performance during selected Trading Intervals with a high Existing Facility Load for Scheduled Generation and/or the New Facility Load for Scheduled Generation (**Selected Trading Intervals**).[2] As outlined in the Draft Rule Change Report, the Rule Change Panel considers that it is important to incentivise a diverse fleet of Intermittent Generators where different Facilities complement each other during times of system stress. The Rule Change Panel has identified the following issues with the current RLM's approach to account for diversity and saturation:

- using the Existing Facility Load for Scheduled Generation and/or the New Facility Load for Scheduled Generation may undervalue a Facility's capacity value if the Facility's output shifts the Trading Intervals with the highest system stress;
- the current RLM does not include the estimated generation of new Intermittent Generators (provided in the independent expert reports) before their full operation date in the determination of other Intermittent Generators' Relevant Level, which delays the assessment of the diversity and/or saturation impacts of a new Intermittent Generator on the capacity value of the other Intermittent Generators (existing and new); and
- the selection of the Trading Intervals for the assessment of performance of high system stress:
    - includes many Trading Intervals that do not show high system stress; and
    - excludes most of the Trading Intervals that show high system stress, by selecting only one Trading Interval in any given day, which ignores that Intermittent Generators' performance often varies over the Trading Intervals of a system stress event.

The Rule Change Panel notes that the current RLM includes an adjustment factor that reduces Facilities' Relevant Levels from their average performance during the Selected Trading Intervals. This reduction:

- is bigger the greater the variability of the Intermittent Generator's performance over the Selected Trading Intervals; and
- includes a factor (U) that accounts for the concern that the performance of Intermittent Generators may degrade under the conditions that may cause system stress.[3]

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2 The benefits from diversity occur where the output of different Intermittent Generators complement each other during system stress events, so that the capacity value of the group of Intermittent Generators is greater than the sum of the marginal capacity values of the individual Intermittent Generators. This will tend to occur when the fleet has a variety of technologies across multiple locations.

The disadvantages of saturation occur when several Intermittent Generators have similar output during times of system stress, so that the capacity value of the group of Intermittent Generators is smaller than the sum of the capacity values of the individual Intermittent Generators calculated on a standalone basis. This will tend to occur when the fleet has one or a few technologies concentrated in one or a few locations.

3 See page 27 of the ERA Final Report.

The Rule Change Panel agrees that the specific adjustments used in the current RLM to account for volatility and possible performance degradation under system stress conditions are either arbitrary or based on assumptions that are no longer applicable in the SWIS.

However, as outlined in section 2.1 of this notice, the Rule Change Panel considers that the method used to determine the Relevant Level of an Intermittent Generator should account for the volatility of its performance.

The Rule Change Panel also notes that its own analysis, the analysis provided by AEMO in its first period submission, and the presentation provided by Alinta Energy at the 10 May 2021 MAC workshop all indicate that the performance of many wind farms in the SWIS degrades under system stress conditions.[4] The Rule Change Panel considers that ignoring this phenomenon when determining Relevant Levels (e.g. by assuming that the expected performance of Intermittent Generators in lower system stress conditions is no different from their expected performance in high system stress conditions) could lead to inflated Relevant Levels that threaten system reliability.

To assess how the individual Relevant Levels will change under the current RLM once the Intermittent Generators that are currently new Intermittent Generators become existing Intermittent Generators for the full five-year reference period, the Rule Change Panel asked AEMO to run the current RLM for the 2020 Reserve Capacity Cycle assuming that all new facilities are existing facilities with actual output equal to the output estimated in the relevant independent expert reports (current Relevant Level projection). The Rule Change Panel notes that, for the sake of comparability, AEMO has only considered Facilities that were included in the Rule Change Panel's previous analyses. Each individual Facilities' current Relevant Levels and AEMO's calculations of the current Relevant Level projections for the 2020 Reserve Capacity Cycle are summarised in Figures 1 and 2.

[4] See section A1 of AEMO's first period submission and slides 14 to 19 of Alinta's presentation at the 10 May 2021 MAC workshop, both published on the Rule Change Panel's website.

Figure 1: Comparison of the individual Facilities' current Relevant Levels and the current Relevant Level projections for the 2020 Reserve Capacity Cycle

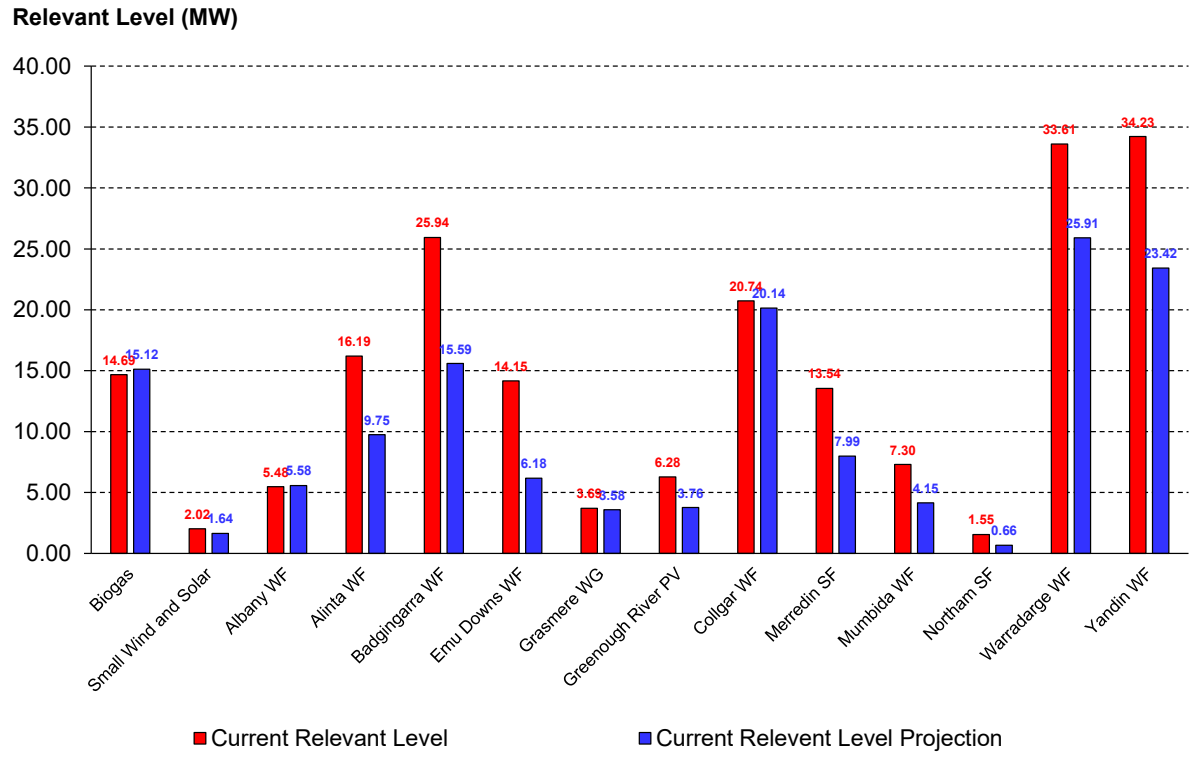
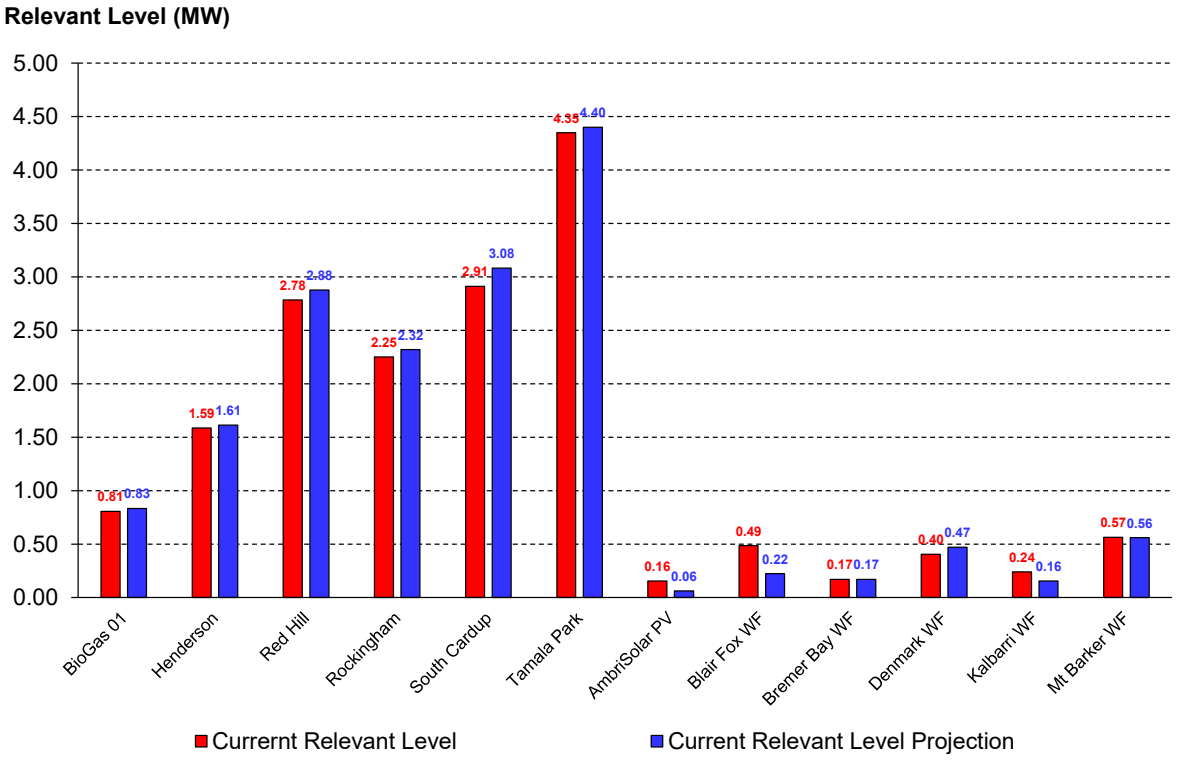


Figure 2: Comparison of the individual Facilities' current Relevant Levels and the current Relevant Level projections for the 2020 Reserve Capacity Cycle (Biogas and Small Wind and Solar)



Figures 1 and 2 show that the Relevant Levels of Intermittent Generators that are expected to have a similar performance to the Intermittent generators that are currently assessed as new facilities (including the new facilities themselves) decreases markedly if the estimated output of the new facilities is included in the determination of all other Intermittent Generators' Relevant Levels.

2.3 Volatility of the Draft RLM

2.3.1 Historical Performance

The Rule Change Panel notes that stakeholders raised concerns at the 10 May 2021 MAC workshop and in second period submissions about the volatility of the RLM under the draft Amending Rules, as published in the Draft Rule Change Proposal (**Draft RLM**). The Rule Change Panel acknowledges that the Relevant Levels determined under the Draft RLM may be volatile over time and that this is a risk for both system reliability and Market Participants.

The Rule Change Panel notes that the results of the Draft RLM for the reference period from 1 April 2013 to 1 April 2020 (**2013/2020 Reference Period**) are driven by only a few events. The Rule Change Panel has identified that the 2013/2020 Reference Period included three dominating system stress events, with several dominating Trading Intervals per event, and the performance of the Intermittent Generators during these events drives the ELCC of the Fleet and the Relevant Levels of the individual Facilities.

For the Fleet ELCC, this is illustrated by Figure 1 of the Draft Rule Change Report which is reproduced as Figure 3.

Figure 3: Comparison of Fleet ELCCs for the 2013/2020 Reference Period and for the Trading Intervals with the highest system demand without setting an initial target loss of load expectation (LOLE)

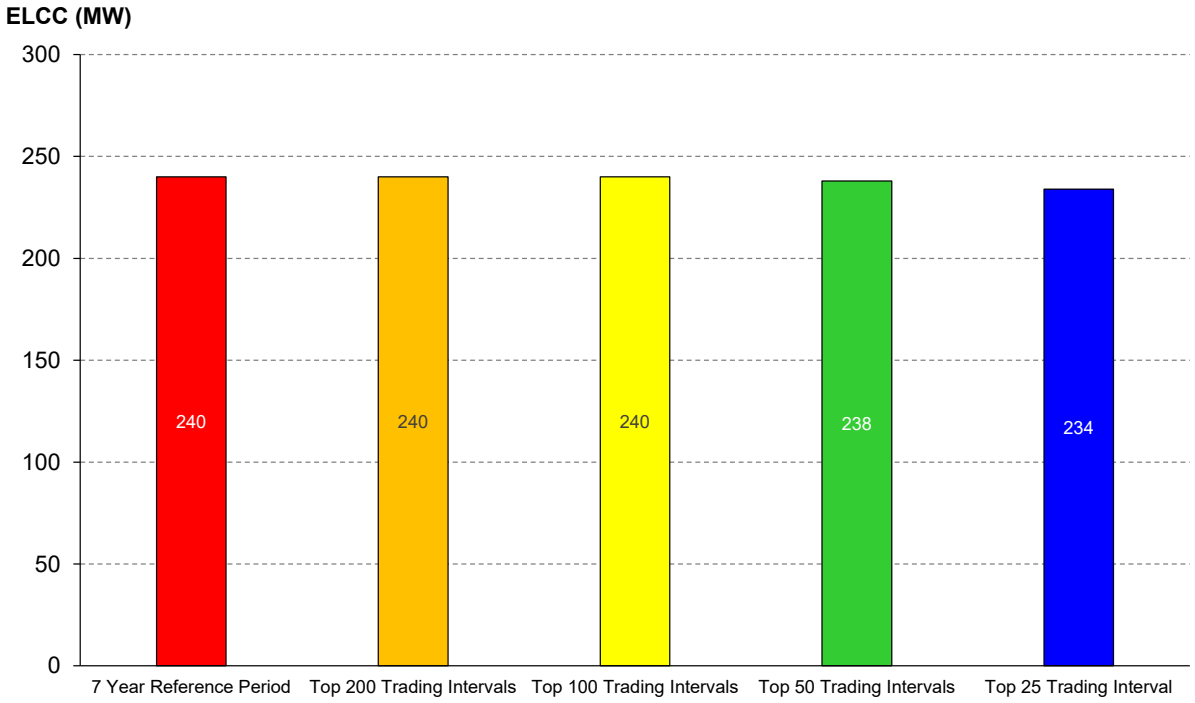
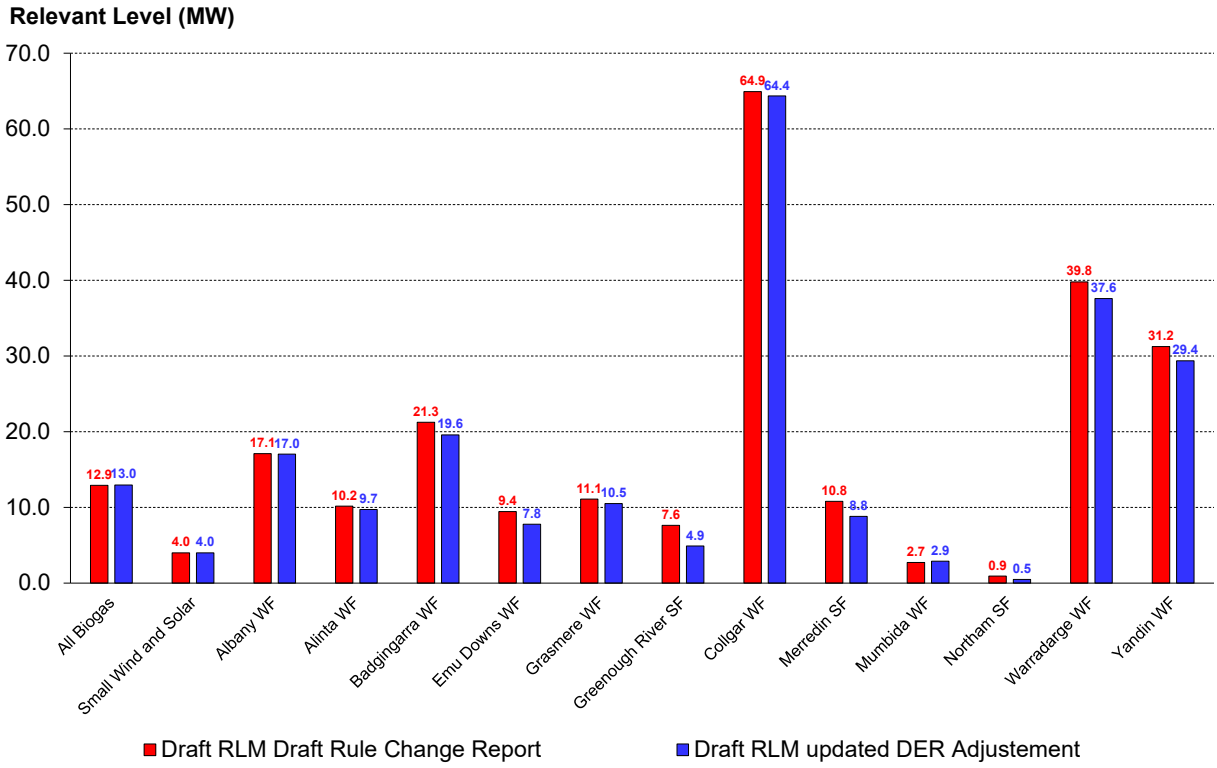


Figure 3 shows that the Fleet ELCC does not change markedly when applying the Draft RLM to a narrower set of Trading Intervals made up of the Trading Intervals with the highest system demand.[5]

Since publication of the Draft Rule Change Report, the Panel has obtained updated values for the installed capacity of behind the meter PV and has re-run the draft RLM for the 2013/2020 Reference Period with this updated data.[6] The updated Fleet ELCC is 230 MW (the Fleet ELCC based on the previous DER adjustment was 244 MW). Figures 4 and 5 compare the Relevant Levels calculated for the individual Facilities under the Draft RLM using the DER adjustment data used in the Draft Rule Change Report and the updated DER adjustment data.

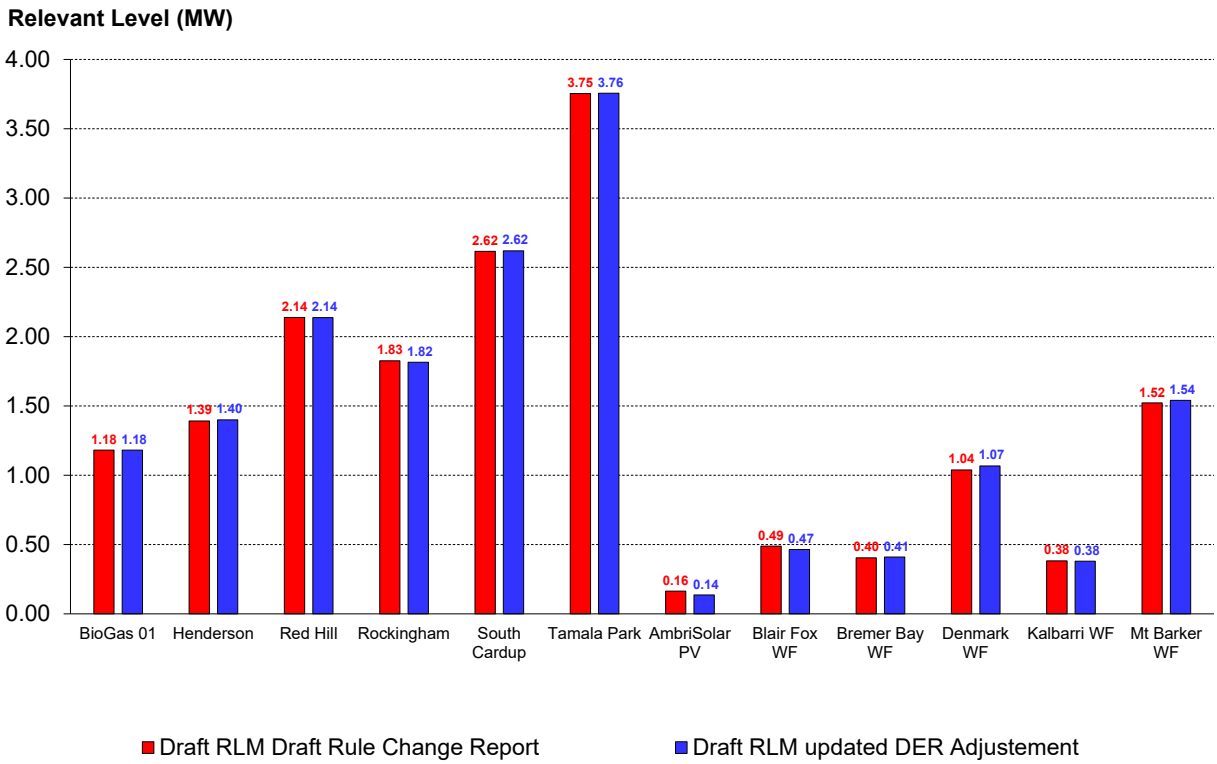
Figure 4: Comparison of the Relevant Levels of Individual Facilities under the Draft RLM using the DER Adjustment Data used in the Draft Rule Change Report and the updated DER Adjustment Data



5 The Rule Change Panel notes that the method underlying the results in Figure 3 does not include the setting of a target LOLE by adjusting the Capacity Outage Probability Table as per the Draft RLM, as outlined in section 6.1.6 of the Draft Rule Change Report.

6 The DER adjustment used for the analysis in the Draft Rule change Report was based on the estimate of installed capacity of behind the meter PV on 1 April 2020. The updated DER adjustment is based on the estimate of the installed capacity of behind the meter PV on 1 March 2021

Figure 5: Comparison of the Relevant Levels of Individual Facilities under the Draft RLM using the DER Adjustment Data used in the Draft Rule Change Report and the updated DER Adjustment Data (Biogas and Small Wind and Solar)



Figures 4 and 5 show that the increasing penetration of behind the meter PV continues to affect the Relevant Levels of many Intermittent Generators in the SWIS.

The Rule Change Panel has assessed the distribution of system stress events over the 2013/2020 Reference Period by sorting the Loss of Load Probability (**LOLP**) of each Trading Interval of the period from the highest to the lowest. Figure 6 shows the LOLP for the 50 Trading Intervals with the highest system demand (and therefore the highest LOLP).

Figure 6: LOLP for the 50 Trading Intervals with the highest system demand for the 2013/2020 Reference Period

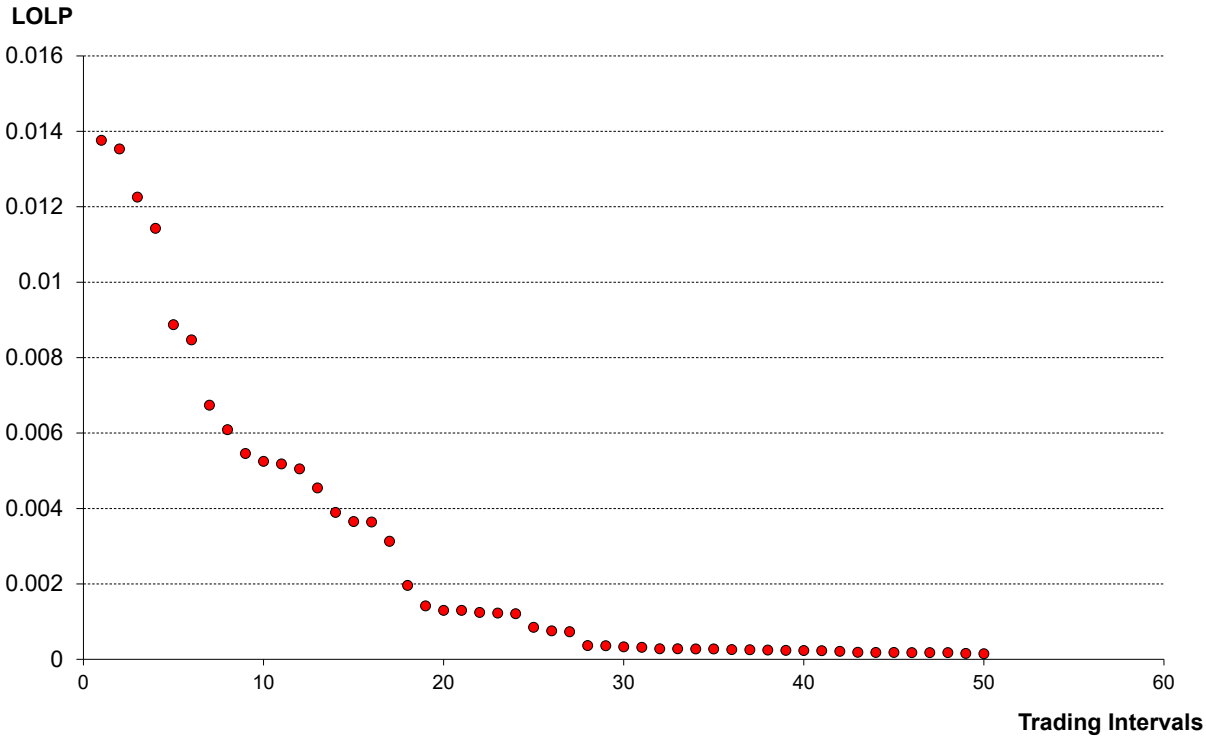


Figure 6 shows that the Trading Intervals with the highest LOLP have a markedly higher LOLP than the other Trading Intervals, with the LOLP falling under 0.002 for the Trading interval from the eighteenth highest LOLP.

Further, the Rule Change Panel has identified that the 21 Trading intervals with the highest LOLP all fall on one of the following three days:

- 8 February 2016;
- 14 March 2016; and
- 4 February 2020.

The Rule Change Panel notes that the fleet of Intermittent Generators mainly consists of wind farms located in the following regions:

- north (776 MW installed nameplate capacity);
- east (206 MW installed nameplate capacity); and
- south (39.87 MW installed nameplate capacity).

This means that the Fleet ELCC is mainly driven by the performance of the wind farms in the north and east. An indication of the performance of the wind farms in the three regions during the three events of system stress is provided in Table 1.

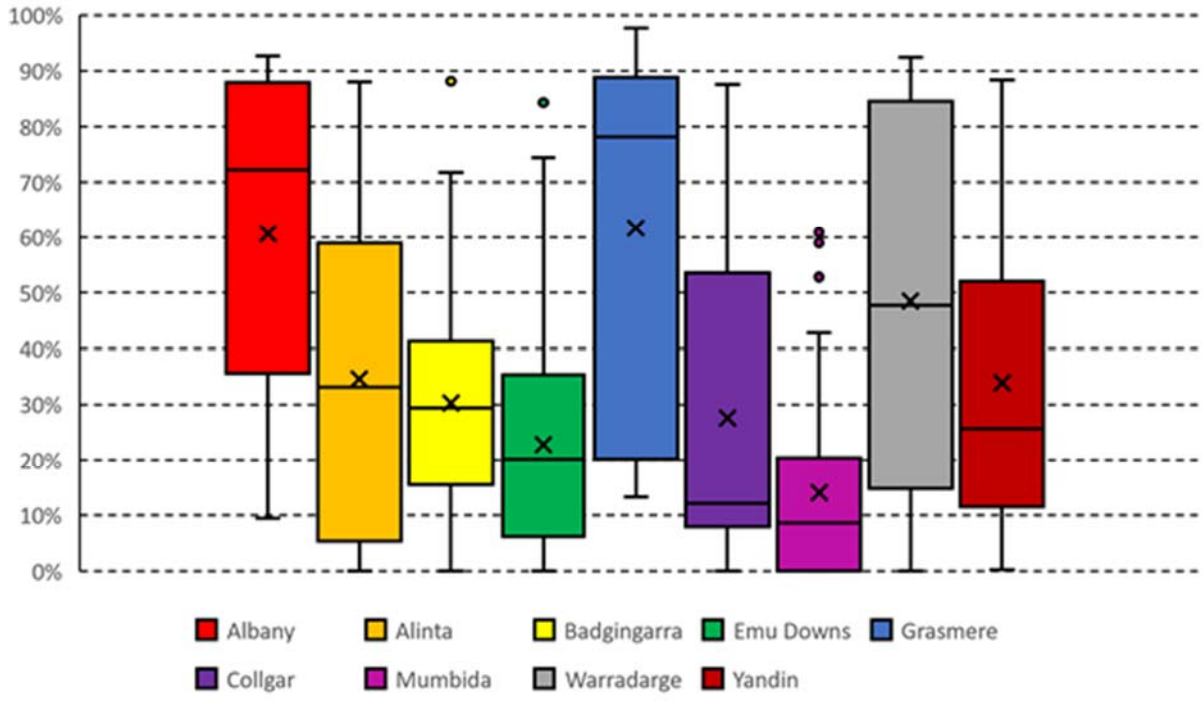
Table 2: Performance of wind farms by region during the three system stress events in the 2013/2020 Reference Period

	South	East	North
8 February 2016	good	bad	good
14 March 2016	very good	good	bad
4 February 2020	very good	bad	bad

Table 1 indicates that the wind farms in the east and north can perform well or badly in any combination during a peak event.

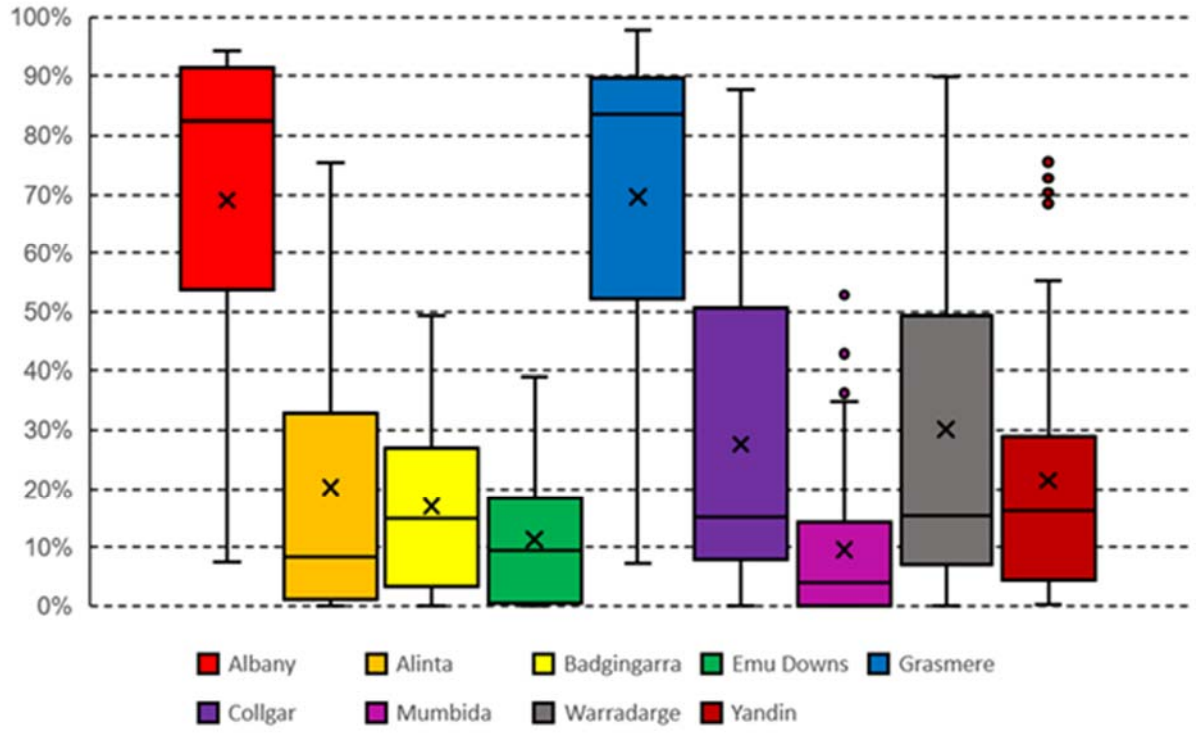
The Rule Change Panel has assessed the volatility of the wind farms in the SWIS over the 50 Trading Intervals with the highest system demand and the 50 Trading Intervals with the highest Load for Scheduled Generation in the 2013/2020 Reference Period. Figures 7 and 8 provide box plots[7] indicating the average performance and variability of performance of the nine largest wind farms, as a percentage of nameplate capacity, in the 50 Trading Intervals with the highest system demand and the 50 Trading Intervals with the highest Load for Scheduled Generation.

Figure 7: Wind farm performance as a percentage of nameplate capacity in the 50 Trading Intervals with the highest system demand



[7] A box plot provides a graphical overview of the distribution of a set of numbers. The coloured box extends from the first quartile (**Q1**) to the third quartile (**Q3**). The length of the box (Q3 – Q1) is the interquartile range (**IQR**). The second quartile or median is shown as the line intersecting the box and mean is shown as an 'X'. The upper whisker extends up from the top of the box to the largest data element that is less than or equal to (Q3 + 1.5 * IQR). The lower whisker extends from the bottom of the box to the smallest data element that is greater than or equal to (Q1 – 1.5 * IQR). Data elements that fall outside the range of the whiskers are considered outliers and are represented by dots.

Figure 8: Wind farm performance as a percentage of nameplate capacity in the 50 Trading Intervals with the highest Load for Scheduled Generation



Figures 7 and 8 show that the performance of the individual wind farms varies markedly over the system stress Trading Intervals.

The Rule Change Panel notes that the SWIS experienced an event of relatively high system stress on 8 January 2021. To assess the impact of this event, the Rule Change Panel ran the Draft RLM for the reference period from 1 April 2014 to 1 April 2021 (**2014/2021 Reference Period**). The Rule Change Panel notes that the input data for the 1 April 2020 to 1 April 2021 period is incomplete and the performance of one of the Facilities was provided as an estimate by the responsible Market Participant. Therefore, the outcomes of this scenario can only be seen as indicative.

Figure 9 shows the LOLP of the 50 Trading Intervals with the highest LOLP for the 2013/2020 Reference Period with updated DER adjustment and for the 2014/2021 Reference Period based on the same DER adjustment.

Figure 9: LOLP for the 50 Trading Intervals with the highest system demand for the 2013/2020 and 2014/2021 Reference Periods

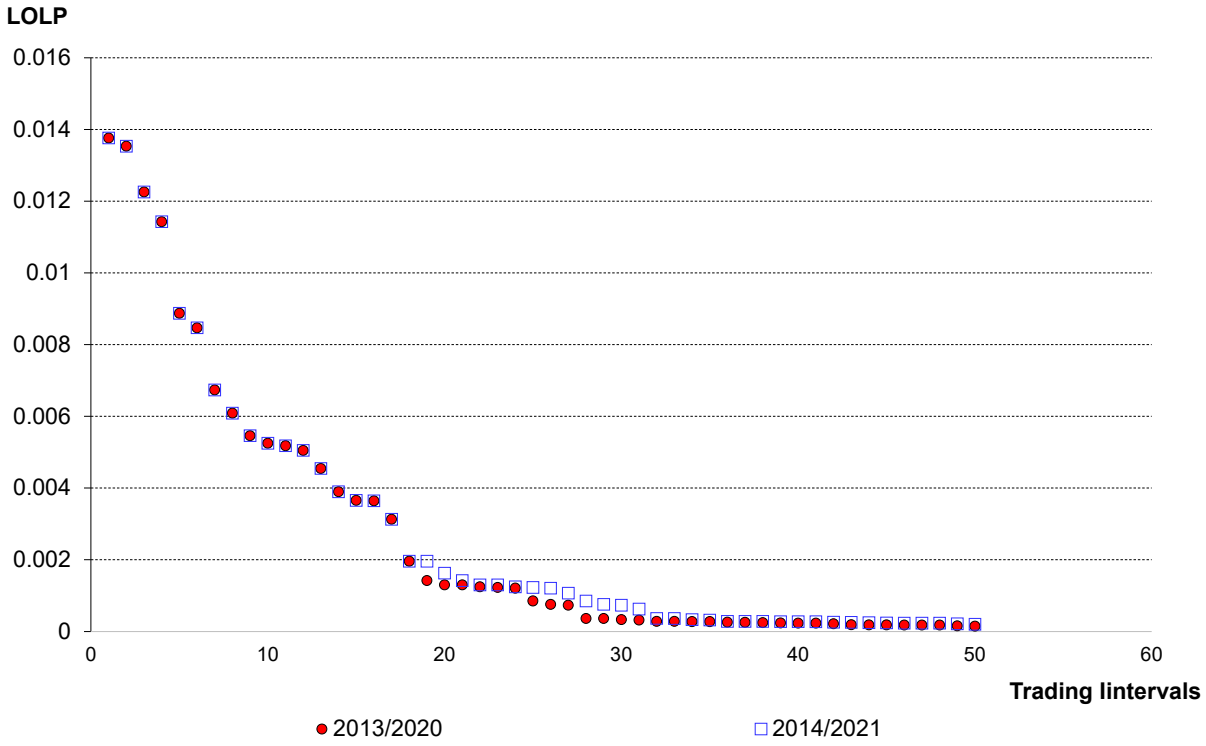


Figure 9 shows that the highest 50 LOLPs are very similar for both scenarios, with the 18 Trading Intervals with the highest LOLP being the same in both scenarios.

Figure 10 shows the individual Relevant Levels for the larger Facilities for the 2013/2020 Reference Period and the 2014/2021 Reference Period.

Figure 10: Comparison of Relevant Levels for the 2013/2020 Reference Period and the 2014/2021 Reference Period

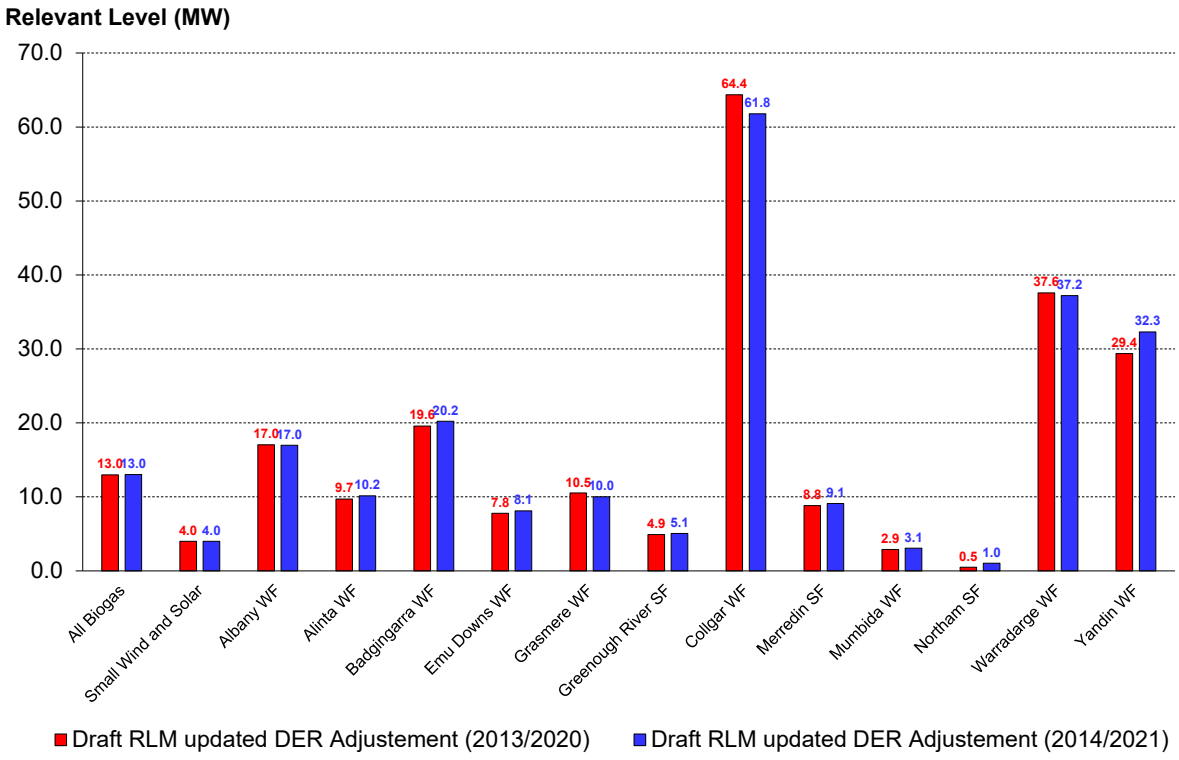


Figure 10 shows that the individual Relevant Levels are very similar in both scenarios.

This analysis indicates that the stress event on 8 January 2021 did not markedly affect the Fleet ELCC or the individual Relevant Levels. However, this event provides an additional example of the wind farms in the SWIS showing relatively poor performance during a system stress event.[8]

2.3.2 Future Volatility of the Draft RLM

The Rule Change Panel notes that, under the Draft RLM, the CRCs for the 2022 Reserve Capacity Cycle would be based on the reference period from 1 April 2015 to 1 April 2022. This means that the three events that are currently driving the Fleet ELCC and individual Relevant Levels will still fall within that reference period. To assess the credible spread of possible Fleet ELCCs for the 2022 Reserve Capacity Cycle, the Rule Change Panel ran the following scenarios adding a 402 MW peak to represent a 1 in 10 year peak demand event.[9]

- An additional peak representing a 1 in 10 year peak demand, where the wind farms in the east and the north perform well – for this scenario, an additional day was added to the 2014/2021 Reference Period using the following input data:
    - the DER adjusted demand from 14 March 2016, scaled so that the peak demand of the day equals the 1 in 10 year peak demand forecast;

8 The output of all Intermittent Generators (including estimates) during the Trading Interval with the highest system demand (6:00 PM) was about 206 MW.

9 The 402 MW equals the forecast 1 in 10 year peak demand for the 2022/23 Capacity Year from the 2020 Electricity Statement of Opportunities, which is used to set the 2020 Reserve Capacity Requirement.

- the performance of the large wind farms in the north from 8 February 2016;[10] and
- the performance of all other Intermittent Generators from 14 March 2016;

- An additional peak representing a 1 in 10 year peak demand, where the wind farms in the east perform well and the wind farms in the north do not perform well – for this scenario, an additional day was added to the 2014/2021 Reference Period using the following input data:
  - the DER adjusted demand from 14 March 2016, scaled so that the peak demand of the day equals the 1 in 10 year peak demand forecast; and
  - the performance of all Intermittent Generators from 14 March 2016;
- An additional peak representing a 1 in 10 year peak demand, where the wind farms in the east perform badly and the wind farms in the north perform well – for this scenario an additional day was added to the 2014/2021 Reference Period using the following input data:
  - the DER adjusted demand from 8 February 2016 scaled so that the peak demand of the day equals the 1 in 10 year peak demand forecast; and
  - the performance of all Intermittent Generators from 8 February 2016;
- An additional peak representing a 1 in 10 year peak demand where the wind farms in the east and north perform badly – for this scenario an additional day was added to the 2014/2021 Reference Period using the following input data:
  - the DER adjusted demand from 4 February 2020, scaled so that the peak demand of the day equals the 1 in 10 year peak demand forecast; and
  - the performance of all Intermittent Generators from 4 February 2020.

Figures 11 and 12 show the results of these scenarios against the base case (no additional peak) and Table 2 provides the data points shown in Figure 12.

[10] These wind farms include Walkaway Wind Farm, Badgingarra Wind Farm, Emu Downs Wind Farm, Mumbida Wind Farm, Warradarge Wind Farm and Yandin Wind Farm.

Figure 11: Scenarios indicating volatility of the Fleet ELCC from a 1 in 10 year peak, depending on performance of wind farms in the north and east

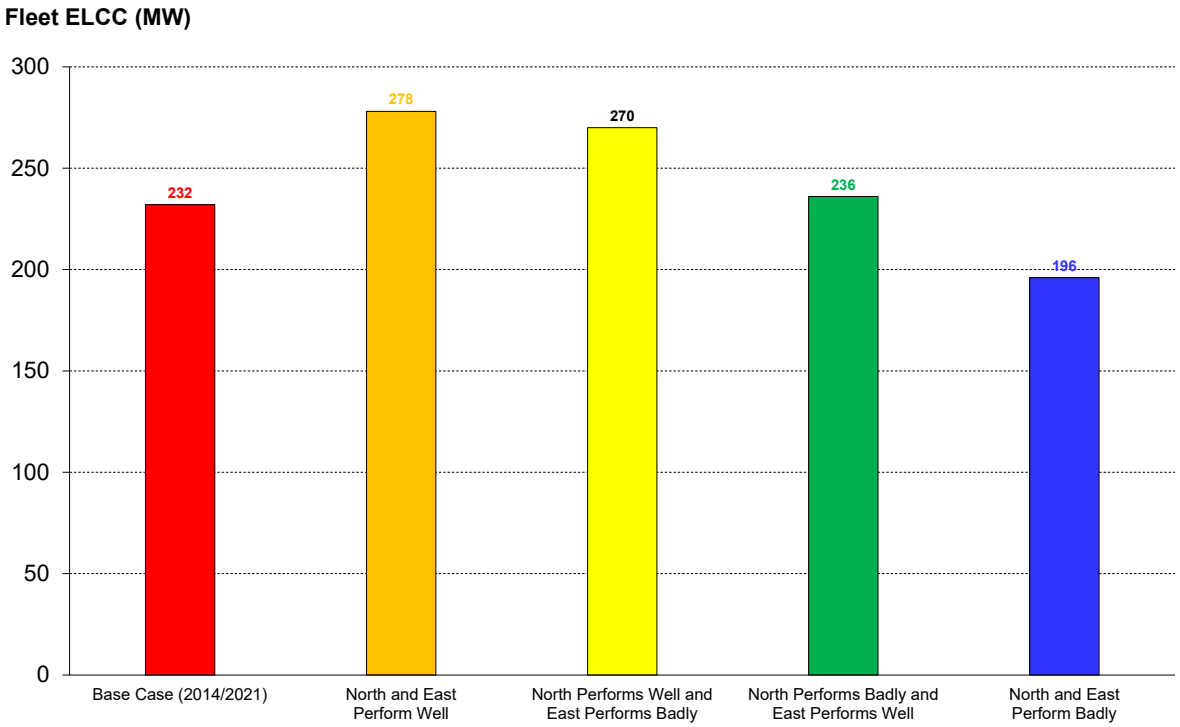


Figure 12: Scenarios indicating volatility of the individual Facility Relevant Levels from a 1 in 10 year peak, depending on performance of wind farms in the north and east

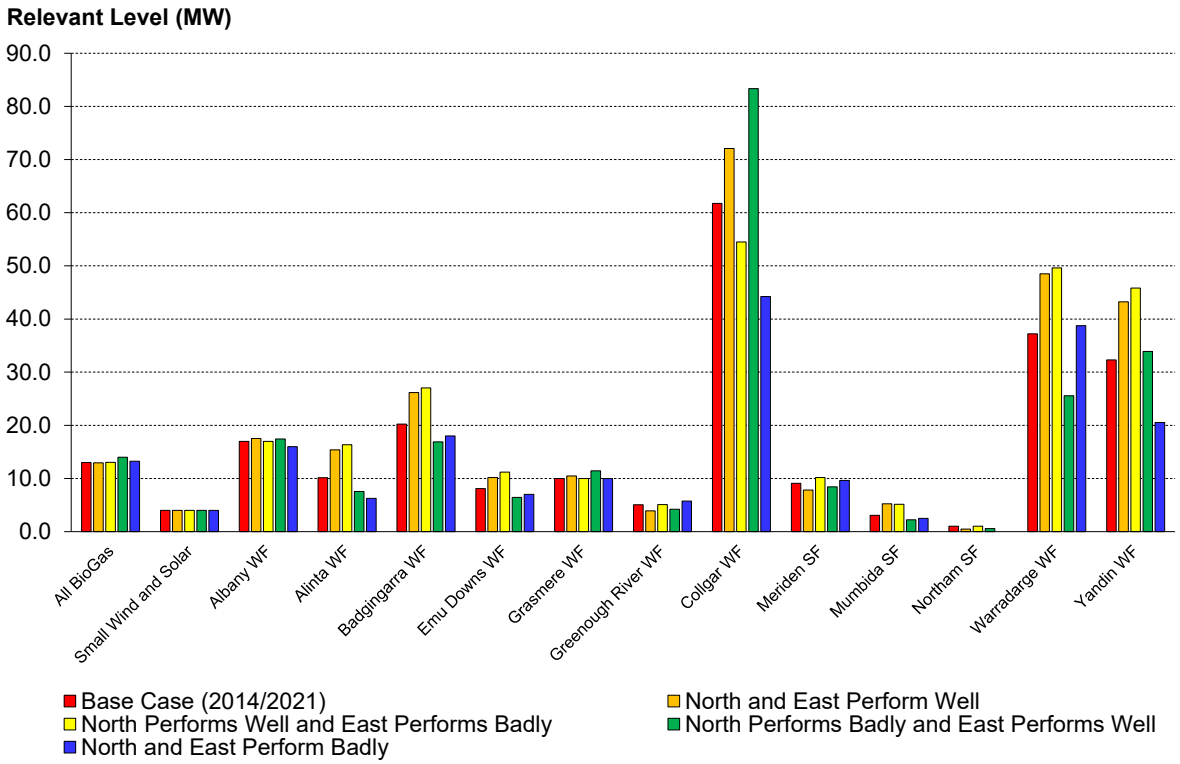


Table 2: Scenarios indicating volatility of the individual Facility Relevant Levels from a 1 in 10 year peak, depending on performance of wind farms in the north and east (units in MW)

Facility	Base Case (2014/2020)	North and East Perform Well	North Performs Well and East Performs Badly	North Performs Badly and East Performs Well	North and East Perform Badly
All Biogas	13.0	13.0	13.0	14.0	13.3
Small Wind and Solar	4.0	4.0	4.0	4.0	4.0
Albany WF	17.0	17.5	17.0	17.4	16.0
Alinta WF	10.2	15.4	16.4	7.6	6.3
Badgingarra WF	20.2	26.2	27.0	16.9	18.0
Emu Downs WF	8.1	10.2	11.2	6.4	7.0
Grasmere WF	10.0	10.5	10.0	11.4	10.0
Greenough River SF	5.1	3.9	5.1	4.2	5.8
Collgar WF	61.8	72.1	54.5	83.3	44.2
Merredin SF	9.1	7.8	10.2	8.4	9.6
Mumbida WF	3.1	5.3	5.2	2.2	2.5
Northam SF	1.0	0.5	1.0	0.6	0.0
Warradarge WF	37.2	48.5	49.6	25.6	38.8
Yandin WF	32.3	43.2	33.9	33.9	20.5

Figure 11 shows that the Fleet performance varies markedly between the scenarios, from 196 MW to 278 MW.

Figure 12 shows that the individual Relevant Levels of the wind farms in the east and north also vary markedly between the different scenarios.

To assess the impact a 'super peak' system stress event (an event with demand 5% higher than the 1 in 10 year peak) could have on the Fleet ELCC and on individual Relevant Levels, the Rule Change Panel ran the different additional peak event scenarios indicated above, but scaled the DER adjusted demand so that the highest system demand was 105% of the 1 in 10 year peak demand forecast. The results of this analysis are presented in Figures 13 and 14, and Table 3 provides the data points shown in Figure 14.

Figure 13: Scenarios indicating volatility of the Fleet ELCC from a super peak, depending on performance of wind farms in the north and east

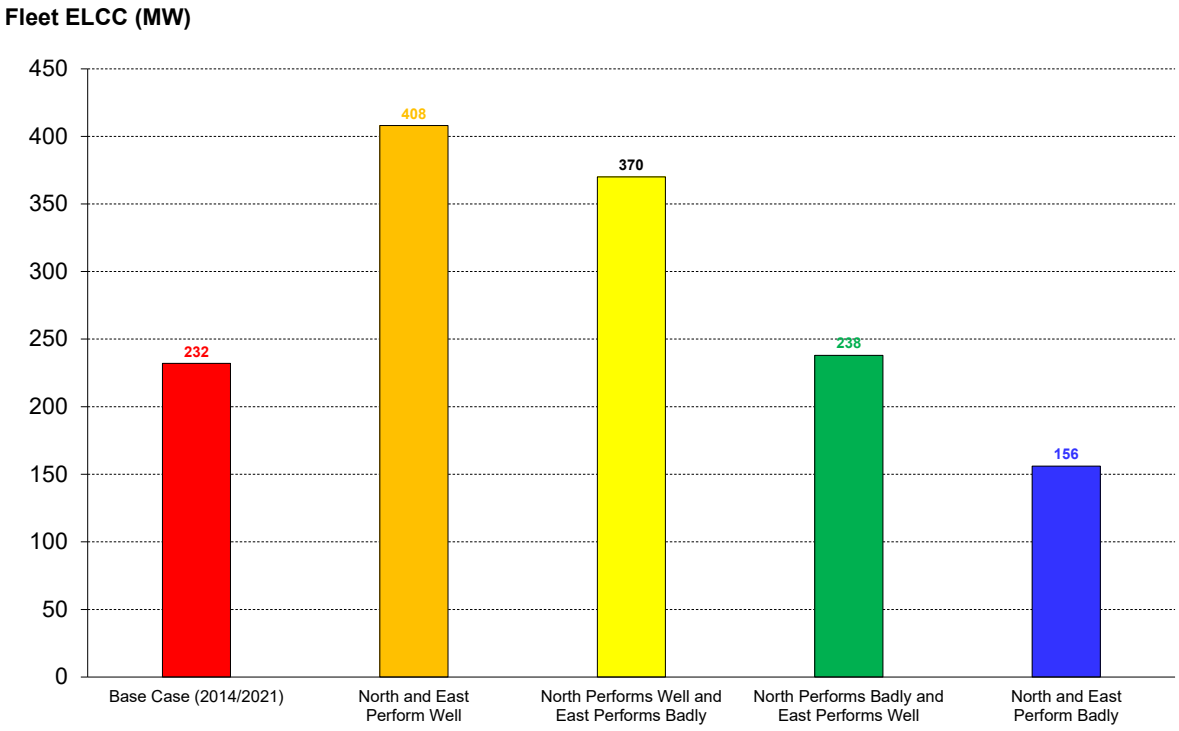


Figure 14: Scenarios indicating volatility of the individual Facility Relevant Levels from a super peak, depending on performance of wind farms in the north and east

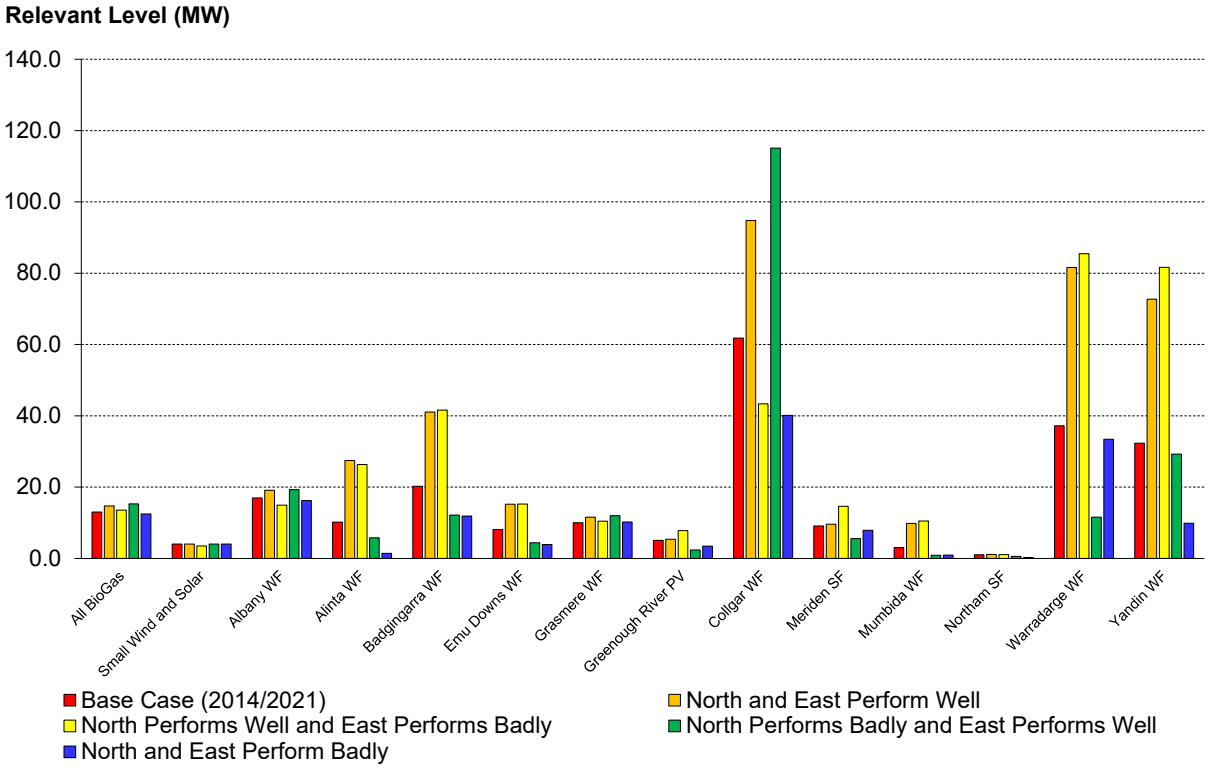


Table 3: Scenarios indicating volatility of the individual Facility Relevant Levels from a super peak, depending on performance of wind farms in the north and east (units in MW)

Facility	Base Case (2014/2020)	North and East Perform Well	North Performs Well and East Performs Badly	North Performs Badly and East Performs Well	North and East Perform Badly
All Biogas	13.0	14.7	13.5	15.3	12.5
Small Wind and Solar	4.0	4.0	3.5	4.0	4.0
Albany WF	17.0	19.1	14.9	19.3	16.2
Alinta WF	10.2	27.5	26.4	5.8	1.4
Badgingarra WF	20.2	41.1	41.6	12.1	11.9
Emu Downs WF	8.1	15.2	15.3	4.4	3.9
Grasmere WF	10.0	11.6	10.5	12.0	10.2
Greenough River SF	5.1	5.4	7.8	2.4	3.4
Collgar WF	61.8	94.8	43.3	115.1	40.1
Merredin SF	9.1	9.6	14.6	5.5	7.9
Mumbida WF	3.1	9.8	10.5	0.9	0.9
Northam SF	1.0	1.1	1.1	0.6	0.2
Warradarge WF	37.2	81.6	85.5	11.5	33.4
Yandin WF	32.3	72.7	81.6	29.2	9.9

Figures 13 and 14 and Table 3 indicate that a super peak would dominate the Fleet ELCC and the individual Relevant Levels.

2.4 Options to Address the Volatility of the Draft RLM

2.4.1 Options Proposed in the Rule Change Proposal and in Submissions

2.4.1.1 Volatility of the Fleet ELCC

In its Rule Change Proposal, the ERA proposed to reduce the volatility of the Fleet ELCC by determining the Fleet ELCC as the lower of:

- the median of the ELCCs of the Fleet in each 12-month period in the reference period (**Median ELCC**); and
- the ELCC of the Fleet in the whole reference period (**Whole Period ELCC**).

The Rule Change Panel notes that the ERA's proposed approach would be more conservative than using the Rule Change Panel's proposed approach to use only the Whole Period ELCC and would therefore reduce the risk to system reliability. However, as outlined in the Draft Rule Change Report, the Rule Change Panel considers that the annual ELCCs for years that include no high system stress events are of no value. Therefore, using the annual Fleet ELCCs to determine the Relevant Levels is inappropriate because it is likely to produce arbitrary values.

In their first period submissions, Alinta Energy and Synergy recommended that the Fleet ELCC be set to the Median ELCC and that the Whole Period ELCC should not be used, while AEMO recommended using the average of the sixth and seventh lowest of the yearly ELCCs. The Rule Change Panel considers that these approaches are also likely to produce arbitrary values.

2.4.1.2 Volatility of the Individual Relevant Levels

In its Rule Change Proposal, the ERA proposed to first allocate the Fleet ELCC between technology groups based on the relative 'First-In' ELCCs of the technology groups, and then to allocate the group ELCCs between the individual Facilities in those groups based on their average performance during selected Trading Intervals from each year in the reference period.

The Rule Change Panel does not support this approach for the reasons outlined in the Draft Rule Change Report.

In its first period submission, Alinta Energy proposed to allocate the Fleet ELCC between individual Facilities directly (i.e. without any intermediate allocation between technology groups) based on the average performance of the individual Facilities during the selected Trading Intervals. The Rule Change Panel notes that during the 10 May 2021 MAC workshop, several stakeholders suggested to allocate the Fleet value between individual facilities based on a larger range of Trading Intervals than the ones driving the outcomes under the Draft RLM.

However, as outlined in section 6.1.8 of the Draft Rule Change Report, the Rule Change Panel does not agree with basing:

- the allocation of the Fleet ELCC on different performance parameters than the ones determining the Fleet ELCC; or
- the CRCs for individual Intermittent Generators on their performance during Trading Intervals that are not high system stress Trading Intervals.

In its second period submission, the ERA suggested that the Delta Method could be applied to allocate the Fleet ELCC between the technology groups. The Rule Change Panel notes that its concern about the technology groups is that an important source of the fleet interaction effect is the diversity within the wind technology group. Therefore, the Rule Change Panel does not agree with any approach that groups all wind farms together without accounting for locational differences.

In its second period submission, AEMO suggested that the Delta Method could be used to allocate the Fleet ELCC between Facility groups that group individual Facilities by technology and location. The Rule Change Panel assessed this alternative by modelling this approach for the 2014/2021 Reference Period. The results of this scenario in comparison to the results of the Draft RLM for the same period are summarised in Figure 15.

Figure 15: Comparison of the Relevant Level for Facilities under the Draft RLM with Facilities grouped by technology and location

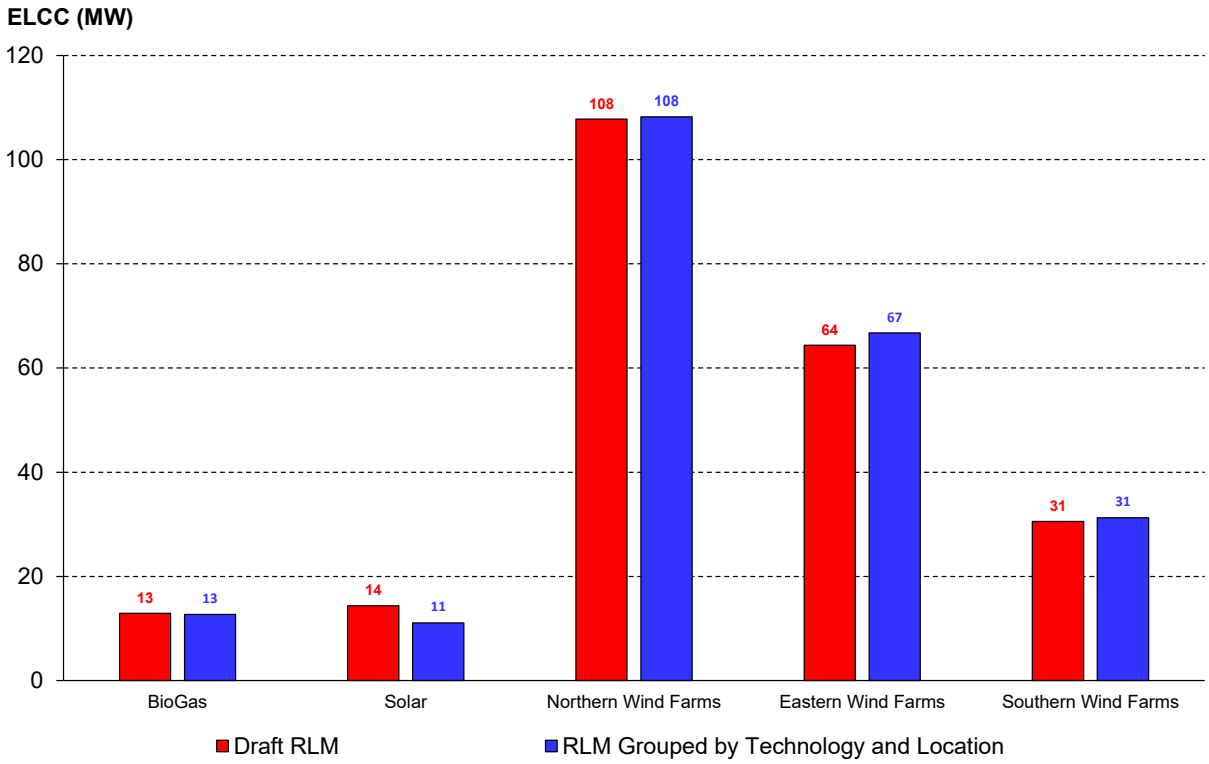


Figure 15 shows that the grouping by technology and location does not markedly affect the individual Relevant Level values. The Rule Change Panel notes that, as outlined in section 2.3.1 of this notice, the wind farms in the SWIS are located in only three regions, with most of the installed capacity located in one region.

2.4.2 Options Suggested by the Rule Change Panel

As indicated in section 2.1 of this notice, the Rule Change Panel considers that if a Facility cannot provide firm (or near firm) capacity, and needs to be assessed using a method like the RLM, then the Facility's capacity value will likely be variable.

The Rule Change Panel notes that it may be possible to reduce the volatility of the Fleet ELCC and individual Relevant Levels without creating the problems discussed above. The remainder of this section 2.4 outlines several possible measures to reduce volatility that could be explored before a final decision is made on the Rule Change Proposal.

The Rule Change Panel notes that any measure that mitigates the volatility of the Draft RLM should:

- be applied for the determination of the Fleet ELCC and the individual Relevant Levels – this is because the Fleet ELCC is driven by the performance of, and interactions between the individual Intermittent Generators (for example, any adjustment that is made after the determination of the Fleet ELCC when allocating the Fleet ELCC to the individual Facilities is likely to invalidate the Fleet ELCC);
- not reduce the risks for Market Participants at the expense of system reliability; and
- not mute the signal incentivising investments in Intermittent Generators that add benefit to the Fleet ELCC by increasing the Fleet's diversity.

The Rule Change Panel notes that, while the measures discussed in the remainder of the section may mitigate the risks of extreme 'outlier' events, some level of volatility risk would inevitably remain.

The Draft RLM shares the volatility risk between the system as a whole (mainly through the risk to system reliability of overestimating the capacity value of the Fleet) and the relevant Market Participants. The risk to Market Participants and investors from changes to their Intermittent Generators' CRCs comes from two sources:

- the small number of high system stress events driving the ELCC calculation results and the extent to which Intermittent Generator performance can vary between events; and
- the effects of underlying changes to the system demand profile and the generation mix, which can materially alter the capacity value of an Intermittent Generator over time.

The Rule Change Panel notes that the extent to which both sources of risk will affect an Intermittent Generator is directly related to the volatility of the Facility's output – the risks are low for a Facility with relatively stable output during periods of high system stress.

Provided that Market Participants can be protected from the extreme impacts of genuine outlier events, they should be able to form a reasonable expectation of the likely range of CRC values they could expect to receive over time for their Intermittent Generator. If Market Participants cannot form such an expectation due to the volatility of their Facility's output, then the Rule Change Panel does not consider it appropriate to use methods that depend on various forms of averaging to shift the risks arising from volatility and saturation away from the causers of that risk.

From a system reliability perspective, the risk is relatively low at present because the penetration of Intermittent Generators in the SWIS is still relatively low – if the entire Fleet failed to perform, the capacity loss would be less than that caused by the failure of the largest Scheduled Generator.[11] However, this risk will continue to grow as the size of the Fleet increases, although the extent will depend to some degree on the diversity of the extended Fleet.

One option that could be considered in future to mitigate the increasing system risk is to adopt the approach used in several American jurisdictions whereby a Market Participant whose Intermittent Generator fails to meet its ELCC 'targets' is liable for penalty payments. While this would not eliminate the volatility risks, it would allocate a greater share of the risks to the causers of those risks and would promote more equitable treatment of intermittent and non-intermittent facilities in the WEM.

If the Coordinator forms the view that the remaining risk from volatility is too great despite the suggested mitigation measures, then this may call into question whether ELCC is an appropriate capacity valuation method for the SWIS at this time, or whether there are too few high system stress data points available to make robust assumptions about the way in which the Intermittent Generators will complement each other during high system stress events (i.e. about the nature and extent of the 'fleet interaction effect'). In this case a simpler, more conservative measure (e.g. a POE-based measure) may be more suitable for the SWIS, as it would likely be less volatile and would not depend on assumptions about wind farm performance and interactions that cannot be made with confidence due to their volatility and the limited number of relevant data points.

[11] This observation is based on the CRCs that would be assigned under the Draft RLM.

2.4.2.1 Adjusting for Super Peak Events

As shown in section 2.3.2 of this notice, an extreme system stress event where the system demand markedly exceeds the forecast 1 in 10 year peak demand, would likely dominate the outcomes of the Draft RLM and markedly reduce the impact of other system stress events that occurred during the reference period. Such an event is extremely unlikely to occur often, and the effect of such an event would likely last for as long as it remains in the reference period, so the Rule Change Panel considers that this constitutes an inappropriate risk for system reliability and Market Participants. Therefore, the Rule Change Panel suggests exploring options to mitigate the impact of such an event, including:

- implementing a cap on system demand so that the DER adjusted system demand can never exceed the forecast 1 in 10 year peak demand for the relevant Capacity Year – this would still allow the event and the associated performance of the Intermittent Generators to be accounted for; and
- providing AEMO with the discretion to remove the event from the input data in its entirety if it considers that the event was caused by extreme weather conditions outside a 1 in 10 year scenario that also affected the output of the Intermittent Generators in a way that was extremely unlikely to reoccur (e.g. a hurricane that prevented wind farms from operating).

2.4.2.2 Eliminate Outliers from Individual Performances

Stakeholders raised concerns that 'bad outlier' performance of an Intermittent Generator during only one of the few system stress events that drives the Draft RLM results can negatively affect a Facility's CRC for a long time. The Rule Change Panel acknowledges this risk and considers that 'good outlier' performance during one of the few system stress events that drives the Draft RLM results could negatively affect system reliability for a long time.

The Rule Change Panel recommends exploring options to mitigate the potentially distortionary effects of outliers, for example by setting a floor and a ceiling for the performance of individual Facilities representing a certain POE of performance during system stress conditions. The Rule Change Panel notes that:

- as outlined in section 2.4.2 of this notice, it is important that such an adjustment is made before the determination of the Fleet ELCC; and
- because the performance of Intermittent Generators may be different under system stress conditions than non-stress conditions, it may be difficult to determine the data set and the POE that is most appropriate to identify outlier performances.

2.4.2.3 Identify Additional Events with Peak Event Conditions

Stakeholders suggested that additional high system stress events could be created by:

1. identifying Non-Business Days with weather conditions similar to high system stress events on Business Days; and
2. scaling or replacing the system demand of those events to represent high system stress events.

The Rule Change Panel recommends exploring this option, but notes that such an approach is complex and will likely require some arbitrary selection of criteria and thresholds for:

- identifying the conditions leading to high system stress; and
- scaling or replacing of the demand for such an artificial event.

The Rule Change Panel considers that, while the approach would likely increase the number of events driving the Fleet ELCC and individual CRCs under the Draft Method, the resulting total number of events is still likely to remain low.

2.4.2.4 Adjusting the Reference Period

Another option that could be considered to reduce volatility of the Fleet ELCC and individual Facility Relevant Levels is to increase the potential number of data points by adjusting the length of the reference period. This could be accomplished by:

- allowing AEMO to set the length of the reference period in a WEM Procedure; or
- setting the start date for the reference period and each year including an additional year to the reference period.

However, the costs for such options would also need to be considered, such as:

- the costs for Market Participants to obtain longer expert reports, and
- the potential for longer reference periods to include years where the demand profile is no longer representative of the current situation in the WEM.

2.5 DER Adjustment of System Demand Profiles

Synergy and AEMO raised concerns in their second period submissions that the system demand profiles used in the RLM may need to be adjusted within the next few years to account for not only the impact of behind-the-meter PV, as required under the Draft RLM, but also for other forms of DER, including the operation of behind-the-meter battery energy storage systems (**BESS**) and electric vehicles (**EV**).

The Rule Change Panel agrees with Synergy's and AEMO's concerns, and recommends that the Coordinator consider additional changes to the proposed Amending Rules to allow AEMO to adjust the system demand profile used in the RLM to reflect the impacts of BESS and EV penetration in the SWIS.

2.6 Grouping of Small Facilities

The Rule Change Panel acknowledges the concerns raised by AEMO in its second period submission about the proposed method of grouping of Non-Scheduled Facilities to allocate the Fleet ELCC using the Delta Method. The Rule Change Panel recommends that the Coordinator undertake further analysis to assess the extent of the potential rounding issues on Non-Scheduled Facilities and whether a better mechanism exists to address the rounding issues. However, the Rule Change Panel notes that it may be challenging to find a better option than the proposed grouping arrangements that can be developed and implemented in time for the 2022 Reserve Capacity Cycle.

The Rule Change Panel considers that the potential rounding issues are also likely to apply to facility upgrades with a nameplate capacity less than 10 MW. The Rule Change Panel recommends that the Coordinator consider options to address this concern, including but not limited to:

- treating facility upgrades with a nameplate capacity of less than 10 MW in the same way as Non-Scheduled Facilities; or
- grouping small Candidates that are upgrades with their parent facility for processing under the Delta Method.

2.7 Timeframe for the RLM

AEMO requested in its first and second period submissions that the Reserve Capacity Mechanism timeframes be extended to give it more time to prepare the inputs for the RLM and to complete the required calculations.

The Rule Change Panel agrees that AEMO is likely to require additional time to complete the new RLM calculations. Therefore, the Rule Change Panel recommends that the Coordinator implements AEMO's suggestion to extend the timeframes for the notification of CRC assignments and subsequent events by 12 days, so that the publication of Capacity Credit and NAQ assignments would fall on the last Business Day on or before 12 October of Year 1 of the Reserve Capacity Cycle.

The Rule Change Panel notes that Synergy was the only Market Participant to respond to the request in the Draft Rule Change Report for stakeholder views on this issue. In its second period submission, Synergy noted that it was supportive of adjusting the RCM timelines for the publication of CRC assignments, but requested that any delay should be kept to a minimum, where possible. In subsequent discussions with RCP Support, Synergy confirmed that it had no concerns with a 12-day extension of the relevant deadlines.

2.8 Publication of Information Relevant to the RLM

The Rule Change Panel acknowledges the concerns raised by Synergy and the Australian Energy Council about the publication of Historical Output values for Intermittent Generators that are derived from independent expert reports; but is not convinced that these concerns outweigh the efficiency and transparency benefits of making the information available to all stakeholders.

However, the Rule Change Panel recommends that the Coordinator consider restricting the publication of Historical Output values to facilities that are assigned Capacity Credits for the current Reserve Capacity Cycle or Early CRC for a future Reserve Capacity Cycle.