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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Submissions on Rule Change Proposals can be sent by:

Email to: support@rcpwa.com.au

Post to: Rule Change Panel
Attn: Executive Officer
C/o Economic Regulation Authority
PO Box 8469
PERTH BC WA 6849

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

Alinta Energy appreciates the opportunity to provide feedback on the proposed reforms to the method for assigning Certified Reserve Capacity to intermittent generators.

Alinta Energy strongly objects to the Rule Change Panel's draft decision to substantively modify the rule change proposal. Alinta Energy considers that the RCP's proposed replacement method represents an abrupt and significant divergence from the method the ERA had developed over three years in close consultation with industry.

Alinta Energy's objection is on the basis that the RCP's proposal will:

- incorrectly value the contribution of intermittent generators to reliability, distorting investment signals, at a time when most new entrants are expected to be

intermittent generators;[1]

- render renewable generators' Capacity Credits extremely and unduly volatile, dissuading any future investment in wind farms, despite the WOSP forecasting that WA needs more investment in wind farms to achieve least cost over the next 10 years;[2] and

- cause perverse outcomes in terms of meeting the Wholesale Market Objectives.

These consequences stem from the fact the draft decision's changes would significantly limit the sample size for calculating both the fleet ELCC and the ELCC for individual generators. Analysis conducted by Endgame Economics on behalf of Alinta Energy demonstrates that the proposed Delta Method would use as few as three observations of a facility's historical output to determine its relevant level.

As a general principle, Alinta Energy considers that with enough data, both the capacity value of the fleet and individual facilities should be relatively stable over time. This is because ELCC is driven by a facility's (or group of facilities') ability to produce energy when the grid is most likely to experience electricity shortfalls;[3] and this would change primarily with variation in the underlying performance of the assets, the demand profile, and the number of generators in the fleet.

The extremely volatile results forecast by the RCP indicate that insufficient data is distorting both the measurements of the fleet and individual generators' capacity values.

To avoid this outcome, ensure the RLM most accurately values the contribution of intermittent generators to reliability, and best promotes the Wholesale Market Objectives, Alinta Energy recommends that the RCP:

- adopt the ERA's proposed allocation method in place of the Delta Method; and

- determine the fleet ELCC as the median of the seven annual fleet ELCC results.

These measures would improve the accuracy of the RLM and avoid the perverse consequences caused by the RCP's proposals by increasing the sample sizes used to calculate the capacity value of the fleet and individual generators.

Alinta Energy outlines these recommendations below. Further justification is provided in section 2 of this submission where Alinta Energy provides a comparative assessment of its recommendations and the Delta Method against the Wholesale Market Objectives.

Alinta Energy objects to the Delta Method, and recommends the RCP adopt ERA's method to allocate the fleet ELCC to individual generators.

Alinta Energy strongly objects to the RCP's draft amendments to the ERA's proposal that would implement the "Delta Method".

[1] Energy Transformation Taskforce, *Whole of System Plan*, August 2020.
[2] Energy Transformation Taskforce, *Whole of System Plan*, August 2020.
[3] S Zachary & CJ Dent, *Probability theory of capacity value of additional generation*, in *Proceedings of the Institution of Mechanical Engineers, Part O: Journal of Risk and Reliability*, vol. 226, 2011, 33–43.

Capacity valuation theory states that an intermittent generator's capacity value should reflect its average expected output during system stress intervals.[4,5]

However, analysis conducted by Endgame Economics on behalf of Alinta Energy indicates that the proposed Delta Method will cause a facility's relevant level to be determined by as few as three observations of its historical output. Three historical observations cannot predict the average expected output during system stress intervals.

Under this method, generators' relevant levels would be extremely volatile and inaccurately represent their capacity value. Given that the underlying capacity value of an intermittent generator should be relatively stable over time, the anomalous results forecast by the RCP indicates that a lack of data is distorting the measurements.

If implemented, the Delta Method would have perverse implications in terms of meeting the Wholesale Market Objectives:

- The volatility and anomalous results would inefficiently dissuade investment in wind generation, undermining competition and putting upward pressure on long term costs.

- The RLM would not signal when intermittent generation is most valuable to the system, undermining reliability, and dynamic efficiency.

- The RCM would discriminate against intermittent generation technologies that reduce greenhouse gas emissions.

To avoid these outcomes, Alinta Energy strongly recommends that the RCP does not adopt the Delta Method and instead implements the ERA's method for allocating the fleet ELCC to individual generators. The ERA's method increases the number of intervals used to forecast a facility's average output during system stress periods. It uses peak demand and peak LSG intervals as proxies for system stress intervals to improve the accuracy of its capacity value assessment.

Alinta Energy considers that peak LSG and peak demand intervals are appropriate proxies for system stress intervals because they have the largest contribution to the annual LOLE of the system.[6]

Alinta Energy recommends that the RCP determine the Fleet ELCC as the median of the annual fleet ELCC results.

As with an individual facility's capacity value, Alinta Energy considers that with sufficient data, the measure of the fleet's capacity value should be relatively stable over time, changing primarily with changes in the demand profile and the number of generators in the fleet.

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[4] S Zachary & CJ Dent, *Probability theory of capacity value of additional generation*, in *Proceedings of the Institution of Mechanical Engineers, Part O: Journal of Risk and Reliability*, vol. 226, 2011, 33–43.
[5] ERA, *Relevant level method review 2018 - Capacity valuation for intermittent generators: Final report*, March 2019, p.13.
[6] ERA, *Relevant level method review 2018: technical appendix*, March 2019, p.57

While Endgame Economics' analysis may raise questions about whether the fleet ELCC model will be as volatile as the Delta Method used to estimate the ELCCs of individual generators, Alinta Energy notes that the fleet ELCC will be less variable than the ELCCs of individual generators because the fleet output is derived from the sum of the outputs of many individual generators. The more numerous the generators in the fleet, the lower the likelihood that a random chance – in the form of very high or very low output from an individual wind farm – will drive the results. Put another way, the relative variation of the sum of output from a large group of intermittent generators will tend to be lower than the relative variation of a single generator.

Alinta Energy recommends the RCP retain the use of the fleet ELCC because it will correct errors in the current RLM, including, how it:

- incorrectly identifies intervals with the lowest capacity surplus; and
- values capacity on an individual facility basis, which can overvalue existing facilities and undervalue new facilities.

However, Alinta Energy considers that steps need to be taken to mitigate some of the volatility arising from the calculation of the fleet ELCC over the whole period. Using whole period results will unnecessarily limit the number of sample periods that form the basis of the fleet ELCC estimate, and so expose it undue volatility.

To expand the number of intervals used to estimate the fleet ELCC and improve its accuracy, Alinta Energy restates the recommendation in its previous submission[7] for the fleet ELCC to be determined as the median of the annual fleet ELCC values for each year of the seven-year review period. This will expand the number of intervals determining the fleet ELCC and will align with the principle that the measures of capacity value should be relatively stable over time.

Alinta Energy disagrees with the RCP's assessment that the intervals determining the annual ELCC of the fleet are irrelevant to estimating the ELCC of the fleet. Alinta Energy would expect that many of conditions in these intervals which caused them to have a relatively higher system stress (e.g. high temperatures) would reoccur and contribute to causing peak system stress intervals in future. To say they are irrelevant would incorrectly conclude that there would be no relationship between these intervals and future system stress intervals.

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

[7] Alinta Energy's submission on the initial rule change proposal is available here.

A summary of the ERA and RCP methods against the Wholesale Market Objectives is contained below:

	Wholesale Market Objective	RCP (Delta) method	ERA method	ERA Method with Alinta's enhancements
(a)	to promote the economically efficient, safe and reliable production and supply of electricity and electricity related services in the South West interconnected system;	X	✓	✓+
(b)	to encourage competition among generators and retailers in the South West interconnected system, including by facilitating efficient entry of new competitors	X	✓	✓+
(c)	to avoid discrimination in that market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or that reduce overall greenhouse gas emissions	X	✓	✓+
(d)	to minimise the long-term cost of electricity supplied to customers from the South West interconnected system; and	X	✓	✓+
(e)	to encourage the taking of measures to manage the amount of electricity used and when it is used.	N/a	N/a	N/a

a) <u>to promote the economically efficient, safe and reliable production and supply of electricity and electricity related services in the South West interconnected system</u>

<u>The Delta Method</u>

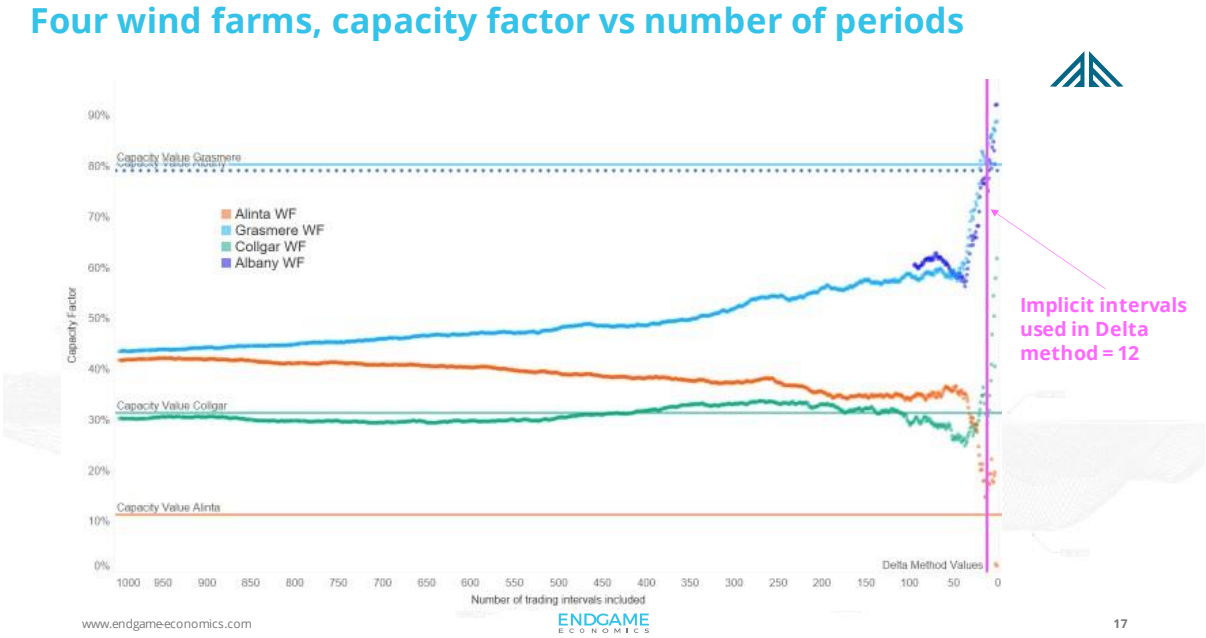
Alinta Energy considers that the proposed Delta Method would not result in economically efficient, safe and reliable production of electricity for the following two reasons.

1. Firstly, the Delta Method would render investment signals extremely volatile and anomalous, disicentivising investment in wind generation, which is expected to be the most efficient source of energy for the SWIS over the next 10 years.[8]

   Endgame Economics' analysis demonstrates that under the Delta Method, an intermittent generator's relevant level will be based on as few as three observations over seven years. As illustrated by the chart below, Endgame Economics found that generators' results under the Delta Method were roughly equivalent to their average output during the top 12 peak demand intervals over

[8] Energy Transformation Taskforce, *Whole of System Plan*, August 2020.

the seven-year period. These 12 intervals were from only three separate days: 8 February 2016, 14 March, 2016 and 4 February 2020.



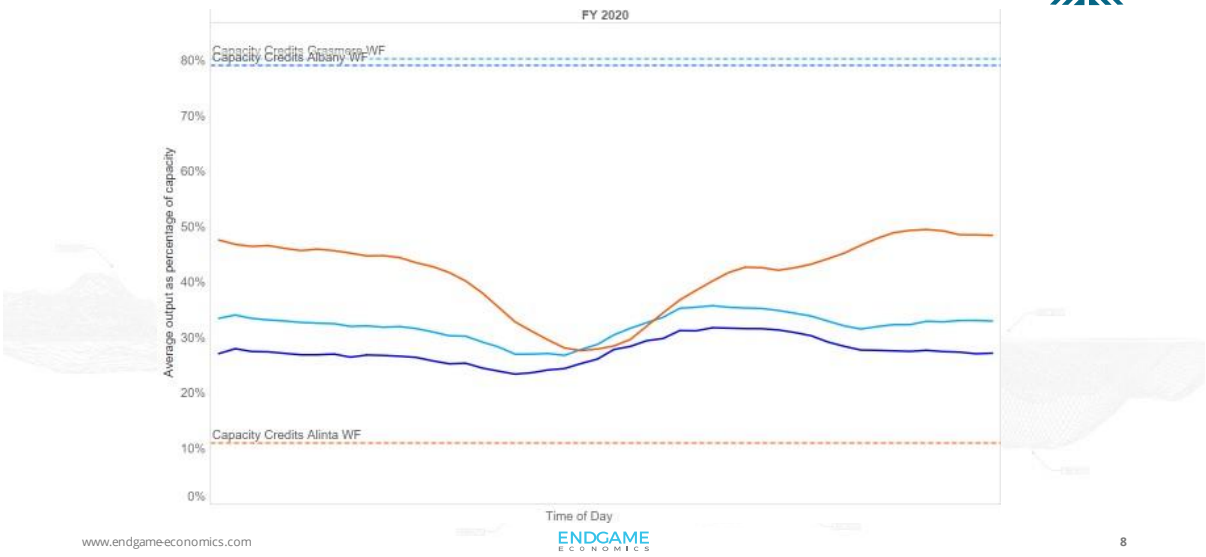
RCP's forecasts indicate that this extremely small sample size would have enormous and anomalous consequences for intermittent generator's Capacity Credits:

- Albany and Grasmere would receive relevant levels indicating they have near-firm capacity factors of ~80%.

- Grasmere Wind Farm (13.8 MW) would have a relevant level comparable to Walkaway Wind Farm (89.1 MW) despite being a sixth of the size.

- Generators would receive relevant levels that are vastly different from what their average profiles of output suggest. For example, Endgame Economics' graph below shows that under the Delta Method, Alinta_WWF would receive significantly lower Capacity Credits than Albany_WF, even though it has a higher average capacity factor at every time in an average day.

Albany and Grasmere versus Walkaway WF, capacity via Delta Method (2019-20)



Capacity Credits are a primary investment signal for investment in generation. To secure financing, investors require a broad understanding of the minimum level of Capacity Credits they are likely to receive. Alinta Energy suggests that investors could not tolerate the risk of their revenue being driven by anomalously low results.

Nor could investors hedge against this risk. Endgame Economics' chart above shows that a generator who achieves a relatively high capacity factor at all times of day will not receive relatively higher Capacity Credits. Further, given the small sample size, the small number of periods that determine a generator's relevant level will likely change frequently and drastically, meaning investors could not predict when an intermittent generator's output would be highly valued and therefore what location would maximise its returns.

Disincetivising investment in wind generation would significantly impact the efficiency of electricity generation in the current context of the SWIS. As forecast by the WOSP, wind generation will be the most efficient source of new capacity in the SWIS over the next 10 years. Consequently, underinvestment in wind generation will cause the SWIS to fail to achieve least cost outcomes.

2. Secondly, the Delta Method would not accurately signal when intermittent generation is most valuable to the system, undermining reliability, and dynamic efficiency.

   Even if an investor can tolerate the risk of anomalously low capacity revenue and commits to a project, the Delta Method would not indicate where that project should be situated to maximise benefits for the system. This is because the small sample size used by the Delta Method would not reliably predict when capacity will be valuable in the future. Instead, these periods will likely vary significantly despite the underlying needs of the system changing more gradually. Consequently, the RLM will not incentivise new entrants to locate in areas that maximise reliability.

The ERA's method

Alinta Energy considers that the ERA's method will avoid these outcomes and therefore better promote the economically efficient and reliable production of electricity by broadening the sample size used to estimate the capacity value of individual generators.

Whereas the Delta Method may use as few as three observations during system stress intervals to estimate a generator's capacity value, the ERA method would use for each year in the seven-year review period, the 12 Trading Intervals occurring on separate Trading Days with the highest Scaled Demand; and the 12 Trading Intervals occurring on separate Trading Days with the highest Residual Demand. This equates to 168 intervals on separate trading days.

Alinta Energy considers the ERA's broader sample size will significantly improve the accuracy of the RLM and the investment signals it sends. A larger sample size decreases uncertainty and increases the confidence of estimates.

Alinta Energy considers that peak LSG and peak demand intervals are appropriate proxies for system stress intervals because they have the largest contribution to the annual LOLE of the system.[9]

Compared to the Delta Method, the more accurate estimate produced by the ERA's proposed method would avoid inefficiently disicentivising wind generation by reducing the riskiness of future projects' potential capacity revenue.

The less volatile ERA method would also more reliably signal where generation can maximise its contribution to reliability.

Alinta Energy's proposed amendment to the calculation of the Fleet ELCC

Alinta Energy does not support determining the ELCC of the fleet as the Whole Period ELCC.

Although Alinta Energy considers that the ELCC of the fleet will be less variable and more accurate than the ELCC of an individual generator, Alinta Energy is concerned that like the ELCC of an individual generator calculated over a seven-year period, the Whole Period ELCC of the fleet could be determined by an inappropriately small sample size. This could over- or undervalue the fleet, cause an over- or under-procurement of capacity, and ultimately impact the efficiency and the reliability of the system.

To avoid these outcomes, and improve the reforms' achievement of Wholesale Market Objective (a), Alinta Energy recommends that the fleet ELCC be determined as the median of the annual fleet ELCC values for the seven-year review period.

This would improve the accuracy of the fleet ELCC by increasing the number of intervals used to calculate it. Whereas the Whole Period ELCC of the fleet may be determined by a small number of intervals over the seven-year period, the annual ELCC will be determined by the highest system stress intervals of each year in the seven-year period. As a result, the median of the annual values will be determined by

[9] ERA, *Relevant level method review 2018: technical appendix*, March 2019, p.57

a much greater sample size and be less prone to being skewed by outliers and over- or under-valuing the capacity value of the fleet.

This contributes to reliability and efficiency by mitigating the risk of the Reserve Capacity Price signaling an over- or under-procurement of capacity.

Alinta Energy disagrees with the RCP's assessment that the intervals determining the annual ELCC of the fleet are irrelevant to estimating the ELCC of the fleet. Alinta Energy would expect that many of the conditions in these intervals which caused them to have a relatively higher system stress would reoccur and contribute to causing peak system stress intervals in future. To say they are irrelevant would incorrectly conclude that there would be no relationship between these intervals and future system stress intervals. Consequently, Alinta Energy considers that omitting the annual peak system stress intervals unnecessarily limits the sample size used to calculate the fleet ELCC, exposing it to being skewed by outliers.

Alinta Energy suggests that volatile results for the ELCC of the fleet would indicate that a lack of data is distorting the outputs, and not that the capacity value of the fleet is volatile. This is because over a longer period, with more data, the capacity value of intermittent generators would change more gradually; for example, at the rate at the performance of the assets deteriorate, or at the rate at which increasing solar PV gradually shifts the periods when the system typically experiences the most system stress.

In the absence of more system stress interval data, the intervals determining the annual ELCC of the fleet over the seven-year period will serve as the best proxies, considering they will be the next highest system stress intervals after those used to determine the Whole Period Fleet ELCC.

(b) to encourage competition among generators and retailers in the South West interconnected system, including by facilitating efficient entry of new competitors;

The Delta Method

Alinta Energy considers that the Delta Method would present barriers to new competitors, rather than facilitating their entry.

As discussed above, under the Delta Method, a facility's Capacity Credits are determined by an extremely small sample size and are therefore exposed to anomalous results. Given the importance of capacity revenue to recovering a generator's costs, Alinta Energy considers that this risk would prevent many potential new entrants from securing finance and entering the market.

The impact of this barrier to entry on competition would be particularly pronounced in the current context of the SWIS, given most new entrants are expected to be intermittent generators.[10]

The ERA method

By comparison, the ERA method would avoid creating this barrier to entry by increasing the sample size used to determine a facility's Capacity Credits. This larger

[10] Energy Transformation Taskforce, *Whole of System Plan*, August 2020.

sample size would mitigate the risk that a new competitor receives anomalously low capacity revenue, improving its prospects of securing financing and entering the market.

Alinta Energy's proposed amendment to the calculation of the Fleet ELCC

Alinta Energy's proposed amendment to determine the fleet ELCC as the median of the annual fleet ELCC results would further improve competition by mitigating the risk that the full period ELCC is skewed and overvalues the fleet, setting an artificially low Reserve Capacity Price that inefficiently discourages new entry.

Additionally, Alinta Energy's proposed amendment would likely reduce the volatility of intermittent generators' Capacity Credits, potentially making it easier for new competitors to secure financing and enter the market.

(c) to avoid discrimination in that market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or that reduce overall greenhouse gas emissions;

The Delta Method

Alinta Energy considers that the Delta Method would discriminate against technologies, including intermittent renewable generators that reduce greenhouse gas emissions.

By determining intermittent generators' Capacity Credits based on as few as three observations, the Delta Method may assign many generators relevant levels that significantly undervalue their contribution to reliability relative to that of scheduled generators and their accreditation.

The ERA method

The ERA's method would mitigate this risk and better support this Wholesale Market Objective by increasing the sample size used to calculate intermittent generators' relevant levels. This would ensure their assigned relevant level better reflects their average output during system stress periods and therefore their contribution to reliability relative to scheduled generators.

Alinta Energy's proposed amendment to the calculation of the Fleet ELCC

Alinta Energy's proposed amendment would further improve the reform's alignment with this Wholesale Market Objective. By increasing the sample size of intervals used to determine the ELCC of the fleet, this amendment would mitigate the risk that outlying results skew the relevant level of the fleet and cause it to undervalue the fleet's contribution to reliability.

(d) to minimise the long-term cost of electricity supplied to customers from the South West interconnected system; and

The Delta Method

For the reasons discussed in relation to objectives (a), (b), and (c) Alinta Energy

considers that the Delta Method would disincentivise investment in large scale wind generation. This would cause the reforms to fail to to minimise the long-term cost of electricity supplied to customers from the SWIS, considering that wind farms are expected to be the least cost sources of electricity for the SWIS over the next 10 years.

The ERA method

The ERA method would avoid this outcome by increasing the sample size used by the RLM and thereby mitigating the unnecessary risks to intermittent generators' capacity revenue that would otherwise present a significant barrier to their entry.

Alinta Energy's proposed amendment to the calculation of the Fleet ELCC

Alinta Energy's proposed amendment would improve the proposed reforms' performance against this objective by further reducing unnecessary volatility in the RLM that could otherwise:

- set the reserve capacity price artificially high, dissuading the entrance of cheaper renewable energy; or
- disincentivise new entrant intermittent generators due to the perceived risks to their future capacity revenue.

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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.

See below.

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

Alinta Energy anticipates that the costs and operational changes required to implement the proposed reforms will be negligible. Alinta Energy therefore recommends that the RCP focus its considerations on the issues that Alinta Energy has raised in relation to the previous questions of this form.
