Electricity Market Advisory Services

Reserve Capacity Mechanism Review - Consultation Paper

An information paper prepared in response to Energy Policy WA's Consultation Paper (Stage 2)

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1. Introduction

Electricity Market Advisory Services (EMAS) welcomes the opportunity to respond to Energy Policy WA's (EPWA's) *Reserve Capacity Mechanism Review – Information Paper (Stage 1) and Consultation Paper (Stage 2)*. This response specifically relates to changes to the Wholesale Electricity Market's (WEM's) Individual Reserve Capacity Requirement (IRCR) mechanism discussed in Chapter 3 of EPWA's consultation paper.

EMAS is a specialist consultancy firm with expertise in energy market modelling. Our team has extensive experience in working with WEM participants to optimize their IRCR position, which has informed the issues raised in this response.

KEY POINTS

In broad terms, our recommendation is for EPWA to adopt an ex-ante design for both the peak and flexible IRCR mechanisms. Under an ex-ante design, AEMO would nominate trading intervals for inclusion in the peak or flexible IRCR calculation some hours before the event occurs, providing time for market participants to coordinate their response.

Our rationale is that an ex-ante design will reduce the cost and uncertainty for market participants to interact with the IRCR mechanisms, resulting in a larger number of market participants responding than would be achieved with an ex-post design. Critically, a larger and coordinated IRCR response will benefit all consumers in the WEM by reducing the Reserve Capacity Requirement (RCR), leading to a lower Reserve Capacity Price (RCP).

In relation to the flexible IRCR product, we propose a minor alteration to the calculation proposed by EPWA to remove any incentive to temporarily constrain behind the meter generation.

NEXT STEPS

For any further information or clarification of topics presented in this paper please contact the EMAS team at contact@electricitymarketadvisory.com

2. IRCR for Peak Capacity

2.1. Overview

The IRCR mechanism for peak capacity is used to allocate the cost of procuring reserve capacity between market participants. The apportionment is dependent on each customer's relative consumption during a small number of trading intervals, as a proxy for each customer's contribution to the total RCR. A small but significant number of market participants actively constrain their electricity consumption from the WEM during trading intervals they expect will be used to calculate IRCR. By reducing consumption from the WEM in these intervals, participants lower their own IRCR, and contribute to a lower total RCR for all participants.

The purpose of this chapter is to provide information on how the options presented by EPWA in Proposal B and Proposal C will likely impact the incentive for market participants to respond to the peak IRCR mechanism. Given the incentives, an ex-ante design will reduce the costs and uncertainty for market participants to interact with the peak IRCR mechanism, resulting in a greater reduction in the total RCR than would be delivered under any ex-post design. Under the existing RCP formula, a lower RCR will translate into a lower RCP, benefiting all consumers in the WEM.

2.2. Costs and benefits of IRCR response

Market participants base their decision to engage in IRCR reduction activities on the expected costs and benefits of planning and implementing demand management. The benefits of a lower IRCR liability are directly related to the unit price of reserve capacity. Costs are determined by the approach used to achieve lower electricity consumption from the WEM. Generally speaking, market participants either:

1. shut down electricity consuming processes, incurring an opportunity cost of any lost production associated with those processes.
2. switch to alternative behind-the-meter electricity sources. Historically this has been high-cost on-site generation, but battery storage options are becoming increasingly cost effective.

The cost of performing an IRCR reduction is a function of the approach used to lower consumption and the number of days/intervals selected for inclusion in the IRCR calculation. If the total number of days/intervals is increased, cost benefit ratio of responding will decrease, resulting in a lower aggregate IRCR response by market participants.

2.3. Ex-ante versus ex-post interval selection

A key difference in the options presented by EPWA is whether IRCR intervals are selected on an ex-ante or ex-post basis. Under an ex-ante design, AEMO would nominate trading intervals for inclusion in the IRCR calculation some hours before the event occurs.

The two key reasons for adopting an ex-ante design are discussed in detail below.

MINIMIZING FALSE POSITIVE RESPONSES

False positive responses are those instances where a market participant has engaged in an IRCR response during trading intervals that are ultimately not used for the purposes of determining their IRCR liability. The market participant incurs the costs outlined in Section 2.2 but for no benefit in reducing their IRCR liability. The potential for a high false positive rate is a significant disincentive for market participants to actively manage their IRCR liability. Reducing the false positive rate will increase the number of participants delivering an IRCR response, contributing to a lower total RCR.

In our experience, a market participant's tolerance for false positives is primarily determined by whether they are shutting down production processes or switching to behind-the-meter generation to achieve a reduction in their WEM consumption.

An ex-ante design removes the risk of false positive responses as market participants can be sure that if a trading interval is nominated by AEMO then it will be used to determine IRCR liability.

In their evaluation of the ex-ante design EPWA discusses the challenges associated with forecasting peak trading intervals[1] and the potential for false positives. Critically, the ex-ante approach explicitly shifts this responsibility from market participants to AEMO who, we believe, are far better placed to perform the necessary modelling than most market participants.

[1] EPWA (2023) Reserve Capacity Mechanism Review – Information Paper (Stage 1) and Consultation Paper (Stage 2), Page 49

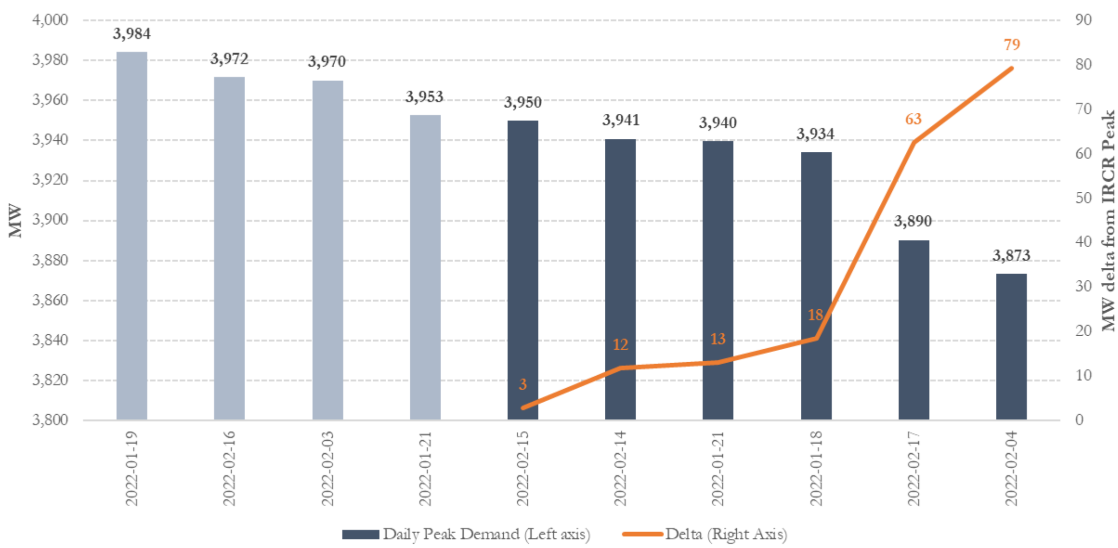
Crowding-out Effects

When trading intervals are selected for calculating IRCR using peak demand on an ex-post design, a crowding-out effect occurs when a sufficient number of participants respond simultaneously. By responding to the same potential peak demand event, demand decreases, and it becomes unlikely that those trading intervals will be used for the purpose of calculating IRCR.

AEMO has estimated that up to 192MW of IRCR reduction has been observed in the WEM[2]. Given the characteristics of high load periods discussed in Section 3.2.3 of EPWA's consultation paper, deployment of part of the fleet IRCR capability would likely result in a change to which intervals are identified as peak.

By way of example, Figure 1 illustrates the daily peak demand in the WEM in 2021/22. It is unclear what the IRCR response was in any of the intervals listed in Figure 1. However, only a small change in total IRCR response would be required to change the ordering of peak demand days.

Figure 1: WEM Daily peak demand (TT30GEN) in 2022, top 10 days



This creates a dilemma for market participants predicting whether an upcoming peak demand event is likely to be used for the purpose of calculating IRCR. Under an ex-post design, participants are implicitly attempting to predict whether other participants will also be making an IRCR response, rather than directly responding in a way to minimize the RCR. This effect is not present in the ex-ante approach.

2 AEMO (2021) WEM ESOO Supplementary Analysis. https://aemo.com.au/-/media/files/electricity/wem/planning_and_forecasting/esoo/2021/2021-wem-esoo-ircr-analysis.pdf

2.4. Proposed ex-ante operating methodology

To address the operational challenges of the ex-ante methodology noted by EPWA, and to maximize the incentive for participation in IRCR reduction by market participants, we propose the following interval selection and operational methodology:

- AEMO provides notification of the probability that an IRCR event will occur with 48, 24, 12, and 6 hours notice. This provides time for market participants to coordinate a response, while still allowing for changes to weather and market conditions. These notifications are not binding and AEMO may cancel a notice.
- AEMO provides a final binding notification two hours ahead that an IRCR event will be occurring.
- AEMO may select between four and six unique days throughout the hot season, and four contiguous trading intervals on each unique day. While we are recommending an increase in the number of days available, market participants operating under the current ex-post design would, on average, trigger their IRCR reduction response on more than six days in order to ensure they capture all potential peak days.
- EPWA perform an annual quantitative assessment of the quantity of IRCR response achieved, informed by analysis of meter data and feedback from retailers that provide IRCR reduction advice to their customers.
- Market participant IRCR is determined based on the mean (not median) load during the selected trading intervals. This should remove any incentive by market participants to ignore notifications towards the end of the hot season.

Periodic reviews of the number of days, number of intervals, and notice period should take place to validate that the chosen parameter settings achieve an optimal IRCR response.

2.5. EPWA comparison of IRCR approaches

In Section 3.3.2 and Table 4 of the Consultation Paper, EPWA provides a qualitative comparison of the peak IRCR options. A response to select items is presented in the table below.

Table 1: Response to qualitative comparison of peak IRCR options

EPWA	Response
[Goal 8] - Can be replicated by potential investors and other stakeholders.	The ex-ante approach is scored one out of four on this goal. We disagree with this evaluation. Replicating the ex-ante approach in forward looking modelling becomes simpler than any ex-post design, as IRCR responses will only occur during nominated trading intervals.
[Goal 9] Is predictable so it incentivises effective load management during system stress events.	The ex-ante approach is scored one out of four on this goal. In our experience of peak demand forecasting in the WEM, the current (ex-post) IRCR mechanism increases peak demand variability as the quantity of the response is dependent on the accuracy of weather forecasts and the issues discussed in section 2.3. An ex-ante design would remove such variability.
[Page 51] "Options 2 and 3 are less directly related to the way the RCR is calculated, and so the signal they provide is less likely to result in a reduction in the RCR"	If the quantity of the peak IRCR response was consistent under all options, then we would concur with EPWA's assessment. However, the ex-ante approach will likely deliver a significantly greater peak IRCR response than any ex-post alternative, delivering a greater reduction to the RCR.

3. IRCR for Flexible Capacity

3.1. Overview

The proposed IRCR for flexible capacity will provide a mechanism for allocating costs between market participants based on their contribution to the evening ramp. We expect the flexible IRCR mechanism will primarily impact market participants with a high proportion of behind-the-meter photovoltaic solar capacity.

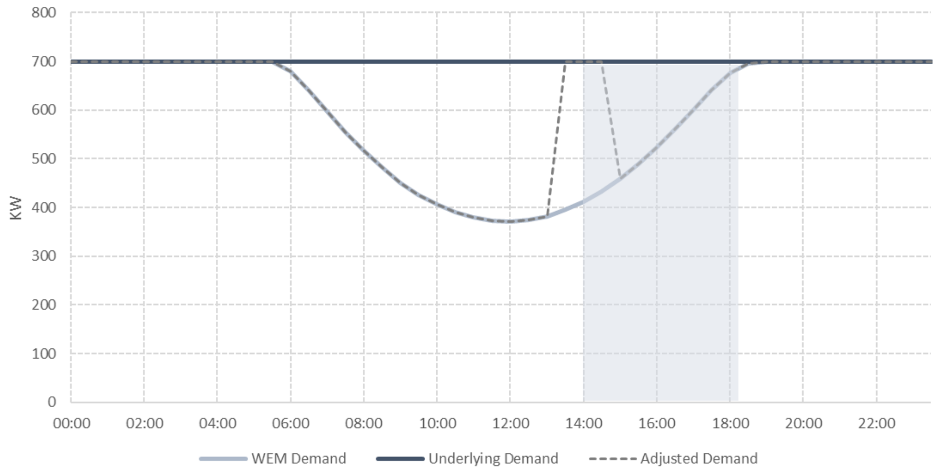
For the same reasons outlined in Section 2, we recommend the flexible IRCR mechanism also adopt an ex-ante design.

3.2. Proposed Method for Flexible Capacity IRCR - Request for clarification

In Section 3.3.2 of the consultation paper, EPWA set out the proposed mechanism for determining a market participant's flexible IRCR liability. Step 4A requires calculating the ramp contribution on a given day as the difference between consumption at the start of the earliest selected trading interval and the end of the latest selected trading interval.

At face value, the proposed mechanism would appear to incentivize market participants to temporarily isolate any behind-the-meter photovoltaic generation capacity to increase consumption from the WEM, so that the difference between the start and end values is reduced. A stylized example is illustrated in Figure 2 for a market participant with a flat load profile but with significant photovoltaic capacity. By temporarily reducing photovoltaic solar capacity between 13:30 and 14:30, the market participant is able to achieve a zero flexible IRCR liability.

FIGURE 2: STYLIZED DEMAND PROFILE WITH ACTION TO AVOID EVENING RAMPING



The incentive to perform such an action would be dependent on the flexible RCR price and balancing prices in the middle of the day.

While the behavioral response results in a lower flexible IRCR for the individual market participant, it does not reduce the afternoon ramp, and may introduce undesirable volatility into the WEM.

As a solution, we recommend revising the calculation from being the difference between only the start and end values of the four-hour window, to the average (mean) difference between all contiguous trading intervals during the four hour window. While a more complex calculation, the additional step would remove any incentive to temporarily constrain behind the meter generation.