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4 May 2023

Reliability Panel Review of the Reliability Standard and Administered Price Cap: Issues Paper

The Australian Energy Council (AEC) welcomes the opportunity to make a submission in response to the Reliability Panel Review of the Reliability Standard and Administered Price Cap: Issues Paper.

The AEC is the peak industry body for electricity and downstream natural gas businesses operating in the competitive wholesale and retail energy markets. AEC members generate and sell energy to over 10 million homes and businesses and are major investors in renewable energy generation. The AEC supports reaching net-zero by 2050 as well as a 55 per cent emissions reduction target by 2035 and is committed to delivering the energy transition for the benefit of consumers.

The Panel has reviewed the form of the standard many times and found it to be a superior expression compared to all alternatives of the economic trade-off of additional supply versus customer interruption. The issues around extreme "tail risks" raised in the paper have also been considered in those earlier reviews and the AEC sees no reason a different conclusion would be reached now. Indeed, the USE form captures the economic impact of extreme events better and more objectively than the most used alternatives overseas.

The AEC considers the Australian Energy Regulator's (AER) calculation of the Value of Customer Reliability (VCR) to be the most robust available and is appropriate to the rotational load shedding which results from reliability shortfall. This is not expected to change with the changing power system. It already captures a full spread of duration of outages which adequately covers widespread and extended rotational load shedding events.

Whilst the changes in the power system require new simulation approaches to accurately predict USE, it does not follow that a new form of outcome standard is required. In any case, it is not until the simulation models are updated to properly describe the new power system can the Panel approach the question of what form of reliability standard should be used.

Continuity of supply to customers involves a chain of aspects of power system performance, and all the links must perform to avoid an interruption. The only aspect to which the reliability standard applies, adequacy of upstream energy to meet bulk demand, is already the strongest link in that chain. Customer outcomes will not observably improve by further strengthening this link.

Reliability Risks versus other risks of customer interruption

When considering the form of reliability standard, it is important to remember that it only applies to *reliability* events, not *security* events or local network outages. The Issues Paper correctly notes this but does not put in context the consequences of this limited scope.

In terms of their adverse impacts on customers, *reliability* events are dwarfed by the other two, in both:

- The absolute amount of energy interrupted – as clearly evidenced by the Panel's annual reviews comparing reliability USE to other causes; and
- The impact of each event when it does occur, as the rotational load-shedding caused by reliability events has less adverse impact on customers than those that arise from uncontrollable *security* and network events.

Level 14, 50 Market Street
Melbourne 3000
GPO Box 1823 Melbourne Victoria 3001

P +61 3 9205 3100
E info@energycouncil.com.au
W energycouncil.com.au

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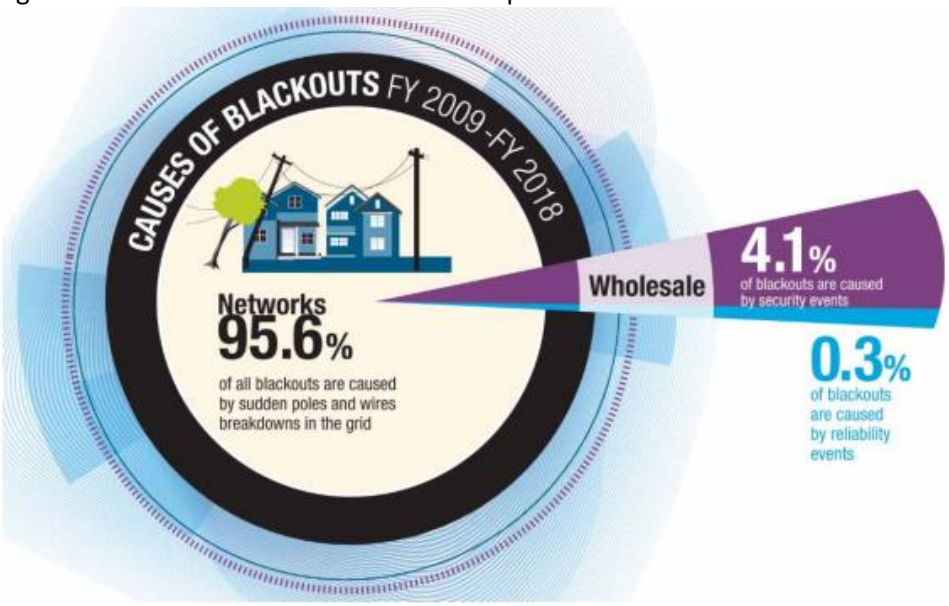
Figure: Relative causes of customer interruption



Source: Reliability Panel fact sheet on the Reliability Standard

Reliability events have a controllable characteristic where the market operator can instruct quantities of load to be shed in rotation. Feeders without critical loads are rotated over a period of 40-60 minutes. This approach shares the burden thereby causing the least individual harm, such as averting loss of refrigerated produce. Furthermore, although not in all cases, there is the prospect of at least some warning of a risk of load shedding is possible allows some customer preparation.

These characteristics should be considered against the customer impacts of the more material forms of customer interruption, being local network and *security* events:

- Network outages often extend for multiple hours, and sometimes multiple days. Whilst a 60-minute reliability rotational load shed presents an inconvenience for customers, an extended loss of local supply from network failure will effectively suspend all community activity in the affected area and cause considerable loss of goods.
- In security events, interruption occurs very widely and indiscriminately, including sensitive loads. The widespread nature of a security event such as a system black or under-frequency load-shedding have community-wide impacts and in some cases have even provoked civil unrest.
- In both cases, there is little or no ability to forecast interruption, nor restoration, as there is in rotational load-shedding.

The VCR surveyed by AER contemplates all forms of supply interruption and is naturally dominated by local network outages. There is good reason to expect that the weighted average approach over-states the true inconvenience and cost of the form of interruption that results from *reliability* events, being rotational load shedding.

Tail Risk and USE

The power system has always been potentially subject to high impact but low probability events. A power system may go many years without a reliability event, and then have a severe one. This occurs both in reality and in monte-carlo simulation of a traditional power system. However, there is no reason to suggest that this characteristic of the "bunching" of rotational load shedding in individual years does more economic harm to customers than one which spreads it evenly.

Level 14, 50 Market Street
Melbourne 3000
GPO Box 1823 Melbourne Victoria 3001

P +61 3 9205 3100
E info@energycouncil.com.au
W energycouncil.com.au

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The widespread community impact of a major *security* event may have a detriment beyond the accumulated cost of the consumer interruptions themselves. However, this should not be confused with the rotational load-shedding that results from a severe *reliability* event. As a reliability event becomes more severe, the only change is that a greater number of customers experience rotational load-shedding. The controlled nature of rotational load-shedding means that the economic impact on customers will increase only *linearly* with the amount of USE.

Or in other words, the economic harm of 10 GWh of rotational load-shed USE in one year is the same as 1 GWh every year for ten years. The Issues Paper presumes that this is not the case but has provided no explanation as to why it would be.

New Modelling Approaches

The Issues Paper makes claims that historically the risk of USE in the NEM followed a normal distribution. This is incorrect. A conventional system's supply side risk is typically modelled with independent unit forced outages – and the tail end of combinations of outages has a broadly normal shape. However, customers have never behaved as independent variables. Demand has always responded to highly correlated weather and community activity patterns (time of day/holiday etc). Thus, demand has never demonstrated a normal distribution and as a result, nor has the tail of USE. Modellers have however overcome this with their simulations capturing a wide spread of demand traces weighted to their probabilities.

A supply dominated by wind and solar presents the same forecasting challenge as the historical circumstance of forecasting demand. As random forced unit outages decline in relevance, the critical task becomes that of determining realistic traces of solar and wind, including their levels of geographical correlation. These are the same challenges that have always existed with respect to forecasting demand.

A feature of future reliability forecasting that has not been a high focus historically in the NEM is that driven by energy shortfalls as the NEM was historically a capacity-limited system. This is discussed in the Paper. There are however many overseas energy-limited systems from which analysis techniques can be drawn.

The AEC concurs that the process of reliability analysis will require considerable evolution with the transitioning power system. However, this is a *modelling* challenge. Changes in modelling approach do not invalidate the form of reliability standard which relates to the economic impact on customers of accumulated rotational load-shedding.

Tail Risks may actually decline in a variable renewable future

The Issues Paper has emphasised an assumption that periods of still-dark conditions will tend to congregate USE in very rare very severe events. However, a reverse narrative also exists.

Dark-still events that bring the NEM's total wind and solar generation to a very small percentage of its full capacity are not rare, they are observed many times a year. Hence because of these common events, it is reasonable to assume an adequately invested power system includes enough firm capacity to at least meet the frequent event of high demand without material contribution from wind and solar.

Having agreed this, the determination of reliability can revert to a more traditional analysis of the risk of forced outage in the "backup" firm capacity fleet. However, this future firm capacity has a reliability advantage over traditional sources in that unit sizes are smaller. Gas, hydro, batteries and demand-side response have much smaller units sizes than coal, which means the distribution of loss of capacity from multiple forced outages will be much tighter.

In turn this should lessen the tail of the USE distribution.

Level 14, 50 Market Street
Melbourne 3000
GPO Box 1823 Melbourne Victoria 3001

P +61 3 9205 3100
E info@energycouncil.com.au
W energycouncil.com.au

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Existing Value of Customer Reliability remains appropriate

Section 3.6 and 3.7 of the Issues Paper calls into question the appropriateness of the VCR that has been collected by the AER. Whilst of course it is impossible to ever collect a perfect indication of the economic impact of customer interruption, the AEC posits that the AER's figure has been developed more carefully and objectively than any other value. It has also remained relatively consistent with its predecessors which gives some confidence in the survey technique. The AEC is concerned that the Paper seems to imply other values would be more appropriate, a view that seems based purely on hypothesis and anecdote.

Section 3.7 has unreasonably suggested a single-figure VCR will become incorrect as the distribution of USE changes as VCR changes with the length of a blackout. The AEC disagrees:

- Firstly, the AER's VCR calculation assesses all forms of outages, who use it for network expenditure justification. These outages have a wide range of durations, from momentary to multiple days. The AER publishes a value for different time periods as well as a weighted average. It is up to the modeller to choose which value is most appropriate for the form of interruption that it is modelling.
- Secondly, the changes in the power system that are claimed to lead to a "bunching" of reliability USE do not change the way customers experience rotational load-shedding. Outages will still be of a 40-60-minute characteristic, even if more customers experience them at the same time. Hence the existing simplification of using a single value will introduce no additional inaccuracy over time.

Other forms of standard

Previous reviews of the USE standard have favourably compared it with the most common overseas alternatives, Loss of Load Expectation/Probability/Hours (LoLP/LoLE/LoLH). These metrics only identify one dimension of the question, how frequently an event occurs, but not how *deep* it is. In contrast, USE elegantly assesses both dimensions, frequency and severity, in the one value.

Assuming the Paper is correct in suggesting the changing power system will lead to a wider distribution of reliability events, then the limitations of these other approaches become more problematic. They will tend to become anti-conservative as events become rarer but more extreme.

Section 4.2 of the Paper notes work by the Energy Systems Integration Group (ESIG) on the need to adapt metrics with the power system. However, this ESIG work relates to the alternative techniques described above that only focus on the frequency of events. It seems likely that that recommendation from ESIG is that these other power systems should move from these metrics to a total energy lost metric, such as the NEM's USE standard.

Whilst the AEC does not consider the current form to be inappropriate, it seems clear that the most commonly used alternatives would exacerbate rather than resolve the concerns that have led to this review.

In respect to the Panel's earlier desire to accommodate a "tail risk metric", the Panel should first look to the existing standard, which appears quite capable of capturing the objective economic impact of rare but severe rotational load-shedding events. Of concern to the AEC is that metrics associated with shrinking the tail will result in a lower average USE, implying customer expense beyond the economically justifiable level over time.

Administered Price Cap

The AEC has written several submissions regarding the APC. The first of these was to the Reliability Panel's (**Panel**) *2022 Reliability Standard and Settings Review Issues Paper* in early March 2022.[1] In this submission the AEC called on the Panel to substantially increase the APC simply on the basis of inflation having eroded

[1] https://www.energycouncil.com.au/media/aeyfue3k/20220303-aec-submission-to-rel0082-2022-reliabilty-standards-and-settings-review-final.pdf

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half of its original real dollar value. In subsequent submissions to the Panel and the AEMC (Alinta rule change) we expanded our analysis to support increasing the APC (eg, the gas APC linkage to electricity prices).[2]

The success of Alinta's rule change to to increase the APC to $600/MWh until 30 June 2025 has largely resolved the problem of an inadequate APC level. In that process the AEMC's Consultation paper clearly illustrated with $42/GJ delivered gas prices, 7,000 MWs of derated dispatchable thermal generation has a Short-Run-Marginal-Cost (SRMC) at the current $300/MWh APC.[3] At an APC of $600/MWh this reduces to just under 3,000 MWs to 3,500 MWs.

In contrast the Panel has recommended reducing the APC to $500/MWh from 1 July 2025[4] even though the AEMC noted in its Directions paper for the Alinta rule change that, had the APC been escalated by CPI it would now be $592/MWh.[5] Despite this incongruity CPI indexation is one of the options in the Issues paper.

While the level of the APC is not the subject of this review, the AEC believes the $600/MWh APC negates the perceived need to have a dynamically determined APC. All this would achieve is to add unnecessary complexity to resolve a relatively straight forward problem. In the AEC's view the key criteria for the APC are as follows:

1) Set at a value that is extremely unlikely to be exceeded but no more than is needed. This also reduces the unhedgeable risk for retailers and ultimately consumers (ie, the generator compensation cost recovery).
2) To support long term decision making and contract markets it needs to provide certainty over a period of years and only subject to incremental change at Panel RSS reviews.
3) At Panel RSS reviews consideration can be given to historical CPI indexation and/or ratio to the prevailing MPC. For example, in 2008, the AEMC noted that a $300/MWh APC only represented three per cent of the Value of Lost Load (VoLL)[6] price at the time ($10,000/MWh). Based on the Panel's recommended MPCs for 2025-2028, a $600/MWh APC represents 3.1 per cent of the average MPC of $19,500 whereas at $500/MWh APC it is 2.6 per cent.

Accordingly, the AEC does not support any of the proposed changes to the form of the APC. Instead, the AEC believes at a $600/MWh APC criteria's 1 and 2 above are satisfied and criteria 3 is an appropriate approach to maintain this.

Other Issues

Page 9 of the paper has stated that the existing "…reliability standard implies that we expect to have enough supply to meet demand 99.998 per cent of the time…". This is not correct, the 0.002 per cent refers to the quantity of demanded energy that could not be supplied, it is not a metric of time.

Conclusion

The AEC does not understand why the changes in the power system necessitate a change in the outcome USE form of the standard. Clearly reliability analysis must adapt with the power system, but the ultimate outcome objective would appear to not require adjustment. As such, the questions raised in the Discussion Paper appear to relate to the operationalisation of the standard, not the form of the standard.

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[2] https://www.energycouncil.com.au/media/ltaiiack/20220707-aec-submission-to-rel0082-2022-rss-review-final.pdf
https://www.energycouncil.com.au/media/eklb3azu/20220901-aec-sub-apc-rule-change-final.pdf
[3] https://www.aemc.gov.au/sites/default/files/2022-08/Amending%20the%20administered%20price%20cap%20-%20Consultation%20Paper%2010%20aug%20246%20pm.pdf
[4] https://www.aemc.gov.au/sites/default/files/2022-09/2022%20RSS%20Review%20Final%20Report%20%281%29.pdf
[5] https://www.aemc.gov.au/sites/default/files/2022-09/APC%20Directions%20paper%202022_09_29.pdf

[6] Since renamed to Market Price Cap

Level 14, 50 Market Street
Melbourne 3000
GPO Box 1823 Melbourne Victoria 3001

P +61 3 9205 3100
E info@energycouncil.com.au
W energycouncil.com.au

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The appropriate course of action for the Reliability Panel is to observe the evolution of the modelling targeting the current reliability standard. The standard itself should only be reconsidered after that evolution has occurred, and where modellers are expressing a technical compatibility challenge between their models and the standard. The current interest in alternative standards does not appear to have come about for this reason, but more from an external fear of the political, rather than objective economic, consequences of "tail risk" events.

Questions about this submission should be addressed to:

- Regarding the Reliability Standard by e-mail to Ben.Skinner@energycouncil.com.au or by telephone on (03) 9205 3116; or
- Regarding the APC by e-mail to Peter.Brook@energycouncil.com.au or by telephone on (03) 9205 3103.

Yours sincerely,

Ben Skinner
GM Policy
Australian Energy Council

Level 14, 50 Market Street
Melbourne 3000
GPO Box 1823 Melbourne Victoria 3001

P +61 3 9205 3100
E info@energycouncil.com.au
W energycouncil.com.au

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