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Dear Mr Feather

**Values of Customer Reliability – Consultation paper**

The Australian Energy Market Operator (AEMO) welcomes the opportunity to comment on the Australian Energy Regulator's (AER's) Values of Customer Reliability (VCR) consultation paper.

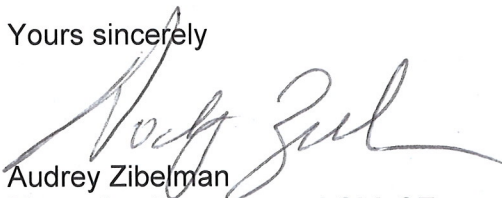
AEMO is the independent National Electricity Market (NEM) and Western Australian Wholesale Electricity Market (WEM) market and systems operator, and the NEM National Electricity Transmission Planner, with primary responsibility to manage and maintain power system security and reliability. This role is undertaken within the legislated policy and market frameworks and in adherence to the National Gas and Electricity Objectives and Rules.

VCRs are an important means of considering customers' expectations of reliability in the planning and operational environments. As such, appropriate development of VCRs is critical to make sure they are fit-for-purpose and reflective of consumer impacts particularly as the energy sector continues to evolve.

We look forward to working with the AER and other stakeholders on development of VCRs and their application in the NEM.

Should have any questions regarding AEMO's submission, please contact myself or Alicia Webb – Principal Analyst on 03 9609 8824.

Yours sincerely



Audrey Zibelman  
**Managing Director and Chief Executive Officer**

## Response to the AER's Consultation Paper

### 1. Summary

AEMO completed a NEM-wide review of the VCR in 2014 from which valuable insights were obtained and published in our review's final report<sup>1</sup>. This submission builds on these insights based on the current and transforming energy environment with reference to AEMO's application of VCRs in planning and operating the power system and market. In summary:

- The survey should focus on both quantifying the value of reliability and determining customer tolerance for load shedding.
- The experience of involuntary load shedding differs over several dimensions. VCRs can vary by customer type, time of day, day of week, season, and the duration of any supply shortfall event. Greater granularity in VCRs is therefore preferable to ensure the most meaningful VCRs are used in any situation.
- The economic impacts of widespread or prolonged events can be wide-ranging, and distinctly different to shorter duration events at a more localised level. The current VCR methodology is likely to miss or underestimate some impacts, due to the relative rarity of high impact, low probability power system events. Other approaches may be necessary to effectively quantify the wider economic impacts of these events.
- Well-developed VCRs that accurately represent what consumers are willing to pay are critical to ensure the NEM functions in accordance with the National Electricity Objective (NEO), as they provide information about power system reliability expectations.
- AEMO's recent submission to the AEMC's Enhanced RERT Rule change consultation process<sup>2</sup> has highlighted the importance of understanding how VCRs change under different system conditions when assessing the appropriateness of the reliability standard and the efficient level and cost of reserve capacity that should be held out of market.

### 2. Applying VCRs

It would add value to the exercise of determining the VCR if the survey questions asked respondents to focus on both quantifying the value of reliability and determining their tolerance for load shedding. The cost-based questions should focus on both cost and reward. That is, the cost to the household or business to be without power, as well as what the household or business would want to be paid in order to voluntarily stop consuming electricity for a period.

The impact of involuntary load shedding can differ over a number of key dimensions such as customer type, regional extent, duration, time of day or day of week, season and temperature. There is need for clarity in the application guidelines and examples with respect to how tailored VCRs may be developed and applied. However, many VCR applications use aggregated, region-wide VCRs based on historical outage statistics applied to component VCRs for different outage durations, time of day and season, and other dimensions.

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<sup>1</sup> AEMO, 2014, Value of Customer Reliability Review Final Report

<sup>2</sup> AEMO, 2018, The NEM Reliability Framework,  
<https://www.aemc.gov.au/sites/default/files/2018-11/Additional%20information%20from%20AEMO%20to%20support%20its%20Enhanced%20RERT%20rule%20change%20proposal.pdf>

AEMO's recent submission to the AEMC's Enhanced RERT Rule change consultation process<sup>3</sup> has highlighted the importance of understanding how VCRs change under different system conditions when assessing the appropriateness of the reliability standard and the efficient level and cost of reserve capacity that should be held out of market.

AEMO's 2014 VCR review noted limitations with the survey-based methodology. Respondents could not easily comprehend widespread and prolonged outage situations. Also, given the relatively infrequent and region-specific experience of these situations, it is unlikely that responses would capture the full social costs of such outages.

### *2.1. Customers*

The customer segmentation should include consumers, small and large businesses and governments. AEMO has used these groups, as well as manufacturing, to study demand patterns in the past. There may also be some advantage to segmenting residential customers who have alternative fuel source for some household functions, such as mains gas, solar hot water or standalone solar as these houses are likely to place different value on electricity reliability.

### *2.2. Outage scenarios*

The scenarios should consider the conditions that most often lead to supply interruptions. This includes an explicit examination of POE10<sup>4</sup> extreme weather events such as excessive heat, high winds, excessive humidity and excessive cold.

The size of outages may be another element that influences cost and should therefore be incorporated as a range of scenarios. For example, questions could ask about the value of reliability if an outage impacts a street, an entire suburb or a city for several hours.

The survey should also target specific scenarios to elicit useful responses. Health and comfort in extreme weather will be one aspect but there are other factors to consider, for example:

- Commercial implications
- Failure of traffic lights and public transport making travel difficult.
- ATM / EFTPOS systems unavailable
- Mobile phone or internet services unavailable

### *2.3. Widespread and prolonged outages*

Certain high-impact, low probability (HILP) events in modern power systems can result in widespread and/or prolonged outages. Events can span entire regions (system black events such as South Australia 2016), significant portions of a single region or multiple regions at a time. The economic impacts of such events can be wide-ranging, and distinctly different to shorter duration events at a more localised level which do not lead to wider social and economic implications.

The wider economic and social costs of HILP power system events can be characterised as follows:

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<sup>3</sup> AEMO, 2018, The NEM Reliability Framework, <https://www.aemc.gov.au/sites/default/files/2018-11/Additional%20information%20from%20AEMO%20to%20support%20its%20Enhanced%20RERT%20rule%20change%20proposal.pdf>

<sup>4</sup> POE10 weather conditions are conditions likely to be exceeded only once every 10 years.

- **Direct tangible:** costs incurred as a direct result of the event, with a market value such as damage to property or infrastructure.
- **Indirect tangible:** flow-on effects not directly caused by the event itself but arising due to the damage caused by it, e.g. business and network disruption.
- **Intangible:** direct and indirect impacts that cannot be priced such as death and injury, impacts on health and wellbeing and community connectedness<sup>5</sup>.

The VCR as per the current estimation methodology, is likely to capture some portion of direct tangible and indirect tangible costs. For example: business participants are likely to have incorporated costs of business disruption within their survey responses; most residential users may understand short duration service unavailability during hot weather - as distribution issues at these times are relatively common.

However, it is likely to miss or underestimate other tangible, as well as intangible impacts, due to the challenges with providing sufficient context for hypothetical HILP events for which there may not be consistent, comparable recent experience.

Other approaches may be necessary to effectively quantify the wider economic impacts of HILP events. This could include more targeted questioning and stakeholder engagement that considers the specific times that involuntary load shedding is most likely to occur, the post event experience of reconnecting and resuming business or household functions, and wider economic impacts such as public safety, law enforcement and health, among others. The AER may also wish to consider the wider social-economic costs of a jurisdiction having (or being perceived to have) an electricity supply of questionable reliability.

VCR estimation from surveys and case studies such as this are likely to be affected by a sparsity in survey respondents with the relevant knowledge and experience of the situations being considered. A wider consideration of social and economic impacts may be a complementary way to achieve this, common in insurance and risk mitigation contexts such as natural disasters, and public service disruption.

#### *2.4. Distribution of costs*

The large body of existing work on cost reflective network tariffs may be informative in determining whether VCR values for different customer types should in future inform the allocation of distribution and transmission shared costs among customers. The current Regulatory Investment Test for Transmission mentions VCRs only in the context of justifying a credible option that reduces load shedding.

Using VCRs to inform cost sharing would only be appropriate if the customers with higher VCRs were receiving a higher service than customers with a lower VCR. However, as these are shared assets providing a similar shared service to everyone, it appears difficult to justify why they should pay more.

Where AEMO, or another network planner can estimate the proportion of demand by customer class at a transmission connection point, VCRs for each class may be weighted to produce an overall figure for that location in the network.

<sup>5</sup> As characterised by Deloitte, SACOSS and others.

Deloitte Access Economics, 2016, Economic assessment of System Restart Ancillary Services in the NEM.  
 SACOSS, 2016, Looking Around the Corner: A discussion on Current South Australian Power System Risks.  
 Business SA, 2016, Blackout Survey Results

## 2.5. Load shedding considerations

The VCR does not inform load shedding priorities under current arrangements, which are designed to prioritise system security rather than cost. In accordance with the National Energy Rules (NER) clause 4.3.2(f), AEMO must request that the Jurisdictional System Security Coordinator (JSSC) for each participating jurisdiction provides AEMO with a schedule setting out the order in which loads in the participating jurisdiction, other than sensitive loads, may be shed by AEMO for the system security requirements given in NER clause 4.8<sup>6</sup>.

In accordance with NER clause 4.3.2(h), AEMO maintains load shedding procedures for each participating jurisdiction under which loads will be shed and restored. Transmission network service providers (TNSPs) are responsible for selecting and interrupting suitable loads from the Priority Load Shedding Schedules to match the amount of load to be shed as advised by AEMO.

If loads were shed in ascending cost to the system based on the VCR it may, for example, dictate that residential loads should be shed before industrial loads. Theoretically, such an approach would be the most economically efficient and equitable approach to load shedding, with customers who value reliability more being shed later than those who value it less and paying a premium reflecting this.

In practice, there are practical limitations in the current system because residential loads are not straight forward to shed in reliable blocks of capacity; nor easy to restore after an event. For this reason, it is preferable to shed industrial loads first as they tend to be in larger capacity blocks and easier to restore after an event.

However, in an increasingly controllable and dispatchable future with smart aggregation of batteries, solar systems, and demand response, it is foreseeable that there may be sufficient visibility and control<sup>7</sup> over precise amounts of capacity in multiple sectors. This may allow the use of VCR in making load shedding decisions.

Ultimately AEMO will direct load shedding when required for reasons of system security, public safety or to maintain or to re-establish a reliable operating state (using jurisdictional procedures developed in accordance with NER clause 4.3.2).

## 3. Approaches to deriving VCRs

Painting credible scenarios with detailed consideration of broad impacts may reveal a much higher willingness to pay to avoid such a situation rather than simply being asked if the outage affected more than the respondent's own block (a question used in AEMO's 2014 survey).

Whilst determining the cost of load shedding can be a useful input in determining the tolerance for load-shedding, as noted in section 2.3 survey-based results should be used with caution when considering less common, more extreme events, as people tend to anchor their views on recent experience. As USE is a rare occurrence, respondents may find these events difficult to contemplate and hence struggle to estimate their impact.

Some of the limitations of the previous survey method are outlined in the AER consultation paper, including loss aversion and protest responses. In some respects, eliciting high quality, thoughtful

<sup>6</sup> AEMO, Power system security guidelines, September 2018

<sup>7</sup> This visibility and control would need to exist somewhere between DNSPs, TNSPs, and AEMO.

responses will be a function of the skill and professionalism of the organisation undertaking the survey.

Willingness to pay and willingness to accept questions may be better received than the 2013/14 survey because electricity reliability has been a much more high-profile issue in the media, particularly following the South Australian system black in 2016.

### *3.1. Current and future uses*

Well-developed VCRs that accurately represent what consumers are willing to pay are critical to ensure the NEM functions in accordance with the National Electricity Objective (NEO), as they provide information about power system reliability expectations.

VCRs need to be adaptable to considering the value of being connected to the grid, rather than simply the value of energy delivered. The proliferation of solar PV means that a given household may be a low user of energy from the network however most commonly their PV inverter will not supply energy if the network goes down due to network fault or system supply shortfall. Therefore, the value of reliability is not defined by unserved energy but in fact unserved grid availability.

A traditional VCR based on energy provided will result in different amounts of 'value' to customers without PV and those with PV. This is because two households with the same underlying demand might put the same 'value' on reliability but the one with PV may only purchase half as much energy from the network. Households with battery or PV systems with islanded mode capability would have a different 'value' of supply again. Microgrids will also require consideration, particularly if they run 100% (or at least majority of the time) independent of the main grid.

As noted, AEMO's recent Reliability paper<sup>8</sup> emphasises the importance of understanding how VCRs change under different system conditions when determining the reliability standard and the efficient level of reserve capacity that should be held out of market

### *3.2. Engaging the community*

Energy literacy among the community is a vital requirement for high quality and meaningful answers to VCR questions. A widespread campaign to combine the survey with energy literacy in the community could tackle a range of important issues such as efficiency, demand response and retail bills. Delivery of such a program would need to be through trusted impartial institutions such as council or schools.

## **4. Conclusion**

Well-developed, fit-for-purpose VCRs that accurately represent what consumers are willing to pay are critical to ensure the NEM functions in accordance with the National Electricity Objective (NEO), informing planning and operational decisions going forward.

The updated 2019 VCRs should consider the indirect impacts of widespread and prolonged outages, as well as reliability expectations based on an updated range of credible scenarios that take into account the evolving energy market.

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<sup>8</sup> AEMO, 2018, The NEM Reliability Framework, <https://www.aemc.gov.au/sites/default/files/2018-11/Additional%20information%20from%20AEMO%20to%20support%20its%20Enhanced%20RERT%20rule%20change%20proposal.pdf>

Any work to improve energy literacy within the community will likely result in more accurate survey responses, and thus more accurate VCRs.

AEMO looks forward to working collaboratively with the AER on the development of the next VCR methodology as well as its appropriate application in the NEM.

