VALUE OF CUSTOMER RELIABILITY STATEMENT OF APPROACH

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Contents

1 Executive summary

AEMO's National Value of Customer Reliability (VCR) Review will deliver values of customer reliability (VCRs) that can be applied to network planning, operations and revenue regulation purposes in the National Electricity Market (NEM).

As a result of consultation undertaken as part of this review, AEMO has decided to pursue the following:

- Deliver VCRs nationally for four different customer categories (including different sector types).

- Be able to produce VCRs at the transmission node level in the NEM[1], including specifying a methodology for businesses themselves to calculate the VCR at the transmission node level.

- Develop VCRs that incorporate a number of attributes to account for uncertainty. This includes outage duration, severity and time of day.

- Conduct a survey based on choice modelling and validate using contingent valuation questions to obtain VCRs.

To date, the development of VCR has been based on regional surveys, one in Victoria in 2007 by VENCorp and the other in New South Wales by the Australian Energy Market Commission (AEMC) in 2012. These surveys did not deliver regional or sector-specific VCRs and there were some large differences between the two which have not been reconciled.

The VCRs developed as part of this review will be based on a deeper understanding of the value that customers place on reliable electricity supply nationally and will therefore be able to support better decision-making across the electricity industry.

This Statement of Approach incorporates feedback from submissions received in response to AEMO's Directions Paper published in June 2013[2], as well as meetings held with some stakeholders. It outlines AEMO's decision on key points raised in the submissions.

This paper is complemented by a paper provided by the consultant AEMO engaged for this review, Professor Riccardo Scarpa. The accompanying paper further details the methodology and approach that will be deployed to calculate the VCRs.

Ongoing consultation with stakeholders has occurred throughout AEMO's review, particularly with network service providers and the Energy Networks Association. AEMO has also requested input from the network businesses on numerous occasions to assist in the process.[3]

AEMO thanks all those who provided their time to meet, and for their assistance in providing input on this review.

AEMO welcomes ongoing feedback through this process and will flag further opportunities to comment on specific matters.

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[1] Except in South Australia and Tasmania where transmission node data on small customers is not readily available.
[2] AEMO's VCR Draft Directions Paper and submissions received. Available:
http://www.aemo.com.au/Consultations/National-Electricity-Market/Open/Value-of-Customer-Reliability-Directions-Paper.
[3] This has included information relating to energy consumption data as well as geographical mapping and feedback on the survey questionnaires.

2 Stakeholder consultation process

The indicative timeline for the remainder of this review is as follows:

Deliverable	Timeline
Measure VCRs in accordance with the methodology and approach.	November 2013 – Mid January 2014
Draft VCRs published.	Early – Mid February 2014
Submissions due on draft VCRs.	End February 2014
Final VCRs published.	April 2014

A more detailed outline of the process which will be undertaken to measure the VCRs in accordance with the methodology and approach is as follows:

Deliverable	Timeline
Survey development	Early October 2013
In house testing of survey	End October 2013
Residential pilot dispatch and in-field	7-14 November 2013
Residential post-pilot changes	15-20 November 2013
Business pilot dispatch and in-field	14-21 November 2013
Business post-pilot changes	22-27 November 2013
Residential main survey dispatch and in-field	21 November-16 December 2013
Business main survey dispatch and in-field	28 November-16 December 2013
Data analysis and derivation of draft VCRs	17 December 2013 – end January 2014

Where practical within the above review timelines, AEMO will accommodate requests for meetings with individual stakeholders or public meetings. AEMO will also engage with stakeholders throughout the remainder of the review. We are planning to hold a workshop with stakeholders to discuss our methodology and approach outlined in this document in December 2013. A date will be confirmed over the coming weeks.

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3 Summary of submissions received to the VCR Directions Paper

This chapter provides a brief summary of the key issues received in submissions and meetings.

3.1 Approach and methodology

All stakeholder responses supported the proposal to apply the choice modelling technique.

In relation to additional contingent valuation questions to complement the choice modelling approach, ActewAGL commented that they *"would not, however, support the use of open-ended contingent valuation questions, since this technique is not well supported by academic literature."*[4]

ActewAGL would also not support the initial face-to-face forums that AEMO proposed in the Directions Paper, as this *"may lead to sample selection bias".*[5] Alinta Energy also made a similar comment that face-to-face forums could lead to biases.

3.2 Granularity of VCRs

All stakeholders supported more granular VCRs compared to the single regional VCRs currently available.

Alinta Energy commented that calculating connection point VCRs on the proportion of each customer class at that connection point could *"produce differing values in comparison to calculating the VCR in proportion to total energy usage by different customer class".*[6]

Both Grid Australia and Energy Networks Association (ENA) submissions noted that more granularity is required for the large business customer category. They proposed further dividing this segment into commercial, industrial, and agricultural categories.

SA Power Networks' submission commented that AEMO's proposed segmentation of business customers would not provide enough granularity on the types of business customers (such as commercial, industrial, manufacturing, agricultural).

Their submission also noted that *"within the SA Jurisdiction the threshold for re-classification from medium to large business is 160 MWh not the 100 MWh detailed within the Directions Paper. In addition, all small customers (i.e., less than 160 MWh) within SA are supplied from one virtual Transmission Connection Point (TCP), so AEMO will not be able to calculate a VCR for every TCP in SA, as Market Settlement and Transfer Solutions (MSATS) does not contain that information".*[7]

3.3 VCR and the market price cap (MPC)

AGL's submission suggested that "*the MPC should inform the level of the VCR*"[8] rather than the other way around. AGL suggested that a higher VCR (than the MPC) could lead to network investments proceeding ahead of generation investments; this may not be cost-efficient, so the VCR and MPC need to be better aligned.

Alinta Energy also suggested that any material difference between the VCR and MPC would be problematic. They propose that AEMO contribute to the AEMC and Reliability Panel work.

3.4 Catering for uncertainty in VCR development

3.4.1 Different outage durations

All stakeholder responses supported AEMO undertaking work to develop VCRs according to different outage durations.

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[4] Page 1, ActewAGL submission.
[5] Page 2, ActewAGL submission.
[6] Page 3, Alinta Energy submission.
[7] Page 1, SA Power Networks submission.
[8] Page 1, AGL submission.

ENA further suggested that AEMO's proposed estimation of VCRs "*take into account rotational load shedding over a day or a week"*.[9]

SA Power Networks proposed that outage duration granularity should include additional outages of three hours and 12 hours, as *"in SA the majority of outages are less than 12 hours in duration and are typically in the of range 1–3 hours"*.[10]

3.4.2 Severity of supply outages

Grid Australia expressed concerns that the cost of a one-week outage resulting in extended widespread loss of supply would not be accurately determined from customer responses.

They have suggested that qualified experts, as recommended by the Productivity Commission, be engaged to assess such types of costs to provide more meaningful information for decision-makers.

3.5 Publication of VCRs' statistical robustness

Grid Australia and ENA proposed that AEMO publish information relating to the sensitivity of the VCRs, for example confidence intervals, to assist in providing VCR calculation transparency. This would enable stakeholders to understand any limitations of the values.

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[9] Page 3, ENA submission.
[10] Page 2, SA Power Networks submission.

4 AEMO's approach

Most submissions supported the direction AEMO outlined in its Directions Paper.

AEMO believes that calculating a range of VCRs at each transmission node in the National Electricity Market (NEM) for the four customer categories (proposed in the Directions Paper) will provide sufficient granularity to enhance network investment decision-making processes. This is a significant improvement on the previously derived regional VCRs.

An important aspect of this review is to provide industry with more transparency about customer expectations of reliability to better inform investment decision-making. Given this, AEMO plans to publish data—such as survey responses and interpretation of results—as part of the VCR number publication. This will provide confidence that the values were determined robustly, and will inform stakeholders of any limitations resulting from the work undertaken.

Increased transparency of underlying VCR data at a more granular level (down to the transmission node by customer type) will also allow network businesses to apply the values as they see fit for their own commercial decisions. This includes the ability for distribution businesses to determine the relevant VCRs to apply for their own use, depending on the type of load being served by their feeder from that transmission node.

The VCR numbers produced as part of this review would not conclude the VCR work. AEMO expects that continual updates will occur as more granular data becomes available over time from industry.

Following discussions with the ABS and other independent experts, AEMO has engaged Professor Riccardo Scarpa, from the University of Waikato in New Zealand. He will undertake the survey design and development, and review AEMO's interpretation of the survey results.

Professor Scarpa is renowned for his international experience in econometric modelling and non-market valuation. He has recently assisted the New Zealand Electricity Authority's study into the Value of Lost Load.

Professor Scarpa will be supported by market research firm Colmar Brunton who will undertake the survey recruitment process.

AEMO has also approached the ABS to undertake some advisory services as part of this VCR review. These services include peer critique on the survey development including the approach, survey design, and the sampling frame. The ABS will also provide AEMO with a list of businesses by ANZSIC code, which will assist in identifying businesses by industry.

ABS involvement during this review in the capacity mentioned above will provide value given their expertise in this field. It will also benefit future VCR updates, as the ABS will be familiar with the process and methodology applied to past VCR development.

4.1 Approach and methodology

Refer to Attachment 1 for an outline of the approach and methodology that AEMO will apply in calculating the VCRs.

Attachment 1 includes details about:

- Survey method and mode.
- Approach to survey recruitment.
- Sampling frame required.
- Statistical analysis of data to be undertaken.

4.1.1 Grouping of transmission nodes

The process of estimating VCRs at the transmission node level requires a significant sample of respondents[11] to deliver a statistical valid estimate for each location. Undertaking this for all transmission nodes in the NEM would be costly, and AEMO expects the VCR will be similar across nodes with similar characteristics.

Given this, AEMO—assisted by distribution network service providers—has grouped transmission nodes for which the VCR is expected to be similar. These are grouped initially by NEM region, and are then split further based on:

- Connection load type (whether capital city CBD, urban[12], or rural).
- Climate zone[13] (to reflect differences in cooling and heating needs).
- Access to alternative fuels[14] (whether there access to, or use of, reticulated natural gas).

Table 1 – Sub-regional grouping for NEM transmission nodes

Region	Sub-regional grouping	
Queensland	Tropical QLD	Tropical QLD - urban
	Central QLD	Central QLD - urban
	SEQ – Urban	SEQ – CBD
	SWQ – Urban	SWQ – Rural
	Inland QLD	
New South Wales	North East NSW	North East NSW - urban
	Inland NSW	Inland NSW - urban
	Mid-south NSW	ACT/Canberra
	Sydney/Wollongong	Sydney CBD
Victoria	South-Mid Victoria	South-Mid Victoria - urban
	Inland Victoria	Inland Victoria - urban
	Melbourne	Melbourne CBD
South Australia	South-east SA	
	Northern SA	
	Adelaide	Adelaide CBD
Tasmania	Tasmania	Tasmania - urban

The Appendix below includes a diagrammatic representation of the regional groupings.

4.2 Customer classes

As outlined in the Directions Paper, AEMO's review will be able to calculate VCRs at the transmission node level. Due to recent changes as part of the Consumer Administration and Transfer Solution (CATS) Procedures, AEMO is now able to disaggregate customers into four categories:

- Residential.

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[11] To acquire a representative sample set for each transmission node in the NEM Professor Scarpa has estimated at least 100,000 respondents are required.

[12] Urban loads have been classified as those nodes that primarily serve cities with a population above 30,000.

[13] AEMO used the climate zones introduced in the Building Code of Australia (BCA), see: http://www.abcb.gov.au/major-initiatives/energy-efficiency/climate-zone-maps.

[14] About 60% of ACT households use gas heating; in NSW this figure is 20%. This may be reflected in different VCR estimates.

- Small business (average annual energy consumption < 40 MWh pa).
- Medium business[15] (average annual energy consumption 40–100 MWh pa).
- Large business (average annual energy consumption > 100 MWh pa).

Following consultation with stakeholders, AEMO notes that different consumption thresholds are applied in both South Australia and Tasmania. As a result, the following segregation of business customers in these two regions will be:

South Australia:

- Small business (average annual energy consumption < 40 MWh pa).
- Medium business (average annual energy consumption 40–160 MWh pa).
- Large business (average annual energy consumption > 160 MWh pa).

Tasmania:

- Small business (average annual energy consumption < 150 MWh pa).
- Large business (average annual energy consumption > 150 MWh pa).

As small customer information at each transmission node is unavailable in both South Australia and Tasmania, AEMO will not be able to produce VCRs at every transmission node in these regions.

However, AEMO will be able to develop VCRs for each sub-region identified in Section 4.1.1 using other locational means for these regions, such as applying post codes. Disaggregation of customers into the customer categories defined above by post code will allow the composition of customers for each sub-region within South Australia and Tasmania to be provided.

AEMO understands that the geographic location of residential customers may have an impact on the VCR for this category. To gain a more comprehensive understanding of this aspect, AEMO's survey for residential customers will identify if there is a large variance across the regions between the residential categories including CBD, urban and rural areas.

Additionally, as AEMO will receive services from the ABS, it will also be able to distinguish the business categories, particularly the large businesses, into sector type; this will enhance VCR methodology granularity. Such sectors would include:

- Primary (relating to agriculture, fishery, forestry, mining etc)
- Secondary or Industrial (relating to food processing, manufacturing of components and final products etc)
- Trades and services (relating to government, hospitality, health, education, transport etc)

For large direct-connect customers to the transmission network, AEMO will be approaching these businesses separately as part of our review. AEMO acknowledges that the impact of outages to these customers can be significantly different to other large customers and therefore the value they place on their electricity supply must reflect this matter.

AEMO expects that the level of VCR granularity delivered by the review will assist in developing VCRs that better reflect customer values throughout the NEM.

4.3   Role of VCRs

As outlined in the Directions Paper, the primary focus of this review is to develop a suite of VCRs that will inform better network investment decisions.

The VCRs calculated through this review will benefit many processes in the NEM by providing confidence that the true value that customers place on reliability is reflected in the outcomes

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[15] Identified as *small market offer customers* in the National Energy Customer Framework (NECF).

delivered. This said, AEMO remains conscious that it is not in a position to specify where and when the resulting VCRs should be used by others in the NEM.

AEMO will apply the VCRs in its own transmission planning process as part of its national and Victorian transmission planning roles. The VCRs' more detailed design will allow more accurate decision-making to occur so that the right investment is delivered when customers in a particular location require better reliability.

AEMO recognises that the application of VCRs in other NEM contexts, such as distribution network planning or network regulation, will depend on the level of granularity required for the purpose and data available.

AEMO acknowledges that investment decision-making in the distribution planning process will benefit more from VCRs calculated for each feeder. The VCR review will produce VCRs at the transmission node level only; if these VCRs were used to inform distribution investment planning, then the information produced by AEMO must be complemented with additional information supplied by network business.

For transmission investment decision-making purposes, AEMO recommends using the appropriate VCRs that correspond to the network investment location and customer class depending on the approximate outage duration, time of day and severity of the outage that best correspond to the investment requirement.

High-impact, low-probability events should also be considered in the network investment decision-making process. As outlined in Attachment 1, AEMO's methodology and approach to account for such events will mean that the VCRs developed, particularly for the longer outage durations, could be used in this context. AEMO will also continue to work with network businesses to understand how these events can best be incorporated beyond this review.

Regarding the VCR informing the MPC, AEMO notes that the AEMC has been tasked to identify whether a link exists between the VCR and the Reliability Standards and Reliability Settings; and how these standards and settings (principally the MPC) should be amended to reflect a VCR.[16]

As outlined in the Directions Paper, AEMO will focus specifically on measuring and calculating VCRs, not deciding whether VCRs should be used to inform the MPC. AEMO will continue to engage with the AEMC to ensure that outcomes do not negatively affect the National Electricity Market.

In publishing the VCRs, AEMO will publish the statistical robustness of the values, as proposed by ENA and Grid Australia. This will provide greater transparency about the process undertaken to calculate VCRs, as well as clarification of results obtained. This will allow industry to identify any anomalies that may exist. It will also assist AEMO and other NEM institutions in determining the extent to which the VCRs may be applied in NEM contexts.

4.4   Catering for uncertainty – VCR attributes

AEMO recognises that uncertainty is inherent in any survey of how customers value reliability. AEMO will attempt to develop the most robust values possible by including certain attributes.

In addition to the original three attributes highlighted in the Directions Paper (range of outage duration, outage time of day, severity of outage), AEMO will also seek to incorporate the following:

- Day of the week (weekday or weekend).
- Season (summer or winter).
- Frequency of occurrence.
- Bill increase (three levels will be expressed as percentages or monetary levels of the average bill).

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[16] As part of the SCER's Extreme Weather Event Review.

These additional attributes will allow better information about customer consumption patterns, and better expectations of reliable supply at particular periods during the year. Numerous studies[17] demonstrate that these factors strongly influence the VCR.

As outlined in the Directions Paper, a range of VCRs will represent the different outage durations that a given transmission connection point is likely to experience.

Following a submission received from SA Power Networks, which outlined that most outages occurring in South Australia are less than 12 hours and generally range from one to three hours, AEMO will include two more outage duration categories: three hours and 12 hours.

VCRs will be calculated for the following outage durations to account for different types of events:

- 1 hour
- 3 hours (new)
- 6 hours
- 12 hours (new)
- 1 day
- 1 week

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[17] Including those undertaken by Blass (2010) and Baarsma and Hop (2009).

5   Appendix – Regional grouping of transmission nodes
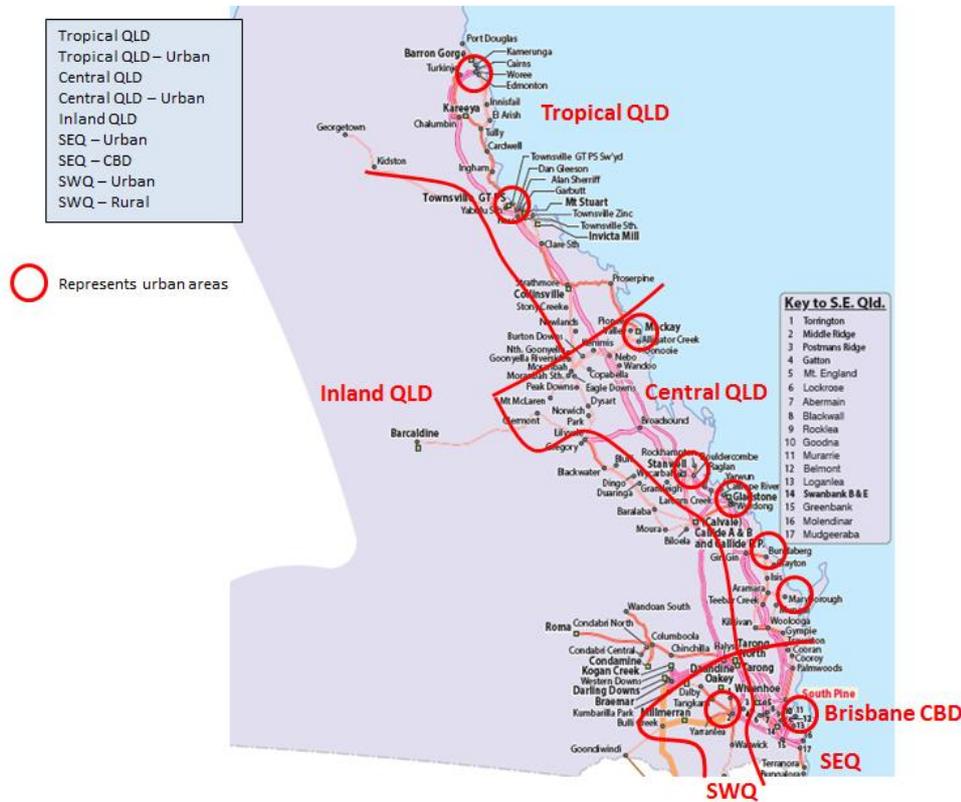
Figure 1 – Queensland

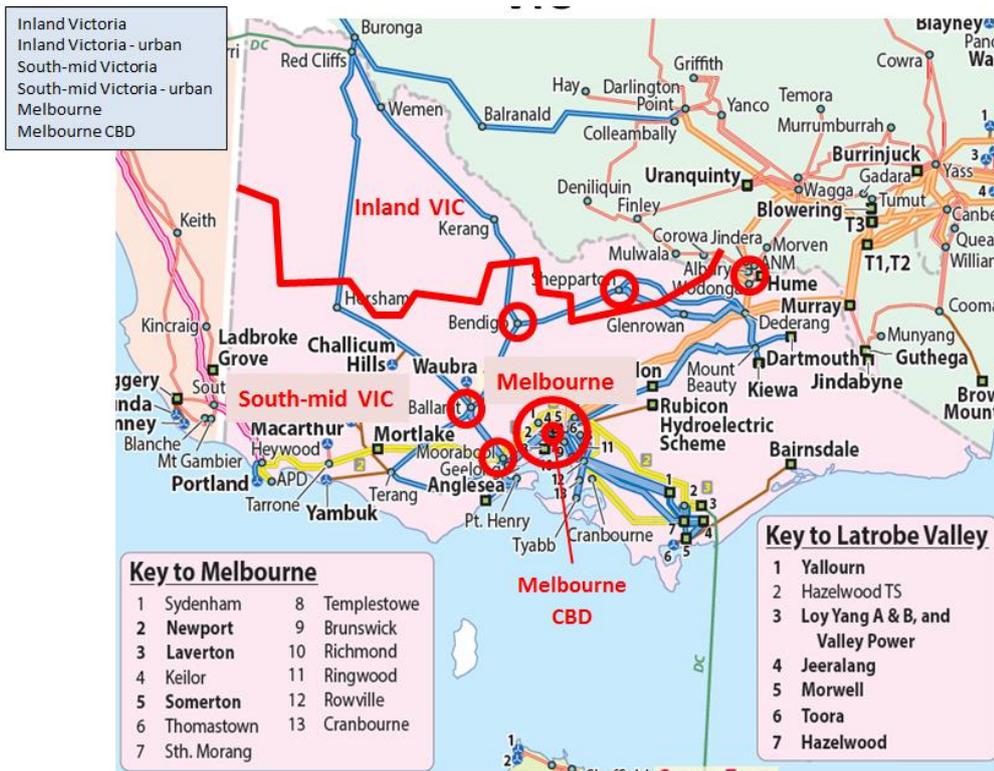## Figure 2 – New South Wales

Figure 3 –Victoria

Figure 4 –South Australia

Figure 5 –Tasmania