

Value of Customer Reliability Review – Update

The Australian Energy Market Operator (AEMO) was established in 2009 by the Ministerial Council for Energy (MCE), now the Standing Council for Energy and Resources (SCER), as an independent organisation working in the long-term interests of Australian energy consumers by developing and operating markets that offer affordable, safe and reliable energy supplies. AEMO is the national market operator responsible for electricity and gas market functions, national electricity market system operations, management of Victoria's gas transmission network and national transmission planning.

AEMO commenced the Value of Customer Reliability (VCR) review in 2013 following the SCER's 2009 Review of Extreme Weather Events. The SCER tasked AEMO to deliver national level VCRs.^{1,2} The review aims to improve understanding on the level of reliability that customers expect by being able to produce VCRs at a greater degree of granularity for the nature of the outage, different customer categories and business sectors than has previously been available.

In November 2013 AEMO published a Statement of Approach for the VCR review. This paper built on issues raised and stakeholder feedback received in respect of our VCR Issues Paper (published in June 2013). The Statement of Approach set out AEMO's intention to:

- 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 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.

The Statement of Approach was complemented by a methodology paper provided by the Professor Riccardo Scarpa, an international academic consultant with the University of Waikato in New Zealand, setting out the underlying survey design and methodology for calculating VCR values based on a choice modelling technique. In developing this approach, AEMO also sought advice from the Australian Bureau of Statistics (ABS).

To develop the VCRs, a sample of customers, including residential and business customers across the NEM needs to be surveyed. The survey uses choice modelling to test different variables and enable customers to state their preferences in respect of various outage scenarios. The options provide for customers to select from eight outage related variables and, through their selections, enable AEMO to better understand customers' willingness to accept compensation for different types of power outages or their willingness to pay to avoid such outages.

¹ SCER have also directed the Australian Energy Market Commission (AEMC) to carry out a review of National Electricity Network Reliability Framework and Methodology, for which the VCR values are a relevant consideration.

² The Productivity Commission in its Inquiry Report on Electricity Network Regulatory Frameworks (April 2013) also identified that reliability standards in the NEM should be based on the value customers place on reliability (r.14.1).

In order to recruit and dispatch the survey material to both residential and business customers, AEMO commissioned a market research firm to carry out the pilot survey process over November and December 2013.

VCR Pilot Study

The objectives of the pilot study were to:

- Test the survey instrument (a web-based survey using choice modelling techniques)
- Verify the ability for the survey to deliver estimated VCR coefficients and other statistics at required levels of accuracy
- Identify other practical issues with survey recruitment and execution

Due to the pilot study's sample size, it is too early to validate or publish updated VCR values emerging from the survey results. However, the results have been valuable for informing revisions to the sampling plan and survey approach ahead of carrying out further customer recruitment for the main survey.

In respect of the residential pilot, the survey is performing as expected. Although recruitment proved challenging, particularly in the lead up to the traditional holiday period over December, the responses from the pilot have shown statistically significant relationships between the outage variables being tested. Professor Scarpa has also noted that the results collected from the choice modelling questions, critical to determining VCR estimates, are meaningful and relate appropriately to the quantities and the attributes at play. Analysis of responses obtained from the demographic questions of the survey has demonstrated an adequate and representative coverage.

However, results across the business pilot have proven to be far less useful. The customer response rate and quality of the results emerging from across the business survey pilot were both much lower than those received in respect of the residential customer pilot. Further to this, the majority of responses received for the business pilot have been from commercial businesses, and not reflective of the range of ABS classifications that AEMO is looking to deliver. Challenges were evident in respect of achieving the desired spread of customer responses, both geographically and also in respect of consumption type. Large variations in the bill amounts provided by respondents was also problematic and had to be scaled appropriately for analysis.

These issues combined, together with challenges associated with targeting businesses for recruitment, have meant meaningful analysis of the data collected across the pilot has not been possible.

The performance of both the residential and business surveys across the pilot process has highlighted the need to adapt aspects of the survey design and its execution for the next phase of the project. Due to the pilot results delivering a greater degree of confidence in how the survey was performing with residential customers than for business customers, different approaches have been considered for recruitment of residential and business customers for the next phase of work.

Updated Statement of Approach

AEMO's objective continues to be to deliver robust VCR results on a national level. In the attached appendix, we set out AEMO's proposed amendments to the residential and business survey design and processes in order to better meet our project objectives. These

amendments broadly retain the survey design and underlying methodology, and follow AEMO’s review of the results and findings from across the pilot process. These findings were also discussed with stakeholders at a workshop hosted by AEMO workshop on 30 January, and feedback from this session has also been drawn on as part of this process.

AEMO welcomes feedback on the amendments as outlined in this paper. Our intention is to continue to engage with stakeholders, providing progress updates throughout the remainder of the review. We plan to shortly recommence customer recruitment, consistent with the approach as outlined in this paper. However, AEMO remains receptive to stakeholder feedback, particularly in respect of discussing potential alternative options for achieving a wide and reflective customer sample.

Updated Timetable

AEMO’s proposed timeline for delivery of the next phase of work on the VCR review is outlined below. We are currently confirming timetables for delivery with market research firms, and note that this timetable is therefore indicative.

Activity	Proposed Date
<ul style="list-style-type: none"> • Publication of updated statement of approach 	Early March 2014
<ul style="list-style-type: none"> • Recommence survey recruitment for residential and business customers • Currently seeking service provider proposals 	Early March 2014
<ul style="list-style-type: none"> • Direct Connect/Large Businesses Questionnaire • Development of questionnaire in March/April • 	March 2014 onwards
<ul style="list-style-type: none"> • Stakeholder workshop to discuss draft VCR results • Update on survey findings and draft residential results • Business results likely to still be in progress 	29 May 2014
<ul style="list-style-type: none"> • Publish draft VCR values • Publish Guidelines for use of VCR Values • Stakeholder Workshop – date TBC 	July-September 2014

If you require more information or would like to provide further feedback, please contact Jo Witters, Group Manager – Regulatory Policy on 03 9609 8496.

VCR Methodology Paper Update

Value of Customer Reliability – Revised Statement of Approach

1.0 Residential Survey

Sample size:

The purpose of the sampling plan is to estimate the number of responses required to identify variances in outage preferences between different customer groups. Since no previous VCR study has been conducted with the same outage features, population size and composition, the original plan was sized generously to account for large uncertainty about the heterogeneity of the population.

The pilot results have provided a basis for re-calibrating the sample plan now that more is known about the population and its preferences. The results for the residential pilot have shown a statistically significant relationship for the majority of the eight outage variables being tested as part of the choice modelling questions. This has eliminated the need to compare certain variables in the choice modelling tasks, thereby greatly reducing the overall sampling requirement.

As such, AEMO is now intending to survey approximately 1,500 residential customers to develop the residential portion of the VCR values. This revised sample plan reflects the variability in VCRs observed in the pilot results. Although the total sample population is lower, a representative spread of responses across the NEM regions will still need to be reflected in this sample.

Accounting for the surveys already completed, the range of additional survey completes required across the NEM is between 649 and 820. This range reflects the minimum number of additional responses per state AEMO expects will be required to achieve robust results. Based on performance of the residential survey across the pilot, AEMO is anticipating that the high end of the range is a maximum number of responses that would need to be sought to deliver confidence in the survey results. The total number of responses required to achieve robust results is therefore likely to be somewhere within the total range, with a greater number of responses required from some states than others to achieve this.

The range of additional completed surveys consists of the following breakdown:

- 91 – 125 from QLD located participants
- 169 – 215 from NSW/ACT located participants
- 96 – 130 from VIC located participants
- 207 – 253 from SA located participants
- 86 – 97 from TAS located participants

In order to achieve higher response rates, generic incentives (i.e. a prize draw) will also be promoted to potential customer respondents as part of the survey recruitment process. Providing generic incentives for survey participation will also likely reduce selection bias, whereby responses are drawn from a more diverse segment of the population not necessarily motivated by strong views about the issue of electricity outages.

Granularity

In AEMO's Direction Paper, we outlined the need to develop VCR estimates that have the required level of granularity and representativeness to ensure adequate coverage at the state level and at the regional level defined by transmission node groupings. The aim was to achieve adequate regional or sector-specific VCR estimates to be used in the economic evaluation of proposed network investment and for informing network regulation.

AEMO's objective continues to be to deliver a robust set of VCR results to stakeholders that are useful for network planning and evaluation. However AEMO is now aiming to produce statistically significant VCRs at a coarser level of granularity. This reflects challenges associated with achieving robust results at the proposed level of granularity. Under the revised approach AEMO will seek to recruit customer responses to robustly produce regional VCRs, reflecting a CBD, urban and rural breakdown for each state. AEMO will also continue to produce national and state level VCRs as set out in the earlier Statement of Approach paper. Where available data is sufficiently robust to break these values down further AEMO will seek to do so. However, evidence emerging across the pilot process is indicating that this will be difficult to achieve with sufficient confidence in the data.

Recruitment will now be based on achieving state level quotas of customer feedback. A representative spread of responses across the fifteen regions (CBD, urban and rural in five NEM states) will be sought by adapting recruitment part way through the process, and where there is a need to recruit more customers in a particular region, AEMO will work with the market research firm to target online panel recruitment via postcode ranges and potentially through regional focus groups.

Extreme weather outage variable

Information about how a customer may value electricity supply during extreme weather conditions is particularly relevant to network planning where investment to ensure reliability is largely driven by peak demand conditions. In response to stakeholder feedback, AEMO is looking to expand the existing choice modelling tasks to determine a customer's willingness to pay to avoid an outage during an extreme weather event.

This additional scenario highlights a distinction between measuring customer preferences during a seasonal peak (a typical summer/winter day) from periods of prolonged extremely hot temperature conditions (for example, a week-long heatwave above 35 degrees Celsius) where the likelihood of such outages is higher. If customer responses can deliver robust results in respect of this scenario, AEMO intends to include this data as part of the final VCR values. This would be shown as the incremental value that a customer would be willing to pay to avoid an extreme weather related outage, as an addition to the value of a basic outage.

Willingness to pay questions

In response to feedback from industry stakeholders and pilot survey participants, AEMO has also sought to amend how the willingness to pay survey questions are set out. Customers are asked to provide a maximum value that they would be willing to pay to avoid each outage scenario. It can be difficult to validate values provided by customers in this respect, which may be disproportionate to the actual impact they incur from the outage.

Changes have therefore been made in respect to how the willingness to pay values are presented in the survey. Customers will be presented with a range of values and will have to elect whether they would be willing to pay that value to avoid an outage (a yes or no based answer). Customers will track through a series of similar options (with increasing values

presented) until they are asked what would be the maximum they would seek to pay to avoid that outage scenario.

These amendments also serve to address concerns raised across the pilot where zero values were provided by some customers as willingness to pay values (i.e. \$0). Under the amended approach, where customers elect to choose a \$0 value to indicate their willingness to pay to avoid an outage, this will be a conscious rather than a default choice.

Additional questions

Following stakeholder feedback, questions relating to consumer investment in energy efficient technology and accessibility of alternative energy sources were incorporated to the residential pilot survey. AEMO considered that qualitative information on the consumer motivations and drivers for adopting energy efficiency and conservation techniques would help provide valuable context in respect of how customers value electricity.

AEMO intends to retain these questions for the main survey. There is broad support for these questions from both internal and external stakeholders and they were found to have a negligible impact on response rates. Following feedback, the survey material is being reviewed to ensure that the questions are sufficiently clear for respondents.

2.0 Business Survey

Unlike the residential pilot, the results emerging in respect of the business pilot were poorer in quality and the survey suffered from low response rates. This means there is little benefit in continuing with the same survey approach. AEMO is proposing a number of amendments to how it intends to approach the business customer aspect for this phase of work.

Sample scope and granularity

AEMO intends to develop VCRs for a defined set of industries. The VCRs developed for these industries would then be used as representative at the national and state levels for other firms within that industry/sector.

AEMO will continue to employ choice modelling and contingent valuation techniques to survey business customers but will change its recruitment approach to be more targeted at specific industries. The business sampling requirements have been reduced to reflect this change in recruitment approach.

Approximately 500-750 completed business surveys are now required to obtain statistically robust results along industry lines. AEMO anticipates that a representative spread of up to 50 participants per AEMO identified industry group will be required. AEMO will work with the market research firm to identify 10-15 key industry groups, based on energy use and other factors of primary importance, and reflecting ABS sector classifications (primary, secondary and tertiary). Each focus group is expected to contain a random and diverse spread of participants from a given industry and by consumption size (small, medium and large), and those customers surveyed for each industry group will be treated as representative for that industry across other NEM regions.

Focus groups

AEMO is looking to employ facilitated focus group sessions and computer-aided personal interview (CAPI) approaches to surveying business customers across the different industries. Where possible, customers would be recruited to attend the focus group where a facilitator

would walk them through the online survey. AEMO is commissioning a market research firm to recruit participants and to facilitate the sessions.

Furthermore, a key learning from the pilot is the importance of targeting recruitment to ensure the right business decision-makers are completing the survey. It is important that the market research firm recruit employees into the focus group that understand their business processes, have been involved in or understand investment decisions that have been made to ensure business processes are protected from power outages, and can understand and discuss what the opportunity cost to their business may be of being without power over a short or long period. AEMO is working closely with its market research firm to establish clear criteria to assist business customer recruitment.

Some industries, locations or size of customer, may lend themselves to a focus group discussion more easily than others. AEMO is giving consideration to how to access and represent responses from customers with limited web access. As part of this, AEMO is exploring options with its market research firm to offer incentives to encourage customers to participate. AEMO also intends to seek input from industry stakeholders and consumer representatives in order to assist the process for business customer recruitment.

3.0 Direct Connect Customers

Direct connect businesses comprise a large proportion (approximately 30%) of Australia's energy load. It is therefore important to develop VCR values for customers of this size to ensure that NEM and state-wide VCR values are inclusive and reflective of the population as a whole. AEMO's intention is to produce national and state level VCRs for this customer group.

Direct connect customers will be surveyed on a separate basis to other business customers (discussed above). AEMO is working with Grid Australia and other stakeholders to develop an appropriate draft questionnaire based on a direct questioning approach (rather than choice modelling).

Early consultation with stakeholders and analysis of in house data has been helpful in better understanding the unique characteristics of this customer set and formulating a survey approach that reflects their load characteristics and bilateral arrangements with network providers.

AEMO is intending to manage the survey process for these customers in-house. As part of this, we will work alongside other internal staff to ensure that repetition of questionnaire content from other customer survey processes underway (e.g. for forecasting purposes) is limited as far as possible.

Sample plan and granularity

The outputs of the direct measurement surveys will be combined with outputs from the other customer choice modelling based surveys, and weighted according to their proportion of energy load. This will produce composite national, state level and industry level VCR figures. Where possible, alignment will be sought between the direct connect and business surveys to enable aggregation of results.

AEMO recognises that information provided by these customers in the survey is commercially sensitive and will therefore endeavour to produce VCRs for these customers in

an aggregate format while ensuring that information cannot be traced back to individual businesses.

Survey approach

AEMO intends to apply a direct measurement survey approach (interview based) for surveying large direct connect consumers. The direct measurement survey approach relies on providing a detailed description to electricity consumers of one or more hypothetical outage scenarios. For each scenario, the customer is asked a detailed set of questions designed to capture all direct and indirect costs of the outage scenario.

The direct measurement survey approach for estimating VCRs for direct connect customers is desirable and preferable to the choice modelling survey approach. The advantage of asking direct cost questions is that it requires less hypothetical reasoning than the contingent valuation/choice modelling whereby customers are asked about their willingness to pay to avoid a power outage and/or their willingness to accept compensation.

Estimating costs directly is more appropriate for industrial customers because:

- they are able to directly calculate the losses incurred due to electricity outages than other customer types
- often there are no choices or substitutes that would affect their outage preferences
- their use of electricity, and hence the effects ensuing from its discontinuity of supply, give rise to a much wider range of potential losses of production

AEMO is liaising with Grid Australia to establish an appropriate contact list (roughly forty customers) to distribute the VCR surveys. AEMO will endeavour to survey as many direct transmission connected customers as possible in order to achieve a representative sample. Surveying customers with a range of consumptions from industries, not just the largest users, is important to producing meaningful VCRs that take into account a range of consumer classifications.

Survey content and format

The direct measurement technique estimates direct financial losses borne by customers rather than intangible costs such as inconvenience and discomfort. Organisations will be asked to quantify their direct costs of outages in terms of their lost production or services.

AEMO is exploring the option of asking consumers to provide some information on indirect costs. Indirect costs may include costs relating to reputational damage, additional insurance, on-site generation etc. As these are difficult to consistently quantify, these questions will most likely be qualitative in nature, providing additional context to the drivers for reliability for customers of this size.

For each interview, AEMO will seek detailed evidence to support the responses given and the expected costs of outages provided by the organisation. This could include requesting companies to provide financial reports and costs incurred due to actual outages. As with the business survey, targeting the appropriate company representative to complete the survey is important for obtaining accurate and complete information. Survey results may be further verified against public records (using economic input/output tables) to ensure responses are appropriate and broadly as expected.

4.0 Calculation of Final VCRs

VCR values will be calculated (\$/kWh) on the basis of all outage variables that emerge as significant from the choice modelling tasks, and additive to the value of the basic outage determined from the contingent valuation questions (that is, the \$/event will change dependent on the outage variables reflected such as peak/off-peak, severity etc).

Statistical models (conditional and mixed logit) will identify outage variables (severity, duration, peak/off peak, weekday/weekend, summer/winter) that have statistically significant effects both individually and in combination on the VCR estimate. Outage profiles will then be used to derive the average VCR for the kWh by multiplying the coefficient estimates of each statistically significant outage variable with its likelihood of occurrence and aggregating the values. The composite value is the average VCR for the kWh. This value can be further divided by the average or peak consumption of the population to derive a \$/kWh figure.

AEMO intends to publish a matrix of VCR estimates reflecting geographic (state/regional), customer category and demographic dimensions. For residential customers, national and state VCRs by regional (CBD, rural and urban) groups will be provided where possible. For business customers, our intention is to provide industry level VCRs consistent with ABS classifications and reflecting a range of business consumption categories (small, medium, large) as set out in AEMO's Statement of Approach paper.³ The VCR estimates will be set out in relation to each of the outage types, where the relationship between those variables has shown a significant relationship and AEMO has confidence in the robustness of the dataset.

AEMO recognises that care will need to be taken in interpreting the VCR results. Therefore, at the end of the review process together with the final VCR values, AEMO intends to consult further with stakeholders to develop and publish a paper setting out how and when the different values should be interpreted and applied across the NEM and at TNI level.

³ Available at <http://www.aemo.com.au/Consultations/National-Electricity-Market/Open/Value-of-Customer-Reliability-Statement-of-Approach>.