19 April 2013

Mr Matt Zema
Chief Executive Officer
Australian Energy Market Operator
GPO Box 2008
MELBOURNE VIC 3000

Dear Mr Zema

Value of customer reliability – Response to Issues Paper

ActewAGL Distribution (ActewAGL) welcomes the opportunity to respond to the Australian Energy Market Operator's (AEMO's) Issues Paper (the Paper) on the value of customer reliability (VCR).

In this submission, ActewAGL responds to selected questions from the Paper that relate to our experience undertaking and applying research into the value placed by customers on changes in network reliability in the Australian Capital Territory (ACT). In 2003, ActewAGL engaged NERA and ACNielsen to conduct a state-of-the-art choice modelling survey estimating the value placed on network reliability by residential and non-residential customers.[1] In 2012, the Australian National University (ANU) completed an independent research project that estimated residential customers' willingness to pay to avoid supply interruptions.[2] This study also employed choice modelling techniques. The studies were peer reviewed by internationally recognised experts in the field of non-market valuation: Professor David Hensher and Professor Riccardo Scarpa. ActewAGL has used the studies to derive a value of lost load in the ACT.

Question 8. How should AEMO assess which approach (or combination of approaches) is the most appropriate to deriving VCR while considering the contexts of its application?

Debate over potential methods is often confused by differences in stakeholders' understanding of the term "value." An important step, to which AEMO could contribute, would be agreement on a clear definition of value within a formal theoretical framework. Our view, as noted in our submissions to the Productivity Commission on 23 November 2012 and to the Australian Energy Market Commission (AEMC) review of distribution reliability standards and outcomes on 25 January 2013, is that the relevant measures of value are those defined in the economics literature as the Hicksian compensating and equivalent variations. These values are equal to the maximum amount that customers would be willing to pay (or the minimum

amount they would be willing to accept) for a reliability improvement (or deterioration).[3] ActewAGL notes that this framework appears to implicitly underlie much of the analysis in the Paper.

The economic costs and benefits of improving the accuracy of VCR estimates should be considered in determining the most appropriate approach to deriving them. For example, the Paper states, "The drawback with choice modelling is that it can be more complex, time-consuming and expensive than other approaches."[4] But the additional costs of employing a choice modelling approach should be weighed against the potential welfare effects of under- or over-investment in network reliability due to inaccurate VCR estimation. These welfare effects are likely to far outweigh the differences in costs of alternative survey approaches. Recent work by the AEMC suggests the welfare effect of a modest change in reliability (by two minutes off supply per customer per year) in New South Wales (NSW) would be an estimated $228 million over 15 years.[5] The additional expense of conducting a choice modelling study rather than an alternative survey approach would, for a single jurisdiction, be less than half of one per cent of this amount.

Question 9. Which approach (or combination of approaches) to deriving VCR should AEMO consider employing? Are there any other possible approaches not listed?

ActewAGL is concerned about the potential inaccuracy of the "economic principle of substitution" (EPS) approach used in VCR estimates for residential customers in previous VCR studies by Monash University's Centre for Electrical Power Engineering in 1997,[6] Charles River Associates in 2002[7] and 2008,[8] and by Oakley Greenwood in 2011[9] and 2012.[10] ActewAGL agrees with the following observations in the AEMO Paper:

> EPS tends not to place a value on residual inconvenience and discomfort where customers choose to 'put up with' interruptions.[11]
>
> This is likely to materially understate the welfare losses borne by these customers.[12]
>
> ...one drawback is that substitute purchases may provide different levels of benefit to the continuous supply of electricity.[13]

ActewAGL ackowledges the apparent consistency between EPS and willingness to pay (WTP) estimates derived by Oakley Greenwood in their 2012 study in NSW, but considers this one study to be insufficient evidence to conclude that estimates will be consistent in general. The different theoretical bases of the two methods, highlighted by the observations noted above, imply that results may differ in other cases. We also note that Oakley Greenwood made the following statements in relation to the WTP component of the questionnaire, which used a combination of closed- and open-ended contingent valuation questions:

> Given the cursory level of questioning on these matters, however, the results should be seen as indicative rather than definitive.[14]

> ...customers' WTP was not addressed in the way it would be in a study entirely devoted to that methodology... [15]

Choice modelling and contingent valuation hold a major advantage over the EPS and direct cost survey approaches – they are consistent with the economic concepts of compensating and equivalent variation.[16] Choice modelling is better suited than contingent valuation to simultaneously valuing multiple attributes, such as frequency, duration, advance notice, and time of day of supply interruptions. As a result, it generates a richer data set that can be applied across more than one context. We note that the Charles River Associates report on VCR in 2002 concluded that a choice modelling (or "tradeoff") approach should be considered for future studies into the value of residential reliability.[17] We also note that choice modelling was recommended by the Centre for International Economics in its review of alternative methodologies for the Independent Pricing and Regulatory Tribunal of New South Wales in 2001.[18]

The only drawback explicitly raised in the Paper in relation to choice modelling is "that it can be more complex, time-consuming and expensive than other approaches."[19] As discussed above, these costs are likely to be far outweighed by the net economic benefits of more closely aligning the balance between cost and reliability with customer preferences.

The Paper also raises a couple of drawbacks in relation to contingent valuation surveys that may be relevant to choice modelling. The first of these drawbacks relates to the hypothetical nature of the surveys.[20] Hypothetical surveys raise significant challenges in contexts where respondents have little or no experience with the good or service in question and where respondents have no incentive to answer carefully and truthfully. In the electricity reliability context, however, respondents have generally experienced some form of supply interruption and ActewAGL's experience confirms customers understand that price-reliability options could be applied on the basis of survey findings, particularly if the survey has been commissioned by a utility or regulatory body.

A second concern relates to differences in estimates of WTP and willingness to accept (WTA) from contingent valuation studies.[21] The same comments could apply to some extent to choice modelling studies. However, differences in WTP and WTA estimates should not necessarily be considered as a weakness in the survey technique. We note that WTA is not income-constrained and that substitutes to electricity network services are very costly, which has been shown to explain differences in WTP and WTA.[22] We also note that a difference between WTP and WTA is consistent with loss aversion.[23]

For the reasons outlined above, ActewAGL supports the use of choice modelling for estimating the VCR for all customer classes. The advantages of choice modelling are particularly clear for residential customers, since they are likely to incur significant indirect, non-financial costs due to supply interruptions.

Question 10. Are there any other international VCR studies worth examining to inform the current process?

ActewAGL notes that a significant body of evidence is accumulating in relation to choice modelling studies that estimate WTP or WTA compensation for changes in supply reliability.[24] This research includes relatively recent studies for Ofgem in the United Kingdom[25] and the Electricity Authority in New Zealand.[26] We note that most of these papers and reports present their results in terms of WTP to avoid specific events, rather than as a measure of VoLL. However, with the relevant consumption data, the results could be converted to a VoLL in the same way that VCR is derived from the EPS and "direct cost approach" survey results. These studies should be captured in a comprehensive literature review and considered prior to any decision on a national method for valuing reliability. ActewAGL would also be pleased to provide AEMO with information in relation to the choice modelling studies conducted in the ACT in 2003 and 2011.

ActewAGL also notes there is a substantial body of academic research dealing with similar valuation challenges in environmental economics and other utilities industries, such as urban water supply. The current process should consider the lessons and accumulated knowledge in this broader field.

Question 13. Should contingent valuation or other survey methodologies be used to allow higher values to be placed on residential customer inconvenience from interruptions?

As discussed above in response to Question 9, ActewAGL's view is that choice modelling should be used for estimating the VCR for all customer classes. The advantages of choice modelling are particularly clear for residential customers, since they are likely to incur significant indirect, non-financial costs due to supply interruptions.

Question 21. What improvements should AEMO consider to the conduct and administration of surveys?

Non-market valuation is a specialised, rapidly evolving and technically demanding area. It is therefore important that experts in the field are involved in designing the survey instruments and analysing the data. ActewAGL has utilised experts when conducting studies in the ACT and notes that other studies have also taken this approach; for example, Professor Riccardo Scarpa was involved in the recent VoLL study undertaken by the New Zealand Electricity Authority. It is also important that network service providers have input to the surveys conducted in their jurisdiction.

In terms of survey administration, we note that the choice modelling study undertaken in the ACT in 2011 by the ANU used random digit dialling to recruit customers. Willing participants provided an email address and were sent a link to a self-administered internet survey. This approach utilises the respective strengths of telephone and internet survey methods. It avoids the potential interviewer bias in telephone interviews and the sample selection concerns of online panels and internet recruitment. It allows complex information to be conveyed as part of the online questionnaire, including choices between detailed cost-reliability scenarios.

We would be pleased to discuss the matters raised in this submission with your staff in more detail. Please contact in the first instance Dr Ben McNair, Principal Economist, on (02) 6248 3386.

Yours sincerely

David Graham
Director Regulatory Affairs and Pricing

Endnotes

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[2] McNair, B.J. and Ward, M.B. 2012, *Balancing cost and standards of service: the stated preferences of Canberra households*, Energy Networks Conference, 2 May, Brisbane, Australia.

[3] See, for example, Randall, A. and Stoll, J. 1980, Consumer's Surplus in Commodity Space, *The American Economic Review*, 70(3), 449-455.

[4] AEMO 2013, *Value of customer reliability*, Issues Paper, March, p12.

[5] AEMC 2012, *Review of Distribution Reliability Outcomes and Standards*, NSW Workstream Final Report, p7.

[6] Khan, M.E. and Conlon, M.F. 1997, *Value of Lost Load*, Report for Victoria Power Exchange by the Centre for Electrical Power Engineering (CEPE), Department of Electrical and Computer Systems Engineering, Monash University.

[7] Charles River Associates 2002, *Assessment of the Value of Customer Reliability (VCR)*, Report for VENCorp, December.

[8] Charles River Associates 2008, *Assessment of the Value of Customer Reliability (VCR)*, Report for VENCorp, August.

[9] Oakley Greenwood 2011, *Valuing Reliability in the National Electricity Market*, Final Report to the Australian Energy Market Operator, March.

[10] Oakley Greenwood 2012, *NSW Value of Customer Reliability*, Final Report to the Australian Energy Market Commission, May.

[11] AEMO 2013, *Value of customer reliability*, Issues Paper, March, p11.

[12] AEMO 2013, *Value of customer reliability*, Issues Paper, March, p19.

[13] AEMO 2013, *Value of customer reliability*, Issues Paper, March, p12.

[14] Oakley Greenwood 2012, *NSW Value of Customer Reliability*, Final Report to the Australian Energy Market Commission, May, p52.

[15] Oakley Greenwood 2012, *NSW Value of Customer Reliability*, Final Report to the Australian Energy Market Commission, May, p58.

[16] Small, K.A. and Rosen, H.A. 1981, Applied Welfare Economics with Discrete Choice Models, *Econometrica*, 49(1), 105-130.

[17] Charles River Associates 2002, *Assessment of the Value of Customer Reliability (VCR)*, Report for VENCorp, December, p45.

[18] Centre for International Economics 2001, *Review of willingness-to-pay methodologies*, Report for IPART, August.

[19] AEMO 2013, *Value of customer reliability*, Issues Paper, March, p12.

[20] AEMO 2013, *Value of customer reliability*, Issues Paper, March, p12.

[21] AEMO 2013, *Value of customer reliability*, Issues Paper, March, p12.

[22] Hanemann, M.W. 1991. Willingness to Pay and Willingness to Accept: How Much Can They Differ? *The American Economic Review*, 81 (3), 635-647.

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[24] For example:

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Morrison, M. and Nalder, C. 2009. Willingness to Pay for Improved Quality of Electricity Supply Across Business Type and Location, *The Energy Journal*, 30(2): 117-133.

[25] For example, Accent 2008, *Expectations of DNOs and willingness to pay for improvements in service*, Report prepared for OFGEM, July.

[26] Electricity Authority 2012, *Investigation into the value of lost load in New Zealand – Summary of findings*, available at: http://www.ea.govt.nz/our-work/programmes/transmission-work/investigation-of-the-lost-load/