7 November 2014

Ms Jo Witters
Group Manager, Regulatory Policy
Australian Energy Market Operator
GPO Box 2008
Melbourne VIC 3001

Dear Jo,

RE: AEMO VCR FINAL REPORT AND DRAFT VCR APPLICATION GUIDE

The Victorian DNSPs (CitiPower and Powercor Australia, United Energy, AusNet Electricity Services and Jemena Electricity Networks) welcome this opportunity to provide this submission on AEMO's Draft VCR Application Guide.

In making this submission, we are also taking the opportunity to provide high-level comments on AEMO's VCR Final Report, focussing in particular on issues relating to the application of VCR in network planning. We understand that AEMO will shortly be writing to the COAG Energy Council Secretariat setting out an overview of the results of the VCR review. We would invite AEMO to consider our comments when preparing its report to the Council.

As you know, the Victorian DNSPs apply the VCR in planning the development of their distribution networks and the transmission facilities that connect their networks to the Victorian declared shared network. We therefore have a keen interest in ensuring that:

- the VCR used in network planning evaluations is fit for purpose; and
- the VCR is applied in an appropriate manner, having regard to the inherent uncertainty of its estimated value - however determined.

In this regard, we welcome AEMO's publication of its September 2014 Final Report on the VCR review, and its draft Application Guide. We are strongly of the view, however, that these latest developments must be seen as a 'next step' in the on-going investigation of VCR, and there remain some very important issues to be addressed. We provide comments on four issues of immediate concern under separate headings below.

1. Recognising error and uncertainty in estimating VCR

All methods for estimating VCR are prone to error and uncertainty. This is because the VCR cannot be measured directly, but must instead be estimated indirectly from data obtained in customer surveys, or through other methods. The magnitude of the errors involved in estimating the VCR is illustrated by the wide differences between:

- AEMO's estimate for 2013 of $63 per kWh, which was based on the 2007-08 VENCorp study;

- Oakley Greenwood's 2012 estimate of the New South Wales VCR, of $95 per kWh[1]; and

- AEMO's latest Victorian VCR estimate of $39.50 per kWh.

The wide range of VCR estimates produced by these three studies is likely to reflect estimation errors and methodological differences between the studies, rather than changes in the actual value of customer reliability. Indeed, in this regard, the Final Report states[2]:

> "AEMO has sought to contrast its results with other VCR type studies. Other studies (both domestic and international) were used for verification of VCR magnitude and relativity between customer classes. AEMO notes that results from previous studies should not be directly compared due to differences in survey design and methodology.
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> […]
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> Specifically […] the nature of the survey design, the outage variables tested, and the way in which respondents are asked questions and how they participate, all lead to quite significant differences in findings of these reviews."

Given the significant uncertainty and measurement error associated with any particular VCR estimate, careful consideration must be given to how the new evidence provided by AEMO's latest study is to be taken into account in setting the VCR for network planning and investment purposes. Regarding the application of the latest VCR estimate, the Final Report states[3]:

> "AEMO intends to apply the new aggregated state-level VCR values (both including and excluding direct connect customers) in its National transmission planning functions, including for Regulatory Investment Test (RIT-T) assessments and reviews of other TNSP investment plans."

In effect, AEMO intends to discard the previous VCR estimates used in network planning, and adopt with immediate effect a new VCR value which is approximately 40% lower than the one applied previously. We question whether this is a well-founded approach, in light of the uncertainty and measurement error that affects all VCR estimates. Moreover, we note that the reduction proposed is both material and unexpected, especially in light of Oakley Greenwood's recent estimates of the New South Wales VCR, of $95 per kWh in 2012.

Where the periodic re-estimation of the VCR gives rise to unforeseeable and very large step changes (as is the case here) careful thought needs to be given to how the new VCR will be implemented in network planning, bearing in mind that:

- VCR is used in the economic evaluation of assets that have lives of 40 years or more.

- Periodically changing the network planning VCR to reflect estimates that vary substantially from survey to survey is unlikely to enhance confidence in the results of network investment evaluations.

- The immediate adoption of a new, 40% lower VCR for investment evaluation purposes will have implications for the level of supply reliability delivered to customers in the future. For

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1 AEMO, Value of Customer Reliability Review Final Report, September 2014, Appendix G, page 57.

2 AEMO, Value of Customer Reliability Review Final Report, September 2014, page 37.

3 Ibid, page 40.

instance, the application of the new VCR may result in some terminal stations being loaded beyond their N level ratings before an augmentation is economically justified. Notwithstanding the VCR estimate inferred from the latest customer survey, the rotational load shedding required to manage asset loading to within safe limits may not be consistent with the community's reasonable expectations regarding reliability of supply[4].

In view of the above, we suggest that a better approach would involve AEMO weighing up all the evidence on the VCR - including previous survey results and estimates - and forming a considered view as to the appropriate VCR to apply for network planning purposes. Alternatively, it may be appropriate to undertake VCR surveys more frequently and apply a moving average of the estimates to reduce their variability over time.

Whatever approaches are adopted to address the issues that arise from material changes in the estimated VCR, it will be important to recognise that:

- Future VCR surveys may well produce materially higher or lower VCR estimates than the current estimate, which cannot be predicted for the purposes of conducting RIT-T or RIT-D evaluations.

- Any material variations in VCR estimates are much more likely to be driven by the estimation error, rather than changes in the actual VCR.

We would urge AEMO to consider these matters prior to finalising its Application Guideline. In particular, we would caution against the immediate adoption of a new - and materially different - VCR estimate without careful consideration of the matters set out above.

In relation to the confidence intervals applying to its VCR estimates, the Final Report states[5]:

> "In order to produce confidence intervals for the overall $/kWh VCR results, additional probabilistic modelling (likely involving a Monte Carlo simulation) would have to be undertaken. Such a simulation would estimate probabilistically the net impact of the combined uncertainties from both the survey results and supporting data to determine rough confidence intervals. Due to the lack of information on the standard errors and confidence intervals associated with the supporting data (such as AER's RIN data, BREE data, and demand data), AEMO did not undertake this analysis.
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> On the basis of the choice modelling results alone, the approximate confidence interval for a VCR produced in this study is +/-30%, which is an acceptable range for a survey of this nature."

We also note that the Final Report states, in relation to Pricewaterhouse Coopers' (PwC) review of AEMO's results, that:

> "PwC's review found the modelling to be reasonable and the VCR survey results to be sensible. PwC considered that the VCR values may be on the lower range due to WTP being calculated using non-parametric estimates and the use of WTA attributes with only 99% statistical significance." [Emphasis added]

In view of these considerations, we suggest that the Application Guideline should:

- explicitly address the issue of VCR estimation error and uncertainty; and

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4 Clause 5.2 of the Victorian Electricity Distribution Code states: "A distributor must use best endeavours to meet targets required by the Price Determination and targets published under clause 5.1 and otherwise meet reasonable customer expectations of reliability of supply."

5 AEMO, Value of Customer Reliability Review Final Report, September 2014, page 31.

- provide meaningful guidance on the application of the VCR in network investment analysis, so that estimation error and uncertainty are properly taken into account in investment decisions.

2. Cost of high impact, low probability events

Under a probabilistic approach, the benefits of network investment are expressed in terms of reduced expected unserved energy valued at VCR, and the objective is to select the investment that maximises expected (probability-weighted) net present value. The weighting ascribed to high impact, low probability (HILP) events under this evaluation framework is very low, reflecting their very low probability of occurrence. The application of VCR in the context of probabilistic investment analysis therefore masks customers' exposure to HILP events. In relation to such events, AEMO's Final Report stated:[6]

> "During consultation, some network service providers stated that high impact, low probability (HILP) events should be considered when developing VCRs. As part of the survey, customers were asked for their willingness to pay to avoid rare but long outages and 'extreme' weather outage events.
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> Although questions were added to the survey to capture WTP data for HILP events, further analysis has not been undertaken to develop VCR values on this basis as these values cannot be readily applied as yet for network planning.
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> There are three reasons to expect that HILP outages would have a small impact on the calculated VCR expressed as $/kWh. First, the survey method focused on attributes of outages. These attributes can be combined such that they provide a value for extreme weather type outage scenarios. This would be an extrapolation from the data, but provides a first-cut estimate of the value.
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> Secondly, rare but long outage VCR when calculated may also be lower than the WTP and WTA results derived from the survey results given the high loss of load which occurs during a HILP event. Results suggest that the VCR is non-linear with respect to both time and load, declining with larger losses.
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> Finally the low probability of a high impact event occurring reduces its impact on average VCR. The value of a loss is calculated as the impact multiplied by its probability. When the value of lost load under a high impact event is multiplied by its very low probability of occurrence, its effect in cost-benefit network assessment is further reduced. Even doubling or trebling the size of the impact has little effect on the average VCR, because of the low probability."

We consider that the explanation provided by AEMO (cited above) does not directly address the contention that the treatment of high impact, low probability events is an important issue which is understated in assessing the benefits of a proposed network augmentation using a probabilistic approach.

We understand and accept AEMO's explanation that HILP outages would have a small impact on the calculated VCR expressed as $/kWh. However, this misses the point. VCR is currently applied in a probabilistic framework which places very little weight on the value of avoiding or reducing exposure to HILP events. We therefore consider that there remains a need to explore the following contentions:

- Contrary to the assumption implicit in the current approach to network investment decision analysis (which seeks to maximise the probability-weighted, or expected value), consumers may be risk averse.

[6] AEMO, Value of Customer Reliability Review: Appendix, September 2014, page 20.

- Therefore, when fully appraised of the potential consequences of a HILP event, consumers may be prepared to pay a premium - in the form of advancing network investment - to reduce or eliminate that exposure. While the probabilistic approach weights this exposure by a low probability of occurrence, alternative decision-making criteria - such as least regrets or no regrets - could legitimately attribute much greater value to actions which reduce or avoid exposure to such events.

- If network investment decisions are always based on maximising expected value, this may fail to maximise expected utility, contrary to the long term interests of consumers.

Unfortunately, AEMO's Final Report contains no analysis of customers' responses to questions about their willingness to pay to avoid high impact low probability events. We consider this information would be worth including in an updated report or appendix, and it would also be helpful if AEMO's Application Guide were to flag the matters set out above, and note the need for further investigation.

It is also worth noting that the Victorian Electricity Distribution Code includes a specific obligation on distributors to develop, test or simulate and implement contingency plans (including where relevant plans to strengthen the security of supply) to deal with events which have a low probability of occurring, but are realistic and would have a substantial impact on customers.[7] This obligation may require the distributors to consider matters beyond the scope of those included in the VCR estimate when evaluating contingency and investment plans.

3. Costs of widespread outages

The potential societal costs of widespread outages are likely to materially exceed the customer interruption costs used in AEMO's recent study to derive VCR estimates. This suggests that there is a need to distinguish between the estimated value of supply reliability to an individual customer's premises, and the estimated value to the community as a whole.

The costs of widespread outages include non-tangible and flow-on social disruption costs. Non-tangible costs include impacts on leisure and study time, and interruptions to schools, public administration and transportation. Flow-on costs include impacts such as trauma related to injuries/mortalities attributable to disruptions to health services, fear, panic, and increased incidence of crime.[8]

AEMO's Application Guide should explore this issue in more detail, and note the need for further investigation. For example, the exclusion of societal costs from the latest VCR estimate may explain a small proportion of the difference between that estimate and the earlier NSW study conducted in 2012.

4. Potential re-weighting of outage probabilities

Page 13 of the draft Application Guide states:

> "Customer class VCRs are aggregated values derived by probability weighting the VCR of 24 outage scenarios. However, in some cases network planning may only be concerned with specific outage scenarios (i.e. ones occurring during peak times). In those scenarios it may be appropriate to re-weight the outage probabilities to create an aggregate customer class VCR which better reflects the outage scenarios considered. For example, where network planning identifies that an outage in peak conditions results in a loss of supply to a connection point, the customer class VCRs are re-weighted

7 Victorian Electricity Distribution Code, May 2012, clause 3.1(c)

8 Oakley Greenwood, Valuing Reliability in the National Electricity Market, Final Report, March 2011, page 10.

by removing the off-peak outage scenarios and changing the probabilities of the peak demand scenarios.

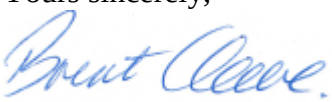
AEMO considers that further investigation of this approach to deriving locational VCRs is required before a decision can be made on whether it can be adopted."

We consider there is merit in the approach suggested by AEMO. We note that in addition to the example cited by AEMO, it may be appropriate in some cases to adopt a specific VCR that considers outage durations of, say, less than 3 hours. For instance, feeder outages are typically shorter than 1 hour, while a scenario with very large amounts of energy at risk may involve a prolonged outage but with load shedding applied through a series of repeated "rolling" outages of 1 to 3 hours duration.

We suggest that the Application Guide should provide for the calculation of specific VCRs that reflect the outage scenarios that are most likely to drive the need for network investment or other action to address emerging constraints. We would welcome the opportunity to work with AEMO in investigating these matters in further detail.

The Victorian DNSPs appreciate the opportunity to make this submission and would welcome the opportunity to discuss any of the matters raised in this submission. If you have any questions, please contact Neil Watt on (03) 9683 4104 or by email at nwatt@citipower.com.au.

Yours sincerely,



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