# Values of Customer Reliability

## Consultation Update

April 2019

AUSTRALIAN ENERGY REGULATOR

Inquiries about this publication should be addressed to:

Australian Energy Regulator
GPO Box 520
Melbourne Vic 3001

Tel: 1300 585165

Email: AERInquiry@aer.gov.au
AER Reference: PRJ1003080

# Contents

## Invitation for views and feedback

We are publishing this document to update stakeholders on our progress and thinking to date. We also hope that this provides some useful transparency. Given this is not a formal consultation document we are not requesting formal responses. However, we welcome any views and feedback interested parties wish to provide.

Views and feedback to this Consultation Update paper should be sent to: VCR@aer.gov.au.

Alternatively, post to:

George Huang
Director, Policy and Performance
Australian Energy Regulator
GPO Box 520
Melbourne VIC 3001

Over the next few months we will continue to progress the VCR review and intend to publish a formal consultation on the VCR methodology in third quarter of 2019. We will consider and respond to all views and feedback to this Consultation Update received by 24 May 2019 in our consultation on the VCR methodology.

Any views and feedback should be in PDF, Microsoft Word or another text readable document format.

We prefer that all views and comments be publicly available to facilitate an informed and transparent consultative process. Views and comments will be treated as public documents unless otherwise requested. Parties wishing to submit confidential information should:

1. clearly identify the information that is the subject of the confidentiality claim
2. provide a non-confidential version of the submission in a form suitable for publication.

All non-confidential information will be placed on our website. For further information regarding our use and disclosure of information provided to us, see the ACCC/AER Information Policy (June 2014), which is available on our website.[1]

[1] https://www.aer.gov.au/publications/corporate-documents/accc-and-aer-information-policy-collection-and-disclosure-of-information

## Shortened forms

| Shortened form | Extended form |
|---|---|
| AEMC | Australian Energy Market Commission |
| AEMO | Australian Energy Market Operator |
| AER | Australian Energy Regulator |
| CBD | central business district |
| COAG | Council of Australian Governments |
| the Committee | the VCR Consultative Committee |
| CPI | consumer price index |
| DER | Distributed energy resources |
| DCA | Direct cost approach |
| ECA | Energy Consumers Australia |
| HILP | high impact, low probability |
| kWh | kilowatt-hour |
| NEL | national electricity law |
| NEM | national electricity market |
| NEO | national electricity objective |
| NER | national electricity rules |
| NGR | national gas rules |
| NSP | network service provider |
| RERT | reliability and emergency reserve trader |
| RIT | regulatory investment tests |
| SAIDI | system average interruption duration index |
| SAIFI | system average interruption frequency index |
| Solar PV | solar photovoltaic |
| STPIS | service target performance incentive scheme |
| USE | unserved electricity |
| UPS | uninterruptable power supply |
| VCR | values of customer reliability |
| VENCorp | Victorian Energy Networks Corporation |

| | |
|---|---|
| WTA | willingness to accept |
| WTP | willingness to pay |

# 1 Executive Summary

The Australian Energy Regulator (AER) is the independent regulator for Australia's national energy markets. We are guided in our role by the national electricity, gas, and energy retail objectives set out in in the National Electricity Rules (NER) and the National Gas Rules (NGR). These objectives focus on promoting the long-term interests of consumers.

In response to a rule change proposal from the Council of Australian Governments (COAG) Energy Council, the Australian Energy Market Commission (AEMC) amended the NER to give the AER responsibility for determining the values different customers place on having a reliable electricity supply.[2] This is referred to as the Value of Customer Reliability (VCR). The VCR links efficiency and reliability, playing a pivotal role in network planning and investment and informs the design of market and network price caps and incentives, such as for network reliability. The AEMC's Rule Change came into effect on 13 July 2018.[3]

Our first calculated VCRs must be published by 31 December 2019. Under this rule change we must develop a methodology for estimating VCRs, which includes a mechanism for directly engaging with retail and other customers to determine these values and a mechanism for adjusting VCR on an annual basis. This methodology must be fit for purpose for any current or potential uses of customer reliability that we consider to be relevant.

There are a number of approaches to estimate VCR values. These can be classified as:

- stated preference, the information comes directly from users (typically survey based approaches)
- revealed preferences of current market behaviour with respect to investment activities, for example, standby generators or batteries, or from the inclusion of interruptible supply contracts
- model based approaches which typically rely on macroeconomic information such as production functions for commercial and industrial customers and household income / leisure function for residential customers.

As set out in this update, we have consulted with a wide range of Government, industry and customer stakeholders to assess the preferred methodology for this, our first determination of VCR. Based on our assessment, we propose adopting a hybrid of survey and model based approaches for our 2019 VCR methodology. We consider this will allow us to:

- build on and improve AEMO's 2014 methodology
- take into consideration suggestions proposed by stakeholders in response to our consultation

2 AEMC, *Rule Determination – National Electricity Amendment (Establishing values of customer reliability) Rule 2018*, 5 July 2018.

3 NER, Rule 8.12.

- recognise and consider changes in the energy sector since 2014. These include technological changes such as:
    - enhanced reliability communications to notify customers of expected outage duration times
    - behind the meter reliability solutions, such as solar photovoltaic (PV), battery storage and micro grids.

We have developed an assessment framework consistent with the National Electricity Objective (NEO) to assist in determining the best approaches to estimate VCR values fit for purpose for current and potential uses of VCR which we have identified.

AEMO's 2014 VCR study determined VCR values for three customer types (residential, business and direct connect). Residential customers were segmented by state. Business customers were segmented into agricultural, commercial and industrial along small, medium and large consumption thresholds and direct connect customers were segmented into three sectors; metals, mining and wood, pulp and paper. From our consultation process we understand that if we determine VCR values at a more granular level to include, for example, CBD, regional and rural customers, momentary outages and widespread long duration outages that this will improve network planning and investment tests. We also understand if our VCR values are sufficiently granular they will also be fit for purpose for the other uses of VCR values.

We consider survey based approaches are preferable for estimating VCR values for standard outages compared to revealed preference approaches. This is partly because there are few situations where reliability is priced in the market. Most market prices incorporate information about other things consumers' value besides reliability, and do not provide information on preferences between different outage scenarios.

We also consider survey based approaches to be preferable to model based approaches because they directly interact with customers (as is required by Rule 8.12 of the NER). Questions about preferences for onsite generation and storage can also be included which help identify changing technology preferences enabling us to address the long term interests of customers consistent with the NEO. Survey based approaches also allow for greater flexibility and granularity than model based approaches with respect to the variables being measured:

- customer types
- outage types (duration, temporal differentiation)
- location (jurisdiction, CBD, rural, remote).

For widespread, long duration outages and high impact low probability (HILP) events we consider it necessary to develop a particular methodology to determine VCR values. We will continue to engage with our VCR consultative committee and Melbourne Energy Institute (MEI) to develop an appropriate methodology for these events. It may involve a different survey approach using more targeted questions and stakeholder engagement, a macroeconomic model, or a combination of approaches could also be used to develop VCR values for HILP events.

# 2 Consultation to date

This section summarises the consultation we have undertaken to date for the VCR Review.

## 2.1 Consultation paper and VCR public forums

On 19 October 2018, we commenced the VCR review with the publication of our consultation paper. The consultation paper sought stakeholder feedback on a number of matters including:

- different methodologies to determine VCR values
- current and future uses of VCR
- how stakeholders currently use VCR
- how we should approach trade-offs between cost, complexity and accuracy.

Submissions to the consultation paper closed on Friday 16 November 2018. We received 18 submissions.

Following the close of submissions, we held VCR public forums in Sydney on 5 December 2018 and in Melbourne on 6 December 2018. The public forums provided an opportunity to discuss stakeholder comments on the consultation paper. Following the public forums we extended the consultation period until 20 December 2018. A further 7 submissions were received.

Key views and feedback from stakeholder submissions are summarised in section 2 of this consultation update (Please refer to Appendix 1 for a list of submissions received).

## 2.2 VCR Consultative Committee

At the beginning of the VCR review we established the VCR Consultative Committee (the Committee). The Committee is an advisory body consisting of representatives from organisations with a particular interest in VCRs or who have relevant expertise in how VCRs should be determined, who we will consult with on key issues throughout the VCR review.

Committee members include representatives from the following organisations:

- Australian Energy Council (AEC)
- Australian Energy Market Commission (AEMC)
- Australian Energy Market Operator (AEMO)
- Essential Services Commission of South Australia (ESCOSA)
- Essential Services Commission of Victoria (ESCV)
- Energy Consumers Australia (ECA)
- Energy Networks Australia (ENA)
- Energy Users' Association of Australia (EUAA)

- Independent Competition and Regulatory Commission (ICRC)
- Independent Pricing and Regulatory Tribunal of New South Wales (IPART)
- Office of the Tasmanian Economic Regulator (OTTER)
- Public Interest Advocacy Centre (PIAC)
- Reliability Panel
- Utilities Commission of the Northern Territory (UC)

The Economic Regulatory Authority of Western Australia has also attended meetings of the Committee as an observer.

To date, the Committee has met twice. Minutes of committee meetings can be found on the AER website[4].

## 2.3 High impact low probability events (HILP) subcommittee

A number of stakeholder submissions raised matters regarding the development of VCRs for outages that are typically the result of HILP events. They highlighted a number of complex issues. To give proper consideration to these issues we established a HILP subcommittee (the Subcommittee) sitting under the Committee. The Subcommittee consists of a subset of Committee members with a particular interest in or expertise in this subject area.

The Subcommittee assists us in considering whether to develop VCRs for HILP events and how to achieve this. Findings of the Subcommittee will also be provided to the Committee for its consideration.

The Subcommittee first met on 14 March 2019. We anticipate it will meet regularly over the next few months.

## 2.4 Independent expert advice

Two consultancy groups, MEI and a consortium consisting of KPMG and Insync (KPMG/Insync), are assisting us in our review. MEI is an inter-disciplinary academic research group assisting us in developing the VCR methodology and providing quality assurance over the course of the review. KPMG and Insync are also assisting to develop the VCR methodology, and undertaking the design and delivery of surveys we conduct as part of the review.

4 https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/values-of-customer-reliability-vcr/consultation

# 3 Summary of submissions received to the VCR Consultation Paper

We received 18 submissions in response to our October 2018 Consultation Paper and a further 7 submissions following our public forums.

The submissions suggest the AER's VCR review should:

- focus on deriving values fit for purpose for network planning and investment
- build on AEMO's methodology for deriving VCR values by adding granularity and increasing the sample size
- derive VCRs for HILP events, however contingent valuation (CV) or choice modelling (CM) methodology should not be used for calculating these values
- review the VCR values at least every 5 years, using known escalators such as CPI and PPI annually between reviews
- reflect changes in technology that have occurred since the AEMO VCR review, such as uptake of distributed energy resources (DER), including solar PV and battery storage.

Stakeholders suggested we hold deliberative forums or focus groups to test our survey questions to achieve better survey results. Stakeholders considered these approaches provide an opportunity for respondents to better understand what is being asked and to provide more informed responses.

Stakeholders also suggested we ensure vulnerable customers are captured in the survey.

## 3.1 Methodology and approach

Overall, submissions supported us building upon AEMO's methodology.[5] There was general support for a survey based approach using contingent valuation and choice experiment techniques, as they are best able to capture the values of residential and small business customers.

While submissions supported the overall approach used by AEMO, some comments suggested the methodology should be more granular.[6] Submitters also suggested the surveys should capture changes in the energy environment since 2014, such as increased uptake in solar PV and battery storage.[7] Additionally, submitters considered our

5 Supporting submissions include: AEC p.3, AEMO p.4, Ausgrid p.7, AusNet p.4, Endeavour pp.1-2, Energy Queensland p.6, EUAA pp.3-4, Evoenergy p.3, MEU p.6, Powershop Meridian p.5

6 Supporting submissions include: AEMO p.3, AusNet pp.1, 5, Ausgrid p.5, Business SA p.3, ENA p.5, Endeavour pp.2-3, Energy Queensland p.6, EUAA p.4, Evoenergy p.3, Origin p.1, Powershop Meridian p.5, SAPN pp.2-3, TasNetworks p.1, TransGrid pp. 3, 5.

7 Supporting submissions include: AEMO pp.5-6, AEC p.3, ENA p.5, Energy Queensland p.6, IPART p.2, Origin p.1, Powershop Meridian p.6, S&C p.11.

methodology should be appropriate for future reviews and for consideration to be given to new developments.

Submitters also expressed interest in calculating VCRs for widespread, long duration outages, and suggested that if we require VCRs for these events we should adopt an alternative survey technique or methodology.[8] [9] The reason for this is that customers find it difficult to answer questions about these events as they do not have experience of such events and may not be able to envisage all of the associated consequences and costs.[10]

Most submitters suggested 5-yearly reviews were appropriate, though some favoured more frequent reviews.[11] For example, CitiPower, Powercor and United Energy noted the timeline for this review falls between the Victorian distributors' regulatory proposals (June 2020).[12] Between reviews, submitters also suggested adjusting values by known escalators, such as CPI and PPI, or by developing VCR forecasts.[13] A number of submissions highlighted a need for consistency and stability in the VCR values when transitioning from AEMO's 2014 VCR values, and in the future.[14]

## 3.2 Segmentation/Granularity

Most submitters discussed customer segmentation, with strong support for retaining AEMO's segments.[15] Nearly all supported further segmentation and greater granularity of VCR values, as this would help stakeholders derive appropriate VCRs for specific locations within the NEM and Northern Territory.[16]

Most submitters supported customer segmentation based on remoteness and location[17], climate[18], criticality or reliance on electricity,[19] and whether customers have access to additional fuel sources.[20]

---

8 Supporting submissions include: AEMO pp.3-4, Ausgrid p.4, AusNet p.3, TasNetworks pp.1-2

9 AEMO pp.3-4, Ausgrid p.3, ENA p.3

10 Ausgrid p.3, ENA p.3, PIAC p.12

11 Submissions supporting 5-yearly reviews include: AEC p.3, AusNet p.6, Energy Queensland p.7, SAPN p.4, TransGrid p.6; more frequent reviews supporting submissions include: Powershop Meridian p.6, CitiPower, Powercor and United Energy p.3

12 CitiPower, Powercor, United Energy submission, 16 November, p.3

13 CPI/PPI supporting submissions include: AEC p.3, Ausgrid p.11, ENA pp.6-7, Powershop Meridian p.7, SAPN p.4; VCR forecasts supporting submissions include: Energy Queensland p.7, S&C p.13

14 Supporting submissions include: AEC p.3, Ausgrid p.11, AusNet pp.1, 6, ENA p.6, CitiPower, Powercor and United Energy p.2

15 Supporting submissions include: AEMO p.3, AusNet pp.1, 5, Ausgrid p.5, Business SA p.3, ENA pp.5-6, Endeavour pp.2-3, Energy Queensland p.6, EUAA p.4, Evoenergy p.3, MEU pp.7, 22, Origin p.1, Powershop Meridian p.5, SAPN pp.2-3, S&C p.10, TransGrid p.3

16 Supporting submissions include: AEMO p.3, AusNet pp.1, 5, Ausgrid p.5, Business SA p.3, ENA pp.5-6, Endeavour pp.2-3, Energy Queensland p.6, EUAA p.4, Evoenergy p.3, Origin p.1, Powershop Meridian p.5, SAPN pp.2-3, S&C p.10, TransGrid p.3

17 Supporting submissions include: AusNet p.5, Ausgrid pp.4-5, ENA p.5, EUAA p.4, IPART p.2, Powershop Meridian p.5, S&C p.12, TransGrid p.3

18 Supporting submissions include: IPART p.2, EUAA p.4

19 Supporting submissions include: Ausgrid p.5, ENA p.5, Endeavour p.3, TransGrid p.5

20 Supporting submissions include: AEMO p.3, Business SA p.3, ENA p.5, Energy Queensland p.6, Origin p.1

Submitters also observed the market and technology is changing, and supported deriving VCRs for customers with new technologies.[21]

Similarly, many submitters suggested customers with solar PV, battery storage and other distributed energy resources (DER) are likely to have different reliability preferences than customers without these technologies.[22] This is because such resources provide customers with alternative supply options, or value in facilitating exports to the grid. Submitters suggested additional VCR values for these segments are required because of these differences.

Given the likely time between VCR reviews (at least every 5 years), it may be prudent to establish a VCR methodology that takes into account the increasing take-up of emerging technologies between VCR reviews, and their influence on customer preferences for reliability.

## 3.3 Scope and role of VCR

To ensure the methodology and values of customer reliability are fit for purpose, relevant current and potential uses of VCR should be taken into account. Stakeholder views on the current and potential uses of VCR are summarised below in Tables 1 and 2:

### Table 1: Current uses of VCR

| Current uses | Submission views |
|---|---|
| Network planning and investment assessments | Support among stakeholders |
| Network service standard incentive schemes | Submissions did not specifically discuss these current applications |
| Demand management/non-network incentive schemes | |
| Economic benchmarking of networks | |
| Transmission and Distribution Annual Planning Reports | |
| Wholesale market price settings (such as the Market Price Cap) | Mostly supportive of VCR having an informative “cross check” role |

21 Supporting submissions include: AEMO p.6, AEC p.3, Endeavour p.2

22 Supporting submissions include: AEMO p.3, Business SA p.3, ENA p.5, Energy Queensland p.6, Origin p.1

### Table 2: Potential uses of VCR

| Potential uses | Submission views |
|---|---|
| Prioritising load shedding schedules | Range of views |
| Informing a price cap on ancillary services | Range of views |
| Informing a price cap on AEMO Reliability an Emergency Reserve Trader procurement | Mostly supportive of a limited role |
| High Impact Low Probability events, and assessing Transmission special impact schemes | Mostly supportive |
| Informing scheduled outages | Mostly unsupportive |
| Informing allocation of shared network costs | Range of views |

## 3.4 Consideration of high impact and low probability (HILP) events

The majority of submitters supported the creation of a VCR for HILP events.[23] They considered the methodology used to obtain VCR values should not be survey based, as survey respondents may not understand the consequences of a HILP event if they have no previous experience of them. Some submitters suggested alternative methodologies, including a direct cost approach (DCA) and ex-post assessments on a case-by-case basis.[24]

23 Supporting submissions include: AEMO pp.3-4, Ausgrid p.4, AusNet p.3, Endeavour p.3, Energy Queensland p.5, S&C p.7, TasNetworks pp.1-2, TransGrid pp.2, 5

24 Ausgrid p.3, ENA p.3, Energy Queensland p.5

Submitters also noted the need for a clear definition of HILP events, and a clear purpose for its value.[25]

25 EUAA p.1, Origin p.1, TransGrid pp.2-5

# 4 Initial AER position on approaches to measuring VCRs

The NER requires the AER to develop a methodology to calculate values of customer reliability (the VCR methodology). This chapter evaluates different approaches to estimating VCR. Section 4.1 sets out the assessment criteria for evaluating our VCR methodology. 4.2 discusses current and potential uses of VCR. 4.3 considers approaches for estimating VCR for different outage types. Our plans for establishing and annual adjustment factor are briefly set out in section 4.4.

Our review to date has identified three broad categories of outages for which VCR values may be derived. The VCR methodology will consist of the various approaches we have identified as most suitable to estimate one or more categories of VCR.[26] In this chapter we also set out the current and potential applications of VCRs which we have taken into account in assessing which approaches should be included in the VCR methodology.

There are a number of approaches to estimating VCRs. These can be classified as:

- stated preference techniques, the information comes directly from users (typically survey based approaches)
- revealed preferences techniques, which study current market behaviour with respect to investment activities, for example, standby generators or batteries, or from the inclusion of interruptible supply contracts
- model based techniques using macroeconomic information such as production functions for commercial and industrial customers and household income / leisure function for residential customers (typically model based approaches).

Our study highlights some approaches to estimating VCRs that better address certain customer groups and outage attributes than other approaches. For example, the use of choice experiment surveys provides better estimates of customer reliability for residential customers than a direct cost survey approach.[27]

Consistent with stakeholder comments, we have developed an assessment framework to help us determine the best approaches to estimate VCR values that are fit for purpose.

The discussion below sets out:

- the criteria against which we have assessed different VCR measurement and annual adjustment techniques to develop our VCR methodology
- current and potential VCR applications
- evaluation of approaches to calculating VCR.

---

26 The VCR methodology will also include an annual adjustment mechanism.

27 AEMO VCR Review Final Report, September 2014, page 9.

## 4.1 Assessment criteria

Table 3 below sets out our proposed assessment criteria for the VCR methodology. The proposed assessment criteria are based on requirements set out in National Electricity Rules (NER) and the National Electricity Objective (NEO).

### Table 3 - Proposed assessment criteria

| Assessment criteria |
| --- |
| **1. The National Electricity Objective (NEO) to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity.**<br><br>**We consider this requires the VCR methodology to be flexible such that values produced are a reasonable reflection of customer reliability preferences today, and can be adjusted to reflect future changes in reliability preferences. These changes in preferences may be driven by changes in the energy market, cost, technology or customer perceptions.** |
| **2. The VCR methodology and values of customer reliability should be fit for purpose for any current or potential uses of values of customer reliability that the AER considers to be relevant (the VCR Objective).**[28]<br><br>**We consider this requires:**<br><br>• **the VCR methodology and values to account for the range of customers and geographic locations within the NEM and Northern Territory, and recognise the various uses of VCR values**<br><br>• **us to produce reasonable estimates of customer VCRs which are fit for purpose.** |
| **3. The VCR methodology requirements are set out in clause 8.12 of the National Electricity Rules.**<br><br>**These state that the VCR methodology must:**<br><br>• **include a mechanism for directly engaging with customers which may include the use of surveys**<br><br>• **include a mechanism for adjusting the values of customer reliability on an annual basis.** |

## 4.2 Current and potential VCR uses

Rule 8.12 requires us to develop a methodology that is fit for purpose for any current or potential uses of VCR we consider relevant. To address this we are seeking to understand the current and potential uses of VCR as these will determine what types of VCR values are required and what approach should be used to derive them.

28 Clause 8.12, National Electricity Rules

In this chapter we outline the current and potential uses of VCR we have identified to date, and the types of outage scenarios for which we will need to derive VCR values.

### 4.2.1 Identified uses of VCR

The traditional purpose of VCRs is as an input in the cost benefit analysis for network planning (such as Regulatory Investment Tests and the Integrated System Plans) and the assessment of future network expenditure for capital projects. Using VCRs to estimate the value of unserved energy resulting from outages, a cost-benefit analysis can be performed to assess whether proposed steps to prevent outages (such as increasing network capacity) are economically justified. For example, expenditure would be justified where the value of unserved energy is greater than the cost of preventing outages through investment in a network or non-network option.[29]

Similarly through consultation, we have identified VCRs are also currently used in the NEM for the following purposes:

- in setting transmission and distribution reliability standards and targets[30]
- to inform reviews of the reliability standard and system restart standard
- in the distribution service target performance incentive schemes (STPIS) as the key measure for linking outcome performance with the STPIS incentives.

Similarly, our consultation to date has identified the following potential applications of VCR:

- determining load shedding priorities and compensation mechanisms in each jurisdiction
- informing reliability and emergency reserve trader (RERT) procurement.[31]

### 4.2.2 Types of VCR required to support identified uses

AEMO's 2014 NEM-wide VCR study determined VCR values for three customer types; residential, business and direct connect customers. Residential customers were segmented by state. Business customers were segmented into agricultural, commercial and industrial sectors, with small, medium and large consumption thresholds. Direct connect customers were segmented into three sectors; metals, mining, and wood, pulp and paper.

---

29 At a high-level, this is done by multiplying the applicable VCR by the energy at risk of being unserved in the event of outage or outages and comparing this with the cost of network investment to prevent the outage. If this value is less than the cost of the proposed step to prevent the outage, then the network investment should not go ahead.

30 For example, IPART has recently been requested by the Premier of NSW to review electricity distribution reliability standards taking into account the VCR values to be published by the AER as a result of this VCR review. See, https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-electricity-publications-electricity-distribution-reliability-standards/final-terms-of-reference-electricity-distribution-reliability-standards-february-2019.pdf.

31 On 7 February 2019 the AEMC published a draft rule determination on the enhancement to the reliability and emergency reserve trader rule change proposal. The draft rule proposes that AEMO must reasonable endeavours to ensure that the average amount payable for reserve contracts for each MWh of reserves in a region does not exceed the estimated load shedding VCR for that region. For more information, see https://www.aemc.gov.au/rule-changes/enhancement-reliability-and-emergency-reserve-trader.

For each customer segment, the AEMO methodology allowed for VCRs to be derived across a number of unplanned outage scenarios differing by:

- outage durations of less than 12 hours
- peak/off-peak times
- day of the week and season.

This enabled VCR values to be derived for specific outage scenarios or for a probability weighted VCR value comprising a range of different outage scenarios. We will refer to outage scenarios for which VCRs can be derived using the AEMO methodology as standard outages.

Through consultation we have found the range of VCRs that can be produced using the AEMO methodology is sufficient to cover the majority of outage scenarios and are suitable for the applications of VCRs identified above. However, stakeholders have highlighted value in having additional granularity in the number of customer segments. For example, some stakeholders suggested residential customers could be further segmented into rural, urban and CBD cohorts, as reliability preferences and VCR values may vary with remoteness.[32] This would potentially enable more accurate estimates of unserved energy to be used in network planning and investment tests.

We have found network planning will require the most granular application of VCRs. Therefore, provided our VCR values are fit for this purpose they will also be fit for the other current and potential uses of VCR identified above. Accordingly, our preference is for an approach capable of deriving VCR values across a similar range of outage scenarios to AEMO's methodology but with increased customer segmentation. Our proposed segmentation / granularity of VCR values is discussed below in section 5.4.

We have also identified two additional types of outage scenarios for which VCRs are not covered well by the AEMO methodology. These are:

- momentary outages (less than 3 minutes)[33]
- widespread and long duration outages, including HILP events.

Stakeholders suggested it would be useful to develop VCRs for momentary outages as some customer groups, such as smelters, paper mills, and food processors (distillers, dairy) may be impacted more by these outages than others, and VCRs for these outages would assist with network planning.

Stakeholders also suggested VCRs for widespread and long duration outages, including HILP events, would be useful for transmission planning and investment tests, particularly if a more resilience-based approach to planning is adopted. Additionally, HILP VCRs would assist the Reliability Panel in reviews of the system restart standard. The system restart standard specifies the parameters for restoring generation and transmission system

32 Supporting submissions include: AusNet pp.1-5, Ausgrid p. 5. ENA p.5, EUAA p.4, SAPN pp 2-3. TransGrid pp 3-5.

33 As defined in the AER, Electricity distribution network service providers - service target performance incentive scheme, V.2, November 2018, p.25

operations after a major supply disruption including a black system event. AEMO then procures system restart ancillary services (SRAS) to meet this standard, and develops the system restart plan in accordance with the standard. In the most recent review of the system restart standard, the Reliability Panel used VCR as an input in determining the marginal benefit associated with each combination of SRAS plants. AEMO's VCRs were used to estimate the value customers place on avoiding system-wide blackouts of varying durations.[34]

## 4.3 Evaluating approaches for estimating VCR

We consider there are three broad categories of outage durations for which we need an approach to derive VCRs in the VCR methodology. They are:

- standard outages (this should include more customer segments than AEMO's methodology)
- momentary outages
- widespread and long duration outages, including HILP events.

As there is no one approach to estimating VCR that would be appropriate to all outage durations and customer segments, we propose a hybrid approach for our 2019 VCR methodology.

To date we have focused on assessing approaches to estimate VCR values for standard unplanned outages[35], and have commenced work on approaches for momentary and widespread outages. Our considerations on methods to identify VCRs for the three different outage types are outlined below.

### 4.3.1 Approach for standard outages

Surveys are our preferred approach for estimating VCR values for standard outages because:

- the VCR values derived using survey approaches are forward looking and able to be applied to the majority of applications of VCR we have identified (assessment criteria 1 and 2)
- submissions supported us building upon AEMO's methodology, considering that contingent valuation and choice modelling are best able to capture the values of residential and small business customers (assessment criteria 2 and 3)

---

34 For more information about the system restart standard please go to https://www.aemc.gov.au/markets-reviews-advice/review-of-the-system-restart-standard.

35 We have examined deriving VCRs for planned outages in addition to unplanned outages, however we consider the additional complexity in survey design, and the increased minimum sample sizes per cohort, is not a desirable trade-off for the limited uses for planned outage VCR (principally, informing NSPs of the ideal times to conduct necessary network maintenance).

- MEI advised the combined contingent valuation and choice experiment survey techniques used by AEMO is robust and can be implemented with the NER timeframe (assessment criterion 2)
- surveys seek information directly from customers as opposed to model based approaches which rely on historical data. The use of surveys is therefore consistent with the requirements in the NER that the VCR methodology has a mechanism to directly engage with customers (assessment criterion 3)
- surveys can better ascertain information about how customer perceptions of grid reliability change as a result of solar PV, battery storage and other emerging technologies. This better supports the achievement of the NEO (assessment criterion 1)
- survey based approaches offer greater flexibility and granularity than model based approaches with respect to the variables being measured / targeted (assessment criterion 2) such as customer types, outage types (duration, temporal differentiation) location (jurisdiction, and further by CBD, urban, rural, remote). This supports the achievement of the NEO by allowing more targeted VCRs to be developed that enable better assessments of the efficiency of network expenditure (assessment criterion 1).

### Comparison between survey and model-based approaches

As a point of comparison to survey-based studies, we are investigating the use of the Leisure Time method as outlined by Cambridge Economic Policy Associates (CEPA) in their analysis of the Value of Lost Load (VoLL) of electricity supply in Europe.[36] This is one of the model based approaches used for estimating VCR. This technique is based on the assumption that the VoLL of households (which is akin to VCR in our studies) is driven by the interruption of leisure (i.e. leisure time requires electricity. Without it the value of leisure time decreases).

Model-based approaches typically require less data and are less costly than survey-based approaches. For example, the CEPA study uses sectoral data on consumption, gross value added, and wage rates to measure the reduced leisure utility impact on different sectors of an economy for all European member states.

However, model based approaches rely on a number of simplifying assumptions and do not easily allow for the same granularity and flexibility as survey based approaches (assessment criterion 2). Model based approaches also rely on historical data. While adjustments can be factored into account for contemporary trends, this still relies on assumptions about the trends themselves. With modern developments (such as an increase in home-based work) and the rapid emergence of new technologies (such as solar and batteries and demand-side participation) it is unclear without further detailed study whether the Leisure Time technique is appropriate. In particular, whether it adequately captures all the factors that contribute to a customer's VCR (assessment criterion 1).

36 Cambridge Economic Policy Associates Ltd, Study on the estimation of the value of lost load of electricity supply in Europe, 06 July 2018.

For our study we also consider the changing technical environment for networks and the shift from consumer to 'prosumer' which means information sought directly from customers (assessment criterion 3) about how they value reliability from surveys will provide better information about contemporary preferences than indirect model-based approaches (assessment criteria 1 and 2).

While there are disadvantages to survey-based approaches, such as biases introduced through the type of survey (questionnaire/wording, interview technique), we consider they can be addressed. Overall, our preferred approach is to use survey techniques as our main instrument to estimate VCR values. This is consistent with AEMO's 2014 study[37] and meets our assessment criteria as discussed in chapter 5. While we do not propose adopting a model based approach, we consider approaches such as the Leisure Time method offer interesting points of comparison to our chosen methodology and options for cross checking our results, which we intend to consider further..

### 4.3.2 Approach for momentary outages

Momentary outages are outages lasting less than three minutes.[38] Some customer groups, such as smelters, paper mills, and food processors (distillers, dairy), may be more impacted by these outages than others. Stakeholders have suggested VCRs for these outages would be useful for network planning purposes.

However it is not clear whether customers place any substantial value on grid solutions to address momentary outages. As a first step, we propose asking residential and business customers about momentary outages as part of the pilot surveys for standard outages (see section 5 for more information). For residential and business customers we will use the contingent valuation survey technique. Survey respondents will be asked how much they would be willing to pay, if anything, for investment in the electricity network to address momentary outages. We propose asking business customers an additional follow-up question about whether any investment in back-up generation has been undertaken to help mitigate the impact of momentary outages. This follow-up question will help us understand business customer responses, in particular if low or zero willingness to pay responses are due to businesses already taking active steps to minimise the costs incurred as a result of momentary outages.

### 4.3.3 Approach for widespread and long duration outages

We are considering other approaches that can be use in place of or in addition to surveys to determine VCRs for outages that are particularly widespread, of long duration (classed as outages which last longer than 12 hours), or both. These outages can arise as a consequence of HILP events and occur rarely. Therefore, many customers will never have

37 In its 2014 study AEMO used survey techniques to estimate VCR values. For residential and small business customers a combination of contingent valuation and choice experiment survey techniques was used and for large direct connect customers a direct cost survey technique was adopted.

38 As defined in the AER, Electricity distribution network service providers - service target performance incentive scheme, V.2, November 2018, p.25

experienced these types of outages and stakeholders have raised concerns customers may have difficulty accurately stating their willingness to pay to avoid them.

The consequences of such outages can be more severe than the more common localised and shorter duration outages that customers are likely to have experienced. For example, once localised backup solutions (such as diesel generation) are depleted, important services such as telecommunications, traffic management and water treatment may fail. If the outage affects a large area, it is also logistically challenging to transport substitutable products and services into the affected region. In addition, for widespread and long duration outages the indirect costs are difficult to quantify. Indirect costs are the costs to businesses and households from other businesses and organisations not having power. As indirect costs increase and become more important it may be difficult for survey respondents to consider all the costs they will incur and to place a value on these costs.

We are currently engaging with the Committee, the Subcommittee and the MEI to develop an appropriate methodology for these types of outages and plan to have regular meetings with these stakeholders throughout the course of our VCR review. We may adopt a different survey approach using more targeted questions and stakeholder engagement, macroeconomic modelling, or a combination of approaches.

We are considering whether it may also be necessary to calculate a number of VCR values for different ranges of outage durations and numbers of customers simultaneously affected (or a similar metric or metrics describing the extent of the outage). This is because there may be step changes in the impact of a customer's experience of an outage once certain duration and extent thresholds are exceeded.

We are also considering whether it may be appropriate to classify such outages and corresponding VCR values by ranges of “customer-hours” or unserved energy, as this would provide flexibility to capture a variety of outage scenarios with different combinations of customers affected and durations.

We will publish our proposed approach, which will have regard to feedback from the Committee and the Subcommittee, as well as commissioned research from MEI, for consultation in our Draft Decision on the methodology in August.

## 4.4 Annual adjustment factor

Rule 8.12(d)(2) states the VCR methodology must include a mechanism for adjusting the values of customer reliability on an annual basis. In response to our consultation paper most stakeholders suggested adjusting VCR values by CPI or the producer price index. Some stakeholders[39] suggested given the changing nature of Australia's energy system, automatically adjusting VCR for inflation may not be suitable. Energy Queensland suggested the forecast could reference AEMO's electricity forecasting insights, and that by incorporating such a mechanism, the VCR would be forecast on a similar basis to demand and consumption. Energy Queensland noted this would provide a more accurate VCR for use in revenue proposals where regulatory periods fall between review periods.

39 Energy Queensland, S&C Electric Company and Business SA

Furthermore, a VCR forecast based on economic factors/forecasts and reflective of the needs of customers should produce a less volatile VCR over the longer term.[40]

We agree that adjusting VCR values on an annual basis (between reviews) by CPI may not fully reflect the changing energy sector and the long term interests of consumers. We consider the adjustment mechanism should take into account expected future changes in the Australian energy sector, including the adoption of storage, solar PV and electric vehicles.

We consider an adjustment mechanism for VCR values capturing the effect of the increasing uptake of solar PV and battery storage will better support the long term interests of customers specified in the NEO (assessment criterion 1).

We are working with MEI on developing an adjustment factor to take into account these future changes. We will also discuss options for an annual adjustment mechanism with the Committee. Stakeholders wishing to provide suggestions on an annual adjustment mechanism are also welcome to do so. Please send an email to: vcr@aer.gov.au.

We will publish our proposed approach for an annual adjustment mechanism for consultation in our Draft Decision on the methodology in August.

40 Energy Queensland Limited, Energy Queensland Submission on the Values of Customer Reliability, Consultation Paper, 19 November 2018.

# 5 Proposed methodology and survey design for estimation of standard outages

This chapter provides a detailed overview of our methodology for which we propose adopting a survey based approach. In so doing we will adopt a similar approach to AEMO in its 2014 review, with some adjustments. In particular, our methodology for the estimation of standard outages is to use a survey based approach. It builds on AEMO's VCR review and has been adapted to take into account lessons from that review, consultation with stakeholders, and advice from MEI and KPMG/Insync. AEMO's methodology is discussed in 5.1, and our approach is discussed in 5.2. Section 5.3 discusses our approach to surveying direct connect customers. Our proposed customer segments and approach to testing our methodology are discussed in sections 5.4 and 5.5, respectively.

Our next step is to test the proposed survey techniques for residential and business customers. This chapter also provides a summary of the design of our pilot survey which we intend to use to test parts of the proposed methodology in April 2019, the customer segments which we propose to derive VCRs for, and the validation work we have undertaken to test the proposed methodology and pilot survey design.

## 5.1 Overview of AEMO methodology

AEMO's 2014 methodology used a survey based approach. AEMO surveyed 3000 customers between November 2013 and June 2014.[41] The surveys were split into two groups: “pilot” surveys were undertaken first followed by “final” surveys. Residential, business and direct connect customers of various sizes and industries across the NEM were surveyed. The survey sought to understand customer preferences in relation to a range of outage situations, considering how wide-spread an outage is, how long the outage lasts, how often it occurs, whether outages occur during peak or off-peak periods, whether they occur in summer or winter, on weekdays or weekends.

For residential and business customers AEMO selected choice experiment and contingent valuation survey techniques for measuring VCR values for residential and business customers.[42] [43] Both the contingent valuation and choice experiment survey techniques are stated preference techniques, i.e. customers respond to hypothetical questions.

In AEMO's 2014 study the contingent valuation survey technique was used to estimate the VCR value of a baseline outage. This was primarily done by asking if customers were willing to pay (WTP) specified amounts to avoid a baseline outage.

The choice experiment technique was then used to determine the VCR values for non-typical outages relative to the value of the baseline outage. This technique asks customers to identify their preferred option out of several options. Options vary by:

41 AEMO Value of Customer Reliability final report appendix, Appendix D
42 AEMO Value of Customer Reliability final report, page 1
43 AEMO Value of Customer Reliability final report, page 9

- duration
- time of day, day of the week and time of year.

The AEMO methodology derived an estimate from the contingent valuation question for the baseline outage, and estimates for the values associated with different attributes of more severe outages from the choice experiment questions. The survey also contained additional demographics and behavioural questions that were used to help verify and identify drivers for change in the VCR values. The survey took around 20 minutes to complete.

For direct connect customers AEMO used a direct measurement survey technique.[44] Customers were provided with a hypothetical outage scenario and asked a detailed set of questions to capture all direct and indirect costs of the outage. The direct measurement survey technique was considered preferable for direct connect customers because direct connect customers in the NEM comprise large mining and industrial loads that are better able to calculate the losses incurred from electricity outages than other business customers. Also, direct connect customers' use of electricity and the ensuing effects of supply discontinuity give rise to a wider range of potential losses of production.

## 5.2 Approach for residential and small business customers

As set out in section 4.3.1, we consider a survey based approach to measuring standard outages best addresses our assessment criteria.

Survey based approaches directly interact with customers as required by Rule 8.12 (assessment criterion 3). Questions relating directly to preferences for future onsite generation and storage can be included to help identify changing technology preferences. This enables us to address the long term interests of customers consistent with the NEO (assessment criterion 1). In comparison, model based approaches are more reliant on historical data. While assumptions can be made in model based approaches to account for new developments we consider this less effective than directly asking customers their future preferences.

Survey based approaches also allow for greater flexibility and granularity (assessment criterion 2) than model based approaches which are reliant on existing data that may not segment by the desired customer types, outage durations and locations. Also, surveys can directly target the desired:

- customer segments
- outage types (durations and temporal differentiation)
- locations (jurisdiction, CBD, rural, remote).

44 AEMO Value of Customer Reliability final report, page 9

Whilst we consider survey based approach preferable we also propose to undertake an analysis using model based approaches as a point of comparison and to cross check our results.

For residential and small business customers, the survey approaches we propose to use involve the same combination of contingent valuation and choice experiment survey techniques that AEMO used in its 2014 study, but with some improvements. This approach was supported by a majority of stakeholder submissions to the VCR Consultation Paper.

The AEMO methodology includes contingent valuation and choice experiments which allow for both tangible costs directly related to outages (such as food spoilage) and intangible costs (such as loss of comfort) to be considered. We consider tangible and intangible costs important in determining VCR values for residential and small business customers. We also prefer the combined approach of contingent valuation and choice experiments because it meets our assessment criteria. Specifically, the approach:

- supports the achievement of the NEO. Contingent valuation and choice modelling are common approaches to measuring customer VCR and considered to produce reasonable estimates (assessment criterion 2)
- compared to other survey approaches, such as the direct cost approach or economic principle of substitution[45], better reflects tangible and intangible costs incurred by customers as a result of outages (assessment criterion 2)
- allows for granular VCRs to be produced for a range of customer segments. This is because choice experiments seek to understand the value placed on specific outage attributes[46] by customers (assessment criteria 1 and 2)
- directly engages with customers via surveys (assessment criterion 3)

Our preference for the contingent valuation and choice experiment combination is also supported by MEI, who considers the AEMO VCR review of a high standard, adopting a robust methodology. In particular, MEI considers AEMO's use of a choice experiment to determine the VCR values for non-typical outages relative to the baseline outage, is useful and should be retained.[47] In relation to the contingent valuation questions however, MEI identified a weakness in the presence of anchoring bias, and suggested an improvement to remove the bias, which we propose to adopt.

For its contingent valuation question AEMO asked residential customers two closed (YES/NO) questions about a "base case outage".

Please imagine that your most likely unexpected power outage is once every six months and with duration of one hour. It is likely to be on a weekday, winter, off-peak and localised (i.e. only affecting your street).

Consider the possibility of avoiding this type of power loss during this outage by paying towards additional investment to 'bolster' the network or alternative power supplies.

45 See AER Values of Customer Reliability - Consultation Paper - October 2018, page 19; AEMO Value of Customer Reliability final report page 9.

46 AEMO Value of Customer Reliability final report, page 9

47 Advice from Professor Train, 23,01.2019

Would you be willing to pay an increase of $x/month in your electricity bill (over six months this is a total of $18) to avoid this type of outage?

The value of x was randomly selected from the values 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 (the initial "cost prompt").[48] If respondents replied “YES” they were asked the same question again, but at double the initial cost prompt. If respondents replied “NO” they were asked the same question again, but at half the initial cost prompt.

Our concern, based on advice from MEI, is that the use of cost prompts in the contingent valuation question introduces anchoring bias into the survey. Anchoring bias refers to the potential for later responses to be influenced by the value of the initial cost prompt.[49] For example, if a customer is given an initial value of $6/month in the contingent valuation question, they may assume that $6/month is close to the right 'answer'.

We considered two ways to address this bias:

- using a 'revealed preference' approach to determine the baseline outage
- improving the contingent valuation question to determine the baseline outage.

Choice experiment surveys can be adopted in conjunction with either of these approaches, assisting to determine how VCR values differ for outage situations with different characteristics, such as duration and timing (Peak / Off-peak) relative to the baseline outage. As noted above, we have included a choice experiment in our survey design.

## Revealed preference approach to determine baseline outage

A revealed preference approach uses real-world choices to estimate the value of the base case outage situation.

Possible examples of real world choices that could be designed and presented to customers are set out below.

**Real time pricing**

Under real-time pricing programs, customers are advised in advance the price they will be charged for electricity in the upcoming period. A customer decides whether to forego some electricity usage when the price is sufficiently high. The VCR could be estimated from the statistical distribution of customer responses to the idea of foregoing electricity usage at different price levels.

**Load shedding programs**

One method adopted by load shedding programs is to give customers a discount on their electricity bill in return for allowing the electricity retailer to turn off the electricity to selected

48 Business customers were asked analogous questions, with the dollar values used based on percentages of the electricity bill of the respondent. Business customers who replied YES/YES or NO/NO to the closed questions were asked a further open-ended question asking them their WTP.

49 MEI advice from Professor Train, 23 January 2019.

appliances a given number of times and for a maximum duration each year.[50] An alternative approach is to give customers a credit if their metered consumption drops in response to a notice from their retailer to reduce consumption.[51] The VCR could be estimated from the statistical distribution of customer responses to load shedding programs

**Back-up battery systems**

Under the back-up battery approach a sample of customers could be offered a back-up battery to be attached to their premises that turns on automatically when an outage occurs, takes the customer through a typical outage, and recharges after the outage. The price of the battery varies across customer samples. The share of customers who buy the battery at each price provides information on the statistical distribution of customers' willingness to pay to avoid the typical outage situation. The VCR could be estimated from the statistical distribution of customers' willingness to pay for the back-up battery.

Alternatively, a lottery approach could be adopted where surveyed customers are told the electricity retailer (or a different agency) has several back-up batteries that it will sell to winning customers for a stated price, with the stated price varying over customers. Each customer is offered the option to join the lottery, and if they win, the battery will be installed at their premises and the price will be added to their electricity bill. Using this approach the choice is real (rather than hypothetical) because even though the customer might not win the lottery, they know if they join and win they will have to pay the money, and if they do not join, they have no chance of getting the battery system at that price. The VCR could be estimated from the statistical distribution of customers' willingness to pay for the lottery tickets.

As batteries can provide a range of services in addition to reliability, if this approach is adopted the battery should be designed to operate only during an outage. This also needs to be understood by customers.

We consulted our Committee on whether to adopt a revealed preference approach for the current VCR review. The Committee considered a revealed preference approach has advantages but for this study preferred instead to make improvements to the contingent valuation question. Both MEI and KPMG/Insync pointed out to the Committee the revealed preference approach is untested. The Committee doubted whether a study using revealed preferences could be completed by 31 December (the timeframe for this study). The Committee suggested that if used in the future, the approach should be tested and calibrated.

We do not propose to adopt the revealed preference approach to calculate VCR values for this VCR review. Instead, we propose to improve upon the contingent valuation question, an approach supported by our Committee. We may however, use the revealed preference approach, potentially in combination with other approaches, in the annual adjustment mechanism to take account of customer preferences for new technologies as discussed in section 4.4. It may also be adopted in future VCR reviews. We have engaged MEI to

50 These programs require enabling technology such as smart meters to be installed in the customer's premises.

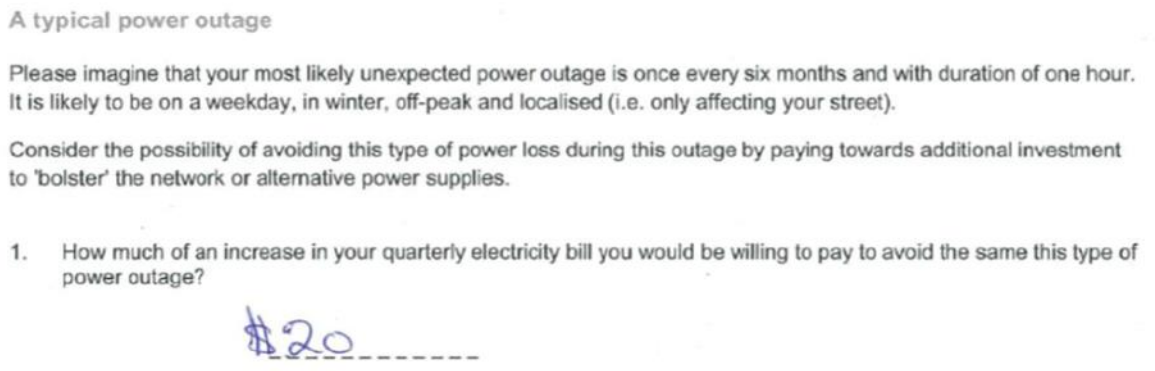
51 This approach requires the customer to respond to an email or SMS message within a predetermined period but does not require modification of the customer installation.

undertake investigations into how the revealed preference approach could be applied in the annual adjustment mechanism and in future VCR reviews.

## Improving the contingent valuation question to determine baseline outage

To address the possibility of anchoring bias associated with cost prompts in the contingent valuation question, MEI suggests it is preferable to have a single open-ended WTP question with no cost prompt. We were however, concerned customers may find it difficult to answer a contingent valuation question without any cost prompt. To explore the issue further, we asked KPMG/Insync to test an open-ended WTP question against a WTP question with a cost prompt in focus groups and one-on-one phone interviews. The two questions tested are reproduced below.

### Open-ended WTP question



A typical power outage

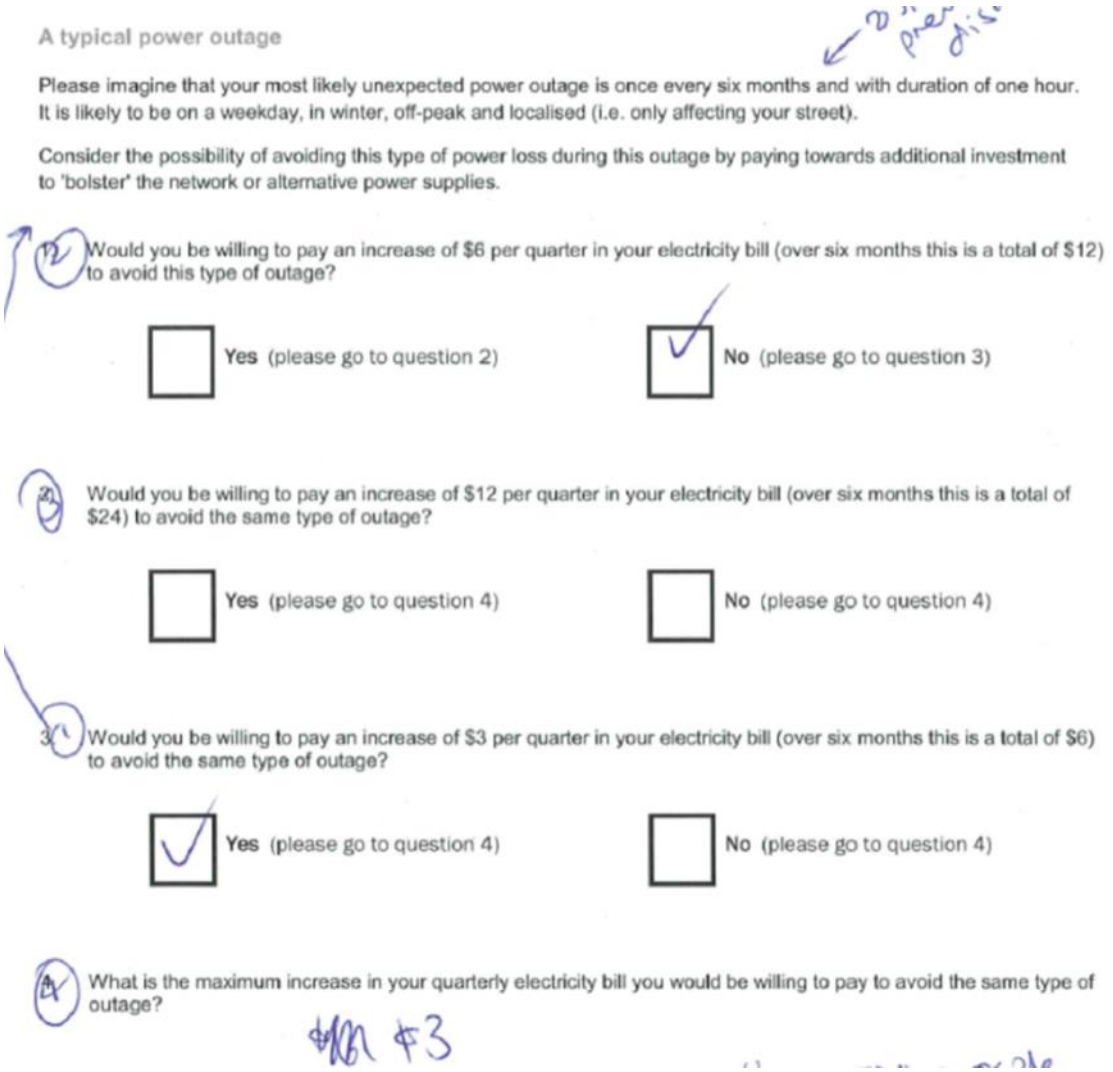
Please imagine that your most likely unexpected power outage is once every six months and with duration of one hour. It is likely to be on a weekday, in winter, off-peak and localised (i.e. only affecting your street).

Consider the possibility of avoiding this type of power loss during this outage by paying towards additional investment to 'bolster' the network or alternative power supplies.

1. How much of an increase in your quarterly electricity bill you would be willing to pay to avoid the same this type of power outage?

$20

### Cost prompt question



A typical power outage

Please imagine that your most likely unexpected power outage is once every six months and with duration of one hour. It is likely to be on a weekday, in winter, off-peak and localised (i.e. only affecting your street).

Consider the possibility of avoiding this type of power loss during this outage by paying towards additional investment to 'bolster' the network or alternative power supplies.

1. Would you be willing to pay an increase of $6 per quarter in your electricity bill (over six months this is a total of $12) to avoid this type of outage?

☐ Yes (please go to question 2) ☑ No (please go to question 3)

2. Would you be willing to pay an increase of $12 per quarter in your electricity bill (over six months this is a total of $24) to avoid the same type of outage?

☐ Yes (please go to question 4) ☐ No (please go to question 4)

3. Would you be willing to pay an increase of $3 per quarter in your electricity bill (over six months this is a total of $6) to avoid the same type of outage?

☑ Yes (please go to question 4) ☐ No (please go to question 4)

4. What is the maximum increase in your quarterly electricity bill you would be willing to pay to avoid the same type of outage?

$3

KPMG/Insync found neither of the questions (open-ended and with a cost prompt) are difficult for the average person to understand, and concluded on balance there is no clear "best" way of setting out the contingent valuation question. Some participants felt unable to provide an answer when asked an open-ended question, and those with cost prompts demonstrated anchoring bias. KPMG/Insync suggested if open-ended WTP questions are used, a preamble should be introduced to help participants overcome difficulties answering open-ended questions.

Considering MEI's advice and the KPMG/Insync test results from focus groups, we propose using an open-ended WTP question in our pilot survey. We chose to adopt an open-ended WTP question for our pilot survey because it removes the anchoring bias associated with the cost prompt question. To address the suggestion for additional preamble to the open-ended question we have made the following amendment:

'Many outages could mostly be avoided if the electricity network was improved. However, improvements would be funded by higher electricity bills. To answer the following questions there is no 'right answer'. When considering your responses please consider how much you value a reliable electricity network. You could consider, for example, the inconvenience of having to reset your clocks, not being able to watch TV or access the internet during an outage, and interruption to other at-home activities requiring electricity.'

Our proposed open-ended WTP question will be tested in our pilot survey against AEMO's 2014 cost prompt question. By running the two pilot surveys we will be better able to understand whether people can answer the open-ended WTP and whether we will receive meaningful results. If we find this is not the case we will re-consider whether to use a cost prompt question in our main survey.

We also propose making other changes to our survey for residential and small business customers. These include simplifying wording and reducing survey length. We propose asking respondents about their future intentions with regard to back-up generation and storage that can provide energy during an outage. We consider this will enable us to take account of changes in the industry over time, and address the long term interests of customers (assessment criterion 3).

Whilst we prefer a survey based approach for residential and small business customers we are aware different VCR estimation techniques can impact VCR values (there is some evidence to suggest model based approaches typically result in lower VCR values than survey based approaches).[52] We intend to check our VCR values using some of these model based techniques, including the Leisure Time method for residential customers. We are also considering applying a cap in our willingness to pay surveys. For example, an obvious cap on customers' willingness to pay is the cost of securing the supply of electricity themselves, such as installing their own back-up generation.

## 5.3 Approach for large direct connect customers and industrial customers

For direct connect customers and large industrial customers we propose using the same direct cost survey technique as AEMO in its 2014 study. As is the case for residential, small and medium business customers, we will simplify wording, reduce the survey length and test for future customer intentions with regard to solar PV and back up storage similarly to residential customers. This will enable us to take account of changes in the industry over time, and provide for the long term interests of customers. We also propose including questions about momentary outages.

The direct cost survey approach asks customers for the direct financial costs associated with an outage. We consider this approach is appropriate for large businesses and direct connect customers as these businesses are more likely to be informed about expected financial costs resulting from an outage than residential and small business customers. We also consider direct financial costs rather than intangible costs are the key drivers of VCR values for large businesses.

We are currently reviewing the approach for direct connect customers and will discuss this with our Committee. We may adopt a slightly different approach to AEMO who surveyed customers directly connected to a transmission network using a direct cost survey, by extending our survey to very high voltage customers connected to a distribution network. We

52 Energeia, Getting the Value of Customer Reliability Right, March 2019.

will also explore whether any potential opportunities exist to streamline and simplify the survey. Our proposed approach will be set out in our draft decision on the methodology.

## 5.4 Customer segmentation/granularity

AEMO's 2014 VCR study determined VCR values for three customer types; residential, business and direct connect customers. Residential customers were segmented by state. Business customers were segmented into agricultural, commercial and industrial sectors, with small, medium and large consumption thresholds. Direct connect customers were segmented into three sectors; metals, mining, and wood, pulp and paper.

Stakeholders have requested increased granularity of VCR values. Based on feedback from stakeholders, our Committee and consultants, we propose the following customer segments for our pilot survey. Depending on the results of the pilot survey, we may make alterations for the main survey.

**Residential**

For residential customers we propose segmenting by remoteness and climate zones. We consider these two factors are most likely to drive variations in residential customer VCR, a view supported by the Committee. Accordingly, we propose segmenting by the following:

- remoteness:[53]
    - CBD
    - suburban
    - regional
    - remote
- climate Zone:[54]
    - high humidity summer, warm winter
    - warm humid summer, mild winter
    - hot dry summer, warm winter
    - hot dry summer, cool winter
    - warm temperate
    - mild temperate
    - cool temperate and alpine
- jurisdiction[55]

53 This is a modified implementation of the Accessibility/Remoteness Index of Australia (ARIA). See https://www.adelaide.edu.au/hugo-centre/services/aria#advantages-of-aria.

54 This is a modified implementation of the Australian Building Codes Board climate zone classification scheme, used in its National Construction Code to account for different heating and cooling requirements across Australia. See https://www.abcb.gov.au/Resources/Tools-Calculators/Climate-Zone-Map-Australia-Wide.

55 We are aiming for proportionate jurisdictional representation in the survey. The way we have designed the survey will allow

We do not intend to further segment residential VCRs by other demographics or household characteristics (such as socio-economic status, age, gender, mains gas access, solar PV or other distributed energy resource). However, we will seek to achieve proportionate representation in our survey, and will examine survey results to see how solar PV and other distributed energy resources drive VCR preferences.

**Business**

For business customers we are proposing to segment by Australian and New Zealand Standard Industry Classification (ANZSIC).[56] We consider how different types of businesses use electricity in their day-to-day operations is the most likely factor to drive variations in business customer VCR, and this was supported by the Committee. Accordingly, we propose segmenting by the following:

- grouped ANZSIC business sectors:
    - agriculture (A)
    - construction and manufacturing (C,E)
    - energy and telecommunications, supply chain logistics, wholesale and warehousing (D,F,I,J)
    - retail, hospitality, arts and recreation (G,H,R)
    - professional, administrative and education services (K,L,M,N,O,[57]P)
    - critical health and safety services (Q,O[58])
- annual consumption amounts (MWh/year).[59]

We propose to further segment the ANZSIC business sectors into climate zones (agriculture; and critical health and safety services) and others by remoteness (retail, hospitality, arts and recreation; professional, administrative and education services).

**Large Industrial and Direct Connect customers**

We propose to segment large industrial and direct connect customers by business sectors. However, for certain large industrial sectors with few market participants we may need to publish aggregated VCR values to preserve commercially sensitive information provided by survey respondents.

## 5.5 Testing of Methodology

---

us to construct aggregate residential VCRs for each NEM region (and the ACT) and the Northern Territory, which we intend to include in the Final Report.

56 See ABS 1292.0 - Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 (Revision 2.0).

57 Public Administration subset of ANZSIC Code O - Public Administration and Safety.

58 Safety subset of ANZSIC Category O - Public Administration and Safety

59 Businesses will be segmented into "Small", "Medium", and "Large" consistent with the customer classifications in AEMO's Market Settlement and Transfer Solutions system.

Our next step is to test the proposed survey techniques for residential and business customers in a pilot survey to be carried out in April and May this year. To prepare for this we have drawn on information gathered through focus group discussions.

### 5.5.1 Focus Groups

In March 2019, we held focus group meetings to test the wording and design of our surveys for residential and business customers. The focus groups took place in the following locations and included 8 to 9 people per session:

- Sydney
- Adelaide
- Cairns
- Albury
- Darwin

Telephone interviews were also conducted in 24 remote towns around Australia.

We consider this engagement is likely to lead to better survey results as it provides early feedback on the wording and clarity of questions, and comprehension of respondents.

### 5.5.2 Pilot Survey

We will test our residential and small business surveys in April and May this year. We propose running two pilot surveys for residential customers. One pilot survey will be based on AEMO's 2014 survey questions and the second will be used to test our updated survey questions.

By running two pilot surveys we will be better able to ascertain whether differences in contingent valuation and choice modelling results stem from a change in the survey design or result from changes in the energy sector since 2014.

We will also test our proposed open-ended WTP questions and gauge whether we will receive meaningful results from this approach. If not, we will reconsider whether to adopt a cost prompt question for our contingent valuation question in the main survey.

The objectives of our pilot survey are set out below.

**Verify the survey**

- To establish and quantify differences that changing the contingent valuation question makes to the contingent valuation number. This includes testing an open-ended question format and changing the values in the initial cost prompt for an initial closed contingent valuation question.

- Re-run the AEMO survey to compare results against our preferred survey, enabling us to quantify changes in valuations of the baseline outage and other characteristics of an outage (through the choice model).
- To test feedback from focus groups which has been incorporated into the AER surveys.

**Assurance of sampling approach**

- To assess the proportion of usable responses we can expect to obtain from residential and business respondents, and plan our sampling approach accordingly (including recruiting additional business respondents).
- To verify online panels will be able to provide usable business survey responses.
- To verify the survey delivers estimated VCR coefficients and other statistics at different levels of accuracy. This includes verifying the sample plan will be sufficient to deliver results for the proposed customer segments.

**Technical solution and reporting requirements**

- To indicate timeframes required for conducting the main survey.
- To test the technology platforms of third party panel providers.
- To better understand the time it will take for set up, data quality assurance and choice model calculations, and to modify the project plan for the main survey accordingly.
- To test the choice model calculation algorithms.
- Identify practical issues with survey recruitment and execution.

# 6 Next Steps

The AER has until 31 December 2019 to develop a methodology for estimating VCRs, derive VCRs using our methodology and develop a mechanism for adjusting VCRs on an annual basis. Our proposed timeline allows for the conduct of a major NT and NEM wide survey (following the completion of a pilot). It also allows for us to consult extensively – on our October 2018 consultation paper, this Consultation Update, our draft decision and with our Committee and Subcommittee.

Our next steps will be to launch a pilot survey to test our proposed approach for residential and business customers

Our project timeline is as follows.

| Key milestones | Date | Status |
|---|---|---|
| **Consultation paper published** | 19 October 2018 | Completed |
| **VCR Consultative Committee established** | October 2018 | Completed |
| **Stakeholder submissions to consultation paper** | 16 November 2018 | Completed |
| **VCR Consultative Committee meeting #1** | 28 November 2018 | Completed |
| **Sydney Public forum** | 5 December 2018 | Completed |
| **Melbourne Public forum** | 6 December 2018 | Completed |
| **Presentation to Customer Consultative Group (CCG)** | 11 December 2018 | Completed |
| **Further stakeholder submissions in response to consultation paper and key issues raised at public forum and CCG** | 20 December 2018 | Completed |
| **All day workshop with MEI, KPMG/Insync on VCR methodology** | 17 January 2019 | Completed |
| **VCR Consultative Committee meeting #2 – VCR methodology and survey design** | 7 February 2019 | Completed |
| **VCR HILP sub-Committee meeting #1 – how to determine HILP VCR** | 14 March 2019 | Completed |
| **Commence pilot** | End April to 24 May 2019 | |
| **Publish Consultation update paper on methodology** | Mid-April 2019 | |

| | |
|---|---|
| **Submissions to Consultation update** | 24 May 2019 |
| **Insync report on pilot survey results** | June 2019 |
| **VCR Consultative Committee meeting #3 to discuss draft pilot survey results** | 13 June 2019 |
| **Conduct main survey and analyse results** | 9 July–13 September |
| **Draft Decision Methodology (including HILP)** | August |
| **Submissions to draft Decision** | September |
| **Publish Final Decision Methodology +HILP** | October 2019 |
| **Insync main survey draft report** | 11 October 2019 |

# Appendix 1 List of submissions to VCR Consultation Paper

| | |
|---|---|
| Australian Energy Market Operator (AEMO) | Energy Users Association of Australia (EUAA) |
| Ausgrid | Evoenergy |
| AusNet Services | Independent Pricing and Regulatory Tribunal (IPART) |
| Australian Energy Council (AEC) | Meridian Energy Australia & Powershop Australia |
| Business SA | Major Energy Users Inc (MEU) |
| CitiPower, Powercor Australia, United Energy Distribution | Origin Energy |
| Endeavour Energy | S&C Electric |
| Energy Networks Australia (ENA) | SA Power Networks |
| Energy Queensland Limited (EQL) | TransGrid |
| **Further submissions from consultation** | |
| Energy Networks Australia (ENA) | S&C Electric |
| Energy Users Association of Australia (EUAA) | TasNetworks |
| Origin Energy | TransGrid |
| Public Interest Advocacy Centre (PIAC) | |

Submissions can be found on AER website https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/values-of-customer-reliability-vcr/initiation