Values of customer reliability methodology

Revised draft determination

June 2024

AUSTRALIAN ENERGY REGULATOR

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Submissions

Invitation for submissions

Interested parties are invited to make submissions on this draft determination by **3 July 2024.**

Submissions should be emailed to: VCR2024@aer.gov.au. Alternatively, submissions can be mailed to:

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Submissions 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:

- clearly identify the information that is the subject of the confidentiality claim
- 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 on our use and disclosure of information provided to us, see the ACCC/AER Information Policy, June 2014.

1 Executive summary

Values of customer reliability (VCR) seek to reflect the value different types of customers place on reliable electricity supply under different conditions and are usually expressed in dollars per kilowatt hour ($/kWh) of unserved energy. VCR play an important role in ensuring customers pay no more than necessary for safe and reliable energy, helping electricity businesses identify the right level of investment to deliver reliable energy services to customers.

In 2019, following extensive consultation and quality assurance, we developed our first VCR methodology based on a survey approach to determine VCR for outages up to 12 hours (standard outages).[1] We calculated our initial 2019 VCR using that methodology.

VCR for standard outages are important because they can be applied to VCR uses we have identified in most circumstances.[2] Most outages customers experience in the National Electricity Market (NEM) and the Northern Territory originate in distribution networks.[3] Most of these outages are less than 12 hours in duration and typically relate to powerline damage caused by lightning, car accidents, debris such as falling branches, and animals. Consequently, the standard outage VCR have a wide application, including as an input for cost-benefit assessments, such as those applied in regulatory tests that assess network investment proposals.

We must update the VCR by 18 December 2024 and we must review the 2019 VCR methodology before updating the VCR.[4] After we review the methodology, we are required to publish an updated methodology or a notice stating that the existing VCR methodology has not been varied because of the review.

We commenced our formal consultation for the 2024 VCR review using the expedited rules consultation procedure of the National Electricity Rules (NER)[5] by publishing our draft determination on the VCR methodology on 22 March 2024. In that document we considered that minimising changes to the VCR methodology as much as practical would enable greater comparability between the 2019 VCR and the 2024 VCR to see how customer views on reliability might change over time. We proposed to use our 2019 survey-based methodology with minor amendments, including clarifying and refining text, removing reference to specific nominal dollar value for the maximum willingness to pay, and updating cost prompts and bill discounts in the residential customer survey.

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1 As set out in AER, *AER Statement of Methodology for determining Values of Customer Reliability*, Australian Energy Regulator, 2020.

2 See section 3.3 for more information on the identified uses of VCR.

3 Around 95% of the interruptions to supply experienced by electricity customers are due to issues in the local distribution network – see AEMC, *Final report – 2019 annual market performance review*, Australian Energy Market Commission, 12 March 2020, p. 51.

4 NER, rule 8.12.

5 See rule 8.9 of the NER. This rule sets out 3 approaches to consultation: standard, expedited and minor rules consultation procedures. Non-material Proposal means a Proposal that, if implemented, will be unlikely to have a significant effect on the NEM or on the activities of the Registered Participants to which the Proposal relates.

Stakeholders were generally supportive of our proposed minor amendments. However, many stakeholders requested we switch to the standard consultation procedure to facilitate more consultation opportunities and further consideration of issues they raised. Those issues included the appropriateness of the survey approach, the need for the VCR methodology to reflect the energy transition and trends in the broader economy, and the need for us to consider and consult on the annual adjustment mechanism. Stakeholders also called for us to provide more detail on our reasoning. Following the stakeholder feedback, we decided to switch to the standard rules consultation procedure.[6] Consequently, our original draft determination published in March 2024 is now referred to as a consultation paper and this document is a draft determination.

In developing our draft determination on the VCR methodology and reflecting on stakeholder views, we have identified several key areas where we consider further stakeholder views would be valuable. In particular, we are seeking views on:

- incorporating changes in the electricity market related to the rapid transition to net zero and increasing uptake of consumer energy resources. We have reflected this by including energy-specific questions to the demographic section of the survey and seek further feedback on what amendments to those questions may be desirable
- ways to increase the response rate to the direct cost survey by streamlining the questionnaire. Since VCR is load-weighted, it is important to get high-quality responses from large business customers
- any changes to the annual adjustment mechanism to better reflect the ongoing changes in the energy sector and the broader economy and how to implement these changes in practice, noting that we are not putting forward an alternative mechanism at this stage
- conducting VCR reviews more frequently as an alternative to making changes to the current annual adjustment mechanism
- potential improvements to unserved energy calculations for deriving VCR.

To increase transparency and assist stakeholders in providing feedback, we have attached our survey questionnaires to this draft determination.

All underlying methodologies used to gather the data to calculate VCR have certain benefits and limitations. On balance, we give preference to our survey-based methodology for deriving VCR for standard outages. It is an objective and rigorous method that directly engages with customers and allows us to achieve statistical significance, good representation and granularity with respect to customer types, outage types and location. This level of granularity means the resulting VCR can be applied to most uses we have identified. We understand other approaches can be useful in some circumstances. For example, we are currently exploring using deliberative forums in the context of developing the value of network resilience.

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6 See AER, Values of Customer Reliability 2024 - switch to standard consultation procedure, Australian Energy Regulator, 21 May 2024.

Chapter 5 includes further details on our reasoning and considerations of key issues raised by stakeholders.

1.1 Next steps

Stakeholders are invited to make submissions by 3 July 2024. If requested, we will also meet with stakeholders who have already made submissions to this process throughout June 2024 on targeted issues.

The statutory deadline for our final determination on the VCR methodology is 11 September 2024, but we expect to publish the final by late August to provide sufficient time to conduct surveys and interrogate results. We will use the final determination on the VCR methodology to update the VCR. We must update the VCR by 18 December 2024.

1.2 Other outages and values of resilience

We do not currently compute $/kWh VCR for some outage types, like planned outages, momentary outages and prolonged (greater than 12 hours) outages.[7] Prolonged outages are less frequent than other outages but may have a significant impact on affected electricity customers and the broader economy.

Analysing many of these outage types presents some challenges, including with data availability and changing patterns of occurrence. For example, changing technology as we transition to net zero and the potential impacts of climate change may lead to the emergence of new outage patterns and weather-related outages. For these reasons it is important that we develop our understanding of outages that fall outside the scope of the standard VCR. The storm-related outages in Queensland (December 2023 to January 2024) and Victoria (February 2024), where some customers experienced prolonged outages, highlight the importance of this work.

We have commenced work exploring these types of outages, concurrent with our 2024 VCR review for standard outages. There are two dimensions to this work:

1. Analysing prolonged outages and other high impact low probability events – we have commenced work on the value of network resilience, which will estimate the value customers place on network resilience during prolonged outages (greater than 12 hours). We released our Value of Network Resilience Issues Paper on 14 May 2024 and we are engaging with networks, their customers and other interested stakeholders on developing an approach for valuing the benefits of greater network resilience. This work responds to a request from the Energy and Climate Change Ministerial Council[8] and is an important addendum to our guidance for networks proposing resilience investment.
2. Reliability events related to the wholesale energy market – we are interested in understanding whether new types of outages due to wholesale market reliability events may emerge in the future with higher penetration of wind and solar. We are working with the Reliability Panel and the Australian Energy Market Commission (AEMC) as they

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7 While widespread outages up to 12 hours are included in the VCR methodology, we do not produce a $/kWh value for these outages due to data availability issues.

8 Energy and Climate Change Ministerial Council, *Meeting communique – 1 March 2024*, Energy and Climate Change Ministerial Council, 2024, accessed 8 March 2024.

explore these types of wholesale energy market outages. More information on this work is provided in chapter 6.

2 Background

2.1 About values of customer reliability

VCR seek to reflect the value different types of customers place on reliable electricity supply under different conditions and are usually expressed in dollars per kilowatt hour ($/kWh) of unserved energy.

VCR link efficiency and reliability, playing a pivotal role in network planning and investment and informing the design of wholesale market standards and settings and network reliability incentives. VCR play an important role in ensuring customers pay no more than necessary for safe and reliable energy and promoting an efficient level of investment to deliver reliable energy services to customers.

There is no separate market for electricity reliability, so VCR are difficult to observe directly and must be estimated. VCR are a collection of numerical values that cover different customer segments, including residential, business and very large business customers.

2.2 AER 2019 VCR

We developed our initial VCR methodology and first VCR in 2019. As part of that review, we carried out the largest VCR study ever conducted in Australia with over 9,000 customers (7,426 residential customers and 1,821 business and industrial energy customers) completing our survey.

Our 2019 methodology was developed in consultation with stakeholders and largely based on the methodology AEMO used in 2014 to calculate VCR, with some changes we considered as improvements. For example, we found climate zone and remoteness to be strong drivers of reliability preferences for residential customers, so we developed residential VCR values based on this segmentation. This differed from AEMO's 2014 approach, which segmented residential customers by NEM jurisdiction. We also extended the segment of large business customers to include large businesses connected to the distribution network as well as the transmission network.[9]

Our VCR adjusted annually by the Consumer Price Index (CPI) since 2019 are available on the AER website.[10] Figure 1 is a sample of how we present the VCR.

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9 In its 2014 review AEMO calculated VCR values in the NEM for residential, business and direct connect customers. Residential customers were segmented by NEM jurisdiction, business customers were segmented by sector (industrial, commercial and agricultural) and size (small, medium and large) and direct connect customers were segmented by sector (metals, wood pulp and paper, and mining).

10 See our latest update summary at AER, 2023 VCR Annual Adjustment update summary, Australian Energy Regulator, 18 December 2024.

Figure 1 Sample of our published residential VCR

Residential VCR values

By Climate Zone and Remoteness in $/kWh - $2023

Residential customer segment	Applicable state or territory	2023 VCR
Climate Zone 1 Regional	Queensland (QLD)	28.08
Climate Zone 2 CBD & Suburban	QLD, New South Wales (NSW)	26.90
Climate Zone 2 Regional	QLD, NSW	29.97
Climate Zone 3&4 Regional	QLD, NSW, Victoria (VIC), South Australia (SA)	31.03
Climate Zone 5 CBD & Suburban NSW	NSW	34.32
Climate Zone 5 CBD & Suburban SA	SA	38.96
Climate Zone 5 Regional	QLD, NSW, SA	28.80

2.3 Changing energy and economic climate

Since our 2019 VCR review the energy sector and the economy more generally have considerably changed. For example:

- more energy sourced from renewables, replacing fossil fuels
- increased electrification of appliances, including an increased number of electric vehicles (EVs) in Australia
- an increase in customers investing in consumer energy resources, including roof-top solar and batteries, with an increasing acceleration of battery installations
- cost-of-living pressures, including continued increases in the CPI and interest rates
- change in working environment, with a shift towards working from home since the beginning of the COVID-19 pandemic.

These and other changes in the economic environment may affect both customer willingness to pay to avoid power outages and electricity consumption patterns – the two main inputs we use to calculate VCR. However, we consider that the survey methodology can capture these changes (see chapter 5) and does so in a way that is comparable across VCR review processes.

2.4 Timing of our review and consultation

On 14 December 2023, ahead of our 2024 VCR review, we published an information notice to provide stakeholders with information on the background, reasoning and scope of the 2024 VCR review. We also contacted a range of stakeholders to inform them of our next steps. These stakeholders included the Australian Energy Market Operator (AEMO), jurisdictional regulators, members of the 2019 project's Consultative Committee and other stakeholders we thought might have an interest in our project.

Our formal consultation under the NER began with the publication of our consultation paper on 22 March 2024.[11]

As set out in the consultation paper, we considered our proposed amendments to the 2019 methodology to be a Non-material Proposal. Therefore, we decided to use the expedited rules consultation procedure under clause 8.9.3 of the NER.[12] Many stakeholders raised concerns with the expedited rules consultation procedure and requested we switch to the standard rules consultation procedure. Several participants at our public forum on 4 April 2024 expressed similar views.

After thoroughly considering the issues raised, we decided to switch to the standard procedure and issued a notice of our decision on 21 May 2024. The effect of the switch to the standard procedure is:[13]

- The 22 March 2024 draft determination is now considered a consultation paper. Submissions on the consultation paper closed on 23 April 2024.
- The consultation paper is followed by a draft determination (this document) and submissions on this draft determination will be open for 20 business days, until 3 July 2024.
- We must publish our final determination on the VCR methodology no later than 50 business days after the due date for the submissions on the draft determination – which is 11 September 2024 (although we are aiming to complete this sooner to enable survey field work to start).
- The statutory deadline for publishing the updated VCR using the reviewed VCR methodology remains 18 December 2024.

Our consultation paper set out that the 2024 review has two streams of work:

- reviewing the VCR methodology
- updating the VCR.

Updated indicative timings for each stream are set out below.

11 NER, rule 8.9.3(a)(5).

12 NER, rule 8.9. This rule sets out three approaches to consultation: standard, expedited and minor rules consultation procedures. Non-material Proposal means a Proposal that, if implemented, will be unlikely to have a significant effect on the NEM or on the activities of the Registered Participants to which the Proposal relates.

13 NER, rule 8.9.3(g).

VCR methodology review timing

14 December 2023
Published VCR review information notice

22 March 2024
Publish VCR consultation paper (formal consultation under the NER commences)

4 April 2024
Online stakeholder forum

23 April 2024
Submissions from stakeholders received

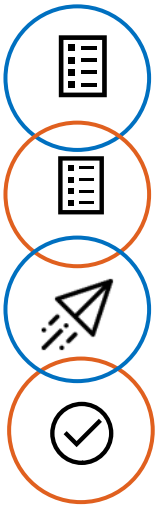
5 June 2024
Publish VCR methodology draft determination

3 July 2024
Submissions from stakeholders received

Late August 2024
Publish VCR methodology final determination
Updated VCR methodology takes effect

Note: Timing is indicative and may change.

VCR update timing



March–April 2024
Undertake pilot residential and business surveys

Late August–October 2024
Undertake residential, business and large business surveys

By 18 December 2024
Publish final VCR

By 18 December 2024
Updated VCR take effect

3 VCR assessment framework

3.1 The VCR rule

The framework for developing the VCR methodology and publishing the VCR is set out in the NER. Specifically, Part I, Rule 8.12 of the NER provides that:

- the AER must, in accordance with the rules consultation procedures, review, publicly consult on and publish a national methodology for calculating VCR[14]
- the VCR methodology must include a mechanism for directly engaging with retail customers and customers (other than retailers), which may include the use of surveys, and include a mechanism for adjusting the VCR on an annual basis[15]
- the AER must ensure that VCR methodology and any VCR calculated in accordance with that methodology are consistent with the VCR objective[16]
- the AER must review the VCR methodology prior to each date the VCR are updated and, following such a review, publish either an updated VCR methodology or a notice stating that the existing VCR methodology was not varied as a result of the review[17]
- the AER must update the VCR at least once every 5 years and publish updated values promptly.[18]

Consistent with rule 8.12 of the NER, we must publish updated VCR numbers no later than 18 December 2024 (that is, 5 years since we published our first VCR).

3.2 VCR objective

The NER establish a VCR objective, which requires the VCR methodology and VCR to be fit for purpose for any current or potential uses of VCR that the AER considers to be relevant.[19]

Therefore, when developing the methodology for deriving VCR it is important to consider the current and potential future uses of VCR. Different contexts may require segmenting the market by different consumer characteristics and outage scenarios, different approaches to calculating VCR and possibly different levels of their precision.

3.3 Current and potential uses of the VCR

As outlined in our consultation paper, we consider the VCR have the following uses:

- inputting into cost-benefit analysis for network planning (such as regulatory investment tests and integrated system plans) and the assessment of future network expenditure for capital projects

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14 NER, rule 8.12(b).

15 NER, rule 8.12(d).

16 NER, rule 8.12(e).

17 NER, rule 8.12(f).

18 NER, rule 8.12(g).

19 NER, rule 8.12(a).

- setting transmission and distribution reliability standards and targets[20]
- informing reviews of the wholesale market reliability standard and settings[21]
- informing reviews of the system restart standard[22]
- informing reliability and emergency reserve trader procurement[23]
- informing the assessment of requests to declare certain risks as protected events[24]
- as the key measure for linking outcome performance with service target performance incentive schemes incentives.[25]

3.4 Considerations for our review

In undertaking our review of the VCR methodology, we must have regard to the requirements of the VCR rule (see section 3.1). We will need to consider whether the updated VCR methodology and any VCR calculated using that methodology are consistent with the VCR objective. We must also have regard to the National Electricity Objective (NEO).[26]

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20 For example, see IPART, Electricity Transmission Reliability Standards, Independent Pricing and Regulatory Tribunal, NSW Government, 2016, accessed 12 December 2023.

21 NER, rule 3.9.3A(e)(4).

21 VCR were an input into the Reliability Panel's 2020 System Restart Review. See AEMC, Review of the system restart standard 2020, Australian Energy Market Commission, 2021, accessed 12 December 2023.

23 NER, rule 3.20.2(b).

24 For example, AEMO's November 2018 request for declaration of a protected event regarding a risk to South Australia's power system. See AEMC, Request for declaration of protected event - November 2018, Australian Energy Market Commission, 2019, accessed 12 December 2024.

25 See AER, *Electricity distribution network service providers – Service target performance incentive scheme* (version 2.0), Australian Energy Regulator, 2018.

26 NEL, ss 7 and 16(1)(a).

4 VCR methodology

This chapter sets out our draft decision on the VCR methodology we will use to calculate the updated VCR.

4.1 Proposed amendments to the VCR methodology

In our consultation paper, we considered that the VCR methodology[27] we developed in 2019 remained fit for purpose with minor amendments.

The minor amendments we proposed were:

- removing the reference to the specific nominal dollar value for the maximum willingness to pay in the residential customer survey[28]
- updating the cost prompts and bill discounts in the residential customer survey to account for inflation impacts and changes in consumer preferences since our last VCR review[29]
- clarifying that when we update the VCR, we may revise the cost prompts and bill discounts in the residential and business customer surveys to account for inflation impacts and changes in consumer preferences since our last VCR review[30]
- refining some text and footnotes to improve clarity, correct minor typographical errors, remove detail specific to the 2019 VCR methodology and make references easier to identify going forward.

In response to our consultation paper, stakeholders questioned whether we had adequately considered the changes taking place in the energy sector and whether, given these changes, our methodology remained fit for purpose.

We elaborate on our reasons for this decision and set out specific questions for stakeholders in chapter 5. Our VCR methodology, with proposed changes marked up (in red), is set out in Table 4.1 to Table 4.3.

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27 As set out in AER, *AER Statement of Methodology for determining Values of Customer Reliability*, Australian Energy Regulator, 2020.

28 We proposed this change because the costs prompts and bill discounts in the residential customer survey are nominal values and need to be revised to account for the impacts of inflation; they may also be revisited to account for changes in consumer preferences over time.

29 We proposed this change because the maximum willingness to pay cap in the residential customer survey is a nominal value based on backup technology available at the time and needs to be revised to account for changes in available backup power systems and their costs.

30 We proposed these amendments because they will help 'future proof' the VCR methodology by allowing us to update the residential and business customer survey questionnaire so that it reflects changes in inflation, consumer preferences and technology that have occurred since we last updated the VCR.

Table 4.1 Methodology for standard outages

Standard outages	
Residential and business customers with a peak demand less than 10 MVA	Stated preference surveys using combined contingent valuation and choice experiment techniques. *Contingent valuation* The contingent valuation technique asks the respondent two closed questions followed by one open-ended question about their willingness to pay (WTP) to avoid two unexpected power outages a year (the baseline scenario) affecting either the home of a residential customer or the specified place of business of a business customer. Each unexpected outage in the baseline scenario occurs on a different random weekday in winter, lasts for one hour in off-peak times and only affects the local area. The closed questions will present a respondent with a bill increase of $x and ask the respondent to indicate (YES or NO) as to whether they would be willing to pay the $x bill increase to fund network investment and avoid the baseline scenario. The bill increase of $x for the first closed question is randomly selected. The second closed question cost prompt is double the first cost prompt if the respondent answers YES to the first question and is half the first cost prompt if the respondent answers NO to the first question. The initial cost prompts for residential customers are the following monthly bill increase amounts: $2, $3, $4, $5, $6, $7, $8, ~~and~~ $9, $10 and $11. The initial cost prompts for business customers are the following monthly bill increase amounts: 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9% and 10%. When we update the VCR at the end of each 5-year period, we will review the cost prompts and may change them to account for inflation impacts and changes in consumer preferences since our last review. The open-ended question following the closed questions asks respondents to indicate the maximum bill increase they would be willing to pay to avoid the baseline scenario. Responses to the open-ended question are capped. For residential customers the cap is ~~$22 per month~~ set at~~, which is~~ the approximate cost of a backup power system which can supply a household for the duration of the baseline scenario[31]. Where a respondent enters a value more than the cap, they will be asked a follow up question as to whether they would be willing to pay ~~$22 per month~~ the cap amount to install the described backup power system. If they answer YES, then the cap amount is used for them. If the respondent answers NO, they will then be presented with an open-ended question asking them how

[31] ~~Appendix 4 of our draft decision discusses how we set the cap of $22 per month.~~

Standard outages	
	much they would be willing to pay to install the described backup power system. This value is used to a maximum of the cap amount. For business customers the cap is equal to 100 percent of their indicated electricity bill. *Choice experiment* The choice experiment technique asks customers to identify their most preferred option out of a series of choices with different outage characteristics such as duration, severity (widespread / localised), time of day, time of week and time of year they occur in. The trade-offs customers make in choosing between options with different characteristics are used to determine the relative value respondents place on each of these attributes. The choice experiment technique will present~~s~~ respondents with eight different sets of three hypothetical outage scenarios ~~that~~ and ask respondents to select their preferred outage scenario in each set. Each outage scenario includes a specified bill discount which a customer would receive if they chose to accept the outage scenario. Each set of outage scenarios contains the baseline scenario with no bill discount. The other two scenarios in each set are variations of the baseline scenario with changes to the ~~severity (~~level~~)~~ of one or more attributes (characteristics) of the outage. The attributes and levels tested in the choice experiment are: • Outage duration: 1 hour, 3 hours, 6 hours and 12 hours • Geographic impact: 'localised' and 'widespread' • Time of day: Peak time and Off-peak time • Season: Summer or Winter • Day of the week: Weekday or Weekend • Bill discount (residential): no change, $~~3~~ 4 per month, $~~7~~ 8 per month and $~~15~~ 18 per month. • Bill discount (business)~~,~~: no change, 1%, 2% and 3%. • When we update the VCR at the end of each five-year period, we will review the discounts and may adjust them to account for inflation impacts, changes in consumer preferences, or for changes in back-up generation technologies and costs since our last review.
Business customers with peak demand equal or greater than 10 MVA	*Direct cost survey* The direct cost survey asks respondents to outline and quantify the actual costs they expect to incur from an unplanned outage affecting their identified business site. There are two versions of the survey - one for business sites with continuous 24/7 operations and one for business sites with non-continuous operations. For customers with continuous 24/7 operations, respondents are asked to outline and quantify the costs they would expect to incur in an

Standard outages	
	unplanned outage of the following durations: 10 minutes, 1 hour, 3 hours, 6 hours, 12 hours, 24 hours and 48 hours. For customers with non-continuous operations, respondents are asked to outline and quantify the costs they would expect to incur for: • unplanned outages that start at peak times (between 7am and 10am, or 5pm and 8pm on a weekday) for the following durations: 10 minutes, 1 hour, 3 hours and 6 hours • unplanned outages that occur at off-peak times (anytime except between 7am and 10am or 5pm and 8pm), on a weekday for the following durations: 10 minutes, 1 hour, 3 hours and 6 hours • unplanned outages that start at any time and have the following durations: 12 hours, 24 hours and 48 hours.

Table 4.2 Methodology for annual adjustment mechanism

Annual adjustment mechanism
Published values will be adjusted on an annual basis using a CPI-X approach, where X is set to zero. This ensures that in economic terms, real values of VCR are maintained between VCR reviews. Due to the lack of available information on what the key drivers of changes in customer reliability preferences are and how they affect VCR, X is set to zero. The AER will periodically review whether X should continue to be set at zero. ~~The AER welcomes further discussions with stakeholders on how real changes in VCR could be monitored annually, prior to the next review.~~ To measure CPI changes we will ~~apply the annual percentage change in~~ use the Australian Bureau of Statistics' (ABS) consumer price index (CPI) series '*Index Numbers; All groups CPI; Australia*' ~~all groups, weighted average of eight capital cities, for the four quarters preceding the most recently reported figure~~.[32] For each interim year between five-yearly VCR reviews, CPI adjusted VCR are calculated using the following method: $$VCR_t = \frac{CPI_t}{CPI_{t-1}} \times VCR_{t-1}$$ Where: VCR_t (VCR_{t-1}) = Value of Customer Reliability for year *t (t-1)* CPI_t = most recent index value of the ABS *All Groups CPI; Australia* available at the time of the CPI adjustment CPI_{t-1} = most recent index value of the ABS *All Groups CPI; Australia* available at the time when VCR_{t-1} was calculated

[32] ABS~~, Catalogue~~ series ID: A2325846C, catalogue number 6401.0, *Consumer price index*, Australia. If the ABS does not or ceases to publish the index, then CPI will mean an index that the AER considers is the best available alternative index. ~~We note this measure is consistent with our approach to indexation employed elsewhere by the AER, for example to index network business' regulatory asset bases.~~

Annual adjustment mechanism
For example, if 2024 VCR were last updated in December 2024, then for the annual adjustments in December 2025, *t* is 2025, CPI_{2025} is the index value for September 2025 and CPI_{2024} is the index value for September 2024; for the December 2026 annual adjustment, CPI_{2026} is the index value for September 2026 and CPI_{2025} is the index value for September 2025; and so on. ~~For example, to publish annual adjustments in December, we will use the reported CPI figures for the four quarters preceding September, which are the most recently reported figures available.~~ ~~ΔCPI_t is the annual percentage change in the ABS CPI All Groups, Weighted Average of Eight Capital Cities[33] from the September quarter in regulatory year t−2 to the September quarter in regulatory year t−1, calculated using the following method:~~ ~~The ABS CPI All Groups, Weighted Average of Eight Capital Cities for the September quarter in regulatory year t−1~~ ~~divided by~~ ~~The ABS CPI All Groups, Weighted Average of Eight Capital Cities for the September quarter in regulatory year t−2~~ ~~minus one.~~ ~~For example, for the 2021 regulatory year, t−2 is September quarter 2019 and t−1 is September quarter 2020; and for the 2022 regulatory year, t−2 is September quarter 2019 and t−1 is September quarter 2020 and so on.~~

Table 4.3 Methodology for converting VCR survey results into dollars per kilowatt hour ($/kWh) VCR values and aggregating values

Converting VCR survey results into dollars per kilowatt hour ($/kWh) VCR values and aggregating values	
Deriving $/kWh standard outage VCR for each residential segment	For each residential customer segment, the contingent valuation and choice experiment results are combined to produce a dollar value for a range of outage scenarios relevant for customers in that segment. To convert into $/kWh values, the dollar value ~~are~~ is divided by an estimate of the consumption which an average residential customer would have consumed over the period had the outage not occurred. This estimate is based on residential consumption data obtained from one or more of the following sources: • the residential survey • network business data, or • other available sources (actual or estimated) of residential consumption data. An aggregate $/kWh for each residential cohort is derived by summing the probability-weighted $/kWh VCR of each outage scenario. The probability for each outage scenario is based on estimates derived from historical network outage data.

~~[33] If the ABS does not or ceases to publish the index, then CPI will mean an index which the AER considers is the best available alternative index.~~

Converting VCR survey results into dollars per kilowatt hour ($/kWh) VCR values and aggregating values	
Deriving $/kWh standard outage VCR for each business segment with a peak demand of less than 10 MVA	The contingent valuation and choice experiment results for each business segment are in % of bill terms. These results are converted to dollar terms using estimates of business customer bills. Different bill assumptions may be used to account for consumption size and/or business sector. The dollar contingent valuation and choice experiment results are combined to produce a dollar value for a range of outage scenarios relevant for customers in that segment. To convert into $/kWh values, the dollar value is divided by an estimate of the consumption which an average business customer would have consumed over the period had the outage not occurred. This estimate ~~is~~ will be based on business consumption data obtained from: • the business survey • network business data, or • other sources (actual or estimated) of business consumption data. An aggregate $/kWh for each business cohort ~~is~~ will be derived by summing the probability-weighted $/kWh VCR of each outage scenario. The probability for each outage is based on estimates derived from historical network outage data.
Deriving $/kWh standard outage VCR for business customers with peak demand greater than or equal to 10 MVA	The responses from the direct cost survey produce a dollar value for the outage scenarios asked in the survey. To convert into $/kWh ~~vales~~ values, the dollar value for each outage is converted using energy consumption data obtained from the direct cost survey. An aggregate $/kWh for each business customer is obtained by summing the probability-weighted $/kWh VCR of each outage scenario. The probability for each outage is based on estimates derived from historical network outage data. The aggregate $/kWh for each response is load-weighted with other direct cost survey responses, ~~on the basis of~~ based on industry or sector groupings, to produce a combined industry or sector $/kWh VCR.
Aggregating VCRs	Aggregate VCRs for a particular area or region are derived by load-weighting the relevant aggregate residential and business cohort VCRs (including combined aggregate industry or sector $/kWh VCRs for business customers with peak demand ~~of~~ greater than or equal to 10 MVA).

5 Reasons for draft decision

In our consultation paper of 22 March 2024, we proposed to continue using the survey-based VCR methodology we developed in 2019, with minor amendments as described in chapter 4. This chapter sets out our response to issues raised by stakeholders on this proposal and the reasons for our draft methodology determination.

In summary:

- We are not addressing momentary outages because they are not usefully dealt with through the VCR. We are not addressing long-duration outages because they are being examined elsewhere (see section 5.1).
- We consider the use of surveys and the survey approach we developed in 2019 for residential and business (<10 MVA) customers remains fit for purpose (with minor amendments we proposed in the consultation paper). We are open to making changes to the demographic/contextual questions section of the residential questionnaire. We seek stakeholder feedback on what amendments may be desirable to help better reflect the rapid transition to net zero and other changes in the broader economy (see section 5.2).
- We consider our 2019 direct cost survey approach for large energy users remains fit for purpose. We ask for stakeholder feedback on how we can refine this approach by streamlining the direct cost survey questionnaire to increase the response rate (see section 5.2.2).
- While we have not proposed any changes to the VCR annual adjustment mechanism, we seek further stakeholder feedback on what approach may better reflect the ongoing changes in the energy sector and the broader economy and how we can implement such an approach in practice (see section 5.3). We also seek stakeholder feedback on whether conducting VCR reviews more frequently may be a better alternative to making changes to the current annual adjustment mechanism.
- We consider our 2019 approach to deriving the $/kWh VCR and aggregate VCR remains fit for purpose (with minor amendments proposed in the consultation paper) (see section 5.4). We are seeking feedback on how to improve elements of the unserved energy calculation for deriving VCR.

5.1 Exclusion of momentary and long-duration outages

Our method does not cover momentary outages because they are unlikely to be efficiently addressed by network level investments, they are hard to measure and report and they do not appear to be related to the quantity of unserved energy.

We also do not consider prolonged outages, which are being examined through a separate project on the value of network resilience.

5.2 Use of surveys

As set out in our methodology in Tables 4.1 to 4.3, we propose to continue to use surveys as our preferred approach to determine VCR for outages less than 12 hours.

5.2.1 Residential and business customers

For residential and business customers with a peak demand of less than 10 MVA we propose to use the same combination of contingent valuation and choice experiment survey techniques as used in 2019.

Contingent valuation survey questions typically ask customers how much they would be willing to pay to avoid an interruption (willingness to pay), or how much they would be willing to accept as compensation for experiencing an interruption (willingness to accept). Our contingent valuation asks customers their willingness to pay to avoid a baseline outage scenario (defined as two localised one-hour outages in a year, occurring in winter in off-peak times).

Choice experiments are used to elicit values associated with specific attributes of a good or service. This technique asks customers to identify their most preferred option out of a series of choices. The outage attributes we use include outage duration, severity (widespread/ localised), time of day, day of the week and season. We proposed these attributes because we consider them to be strong drivers of reliability preferences, electricity use, and/or outage experiences.

Stakeholder feedback

We received several stakeholder submissions in response to our consultation paper, which identified concerns with using surveys, including that:

- surveys are prone to cognitive biases and misinterpretation of questions and responses and capture respondents' reflexive responses, rather than informed consideration of newly presented content
- surveys are an unreliable tool for garnering consumer preferences on complicated (and material) matters
- surveys provide for limited context and a limited ability to ask clarifying questions
- the order in which the questions in the survey are asked may impact the responses.

Some stakeholders (for example, PIAC,[34] EUAA,[35] Essential Energy[36] and Ausgrid[37]) expressed a preference for deliberative forums either as a more suitable alternative methodology to determine VCR or to supplement our survey approach.

AusNet supported the continued use of contingent valuation and choice modelling to determine VCR for residential and small/medium business customers and a direct cost

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34 PIAC, Submission on consultation procedure [letter], Public Interest Advocacy Centre, Sydney, 2024.

35 EUAA, Submission on consultation procedure [letter], Energy Users Association of Australia, Melbourne, 2024.

36 Essential Energy, Submission on draft determination [letter], Essential Energy, Port Macquarie, 2024.

37 Ausgrid, Submission on consultation procedure [letter], Ausgrid, Sydney, 2024.

survey to determine VCR for very large customers. It has used a similar methodology in its recent Quantifying Customer Values study and indicated that the AER's 2019 approach:

- allows for a large and robust sample size
- encourages the respondents to consider their personal value of avoiding multiple outage scenarios, while minimising their cognitive load.[38]

Similarly, CitiPower, Powercor and United Energy's Quantifying Customer Values research incorporated the use of surveys, with over 1,500 customers participating,[39] rather than a model-based, revealed preference or deliberative forum-based approach for their analysis.

A number of stakeholders expressed concern that our survey-based methodology may not capture how customer values may evolve with the energy transition and with increasing electrification (including rapid adoption of solar panels and electric vehicles).[40] Some stakeholders also referred to the need to account for other economic changes, such as cost-of-living pressures.[41] SA Power Networks, which largely supported the more targeted amendments to the VCR methodology, posited that, while increased electrification can be reflected in the quantity of unserved energy in forecasting considerations, a greater dependence on an electricity connection would likely lead customers to assign a higher and more accurate value to their reliability (for example, a customer purchasing an EV in the latter part of the VCR application period).[42]

SA Power Networks, TasNetworks and CitiPower, Powercor and United Energy also commented on possible ways to capture the changes in the energy sector:[43]

- TasNetworks suggested we should consider segmentation of customers with household battery storage and electric vehicle ownership to determine significant differences in VCR for these customer segments.
- SA Power Networks submitted that it is important that adequate context is given to survey respondents on the potential for greater electrification and suggested this could be addressed by adding attributes to the choice model to identify customers' willingness to pay in situations where a customer decides to acquire an electric vehicle or abolish their gas connection.
- CitiPower, Powercor and United Energy suggested our methodology should incorporate electrification forecasts, and that this could be partially achieved by including a demographic split in the research, between those who are in all electric versus gas-connected homes, and with EVs considered. This could be apportioned to determine the

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38 AusNet, Submission on draft determination [letter], AusNet, Melbourne, 2024.

39 CitiPower, Powercor, United Energy, Submission on consultation procedure, VCR 2024.

40 CitiPower, Powercor and United Energy, Submission on consultation procedure [letter], CitiPower, Powercor and United Energy, Melbourne, 2024. EUAA, Submission on consultation procedure [letter], Energy Users Association of Australia, Melbourne, 2024.TasNetworks, Submission on draft determination [letter], TasNetworks, Hobart, 2024. Ausgrid, Submission on draft determination [letter], Ausgrid, Sydney, 2024.

41 SA Power Networks, Submission on draft determination [letter], SA Power Networks, Adelaide, 2024.

42 SA Power Networks, Submission on draft determination [letter], SA Power Networks, Adelaide, 2024.

43 CitiPower, Powercor and United Energy, Submission on consultation procedure [letter], CitiPower, Powercor and United Energy, Melbourne, 2024. SA Power Networks, Submission on draft determination [letter], SA Power Networks, Adelaide, 2024. TasNetworks, Submission on draft determination [letter], TasNetworks, Hobart, 2024.

difference between VCR for customers in all-electric homes with EVs, versus gas-connected customers with petrol vehicles. This proportional difference could be forecast to increase in line with the rate of electrification, with an increasing weighting toward the VCR of all-electric customers, compared with gas-connected customers with petrol vehicles.

Our approach

We consider surveys to be the most appropriate method for these customer types for several reasons:

- Survey-based approaches, particularly choice experiments, offer greater flexibility and granularity than model-based approaches or revealed preference approaches with respect to the variables being measured/targeted, such as customer types, outage types and location.[44]
  - Model-based approaches usually rely on information collected at regional/state or economy-wide levels and so would not allow the same granularity as survey-based approaches.
  - A revealed preference study has never been used for VCR and would require significant time and cost for testing. Further, we consider that currently available market data would not allow us to achieve the same scope and granularity of VCR values using a revealed preferences approach as using our survey-based approach.
- The granularity of data from surveys can be applied to most applications of VCR we have identified. This meets the requirements of the VCR objective that the VCR methodology and VCR be fit for purpose for any current or potential uses of VCR that the AER considers to be relevant. This also supports the achievement of the NEO by allowing more targeted VCR to be developed that enable better assessments of the efficiency of network expenditure and other VCR uses.
- Surveys seek information directly from customers, as distinct from model-based approaches. This meets the requirements in the NER that the VCR methodology must include direct engagement with customers.
- Using a combination of contingent valuation and choice experiment survey techniques can capture both the tangible effects on customers due to an interruption in their electricity supply, as well as intangible effects such as loss of comfort, which are more difficult to be captured by model-based approaches. Survey responses can reflect any relevant changes occurring in the energy sector and the broader economy. This is likely to better support the achievement of the NEO.

We acknowledge the stakeholder submissions in favour of deliberative forums and we recognise that deliberative forums can be a useful tool in some circumstances.

We consider deliberative forums may be more effective for a targeted consultation on issues affecting a smaller demographic, especially when gaining a social licence is important. For example, deliberative engagement can be used before committing investment that would affect the population of a particular confined geographical area. Deliberative forums can also

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[44] Sullivan, Collins, Schellenberg and Larsen, *Estimating power system interruption costs – A guidebook for electric utilities*, Berkeley National Laboratory, 2018.

be more helpful in brainstorming a relatively unexplored issue. For example, to understand impacts of rare outage events on local communities.

However, we note that there are some challenges with using deliberative forums, especially in the context of considering the value customers place on reliability:

- deliberative forums require significant commitment of time and, as a result, it can be hard (and costly) to form a representative group – it may also not be possible to cover a lot of different outage scenarios in each session
- to achieve the same level of granularity[45] of VCR as we did in 2019, or greater granularity as submitted by some stakeholders,[46] through deliberative forums would require many deliberative forums around the NEM and Northern Territory targeted at different customer cohorts and industry sectors; this would be cost- and time-intensive
- deliberation is often used to arrive at a consensus view; our objective is to reflect the values individual energy customers place on reliability (which we then aggregate), rather than to ask respondents directly what value society should (or does) place on reliability, or to determine the consensus view of a small group on the issue
- we understand that there is no established methodology for converting the outcomes of deliberative forums into a set of VCR
- given the nature of the engagement, the information on both the sample composition and potential for influence during a deliberative forum is less transparent than for survey approaches.

Given the challenges and features of deliberative forums, we consider incorporating deliberative forums in our methodology would not help us to better reflect the reliability preferences of diverse Australian energy residential and business (<10 MVA) customers at a level of granularity suitable for any current or potential uses of the VCR.

However, as part of our engagement on network resilience, we are holding deliberative forums to gain insights from customers with lived experience of the recent prolonged outages in Victoria. The purpose of these forums will be to understand:

- customers' outage lived experiences and outage event resilience
- how customers define resilience
- what differentiates prolonged outages from standard outages from a customer perspective.

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45 2019 VCR were segmented by: residential (by climate zone and remoteness); small and medium business (by industry sector – agriculture, commercial and industrial); large business > 10 MVA (by industry sector – services, industrial, mines and metals).

46 TasNetworks, Submission on draft determination [letter], TasNetworks, Hobart, 2024; AusNet, Submission on draft determination [letter], AusNet, Melbourne, 2024; AusNet, Submission on draft determination [letter], AusNet, Melbourne, 2024; Ausgrid, Submission on draft determination [letter], Ausgrid, Sydney, 2024. CitiPower, Powercor and United Energy, Submission on consultation procedure [letter], CitiPower, Powercor and United Energy, Melbourne, 2024; Essential Energy, Submission on draft determination [letter], Essential Energy, Port Macquarie, 2024.

We have also formed a stakeholder reference group comprised of experts and key stakeholders to provide additional insight and guidance throughout the engagement process (and to guide the deliberative forum).

Improving survey design and implementation

In developing both our contingent valuation questions and choice model design in 2019, we aimed to address potential concerns with surveys and consulted with survey experts. Our analysis included:

- the order and number of questions (both of which can influence the response rate and how people respond)
- the level and type of information provided to be clear about what trade-offs we were asking respondents about
- the language we use.

We also conducted extensive testing of our questionnaires through focus groups, cognitive testing and pilot testing.[47]

Similarly, in 2024 we engaged a survey expert to review our residential and business questionnaire, conduct cognitive testing and run a pilot survey (see Appendix A). This included face-to-face cognitive testing on the residential survey and online questionnaire testing on both the residential and business questionnaires. During the cognitive test, participants were asked about what they were thinking when they answered each question and about what they considered in forming their response. To ensure the questions are measuring what they are intended to measure, each question and block of text was assessed on comprehension and ease of answering. As a result of testing, some minor wording changes were made to the questions.

In 2024 we propose to continue to use some techniques used in 2019, such as randomising the order of options for some questions, randomising choice sets provided to respondents and removing rapid responders. These reduce any effect that 'straight liners' or rapid responders might have on the results.

We consider this extensive analysis, consultation and testing of our survey techniques, both in 2019 and 2024, helps to address potential issues with survey techniques around scope for misinterpretation of questions and responses, cognitive biases and the effect of 'straight liners' or rapid/reflexive responders on the results.

We use both choice modelling and contingent valuation survey techniques for residential and business customers. Choice modelling reduces the scope for strategic responses because the willingness to pay is neither open ended or directly asked and it is more difficult for respondents to act strategically.[48]

Recognising potential weaknesses associated with contingent valuation survey techniques, we consulted extensively in 2019 on our willingness to pay question and pilot tested two

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47 AER, *Values of Customer Reliability Draft Decision*, Australian Energy Regulator, September 2019, pp. 17–18.

48 AER, *Values of Customer Reliability Draft Decision*, Australian Energy Regulator, September 2019, p. 50.

ways of asking it. We settled on an open-ended willingness to pay question, with two cost prompt questions preceding it to provide context and assist in framing realistic values.

Cost prompts provide useful context and make respondents reflect on their willingness to pay gradually, which is similar to how consumers may shop around before purchasing some goods or services. However, we do not simply rely on the responses to the cost prompts to set a willingness to pay, as doing so would only provide a range and require further assumptions to obtain a single value. Using an open-ended willingness to pay question gives a single response rather than a range of responses and does so without the assumptions necessary when using the closed responses alone.

One potential issue with an open-ended willingness to pay question is the effect of very high outlier responses. In 2019 we introduced a willingness to pay cap after some unusually high 2019 pilot responses. We considered this approach is in line with the intention of the NEO, as it would promote efficient investment in electricity services. We continue to hold this view and propose to maintain the use of a willingness to pay cap in our 2024 VCR methodology. In their submission, SA Power Networks requested the willingness to pay cap be set with a transparent methodology.[49]

For 2024, we propose a residential cap based on the cost of a mid-range back-up generator and uninterruptible power supply that starts automatically and can operate for one hour per outage. Based on a weighted average of the cost of a 6 kVA generator and a 3 kVA UPS operating for one hour per outage, the 2024 residential cap is proposed at $32. For business customers we will apply the same cap as in our 2019 study.[50] This is to set the cap at the amount of the last bill for the customer.

TasNetworks pointed to responses of zero willingness to pay as a limitation of survey-based methodologies.[51] We note that the baseline outage scenario is a relatively benign outage. Therefore, many customers may not find it worthwhile to avoid it and may report zero willingness to pay. Because we use choice modelling to estimate willingness to pay for other outage scenarios, even if survey participants chose zero willingness to pay response for the baseline scenario, it does not imply they would indicate zero willingness to pay for other scenarios in the choice model.

Tracking changing values through the energy transition and other events

Our survey approach is designed to allow respondents to make their own trade-offs with respect to outage attributes. Our approach is not prescriptive of the things that respondents can consider in making those trade-offs. It allows responses to be affected by any aspect that the respondent considers is relevant to them, such as their own use of electricity and the effect of different outages on them.

Our residential survey captures a snapshot of customers' reliability preferences at the time they are surveyed. We consider our approach to be effective in tracking changing customer values of reliability throughout the energy transition, as long as our survey sample is broadly

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49 SA Power Networks, Submission on draft determination [letter], SA Power Networks, Adelaide, 2024

50 AER, Values of Customer Reliability - Final report on VCR values - December 2019, Australian Energy Regulator, 2019, pp. 67–69.

51 TasNetworks, Submission on draft determination [letter], TasNetworks, Hobart, 2024.

representative of the population. We check broad sample representativeness in terms of demographics. We also introduced questions on energy-specific factors such as:

- have a pool, slab heating or a mains gas connection
- own/drive a fully electric vehicle (excludes hybrid vehicles)
- have rooftop solar panels
- have a home automation system (a system that controls appliances and devices in the home over the internet)
- work from home at least one day per week
- whether they think they may own an EV / solar PV / home automation system or work from home in 5 years' time.

For our 2024 residential pilot survey we slightly modified the wording of some of the 2019 demographic questions (see Appendix A). We also added a question on whether a respondent's house has a battery (connected to their solar system or electricity supply).

We welcome stakeholders' feedback on our demographic/contextual questions, any changes that may be desirable and how they make our VCR methodology more fit for purpose.

We consider our approach of adding demographic questions on energy-specific factors is preferable to incorporating those factors into the contingent valuation or choice modelling sections of the survey. This approach means we will capture changing customer views and experience in an impartial rigorous way.

As noted above, some stakeholders suggested modifications to our survey approach to allow us to estimate willingness to pay separately for EV and battery owners and non-EV and battery owners, and those with and without a gas connection. We have analysed these suggestions and make the following observations:

- If we have a sufficiently large number of respondents with a particular set of characteristics in our sample, we can compute the willingness to pay for the baseline scenario separately for those respondents.
  - For example, in 2019 we estimated willingness to pay to avoid the baseline outage scenario separately for those respondents in our residential sample (7,426 respondents) that own and do not own EVs, respondents with and without rooftop solar and respondents with different reported financial situations, based on self-reported qualitative descriptions of their financial situation.[52]
- To similarly obtain statistically meaningful willingness to pay results for other outage scenarios would require a much larger survey sample. This is because estimating a set of choice modelling coefficients is more data intensive. We would also need to have a larger sample if we wanted to obtain sets of willingness to pay estimates for respondents with particular characteristics separately for different geographic areas.

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[52] KPMG, Values of Customer Reliability Main Survey Report, report to the AER, KPMG 2019 pp. 48–49.

- We note that in 2019 only 125 residential survey respondents reported owning EVs. While the Australian energy sector is changing rapidly, EV and battery owners currently represent a small percentage of Australian households.[53]
- Further, if we wanted to increase the number of survey respondents that own EVs or batteries, we currently do not have a mechanism for targeting potential survey respondents with those characteristics within the general population.

In summary, while it is possible to produce willingness to pay estimates for survey respondents with certain set of characteristics, there are challenges in producing granular willingness to pay estimates for them within the current residential survey approach – both in terms of covering outages other than the baseline and in terms of obtaining results for a specific geographical area.

Feedback we seek from stakeholders

We welcome stakeholders' feedback on our demographic/contextual questions, any changes that may be desirable, and how they would make our VCR methodology more fit for purpose.

5.2.2 Large business customers >10 MVA

For large business customers with a peak demand equal to or greater than 10 megavolt-ampere (MVA) we propose to adopt a direct cost survey approach to determine VCR. This is the same approach we used in 2019.

Direct cost surveys are considered best practice, among survey approaches, for large-scale businesses because these large businesses are likely to have detailed knowledge of the value of energy to their business and any costs they would incur because of an outage.

We consider that our 2019 direct cost survey, with some possible questionnaire modifications to address recent developments in the energy sector, remains consistent with the VCR objective and fit for purpose in 2024.[54] Our direct cost survey seeks information directly from large businesses from various sectors and locations across the NEM and Northern Territory. This also supports the achievement of the NEO because our survey allows for targeted VCR to be developed.

Our proposed modifications deal with implementation issues, rather than our methodological approach, and are discussed below. We have attached the 2019 direct cost survey questionnaire in Appendix B and welcome stakeholder feedback on these modifications.

Our approach

For large businesses, our approach has been to assume that the activity undertaken is a more important driver for reliability preferences than the region or climate zone. In 2024 we

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53 For example, the number of EVs in Australia has increased from around 3,000 pure EVs in 2019 to an estimated 109,000 pure EVs in 2023. Pure EVs make up 0.51% of total vehicles in Australia (Electric Vehicle Council, State of Electric Vehicles Report 2023, Electric Vehicle Council, 2023).

54 We received stakeholder support to our approach for large-scale businesses. See EUAA, Submission on consultation procedure [letter], EUAA, Melbourne, 2024. AusNet, Submission on draft determination [letter], AusNet, Melbourne, 2024.

propose to develop VCR for large businesses by industry sector as we did in 2019. In 2019 our VCR for large businesses were segmented by mines, metals, services and industrial. We received 67 responses to our direct cost survey from a pool of around 300 customers. The survey already covered outages up to 48 hours and asked about the types of costs experienced by businesses because of outages, measures they have taken to reduce the impact, whether they have installed backup supply, how many outages they experienced in the last year and whether the business received information that helped reduce the impact.[55]

In 2024 we propose to include a new question on lost revenue from not being able to export to the grid during an outage.

Feedback we seek from stakeholders

We are interested in stakeholder views on any measures we could take to improve the direct cost survey response rate and whether we should adjust the survey questionnaire, noting a potential trade-off between the number of questions and the response rate.

5.3 Annual adjustment mechanism

Under the NER, the VCR methodology must include a mechanism for adjusting the values of customer reliability on an annual basis.[56] The NER do not prescribe specific requirements for how the mechanism is to be constructed or describe its purpose, but we consider that having regard to the NEO and the VCR objective, as well as consideration of whether an approach can be implemented in practice, provide us with some guidance in our analysis of alternative approaches.

In 2019 we established an annual adjustment mechanism, which involves using the change in the combined all groups CPI[57] minus an X factor. Indexation by the CPI aims to keep our VCR estimates constant in real terms and X is a value we would set using energy-specific drivers to account for changes in electricity preferences relative to inflation. Due to the lack of available information on what the key drivers of changes in customer reliability preferences are and how they affect VCR, we set X to zero in the 2019 methodology and in the 4 annual adjustments of VCR from 2020 to 2023.

While we have not proposed any changes to the 2019 VCR annual adjustment mechanism in our draft determination, we seek further stakeholder feedback on what approach may better reflect the ongoing changes in the energy sector and the broader economy and how we can implement such an approach in practice. We also seek stakeholder feedback on whether conducting VCR reviews more frequently may be a better alternative to making changes to the current annual adjustment mechanism.

Stakeholder feedback

In response to our consultation paper, many stakeholders suggested we revisit the setting of the annual adjustment mechanism. They also suggested that we need to consider how to

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55 While outages up to 48 hours are included in the direct cost survey, we do not produce a $/kWh value for outages that are longer than 12 hours.

56 NER, rule 8.12(d)(2).

57 ABS, Consumer Price Index, Australia, June 2020, Australian Bureau of Statistics, 2020.

best reflect electrification, higher penetration of consumer energy resources and other changes that have occurred in the economic environment or may occur in the future.

Consideration of alternative mechanisms for 2024

As discussed above (section 5.2), we consider that our survey-based approach captures a snapshot of customers' reliability preferences at the time they are surveyed. However, changes in the economic and electricity landscape in the years between VCR reviews can shift reliability preferences and energy consumption patterns, by changes to:

- inflation impacts, as customer preferences are usually driven by real trade-offs that are made within a budget constraint
- electricity consumption patterns, which inform the unserved energy input (the denominator in the VCR formula) and are significantly affected by the uptake of solar PV, battery storage, electric vehicles, more efficient appliances and working from home
- customer preferences and attitudes toward reliability.

In 2019 we considered a range of possible inflation measures for the annual adjustment mechanism as alternatives to CPI:

- GDP deflator
- producer price index (PPI)
- electricity bill increases (as a proxy for inflation)
- labour wage escalator.

For the X value, the 2019 project considered adjustment mechanisms that comprised combinations of data on:

- solar PV uptake
- battery uptake
- EV uptake
- wholesale electricity futures price
- forecast energy consumption
- changes to appliance efficiency
- data from cost-reflective tariff customers
- backup generation costs
- electrification measures.

For a range of reasons, including data availability, suitability for the purpose and regulatory continuity, we concluded CPI was the most appropriate inflation measure for VCR and that the X value should be set to zero until more substantive and reliable data could be sourced.

Of the factors suggested in the submissions to our consultation paper and the factors we examined in 2019, two stood out as potential candidates for use in the annual adjustment mechanism. The first was working from home, given the potential for changes in working from home patterns to affect both willingness to pay and unserved energy components of the

VCR. However, at this stage we do not have estimates of energy consumption segmented by working from home habits and do not see a path to obtaining this data. It is also unclear whether working from home habits will change significantly in the next 5 years, or in which direction. We do not propose to focus on this further.

EV ownership is the other candidate for potential inclusion into the annual adjustment mechanism in 2024. However, we are likely to continue to find it difficult to get enough respondents with EVs to allow a fully developed alternative VCR value for them, even if we were able to develop separate unserved energy estimates for them.

Therefore, we are considering options for an assumption-based approach to accounting for changes in EV ownership in the annual adjustment process. Such an approach could involve specifying in advance a process for updating the VCR of residential customers to account for changes in EV ownership. The process would need to rely on a set of assumptions. For example, it could use the ratio of willingness to pay to avoid the baseline outage between EV owners and non-EV owners in 2024 to set their assumed relative VCR value for the next 5 years. This effectively assumes that this ratio is the same for other outage scenarios as it is for the baseline scenarios and that unserved energy for EV owners is the same as for non-owners and remains constant over the 5 years. This ratio could be used to adjust overall residential VCR values as EV ownership changes.

To illustrate how this might work, consider the following example:

> Assume residential VCR without EV is \$40/kWh and residential VCR with EV is \$100/kWh (that is, the ratio identified above is 2.5).[58] In that case a one percentage point increase in EV ownership[59] would give a 1.5% increase in residential VCR.[60] As measured EV levels shift, this figure could be used to adjust overall residential VCR values.

Residential customers only comprised approximately 27% of the NEM load in 2019, so changes to residential VCR from this kind of adjustment process would have a smaller effect on overall VCR.

An alternative way of addressing an unanticipated large change in VCR between two VCR reviews may be to conduct an earlier VCR review and update. In 2019 we noted that such an approach may be more appropriate for broader changes in customer preferences or consumption.[61] This would have a resourcing impact for the AER. However, we are open to considering this approach and invite stakeholder views on the value that would be gained

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58 In 2019 the ratio of willingness to pay (WTP) to avoid the baseline outage for EV owners relative to non-owners was 2.6. We use 2.5 for illustrative purposes. We do not have separate USE estimates for EV owners versus non-owners, but we would expect unserved energy (USE) to be higher for EV owners all else being equal due to their likely extra use of electricity for car charging versus non-owners. A higher USE would decrease their VCR, all else being equal.

59 For example, if approximately 10% of Australia's new vehicles are EVs and approximately 10% of Australia's vehicle fleet turns over per year, then the EV proportion of the total fleet would increase by about one percentage point per year.

60 This can be shown algebraically. Alternatively consider how VCR would change in moving from zero EV ownership (overall residential VCR = \$40/kWh) to 1% EV ownership (overall residential VCR = 0.99 * 40 + 0.01 * 100 = \$40.6/kWh), an increase of 1.5%.

61 AER, *Values of Customer Reliability Final Decision*, Australian Energy Regulator, November 2019, p. 18.

from it. We consider that the increased accuracy of updates would need to be weighed against the increased cost of this approach.

We note that maintaining consistent VCR methodology across 2019 and 2024 allows us to examine the extent to which CPI indexation 'overshot' or 'undershot' over this period. We will be able to conduct such analysis at the time of our 2024 VCR update.

Feedback we seek from stakeholders

We seek further stakeholder feedback on:

- how any of the presented challenges could be overcome and what approach to annual adjustment may better reflect the ongoing changes in the energy sector and the broader economy
- how we can implement such an approach in practice
- whether conducting VCR reviews more frequently may be a better alternative to making changes to the current annual adjustment mechanism.

5.4 Deriving and aggregating $/kWh VCR values

For the 2024 VCR methodology, we propose to continue using our 2019 methodology for deriving $/kWh VCR values and aggregate VCR from willingness to pay estimates, with minor edits to the description to improve clarity. Our exact implementation will depend on data availability and the responses we get in the survey.

Stakeholder feedback

Most submissions did not address our process for deriving final VCR values directly.

AusNet also submitted that network-level service data would be preferable for calculating both unserved energy and outage probability. They also suggested we could use a larger dataset for estimating the amount of unserved energy – for example, one based on NMI meter data – to that used in 2019.[62]

We would welcome further stakeholder feedback on the process specified below, particularly regarding estimating unserved energy.

Our approach

The methodology describes how we combine survey response data with inputs for unserved energy, historical outage frequency and segment load to derive our final VCR. In 2024 we propose using the same steps as in 2019, described below:

- **Convert survey responses to willingness to pay estimates:** contingent valuation and choice experiment results are combined to produce a dollar value for a range of outage scenarios relevant for customers in that segment.

62 AusNet, Submission on draft determination [letter], AusNet, Melbourne, 2024.

- **Estimate scenario VCR:** for each outage scenario within each customer segment, we divide the dollar value by an estimate of unserved energy – the amount of electricity that an average customer in the segment would have consumed over the period had the outage not occurred.
- **Estimate segment VCR:** for each customer segment, we weight the $/kWh of each outage scenario by its relative frequency in the segment and sum to produce a single $/kWh VCR for the segment.
- **Aggregate VCR:** for a given region or area (for example, state/territory or the NEM), we weight the VCR of the relevant aggregate segments (across residential, business and direct cost cohorts) by the relative electricity load they demand within the region and sum to produce a single VCR for the region.

Unserved energy

We propose to maintain our 2019 approach to estimating unserved energy. That is, estimating a base demand value (average rate of electricity consumption) for the segment and using interval data at the network level to vary that value by patterns of consumption throughout the day.

For base demand:

- For the residential cohort, we propose to use the latest electricity consumption benchmark data to estimate the average demand for a household in each climate zone. The demand is differentiated for summer and winter, and accounts for specific drivers of consumption that are prevalent in the segment.[63]
- For businesses, we propose to use customers' survey responses about recent electricity bills combined with recent ACCC data on electricity prices to estimate their annual consumption, and convert them to base hourly demand figures in kWh, grouped by size and sector.

For both residential and business, we propose to construct demand 'curves' using the interval data to account for consumption variations throughout the day. To produce an unserved energy estimate, the base demand value would be combined with a relevant 'peak factor' derived from the curves, representing the relative consumption during a given outage window compared with the average.

In 2019 we attempted to use NMI data to estimate unserved energy. To do so, we asked residential and business survey participants to disclose their NMI(s). This presented challenges, including privacy concerns and risk of lowering the survey completion rate. Many respondents did not provide their NMI and we decided to use other datasets for estimating unserved energy instead to ensure consistency across the sample. We cannot compel customers to provide their NMI. We consider that the same challenges remain for 2024, but we remain open to stakeholder views on alternative approaches and datasets for estimating unserved energy.

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63 For example, whether they have a swimming pool or underfloor heating.

We are also seeking stakeholder feedback on other improvements to estimating unserved energy, specifically for:

- calculating unserved energy for businesses, potentially differentiating by sector
- how best to account for customers with solar PV, especially those who have periods of net export. Interval demand data would be aggregated at a high level and only captures consumption in 'front of the meter', meaning when solar customers export more electricity than they use (for example, during the middle of a summer day), they have a net negative demand from the network. However, a customer's actual 'behind the meter' consumption during that period would likely go unserved during an outage, even if they are net exporting. Further, their use patterns may be materially different to a customer without solar PV where their habits seek to optimise consumption during sunlight hours.
- adjustments for EVs, battery storage and other customer features not present in the latest electricity consumption benchmarks.

Outage frequency

We also propose the same approach to weighting the frequency of outages as in 2019, where the scenario-specific VCR for outages that customers experience more commonly were weighted more heavily.

For the 2024 VCR update we intend to use data from distributors about sustained interruptions provided in 2022–23 Category Analysis Regulatory Information Notice responses. We will estimate frequency of outage types using customer minutes interrupted (CMI), a product of outage duration and customers affected.

For the residential cohort, we intend to use network feeder data to allocate CMI proportionally to each VCR segment based on how many customers the interrupted feeder serves in each. For businesses, we intend to assign combinations of feeder classifications (CBD, urban, rural short, rural long) to each of the business segments and assign CMI on that basis, as we did in 2019.

Load weighting

We propose the same approach to aggregating weighting as in 2019:

- To aggregate residential segments to state and NEM groupings, we used population data and consumption benchmarks.
- To aggregate NEM and state VCR combining residential and business customers, we used the transmission and distribution connected load split from RIN data, and aggregated the distribution VCR using residential, agricultural, commercial and industrial load splits, estimated from various data sources.

In addition to aggregate VCR, in 2019 we published attachments with our disaggregated frequency weighted VCR, for use in specific, more granular applications. We propose the same approach for 2024.

Feedback we seek from stakeholders

We are seeking stakeholder feedback on improvements to estimating unserved energy, especially for:

- businesses customers
- customers with solar PV
- other customer drivers like EV ownership or battery storage.

6 Related matters

The Reliability Panel is responsible for monitoring, reviewing and reporting on the reliability of the national electricity system. One of the panel's key responsibilities is setting the form and level of the reliability standard.[64]

The reliability standard is a central component of the reliability framework underpinning the wholesale electricity market. It seeks to send a signal about reliability to guide decisions of participants in the wholesale electricity market, while also balancing the trade-off between reliability and affordability (the higher the reliability standard, the higher the cost for customers).[65]

The panel is undertaking a review of the form of the reliability standard and the administered price cap.[66] The panel undertook modelling to better understand how the reliability risk profile could change as the NEM transitions to a system with higher penetration of variable renewable energy resources. On 18 April 2024 the panel released a draft report outlining that the current form of the reliability standard and administered price cap remain fit for purpose.[67]

The panel noted that, while the primary focus of the review is the form of the reliability standard, VCR are closely related to setting the level of the standard, and the findings from the 2024 VCR will inform the level of the standard in the 2026 Reliability Standard and Settings Review (RSSR) process.[68] The panel also identified an opportunity to improve the way in which it applies the VCR in its RSSR process. The panel proposed that the VCR used for the RSSR should be weighted according to the characteristics of future customer outages caused by reliability shortfalls, where feasible.[69]

We have added two additional questions to our residential and business surveys, which explore two potential future outage scenarios of interest to the panel. The scenarios involve a sequence of one-hour outages repeated over a period of time. The questions were developed by AEMC staff and approved by the panel and the responses will be analysed by the AEMC.

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64 The form of the reliability standard is currently based on expected unserved energy and is set at a level of 0.002% expected unserved energy.

65 For more information, see AEMC, Reliability, Australian Energy Market Commission, 2024, accessed 8 February 2024.

66 See AEMC, Review of the form of the reliability standard and APC, Australian Energy Market Commission, 2024, accessed 7 May 2024.

67 AEMC, Draft report: Review of the form of the reliability standard and administered price cap, Draft report, 18 April 2024, accessed 7 May 2024.

68 AEMC, Draft report: Review of the form of the reliability standard and administered price cap, Draft report, 18 April 2024, accessed 7 May 2024, p. 7.

69 AEMC, Draft report: Review of the form of the reliability standard and administered price cap, Draft report, 18 April 2024, accessed 7 May 2024, p. iii.

Glossary

Term	Definition
ABS	Australian Bureau of Statistics
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CBD	Central business district
CPI	Consumer Price Index
NEM	National Electricity Market
NEO	National Electricity Objective
NER	National Electricity Rules
Solar PV	Solar photovoltaic
USE	Unserved energy
VCR	Value(s) of customer reliability
WTP	Willingness to pay
$/kWh	Dollars per kilowatt hour