

Values of customer reliability methodology

Final determination

August 2024

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Inquiries about this publication should be addressed to:

Australian Energy Regulator
GPO Box 3131
Canberra ACT 2601
Email: aerinquiry@aer.gov.au
Tel: 1300 585 165

AER reference: 17150765

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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 by helping electricity businesses and the AER identify the right level of investment to deliver reliable energy services to customers.

Most outages customers experience in the National Electricity Market (NEM) and the Northern Territory originate in distribution networks.¹ 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. VCR for unplanned outages up to 12 hours (standard outages) are important because they can be applied to the uses of VCR we have identified,² 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.³ On 5 June 2024 we published our revised draft determination on the VCR methodology. Since publication of our revised draft determination, we received 10 formal submissions and engaged in several meetings with stakeholders, including representatives of small and large customers along with distribution and transmission network service providers. This final determination on the VCR methodology considers submissions received in response to our revised draft determination and consultation with stakeholders.

We commenced our formal consultation for the 2024 VCR review using the expedited rules consultation procedure of the National Electricity Rules (NER)⁴ 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 would enable greater comparability between the 2019 VCR and the 2024 VCR. This would enable us to make inferences as to how customer views on reliability have changed 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 values for the maximum willingness to pay, and updating cost prompts and bill discounts in the residential customer survey.

Following feedback from stakeholders we conducted an additional round of consultation to enable further consideration of the survey methodology, the need for the VCR methodology to account for the energy transition and trends in the broader economy. We also took the

¹ 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.

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

³ NER, rule 8.12.

⁴ 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.

opportunity to consult on ways to improve the direct cost survey response rate and unserved energy calculations.

Stakeholder feedback on the proposed VCR methodology set out in this final determination focused on 2 key themes:

- whether our proposed survey-based approach is fit for purpose and whether any refinements to it are desirable
- what form the annual adjustment mechanism could take and whether we should conduct VCR reviews more frequently.

In addition, stakeholders commented on VCR methodology implementation, including:

- customer group segmentation
- data inputs and computation steps for estimating unserved energy
- adding to/removing questions from our survey questionnaires.

We reassessed our approach in light of the stakeholder feedback. This included re-examining our survey questionnaires and seeking further advice from our consultants, as well as reviewing literature related to estimating VCR, and further examining the benefits and limitations of different approaches to estimating customers' willingness to pay (including model-based approaches, revealed preferences and deliberative forums).

Having considered these and stakeholder feedback throughout our consultation process, we made some further adjustments to our methodology and survey questionnaires.

We note that all potential methodologies used to gather the data to calculate VCR have certain benefits and limitations. For the 2024 VCR update, on balance, we decided to continue relying on our survey-based methodology. 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. We will continue monitoring developments in approaches used for estimating VCR by other jurisdictions, including internationally and in relevant academic literature to inform our future work on VCR and high impact low probability (HILP) outages.

In response to stakeholder feedback, we refined the following elements in our final methodology:

- We have removed references to questions about outages over 12 hours from our description of the large energy users' section of the methodology. We do not calculate VCR for outages beyond 12 hours. Therefore, we have chosen to remove references to these questions from our methodology. While no longer part of the methodology, we intend to retain some exploratory questions on longer outages in the direct cost survey questionnaire to inform our future work on the value of network resilience (VNR) and HILP outages.
- We removed the X factor from the annual adjustment mechanism. This is because we have chosen to set the X factor to zero. Leaving the X factor in the methodology while it

is set to zero is redundant and could cause confusion, given we cannot adjust the X without reviewing the VCR methodology.

The rest of the amendments are editorial and are meant to improve the readability of the methodology.

We have decided to index VCR on an annual basis by CPI. Stakeholders did not raise any concerns with using CPI rather than alternative price indices and we consider CPI is the most appropriate inflation measure for adjusting VCR.

Many stakeholders supported incorporating additional electrification-related factors into our annual adjustment mechanism, but there were stakeholders also supporting the current CPI-based annual adjustment. We carefully considered available alternative approaches, having regard to stakeholder feedback, but did not identify a feasible alternative (such as a non-zero X factor) that would improve accuracy of the resulting VCR or be more fit for purpose at this time.

We consider there are difficulties in identifying the future drivers of changes in customer reliability preferences and how they may affect VCR. For those potential drivers we did identify, such as ownership of electric vehicles (EVs), we do not consider there is currently enough reliable information to lock in an approach to capture changes in reliability preferences. We consider that the components of the VCR, such as willingness to pay and unserved energy, may be influenced by these factors in opposing ways. For example, a higher willingness to pay for EV owners may be outweighed or balanced by higher unserved energy for EV owners. Noting these matters, we consider there is currently too much uncertainty around the X factor to lock in an approach for the next 5 years.

Broader changes in customer preferences or consumption could be better addressed through a full-scale VCR review. Given the rapid changes taking place in the energy sector, we are open to conducting more frequent reviews of VCR. We will also further consider this when we have assessed the outcomes of the 2024 VCR update and in the context of our medium-term work program for both the VCR and VNR.

Chapter 5 further details our considerations of key issues raised by stakeholders and our reasoning for our final determination on methodology. It also details our considerations on a range of the implementation issues raised by the stakeholders.

1.1 Next steps

We will now use the VCR methodology to update the VCR.

We plan to commence surveys of residential customers, business customers (with peak demand less than 10 MVA) and business customers (with peak demand greater than 10 MVA) in late August 2024. Once the surveys close, we will combine the survey results with other inputs to derive \$/kWh VCR for each outage scenario and to compute aggregate VCR. We must publish the updated VCR by 18 December 2024.

The updated VCR values will be adjusted on an annual basis using the annual adjustment mechanism outlined in the VCR methodology.

Implementing our methodology to update VCR involves procuring all the necessary data inputs and confirming the detailed computation steps. This level of detail is not captured in the methodology. For implementation, we intend to adopt a similar approach and to use equivalent data inputs to those of 2019. This is because we consider continuity of the approach and comparability of results across 2019 and 2024 important.

However, it may be the case that some input data we used in 2019 is no longer available in the same format or has not been recently updated. For example, as noted in section 5.5.2, we are still finalising our approach to estimating unserved energy for residential customers and exploring available alternatives, including those based on more recent electricity consumption data. We will engage directly with stakeholders as our approach to this issue evolves.

1.2 Other outages and values of resilience

We do not currently compute \$/kWh VCR for some outage types, such as planned outages, momentary outages and widespread outages. Analysing and using VCR for these outage types presents some challenges, including with data availability and lack of network-level investments to address these kinds of outages.

We also do not currently compute \$/kWh VCR for prolonged (greater than 12 hours) outages. Prolonged outages are less frequent than other outages but may have a significant impact on affected electricity customers and the broader economy. The storm-related outages in Queensland (December 2023 to January 2024) and Victoria (February 2024) are recent examples where some customers experienced prolonged outages.

We commenced a work program exploring these prolonged outages, concurrent with our 2024 VCR review for standard outages. There are 2 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 our draft decision on 23 July 2024.⁵ This work responds to a request from the [Energy and Climate Change Ministerial Council](#)⁶ and is an important addendum to our guidance for networks proposing resilience investment.
2. Reliability events related to the wholesale energy market – we continue to work with the Reliability Panel and the Australian Energy Market Commission (AEMC) as they explore new types of outages due to wholesale market reliability events that may emerge in the future with higher penetration of wind and solar.

The Reliability Panel recently completed its [review of the form of the reliability standard and administered price cap](#). VCR are closely related to setting the level of the standard,

⁵ See AER, [Values of Network Resilience 2024 Draft decision](#), Australian Energy Regulator, 23 July 2024.

⁶ Energy and Climate Change Ministerial Council, *Meeting communique – 1 March 2024*, Energy and Climate Change Ministerial Council, 2024, accessed 8 March 2024.

and the findings from the 2024 VCR will inform the level of the standard in the 2026 Reliability Standard and Settings Review (RSSR) process.⁷

⁷ See AEMC, [Final report - review of the form of the reliability standard and administered price cap](#), Australian Energy Market Commission, 27 June 2024, accessed 25 July 2024.

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 VCR, adjusted annually by the Consumer Price Index (CPI) since 2019, are available on the AER website.⁸ Figure 1 is a sample of how we present the VCR.

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

⁸ See our latest update summary at AER, [2023 VCR Annual Adjustment update summary](#), Australian Energy Regulator, 18 December 2024.

2.3 Changing energy and economic climate

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

- there is more electricity generated from renewable sources
- we are observing increased electrification, including an increased number of electric vehicles in Australia
- customers are investing in consumer energy resources, including rooftop solar and batteries, with an increasing acceleration of battery installations
- Australians are confronting cost-of-living pressures as reflected in continued increases in the CPI
- working habits have changed for many people, with a shift towards remote work since the beginning of the COVID-19 pandemic.

These and other changes in consumer preferences and the broader economic environment may affect both customer willingness to pay to avoid power outages and electricity consumption patterns – the 2 main inputs we use to calculate VCR.

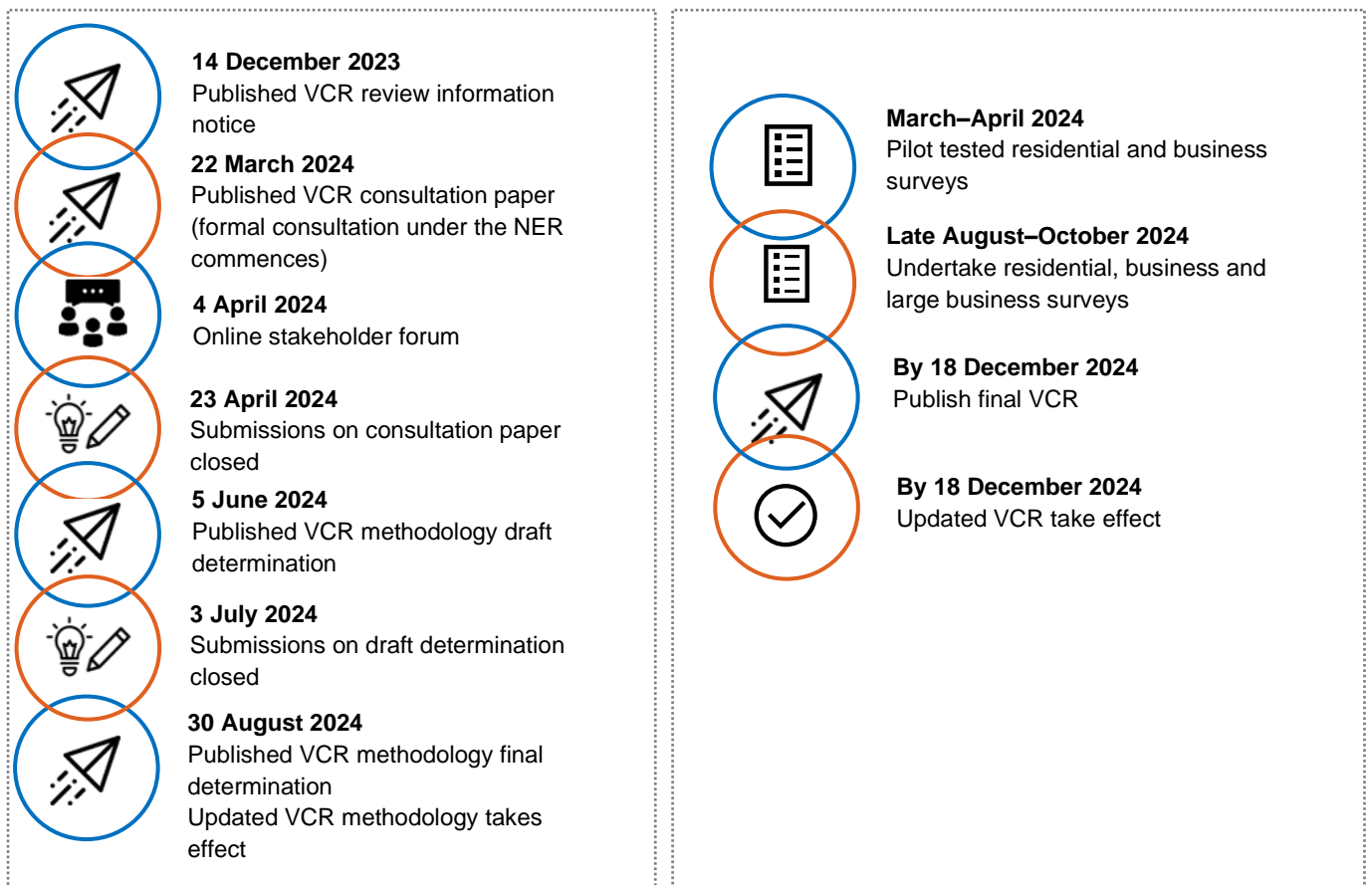
2.4 Timing of our review and consultation

The 2024 review has 2 streams of work:

- reviewing the VCR methodology
- updating the VCR.

Indicative timings for each stream are set out below.

Figure 2 VCR methodology review timing and VCR update timing



Note: Timing is indicative and may change.

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 VCR⁹
- 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 basis¹⁰
- the AER must ensure that the VCR methodology and any VCR calculated in accordance with that methodology are consistent with the VCR objective¹¹
- 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 review¹²
- the AER must update the VCR at least once every 5 years and publish updated values promptly.¹³

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 establishes 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.¹⁴

3.3 Considerations for our review

In undertaking our review of the VCR methodology, we must have regard to the requirements of the VCR rule (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 NEO.¹⁵

⁹ NER, rule 8.12(b).

¹⁰ NER, rule 8.12(d).

¹¹ NER, rule 8.12(e).

¹² NER, rule 8.12(f).

¹³ NER, rule 8.12(g).

¹⁴ NER, rule 8.12(a).

¹⁵ NEL, ss 7 and 16(1)(a).

3.4 Current and potential uses of the VCR

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.

As outlined in our consultation paper and revised draft determination, we consider the VCR have the following uses:

- as an input into the 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
- setting transmission and distribution reliability standards and targets¹⁶
- informing reviews of the wholesale market reliability standard and settings¹⁷
- informing reviews of the system restart standard¹⁸
- informing reliability and emergency reserve trader procurement¹⁹
- informing the assessment of requests to declare certain risks as protected events²⁰
- as the key measure for linking outcome performance with service target performance incentive schemes incentives.²¹

¹⁶ For example, see IPART, [Electricity Transmission Reliability Standards](#), Independent Pricing and Regulatory Tribunal, NSW Government, 2016, accessed 12 December 2023.

¹⁷ 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.

¹⁹ NER, rule 3.20.2(b).

²⁰ 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 2023.

²¹ See AER, [Electricity distribution network service providers – Service target performance incentive scheme \(version 2.0\)](#), Australian Energy Regulator, 2018, accessed 7 August 2024.

4 VCR methodology

This chapter sets out our final decision on the VCR methodology we will use to calculate the updated VCR. The VCR methodology also sets out our approach to the annual adjustment of VCR.

4.1 Final decision on methodology

The VCR methodology is set out in Table 4.1 to Table 4.3. It is also published on the AER website separate to this final determination and serves as a standalone statement of final methodology.

Table 4.1 Methodology for standard outages

Standard-outages Methodology step	Description
<p><u>Willingness to pay for</u> Residential and business customers with a peak demand less than 10 MVA</p>	<p>Stated preference surveys using combined contingent valuation and choice experiment techniques.</p> <p>Contingent valuation</p> <p>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.</p> <p>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.</p> <p>The closed questions <u>will</u> 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.</p> <p>The bill increase of \$x for the first closed question is randomly selected. The second closed question <u>cost prompt</u> 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.</p> <p>The initial cost prompts for residential customers are the following monthly bill increase amounts: \$2, \$3, \$4, \$5, \$6, \$7, \$8, and \$9, <u>\$10 and \$11.</u></p> <p>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%.</p> <p><u>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.</u></p>

Standard-outages Methodology step	Description
	<p>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.</p> <p>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 scenario²². 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. <u>If they answer YES, then the cap amount is used for them.</u> If the respondent answers NO, they will then be presented with an open-ended question asking them how much they would be willing to pay to install the described backup power system. <u>This value is used to a maximum of the cap amount.</u></p> <p>For business customers the cap is equal to 100 percent of their indicated electricity bill.</p> <p>Choice experiment</p> <p>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.</p> <p>The choice experiment technique will presents 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.</p> <p>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:</p> <ul style="list-style-type: none"> • 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.

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

Standard-outages Methodology step	Description
	<ul style="list-style-type: none"> • Bill discount (business): no change, 1%, 2% and 3%. • <u>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.</u>
<p>Willingness to pay for bBusiness customers with peak demand equal or greater than 10 MVA</p>	<p>Direct cost survey</p> <p>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.</p> <p>For customers with continuous 24/7 operations, respondents are asked to outline and quantify the costs they would expect to incur in an unplanned outage of the following durations: 10 minutes, 1 hour, 3 hours, 6 hours, and 12 hours, 24 hours and 48 hours.</p> <p>For customers with non-continuous operations, respondents are asked to outline and quantify the costs they would expect to incur for:</p> <ul style="list-style-type: none"> • 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: of 12 hours, 24 hours and 48 hours.

Table 4.2 Methodology for annual adjustment mechanism

Annual adjustment mechanism
<p>Published values will be adjusted on an annual basis using a CPI-X approach, where X is set to zero by CPI. This ensures that in economic terms, real values of VCR are maintained between VCR reviews.</p> <p>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.</p> <p>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</p>

Annual adjustment mechanism

~~groups, weighted average of eight capital cities, for the four quarters preceding the most recently reported figure.²³~~

~~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~~

~~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 Cities²⁴ 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.~~

²³ ~~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.~~

²⁴ ~~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.~~

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

<p>Converting VCR survey results into dollars per kilowatt-hour (\$/kWh) VCR values and aggregating values Methodology Step</p>	<p>Description</p>
<p>Deriving \$/kWh standard outage VCR for each residential segment</p>	<p>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.</p> <p>To convert into \$/kWh values, the dollar value are-is divided by an estimate of the consumption which <u>an average</u> 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:</p> <ul style="list-style-type: none"> • the residential survey • network business data, or • other available sources (actual or estimated) of residential consumption data. <p>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.</p>
<p>Deriving \$/kWh standard outage VCR for each business segment with a peak demand of less than 10 MVA</p>	<p>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.</p> <p>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.</p> <p>To convert into \$/kWh values, the dollar value is divided by an estimate of the consumption which <u>an average</u> business customer would have consumed over the period had the outage not occurred. This estimate is <u>will</u> be based on business consumption data obtained from:</p> <ul style="list-style-type: none"> • the business survey • network business data, or • other sources (actual or estimated) of business consumption data. <p>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.</p>

<p>Converting VCR survey results into dollars per kilowatt-hour (\$/kWh) VCR values and aggregating values Methodology Step</p>	<p>Description</p>
<p>Deriving \$/kWh standard outage VCR for business customers with peak demand greater than or equal to 10 MVA</p>	<p>The responses from the direct cost survey produce a dollar value for the outage scenarios asked in the survey.</p> <p>To convert into \$/kWh vales-values, the dollar value for each outage is converted using energy consumption data obtained from the direct cost survey.</p> <p>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.</p> <p>The aggregate \$/kWh for each response is load-weighted with other direct cost survey responses, on the basis of <u>based on</u> industry or sector groupings, to produce a combined industry or sector \$/kWh VCR.</p>
<p>Aggregating VCRs</p>	<p>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).</p>

5 Reasons for final decision

Stakeholders provided feedback on both our proposed methodology and on the implementation of our methodology. This feedback has supported us to develop our decision and will inform our work on implementation and on future VCR reviews. This chapter sets out:

- our response to issues raised by stakeholders on the VCR methodology and the reasons for our final determination
- our responses to implementation issues raised by stakeholders

5.1 Approach to determining willingness to pay for reliability for residential customers and business customers with peak demand <10 MVA

To determine the willingness to pay for reliability for residential and business customers with peak demand of less than 10 MVA, we will use a combination of contingent valuation and choice experiment survey techniques.

5.1.1 Stakeholder feedback

Network businesses either did not raise issues with our proposed survey-based approach, as outlined in the revised draft determination, or explicitly supported it (AusNet, Ergon Energy and Energex, Jemena, and CitiPower, Powercor and United Energy (CPU)).

On the other hand, Justice and Equity Centre (JEC), Bartley Consulting, and Energy Users Association of Australia (EUAA) expressed concerns with relying on surveys alone and expressed a preference to incorporate some form of deliberative engagement into the process of determining VCR in future reviews of VCR.

For example, JEC considered that adding elements of deliberative engagement would be very likely to improve the accuracy of VCR and noted that deliberative engagement methods should be included in future VCR methodologies because:

- they enable a researcher to clarify misunderstandings of an issue
- they require respondents to develop their knowledge of the given subject during the process of engagement, overcome preconceptions and cognitive and other biases, and
- allow the researcher to gauge not only respondents' preferences, but also (and often more importantly) their reasons for holding those preferences.

JEC further considered the cost of deliberative forums is warranted because VCR have a material impact on how fundamental questions of the efficient investment in and operation of the energy system in the long-term interest of consumers are answered. The costs to consumers which result from changes to the VCR are significant.²⁵

²⁵ JEC, [Submission on revised draft determination](#) [letter], Justice and Equity Centre, Sydney, 2024, p. 4.

Many stakeholders suggested amendments to our survey questionnaires, such as including questions on demographic and energy-specific factors²⁶ and changing introductory text and framing.²⁷ For example, AusNet considered that single fuel and dual fuel customers are likely to attach different values to avoiding outages and therefore suggested removing our current question on using mains gas and adding ‘access to gas’ to our list of questions to capture customers who may use bottled gas for heating/cooking and those who plan to abolish their mains gas connection.

Ausgrid suggested the AER’s approach to valuing customer willingness to pay for reliable supply of electricity should incorporate the safety consequences of losing supply.²⁸

5.1.2 Rationale for our approach

All underlying methodologies used to gather the data to calculate VCR have certain benefits and limitations. On balance, for the reasons set out below, we prefer our survey-based methodology for deriving VCR for standard outages.

Why we prefer a survey-based approach

We have carefully considered the feedback we received on our approach to estimating willingness to pay for residential and business customers with peak demand of less than 10 MVA and re-visited available alternative approaches. We have also re-examined our reasoning and conducted an additional literature review. While we recognise that every approach has strengths and weaknesses, we decided to continue relying on a survey-based approach for the 2024 VCR update 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.²⁹
 - 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.
 - We have also considered using revealed preference approaches to inform VCR. As ‘electricity supply reliability’ is not a traded service, estimating VCR using existing market data is challenging and potential market data that could be used as a proxy is still very limited. In the absence of suitable actual choices that would reveal customers’ preferences, we could try designing field pilots that could be used to

²⁶ Evoenergy, [Submission on revised draft determination](#) [letter], Evoenergy, Canberra, 2024; CitiPower, Powercor and United Energy, [Submission on revised draft determination](#) [letter], CitiPower, Powercor and United Energy, Melbourne, 2024; Ergon Energy and Energex, [Submission on revised draft determination](#) [letter], Ergon Energy and Energex, Queensland, 2024; AusNet, [Submission on revised draft determination](#) [letter], AusNet, Melbourne, 2024; JEC, [Submission on revised draft determination](#) [letter], Justice and Equity Centre, Sydney, 2024.

²⁷ AusNet, [Submission on revised draft determination](#) [letter], AusNet, Melbourne, 2024; JEC, [Submission on revised draft determination](#) [letter], Justice and Equity Centre, Sydney, 2024; EUAA, [Submission on revised draft determination](#) [letter], Energy Users Association of Australia, Melbourne, 2024.

²⁸ Ausgrid, [Submission on revised draft determination](#) [letter], Ausgrid, Sydney, 2024.

²⁹ Sullivan, Collins, Schellenberg and Larsen, *Estimating power system interruption costs – A guidebook for electric utilities*, Berkeley National Laboratory, 2018.

elicit relevant information from customers. However, these types of studies have difficulties, since for them to work, people must believe it is a real market situation. We consider that using revealed preferences approaches at present would be unlikely to allow us to achieve the same scope, granularity and accuracy of VCR as using our survey-based approach.

- VCR obtained from surveys are sufficiently granular for 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 capture by model-based approaches.
- Surveys capture a snapshot of customers' reliability preferences at the time they are conducted and so 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.
- Stated preferences surveys have been used in a wide variety of contexts to estimate values placed on non-market goods, including aspects of electricity reliability. There is ample evidence in support of using stated preferences surveys for estimating VCR (and value of lost load (VoLL)) in academic literature.³⁰ A literature review by Electricity Northwest found willingness to pay derived from stated preferences in customer surveys was considered the most appropriate measure.³¹

Deliberative forums

Deliberative forums can be a useful tool in some processes to assess consumer preference, especially with respect to qualitative factors. In particular, 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, including in the context of regulatory proposals made by the regulated

³⁰ Ovaere et al., [How Detailed Value of Lost Load Data Impact Power System Reliability Decisions](#), 2019,132; J W. Deutschmann, A Postepska and L Sarr, [Measuring willingness to pay for reliable electricity: Evidence from Senegal](#), 2021,138; Baik, S. et al., [Assessing the Cost of Large-Scale Power Outages to Residential Customers](#), *Risk Analysis*, 2017, 38(2): 283-296; M. J. Doane, R. S. Hartman and C.-K. Woo, [Households' Perceived Value of Service Reliability: An Analysis of Contingent Valuation Data](#), *World Development*, 2021, 9(2); Wen et al., [Household willingness to pay for improving electricity services in Sumba Island, Indonesia: A choice experiment under a multi-tier framework](#), *Energy Research & Social Science*, 2022, 88; Macmillan, M. et al., [Shedding light on the economic costs of long-duration power outages: A review of resilience assessment methods and strategies](#), *Energy Research & Social Science*, 2023, 99.

³¹ Electricity Northwest, [The Value of Lost Load \(VoLL\)](#), *Methodology Statement Addendum A Literature Review*, 2016.

network service providers.³² Deliberative forums can also be more helpful in brainstorming a relatively unexplored issue. For example, to understand impacts of rare outage events on local communities.

Consistent with this view, we have used forms of deliberative engagement from time to time in our VCR and VNR processes to improve our understanding of the relevant issues as we commenced developing our approaches.

For example, to improve on the residential and business surveys used by AEMO in 2014, our consultants, KPMG and Insync, conducted a number of focus groups and interviews across Australia in March 2019. The focus groups and interviews sought to test potential improvements to reduce bias in the contingent valuation survey technique and test the wording and design of the surveys. We also set up a Consultative Committee consisting of representatives belonging to organisations with a particular interest in VCR or with relevant expertise in how VCR should be determined. While the Committee did not have a decision-making role, we considered the views of the group as we developed our methodology.

Similarly, in 2024, as part of our engagement on network resilience, we engaged directly with customers effected by prolonged outages to gain insights from their lived experience. We have also formed a stakeholder reference group of interested stakeholders to provide insight on the engagement process.

In our revised draft determination, we noted the following challenges with using deliberative forums to value customer 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.
- Using deliberative forums to achieve the level of granularity we achieve through surveys would require many deliberative forums around the NEM and Northern Territory targeted at different customer cohorts and industry sectors. This would likely be prohibitively cost- and time-intensive.
- 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.
- 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.

We consider these challenges remain. Prompted by stakeholder feedback, we conducted a further literature review to check the availability of methodologies for converting the outcomes of deliberative forums to VCR. At this stage we could not identify examples where deliberative forums were used to determine VCR at a similar scale and level of granularity as our survey-based approach.

³² For more detail on the types of customer engagement we consider useful in the context of regulatory proposal, see [AER, Better Resets Handbook, Towards Consumer Centric Network Proposals](#), July 2024.

For our future VCR reviews, we will continue monitoring developments in approaches available for estimating VCR, including those identified in relevant academic literature, as well as those used in practice by other jurisdictions, domestic and international.

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 engaged survey experts (Insync, KMPG, Professor Kenneth E. Train) to assist us. 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 ensure clarity around the 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.³³

Similarly, in 2024 we engaged Lonergan Research to review and provide advice on our residential and business questionnaire, conduct cognitive testing and run a pilot survey.³⁴ This included face-to-face cognitive testing on the residential survey and online questionnaire testing on both the residential and business questionnaires. As a result of testing, some minor wording changes were made to the questions.

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.³⁵ In our revised draft determination we explained how we designed our contingent valuation approach to mitigate any potential weaknesses associated with contingent valuation techniques. 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.

We also use a willingness to pay cap (further explained in Table 4.1). For 2024, the residential cap is 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 uninterruptible power supply operating for one hour per outage, the 2024 residential cap is proposed at \$32. We consider the cost of a reasonable alternative may be regarded as the maximum price one would pay for grid-provided electricity. For example, if grid-provided electricity reliability cost more than this, it would be reasonable to expect the alternative to be favoured instead. For business

³³ AER, [Values of Customer Reliability Draft Decision](#), Australian Energy Regulator, September 2019, pp. 17–18.

³⁴ Lonergan, *AER Values of Customer Reliability 2024 – Pilot: Methodology report*, 2024.

³⁵ AER, [Values of Customer Reliability Draft Decision](#), Australian Energy Regulator, September 2019, p. 50.

customers we will apply the same cap as in our 2019 study.³⁶ This is to set the cap at the amount of the last bill for the customer.

In response to our revised draft determination, we received stakeholder comments on how our survey design and implementation could be further improved. We carefully reviewed the amendments proposed by the stakeholders, sought further feedback from our consultant, Lonergan Research on those suggestions, and, based on that, made some amendments to the language of the survey questionnaires.

For the introductory text to the survey questions:

- EUAA suggested that we provide more background information to survey respondents up front on what the survey is about and how the results will be used³⁷
- JEC suggested removing extraneous information such as a statement ‘Power reliability is important’ from the survey questionnaires, since it is an opinion that actively biases the respondents’ engagement with the exercise³⁸
- AusNet suggested adding further examples reflecting the inconvenience of a power outage (being unable to use electricity for cooking, cooling/heating, being unable to charge mobile devices).³⁹

Lonergan Research advised that including longer, complex text can discourage respondents from continuing the survey. An average survey respondent would not need to consider the source of outage to respond to the survey question. Lonergan advised that emphasising the mechanism by which survey responses would affect electricity prices may result in strategic responses and bias the results towards minimising prices.

Having considered all this input, we consider the approach that best strikes a balance between providing sufficient background information while minimising response bias and maximising survey completion rates is:

- removing the sentence ‘Power reliability is important’ from the introductory text
- adding a link to the AER materials on the VCR (that would open in a separate window from the questionnaire) to provide the survey respondents with background on VCR, without adding substantively to the length of the introduction.

On the basis of advice from Lonergan research, as well as the considerable analysis and testing of our survey questions and framing we undertook to date, we decided not to add further examples of the inconvenience of a power outage, as we consider our current description provides sufficient information to respondents.

Ausgrid stated that the current wording of the baseline scenario could anchor later responses provided by customers.⁴⁰ We note that in our stated preferences surveys the choice

³⁶ AER, [Values of Customer Reliability Final report on VCR values](#), Australian Energy Regulator, December 2019, pp. 67–69.

³⁷ EUAA, [Submission on consultation procedure](#) [letter], EUAA, Melbourne, 2024.

³⁸ JEC, [Submission on revised draft determination](#) [letter], Justice and Equity Centre, Sydney, 2024.

³⁹ AusNet, [Submission on draft determination](#) [letter], AusNet, Melbourne, 2024, p. 1.

⁴⁰ Ausgrid, [Submission on revised draft determination](#) [letter], Ausgrid, Sydney, 2024

modelling section precedes the contingent valuation section. Therefore, the described anchoring does not arise.

Several stakeholders⁴¹ proposed exploring whether customers would prefer to experience lower reliability in exchange for lower power bills. We note that our contingent valuation and choice model questions ask the respondents to consider a trade-off between reliability and power bills. The responses then can be used to inform comparisons between a variety of scenarios, some of which may refer to higher reliability and higher bills, and others – to lower reliability and lower bills. That is, the resulting VCR allow to address the question of whether customers would prefer to experience lower reliability in exchange for lower power bills, rather than higher reliability but also higher bills.

Adding further energy-specific survey questions

Many stakeholders suggested amendments to our residential survey questionnaire, such as including questions on demographic and energy-specific factors. Based on advice we received from Lonergan Research, we do not propose to make any further changes to our survey questionnaire, as we consider our current set of energy-specific questions is sufficiently broad and other proposed factors/questions are more difficult to interpret or track against available statistics.

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 informed 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. This includes, as Ausgrid suggested, taking into account safety consequences of losing supply.⁴²

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 representative of the population. We check broad sample representativeness with respect to demographics. We also include questions on energy-specific factors, as detailed in the revised draft determination.

5.2 Approach to determining willingness to pay for reliability for business customers with peak demand ≥ 10 MVA

For large business customers with peak demand equal to or greater than 10 MVA, our decision is to adopt a direct cost survey approach to determine VCR.

⁴¹ Ergon Energy and Energex, [Submission on revised draft determination](#) [letter], Ergon Energy and Energex, Queensland, 2024; EUAA, [Submission on revised draft determination](#) [letter], Energy Users Association of Australia, Melbourne, 2024.

⁴² Ausgrid, [Submission on revised draft determination](#) [letter], Ausgrid, Sydney, 2024.

5.2.1 Stakeholder feedback

Stakeholders supported using a direct cost survey to determine VCR for large business customers. Feedback we received on the methodology included:

- Ergon Energy and Energex supported a direct cost survey being the most appropriate for large business customers and supported the AER's proposal to include a question on lost revenue from not being able to export to the grid during an outage.⁴³
- TasNetworks suggested we consider removing the questions about outages over 12 hours as these are not used to derive VCR values. TasNetworks noted that this depends on the methodology that the AER decides on for the current Value of Network Resilience Review.
- EUAA and Bartley Consulting supported using the direct cost survey methodology but also expressed concern with asking questions on outages that extended beyond 12 hours, on the basis that these questions have not been asked before and would require a lot of context.
- EUAA also submitted that it would be good to understand how AER ensures appropriate sample and diversity of the survey respondents and that there should be pilot testing of the large customer questionnaire.⁴⁴
- While not opposing the use of a direct cost survey, JEC proposed the AER does its own modelling instead of asking survey respondents for estimates of lost revenue from not being able to export to the grid during an outage. JEC suggested that this would produce more accurate responses.⁴⁵

We also received submissions particular to the implementation of our direct cost survey. These submissions identified challenges with engaging with large business customers and suggestions to improve both the response rate and survey questionnaire:

- TasNetworks suggested we remove questions about the National Meter Identifiers (NMI), noting that this information was not used in the calculation of unserved energy.⁴⁶
- CPU provided recommendations to achieve a higher response rate. This included engaging with large industry groups, such as Australian Industry Group and EUAA, and conducting one-on-one interviews with individuals representing large customers. CPU also noted the importance of communicating to customers the value of the research they are contributing to and how it will benefit their business, industry or stakeholder interest.⁴⁷
- Jemena recommended that data centres are represented in the sample for large businesses. Jemena noted these are energy-intensive businesses that have

⁴³ Ergon Energy and Energex, [Submission on revised draft determination](#) [letter], Ergon Energy and Energex, Queensland, 2024.

⁴⁴ EUAA, [Submission on revised draft determination](#) [letter], Energy Users Association of Australia, Melbourne, 2024.

⁴⁵ JEC, [Submission on revised draft determination](#) [letter], Justice and Equity Centre, Sydney, 2024, p. 5.

⁴⁶ TasNetworks, [Submission on revised draft determination](#) [letter], TasNetworks, Tasmania, 2024.

⁴⁷ CitiPower, Powercor and United Energy, [Submission on revised draft determination](#) [letter], CitiPower, Powercor and United Energy, Melbourne, 2024.

expectations that should be incorporated into the evaluation process like any other customer the distribution network service provider serves.⁴⁸

We also held meetings with several other stakeholders to discuss our direct cost survey and how to improve the response rate and received the following feedback:

- AusNet proposed distributing the survey as a link directly to large business customers rather than through a research firm. AusNet and Endeavor Energy further suggested replacing the free text question(s) about types of costs associated with an outage with a checklist containing typical costs a business may experience in an outage.
- AusNet, EUAA and Bartley Consulting also suggested providing rewards for survey completion as a way of increasing response rates.

In addition to the stakeholder meeting following the publication of our revised draft decision, we met with representatives of distribution and transmission network businesses. In 2019 DNSPs and TNSPs helped us distribute the direct cost survey to the qualifying businesses, and we wanted to seek their input on how we could improve the implementation and response rate of our direct cost survey for large business customers ($\geq 10\text{MVA}$) in 2024. We received useful feedback and plan to take up many of these suggestions, such as creating an online version of the survey, rather than sending a Word or an Excel document for the participants to fill out.

5.2.2 Rationale for our approach

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 approach (with some questionnaire modifications) remains consistent with the VCR objective and fit for purpose in 2024.⁴⁹ 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.

Taking into consideration feedback from stakeholders we are making several changes to our direct cost survey.

In particular, we will add a reference to the costs associated with not being able to export to the grid due to an outage (lost revenue) to the list of examples of costs associated with an outage. We will also remove references to questions about outages over 12 hours from our description of the VCR methodology. However, we intend to retain questions with respect to longer outages in the survey questionnaire as exploratory. This is to assist our future work on longer duration outages and high impact and low probability outages. In response to a

⁴⁸ Jemena, [Submission on revised draft determination](#) [letter], Jemena, Melbourne, 2024.

⁴⁹ 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; Ergon Energy and Energex, [Submission on revised draft determination](#) [letter], Ergon Energy and Energex, Queensland, 2024.

comment made by the EUAA, we will also adjust the language referring to businesses that have already installed back-up supply options.

In response to TasNetworks' suggestion to remove questions about the NMI, we note that in 2019 we relied on the NMI data to collect the information on the electricity consumption for the survey respondents and consider maintaining this approach. For this reason, we need to retain the NMI questions.

In response to JEC's submission, we consider that using modelling instead of asking survey respondents for estimates of lost revenue from not being able to export to the grid may not improve accuracy of the resulting VCR. This is because very large users ($\geq 10\text{MVA}$) are a very diverse set of users in terms of their electricity consumption and costs associated with outages. It would be difficult to obtain relevant market data and develop modelling reflecting the diversity of users.

Further, we decided not to provide rewards for survey completion as a way of increasing response rates for the large energy users. This is consistent with our approach in 2019 and AEMO's approach prior to that.

We acknowledge the EUAA's question on whether the survey results are representative of the large energy users. Given the total number of the qualifying large customer business sites is close to 300, we plan to distribute the survey to all of them (rather than a sample) and will report on the number of respondents and their composition, as we did in 2019. To maximise the survey response rate, we will incorporate many of the stakeholder suggestions, including streamlining the survey design, distributing it via a link, rather than a file attachment, using several channels for the survey distribution and developing an introductory message to the participants on why it is important they take part in the survey. Lonergan Research advised us that the number of qualifying respondents is too small to conduct a separate pilot.

We are still finalising our approach to implementation and may incorporate additional stakeholder suggestions on how to implement the direct cost survey approach as we are preparing to commence the survey.

5.3 Annual adjustment mechanism

The VCR methodology must include a mechanism for adjusting the VCR annually.⁵⁰ Our final decision on the annual adjustment mechanism is to index VCR by CPI.

⁵⁰ NER, rule 8.12(d)(2).

5.3.1 Stakeholder feedback

Many stakeholders supported incorporating electrification-related factors (such as EV or rooftop solar ownership, islanding and reliance on gas) into our annual adjustment mechanism.⁵¹

On the other hand, Ergon Energy and Energex supported the current CPI annual adjustment mechanism, noting it is transparent, replicable and most importantly cost effective to carry out. They noted that a more refined annual adjustment mechanism will make little difference to the VCR and the preferred option in a Regulatory Investment Test (RIT) assessment because the adjustment is likely to be immaterial and would be used consistently across all possible RIT options.⁵²

Jemena emphasised the need to identify new forward-looking ways of evaluating the VCR to reflect the value in the period.⁵³

Ergon Energy and Energex also suggested that we consider an X-factor to reflect changes in customers' willingness to sacrifice reliability for reduced bills.⁵⁴

Ausgrid submitted the potential impact of transient macroeconomic factors should be considered when setting a VCR that informs investments that have a 40-year time horizon.⁵⁵

Several stakeholders (SAPN, Ausgrid, EUAA, JEC and Bartley Consulting) stressed the importance of stakeholder consultation in developing an annual adjustment mechanism and more broadly.⁵⁶

In particular, SAPN suggested consultation is undertaken before publishing the values derived by an annual adjustment mechanism. SAPN considered consultation would allow networks to provide feedback on potential data sources. SAPN further proposed that if a top-down assessment suggests the results appear nonsensical or counterintuitive, the original method of calculating VCR could be used while potential adjustment methods are refined for use in the following VCR methodology.⁵⁷

⁵¹ AusNet, [Submission on revised draft determination](#) [letter], AusNet, Melbourne, 2024; Ausgrid, [Submission on revised draft determination](#) [letter], Ausgrid, Sydney, 2024; CitiPower, Powercor and United Energy, [Submission on revised draft determination](#) [letter], CitiPower, Powercor and United Energy, Melbourne, 2024; Evoenergy, [Submission on revised draft determination](#) [letter], Evoenergy, Canberra, 2024; SA Power Networks, [Submission on revised draft determination](#), SA Power Networks, Adelaide, 2024.

⁵² Ergon Energy and Energex, [Submission on revised draft determination](#) [letter], Ergon Energy and Energex, Queensland, 2024.

⁵³ Jemena, [Submission on revised draft determination](#) [letter], Jemena, Melbourne, 2024.

⁵⁴ Ergon Energy and Energex, [Submission on revised draft determination](#) [letter], Ergon Energy and Energex, Queensland, 2024.

⁵⁵ Ausgrid, [Submission on revised draft determination](#) [letter], Ausgrid, Sydney, 2024.

⁵⁶ Meeting with Energy Users Association of Australia (EUAA) and Bartley Consulting on 19 June 2024; meeting with Ausgrid on 24 June 2024; meeting with SA Power Networks on 2 July 2024; and meeting with Justice and Equity Centre (JEC) on 10 July 2024.

⁵⁷ SA Power Networks, [Submission on revised draft determination](#), SA Power Networks, Adelaide, 2024, p. 2.

CPU submitted we should also consider how the updated figures would be applied in practice.⁵⁸

5.3.2 Rationale for our approach to the annual adjustment mechanism

In 2019 we established an annual adjustment mechanism, which involves using the change in the combined all groups CPI⁵⁹ minus an X factor. In 2019 the X factor was set to 0 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 will use the same approach in 2024 but, having considered various ways in which the X factor could be set as described below, will remove the X factor from our methodology rather than setting it at 0. We cannot adjust the X factor without reviewing the VCR methodology, so setting an X factor of 0 is redundant and could cause confusion. Indexation by CPI aims to keep our VCR estimates constant in real terms. We consider that CPI remains the most appropriate inflation measure and stakeholders did not propose to use alternative price indices instead of CPI.

We carefully considered available alternative approaches, taking into account stakeholder feedback, but did not identify a feasible alternative that would improve accuracy of the resulting VCR or be more fit for purpose. Further, we do not consider it appropriate for the annual adjustment mechanism to be employed to make large-scale changes to VCR values.

In our revised draft determination, we listed a range of possible inflation measures as alternatives to CPI, as well as potential 'candidates' for X value that were considered in 2019. In terms of the X factor, we noted that 2 factors stood out as potential candidates for use in the annual adjustment mechanism. The first one was working from home. However, we did not propose to focus on it further and stakeholders did not raise it as an option in the last round of consultation.

The other factor we identified was EV ownership. In the revised draft determination, our view was it would likely be 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. On that basis, we considered options for an assumption-based approach to accounting for changes in EV ownership in the annual adjustment mechanism.

We did not propose adopting such an assumption-based approach in our revised draft determination, but presented an example to illustrate how such an approach might work in practice and what limitations it may have.

Some submissions supported incorporating factors related to electrification into an annual adjustment mechanism, along the lines of the assumption-based approach we outlined. However, we consider that, on balance, using an approach like the one outlined in the revised draft determination is unlikely to improve accuracy of resulting VCR or to be more fit for purpose:

⁵⁸ CitiPower, Powercor and United Energy, [Submission on revised draft determination](#) [letter], CitiPower, Powercor and United Energy, Melbourne, 2024.

⁵⁹ ABS, [Consumer Price Index, Australia, June 2020](#), Australian Bureau of Statistics, 2020.

- Such an approach would need to rely on assumptions that may not hold in reality.⁶⁰
- Changes to the annual adjustment mechanism cannot be made outside of the VCR methodology review process. As such the annual adjustment mechanism cannot itself reflect other substantive changes that may occur, including
 - emergence of new relevant factors (for example, at the time of the 2019 VCR review, we would have been unlikely to predict a significant change in working from home patterns due to onset of COVID-19)
 - change in relative importance of existing factors and their correlation with VCR.
- At this stage we do not have estimates of energy consumption segmented by EV ownership (or other nominated factors) and are unlikely to be able to obtain this data. We consider that making an adjustment for EV ownership to the numerator (but not denominator) of the VCR ratio may be less fit for purpose than making no adjustment.

Further, the overall effect of such an adjustment on the VCR is likely to be small.⁶¹ We note the submission from Ergon Energy and Energex suggesting that a more refined annual adjustment mechanism would make little difference to the VCR and the preferred option in a RIT assessment.

However, should there be an unanticipated change to the energy sector or overall economy that is likely to significantly impact VCR, we can conduct an earlier VCR review and update, which we consider may be a more appropriate way to address the issue (stakeholder feedback and some further thinking on this issue is considered in section 5.5.3).

Ausgrid submitted that customer surveys provide insights at a snapshot in time that may not be representative of longer-term attitudes. Therefore, we should consider if transient macroeconomic factors may be under (or over) stating a customer's willingness to pay at a particular snapshot in time. What is relevant for an investment decision, whatever its time horizon may be, is the best information on the costs and benefits of the investment available at that point in time. With respect to VCR, the relevant value would be one at the time of investment and not the longer-term value. However, as we noted above, we could conduct an earlier VCR review if we have a reason to believe that a significant change to VCR occurred that is not reflected on our annually adjusted VCR.

5.4 Approach to deriving and aggregating \$/kWh VCR values

Our decision on deriving \$/kWh VCR values and aggregate VCR from willingness to pay estimates is to uphold the broad approach used in 2019, with minor edits. This is the same approach we proposed to adopt in our revised draft determination. We have not received any submissions on this aspect of the methodology. We consider some implementation aspects in section 5.5.

⁶⁰ Such as the assumption about the willingness to pay ratio we referred to in the revised draft determination.

⁶¹ We illustrated this in the revised draft determination using an example.

5.5 Other issues related to implementation of the VCR methodology

Stakeholders provided feedback on some other issues related to the implementation of the VCR methodology. These issues are discussed further in this section.

5.5.1 Segmentation of VCR

To calculate different VCR, we need to develop an approach to the segmentation of customer groups based on certain attributes. As in 2019, we will segment NEM residential customers by climate zone and remoteness and target a single residential segment for the Northern Territory. We will group business customers based on their industry sectors. However, final segmentation of the VCR will depend on responses to our surveys and analysis of results.

Stakeholder feedback

Several stakeholders suggested changes or amendments to our survey segmentation.

TasNetworks suggested that we should try to increase (residential) sampling from the outer regional segment of Tasmania.⁶²

AusNet suggested VCR for residential customers should be more granular than climate zones (such as network service areas), to ensure that the preferences of customers are accurately reflected in network planning.⁶³

Ausgrid and CPU supported deriving a separate CBD VCR. However, both noted methodological challenges in capturing CBD VCR. Ausgrid commented that the question of ‘who pays’ is also relevant, if the VCR for CBDs is assessed using a different method that captures the wider community and economic benefits of a reliable electricity supply in addition to the private benefits obtained by electricity customers.⁶⁴ CPU suggested that in the CBD there are often enhanced requirements for reliability due to the critical economic and social activity occurring in these areas and commented that other jurisdictions within the NEM responded to this discrepancy with direct solutions.⁶⁵

Our response and next steps

We will decide our final approach to segmentation of VCR once we have received survey responses and analysed the data. Our current intention is to mirror, as far as possible our 2019 approach to segmentation to maximise comparability.

We are not intending to create a separate CBD segment in our residential survey or to develop a separate VCR for the CBD. Increasing granularity by introducing a CBD segment to the residential survey is unlikely to resolve the issues identified by CPU and Ausgrid, as those appear to be more focused on the impact on business customers and the broader

⁶² TasNetworks, [Submission on revised draft determination](#) [letter], TasNetworks, Hobart, 2024, p. 1.

⁶³ AusNet, [Submission on revised draft determination](#) [letter], AusNet, Melbourne, 2024, p. 4.

⁶⁴ Ausgrid, [Submission on revised draft determination](#) [letter], Ausgrid, Sydney, 2024, p. 6.

⁶⁵ CitiPower, Powercor and United Energy, [Submission on revised draft determination](#) [letter], CitiPower, Powercor and United Energy, Melbourne, 2024, p. 3.

economy. We collect business survey responses from a large range of industry sectors. Therefore, we consider it should be possible for a network service provider to assemble a relevant VCR measure to inform their capital expenditure proposals based on the VCR information we publish and the customer composition relevant for their particular scenario, including for investment in CBD areas.

We consider climate zone and remoteness to be important drivers of residential VCR, so we will continue using them for segmentation. We think that a strong link between network service area and customer willingness to pay is unlikely. Further, our current survey approach does not allow us to easily target residential survey respondents by network service area.

In response to TasNetworks' submission, we intend to target the 2019 final residential segments in the first instance, due to comparability considerations. However, if we collect enough observations in outer regional climate zone 7, we will consider splitting it out and reporting a separate value.

5.5.2 Calculating unserved energy (USE) to aggregate and derive VCR

An accurate estimate of unserved energy improves the accuracy of the VCR and unserved energy is an input into deriving our VCR. We sought stakeholder feedback on improvements to estimating unserved energy.

Stakeholder feedback

AusNet submitted that network service level data would be preferable for calculating both unserved energy and outage probability. AusNet also commented on our 2019 approach for estimating unserved energy for residential customers, noting:

- the consumption profiles used by the AER to calculate VCR in 2019 do not reflect consumption by AusNet's customers (based on the annual consumption data AusNet gathered for its Quantifying Customer Values study)
- the sample size of households used by the AER to calculate unserved energy profiles in 2019 was relatively small
- the most recent energy consumption benchmarks produced for the AER uses energy consumption for calendar year 2019 – given increasing electrification, it may not be reasonable to assume this would reflect the energy consumption respondents are considering when answering the WTP survey in 2024
- if the AER continues to pursue the approach based on the use of consumption benchmarks, each VCR area should have a specific average household size to better reflect the non-homogenous population distribution throughout Australia.⁶⁶

Ergon Energy and Energex encouraged the AER to explore using several different unserved energy methods for unique customer subsets, including for businesses that are especially

⁶⁶ AusNet, [Submission on revised draft determination](#) [letter], AusNet, Melbourne, 2024.

vulnerable to momentary outages and customers who lose income from not being able to export energy during an outage.⁶⁷

Jemena suggested using the latest available information on electricity consumption because usage habits have likely changed significantly since 2019.⁶⁸

SA Power Networks supported using ‘in front of the meter’ data for estimating unserved energy that does not include self-consumption by CER customers.⁶⁹

Our response and next steps

To estimate residential unserved energy in 2019, we relied on *Electricity consumption benchmarks for residential customers*, a report commissioned by the AER from ACIL Allen, published in 2018 and based on 2017 data.⁷⁰ We also made use of the detailed electricity consumption data collected during that process.

The latest version of electricity consumption benchmarks was prepared by Frontier Economics and published by the AER in 2021.⁷¹ This report:

- used a different econometric model and format for published benchmarks compared to the 2018 ACIL Allen benchmarks
- was based on a survey conducted in 2020 and the corresponding set of 2019 electricity consumption data
- is the last version commissioned by the AER – publication of the electricity consumption benchmarks has since been discontinued.

In our revised draft determination, we proposed combining the same computation steps we used in 2019, the latest electricity consumption benchmarks and interval data to estimate the residential customers’ unserved energy. We asked for further stakeholder feedback. We have now revisited our approach to estimating the unserved energy for residential customers, given the methodology as set out in Table 4.3, the data available and the feedback from stakeholders.

There are several options for estimating residential unserved energy, including:

- relying on ACIL Allen’s 2019 benchmarks
- relying on Frontier Economics’ 2021 benchmarks
- developing a new approach, for example, based on AEMO’s Market Settlement and Transfer Solutions (MSATS) data

Some of the relevant considerations include:

⁶⁷ Jemena, [Submission on revised draft determination](#) [letter], Jemena, Melbourne, 2024.

⁶⁸ Jemena, [Submission on revised draft determination](#) [letter], Jemena, Melbourne, 2024, p. 2.

⁶⁹ SA Power Networks, [Submission on revised draft determination](#), SA Power Networks, Adelaide, 2024, p. 2.

⁷⁰ See AER, [Electricity and Gas consumption benchmarks for residential customers 2017](#).

⁷¹ See AER, [Electricity and Gas consumption benchmarks for residential customers 2020, Decision, Australian Energy Regulator](#), 2020.

- data availability
- data currency / capacity to reflect changes in the market
- comparability of the results 2024 VCR with 2019 VCR
- replicability for future reviews
- accuracy in reflecting unserved energy conceptually
- granularity and comprehensiveness

We note that there are trade-offs in terms of how well different options fit the above criteria. For example, following the same approach and using the same data set as we did in 2019 may promote comparability with 2019 VCR. However, these data would not be current.

Given the age of the existing benchmark data, we are exploring the merits of a new approach to the estimation of unserved energy based on more recent consumption data. We will engage with stakeholders as we do this to share our findings and seek input into our decision.

5.5.3 More frequent reviews of the VCR

We sought stakeholder views on whether we should review the VCR methodology and update VCR more frequently than the current 5-year interval.

Stakeholder opinions differed widely. EUAA, Bartley Consulting, AusGrid and TasNetworks favoured either more frequent reviews in general or conducting the next VCR review earlier. CPU, Energex and Ergon Energy, and SAPN were not supportive of more frequent reviews.⁷²

Some regulated businesses (SAPN, CPU and AusNet) stressed the importance of regulatory predictability/certainty both in terms of resets and more general long-term planning.⁷³

Our response and next steps

Economic and energy market developments may warrant a review of the VCR methodology and updating VCR more frequently than the current 5-year interval. We will carefully monitor these and, if such developments arise, we will consider whether to review the VCR methodology and update the VCR at that point in time, taking into account matters such as the significance of the likely change to the VCR, the importance of regulatory predictability and the costs of undertaking the review and update both for the AER and businesses. The 2024 VCR update will provide a near-term opportunity to consider this and will give us some insights into how the 2024 VCR compare with the annually adjusted 2019 VCR. However,

⁷² Meeting with Energy Users Association of Australia (EUAA) and Bartley Consulting on 19 June 2024. Ausgrid, [Submission on revised draft determination](#) [letter], Ausgrid, Sydney, 2024; TasNetworks, [Submission on revised draft determination](#) [letter], TasNetworks, Hobart, 2024; CitiPower, Powercor and United Energy, [Submission on revised draft determination](#) [letter], CitiPower, Powercor and United Energy, Melbourne, 2024; Ergon Energy and Energex, [Submission on revised draft determination](#) [letter], Ergon Energy and Energex, Queensland, 2024; SA Power Networks, [Submission on revised draft determination](#), SA Power Networks, Adelaide, 2024.

⁷³ Meeting with AusNet on 21 June 2024; meeting with CitiPower, Powercor and United Energy (CPU) on 27 June 2024; and meeting with SA Power Networks on 2 July 2024.

the extent to which CPI indexation 'overshot' or 'undershot' over this period is not indicative of its future performance. We also note that other parallel work may require consideration or integration with our VCR. The current work stream on the value of network resilience and its outcomes may also require us to consider the VCR in a period less than 5 years. Finally, we acknowledge that there may be costs associated with more frequent VCR reviews, including those related to the predictability of future values for market participants. We will ensure close engagement with stakeholders as our thinking evolves on this issue.

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
MVA	Megavolt-amperes
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