

7 June 2024

Dr Kris Funston
Executive General Manager
Australian Energy Regulator (AER)
Submitted electronically: vnr2024@aer.gov.au

Dear Dr Funston,

Issues Paper – Value of Network Resilience

Endeavour Energy appreciates the opportunity to provide feedback to the AER's *Value of Network Resilience* (VNR) issues paper which seeks to establish an interim VNR following a request from the Energy and Climate Change Ministerial Council (ECMC). Relatedly, the AER is also in the process of reviewing the Value of Customer Reliability (VCR) and has previously released a guidance note on network resilience.

The resilience of electricity networks is a matter of growing concern in the face of risks posed by climate change impacts and the growing dependence on electricity through decarbonisation and electrification¹. This trend is expected to continue with Deloitte estimating that the Australian economy is facing \$1.2 trillion in cumulative costs of natural disasters over the next 40 years even under a low emissions scenario².

This highlights the growing potential for targeted investments in network and community resilience to significantly reduce these costs. Research indicates that cost savings from investing in risk mitigation could result in savings amounting to a ratio of 1:4³.

We consulted extensively with customers and stakeholders as part of our 2024-29 Regulatory Determination, and network resilience emerged as one of the highest priority areas during this engagement⁴. In balancing this priority with affordability, we proposed \$28 million of incremental⁵ investment to specifically address the increasing risk associated with climate change.

We have also worked closely and extensively with the local community in Bawley Point and Kioloa over the last few years to develop and implement the first network-led [community microgrid](#). This innovative solution was designed to address network constraints, poor reliability and build resilience at an edge of our network that is particularly vulnerable to extreme weather events such as the Black Summer bushfires which completely isolated the community for several days.

¹ UNSW Collaboration on Energy and Environmental Markets (CEEM), *Energy Resilience in Bushfires and Extreme Weather Events – Final Report of the ESKIES project*, August 2023, p. 10.

² Deloitte Access Economics, *Special report: Update to the economic costs of natural disasters in Australia*, 6 October 2021, p. 1.

³ US National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2017 Interim Report*, December 2017, p. 1

⁴ SEC Newgate Australia, *Engagement Summary Report – Endeavour Energy 2024-29 Regulatory Control Period*, Prepared for Endeavour Energy, October 2022, p. 52

⁵ Incremental to the replacement works we undertake as an ordinary course of business which have historically considered opportunities to improve network resilience as opposed to like-for-like replacement where cost-effective to do so (e.g., replacement of bare conductor with covered or wooden poles with composite, steel or concrete poles).

The issues paper sets out several options for deriving a VNR that can be applied as part of the Victorian Distribution Determinations (network proposals due in January 2025). Broadly, the options include an extrapolation or multiplication to the VCR (a survey based method) potentially with an upper bound set by reference to a rational alternative and computable general equilibrium (CGE) or input-output (IO) modelling.

We appreciate VNR is a complex and nascent area of network risk valuation. Broadly, survey-based methods are considered accurate and applicable to geographical areas, customer types and short-term interruption scenarios and hence well suited to the VCR (outages of 12 hours or less) but costly and less accurate (particularly outside of direct customer impacts) for widespread and long duration outages (WALDO). Whilst model-based methods can more accurately value indirect and societal cost impacts of WALDO at a lower cost but can be complex and potentially case study dependent⁶.

It appears the most feasible approach is to adopt a VCR multiplier or extrapolation with an upper bound set to the least-cost backup self-generation given the lack of time available to address the difficulties associated with both survey and model-based approaches. We believe an interim VNR based on these options should consider⁷:

- An upper bound that is sufficiently above the VCR survey ceiling to reflect the practical cost and access barriers to procuring sources of alternative generation encountered by customers during natural disaster and major weather events.
- Adjustments which allow the average cost curve to increase at points beyond the standard outage duration to reflect customer duress from sustained unavailability of essential services and health and employment impacts.
- Information available from recent major outage events to ensure the resilience multiplier reflects modern-day dependence on electricity and the distress and damage of prolonged outages in the context of Australia's extreme weather events. Noting the AER's intent to elicit feedback from customers impacted by recent Victorian outage events through deliberative forums⁸, to improve the robustness of the VNR we encourage the AER to expand these engagements to capture the lived experience of customers impacted by recent major bushfire and flood events in other NEM regions.

Our primary concern is that a cursory interim VNR will be used to develop and assess investments with a long-term horizon and it may become ingrained as a preferred method. Our feedback is therefore focussed on the factors we believe should guide the direction of the VNR and encourage the AER to have regard to the following in making its draft decision:

- **Further development:** committing to and setting out a longer-term program of work to review and refine the interim VNR following the Victorian Distribution Determinations. The issues paper refers to 'possible' longer-term refinement of the VNR. As the paper acknowledges, there is the potential for the 'first best' approach to involve more complex or time-consuming survey-based and/or modelling. We consider this likely and therefore it is necessary to ensure an interim VNR is replaced as soon as reasonably practicable.
- **Expand assessment criteria:** the criteria outlined in the issues paper for assessing potential approaches cover several desirable characteristics of a VNR method. Although these include expediency and the 'impact on network expenditure proposals', these

⁶ Sullivan, Collins, Schellenberg, Larsen, *Estimating Power System Interruption Costs – A Guidebook for Electric Utilities*, Lawrence Berkeley National Laboratory, July 2018, p. 17

⁷ With respect to expressing VNR in \$/kWh, we accept valuing unserved energy is common network planning practice. However, it may not be appropriate in the context of resilience investment targeted at remote and small communities that do not consume the amounts of energy required to support projects which deliver substantial community benefits.

⁸ AER, Values of customer reliability methodology, Revised draft determination, June 2024, p. 25.

criteria could introduce a degree of subjectivity and back-solving to the calculation⁹. We propose an alternate set of criteria, focussing on¹⁰:

1. Power interruption duration: a method that includes a time element and does not assume a linear relationship between duration and cost, with a focus on valuing outages up to a week in duration.
 2. Scalability: a method(s) that can be used at multiple geographic scales and across direct and indirect impacts.
 3. Ease of use: replicable, low-cost methods that rely on readily available datasets and accessible models can support simple and transparent investment and regulatory decisions.
 4. Scope of outputs: valuation methods need to consider costs and benefits germane to the task, which may include customer, network, other industry and societal impacts.
- **Role of rational alternatives:** surveys can reflect the ability of a customer to pay in a hypothetical situation rather than their willingness in reality. A market-based, or revealed preferences, approach can help address this shortcoming. However, market-based methods can lack applicability to the full range of outage conditions, customers, and prices necessary to construct a robust VNR¹¹. We therefore support the use of follow up surveys following outages and/or using rational alternatives as a complementary, rather than primary, measure. The social burden method¹² provides a useful example for identifying and valuing the most valuable disrupted activities to develop a value for outages of specified extents and durations.
 - **Expediency versus accuracy:** there is a risk that the complexity and cost associated with survey and modelling approaches is overstated in the issues paper. As helpful guidance is available for both approaches¹³, we would encourage the AER to pursue these options in the time available rather than appropriating the VCR beyond its intended purposes. Even preliminary work, such as expanding the VCR survey questionnaire would be a positive step towards an optimal VNR.
 - **Provide for flexibility:** we support a flexible approach to VNR, particularly if an interim solution is adopted. Whilst the interim VNR may provide useful guidance, networks and the AER should still be free to apply alternative methods such as surveys, regional economic modelling, case studies, etc., befitting of the outage types, frequency or duration being considered.

Overall, we appreciate the need to specify an interim VNR which is likely to be refined as part of future AER work on WALDO. If a VCR is to be used for VNR purposes, we consider any extrapolation should be non-linear. We also consider the 1.3 VCR multiplier for outages impacting an area greater than 85km previously proposed during the AER's 2020 WALDO review¹⁴ may significantly understate the cost of long duration outages and conflicts with studies which suggest that indirect costs of WALDO events are significant and could exceed the direct cost to customers

⁹ We accept that any proposed investment must be assessed by its impact on both cost and service quality at an individual and portfolio level. But we consider this is better captured by the AER's assessment of an expenditure proposal against the capital and operating objectives, factors and criteria rather than embedded in investment decision inputs such as the VCR or VNR.

¹⁰ Converge Synergies, *The Value of Resilience for Distributed Energy Resources: An Overview of Current Analytical Practices*, Prepared for the National Association of Regulatory Utility Commissioners, April 2019, p. 16

¹¹ Sullivan, Collins, Schellenberg, Larsen, *Estimating Power System Interruption Costs – A Guidebook for Electric Utilities*, Lawrence Berkeley National Laboratory, July 2018, p. 17

¹² Rickerson, Zitelman, Jones, *Valuing Resilience for Microgrids: Challenges, Innovative Approaches and State Needs*, Prepared for the National Association of Regulatory Utility Commissioners, February 2022, p. 15

¹³ In the academic literature cited in both this response and the AER's issues paper.

¹⁴ ACIL Allen Consulting, *Value of Customer Reliability for Widespread and long duration outages, Report to the AER*, February 2020, p. 12

by up to five times¹⁵. On balance, we consider a multiplier no lower than 2.0 should apply and the interim VNR should ultimately be replaced by a hybrid approach that utilises survey-based data to calibrate CGE modelling¹⁶.

For enquiries about our submission to the issues paper, please contact Patrick Duffy, Manager Regulatory Transformation and Policy via email at [REDACTED].

Yours sincerely

[REDACTED]

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¹⁵ Bruch, Munc, Aichinger, Kuhn, Weyman, Schmid, *Power Blackout Risks Risk Management Options, Emerging Risk Initiative – Position Paper*, November 2011, p. 15

¹⁶ Baik, Sanstad, Hanus, Eto, Larsen, *A hybrid approach to estimating the economic value of power system resilience*, Lawrence Berkeley National Laboratory, 13 August 2021.