15 August 2024

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Submitted via: vnr2024@aer.gov.au

Dear Kris,

Value of Network Resilience 2024 – Draft Decision

Erne Energy welcomes the opportunity to provide a submission to the AER's Draft Decision on the Value of Network Resilience (VNR) 2024. The exploration of network resilience is welcome, especially given the increasing costs of network repairs following severe weather events[1].

While recognising the imperative for the AER to develop a VNR, following the request from the Energy and Climate Change Ministerial Council (ECMC)[2], and while neither option 1 or option 2 (or the combination of options 1 and 2) are ideal they represent a pragmatic and practical way to expediently deliver a VNR.

The draft decision that the current VNR is an interim approach with further work on electricity network resilience to follow, is welcome. However, it is a concern that the VNR as defined in the draft decision will promote network investments that will not deliver electricity network resilience that will be beneficial to consumers, and that will increase network costs for all consumers of a Distribution Network Service Providers (DNSPs) investing in "resilience".

For reasons described below (table 1), it will be very difficult for DNSPs to definitively identify vulnerable assets to the severe weather that has the most significant impact on network assets. This means that it will be difficult for a DNSP to demonstrate a causal relationship between resilience investment and severe weather events. Where investment in a resilience solution is progressed, there is a high probability that any severe weather impacts a neighbouring asset that was not "hardened" or that even "hardened" assets will fail resulting in prolonged outages for customers that have been paying for resilience solutions.

Additionally, all customers of a DNSP will pay for a specific resilience solution, which may be directed a specific group of customers who are perceived to be more vulnerable. This means that all will customers pay, but not that all customers will benefit.

For Victorian electricity customers, there is a risk that, with the combination of the Victorian Government reviews and the new VNR, the Victorian DNSPs will seek to invest in resilience solutions that will not ensure their customers have a resilient source of electricity.

Customers in rural and regional areas already experience poor reliability outcomes[3] and as a result are likely to have already invested in their own resilience solutions, such as a diesel generator and/or batteries[4,5]. This is because it is not possible to rely on the DNSP during severe weather, particularly

[1] https://www.aer.gov.au/system/files/2022%20Electricity%20network%20performance%20report%20-%20July%202022.pdf
[2] https://www.energy.gov.au/sites/default/files/2024-03/ECMC%20Communique%201%20March%202024.docx
[3] https://www.aer.gov.au/system/files/2023-Electricity-network-performance-report.pdf
[4] https://energyconsumersaustralia.com.au/publications/resilient-system-resilient-communities-the-connections-that-matter
[5] https://www.energy.vic.gov.au/__data/assets/pdf_file/0021/710409/interim-report-network-outage-review-2024.pdf

for pumping water during a bushfire. Allowing DNSPs to apply a VNR, means that rural and regional customers may pay twice for resilience electricity: once for their own attempts at electricity resilience and then again to fund network resilience.

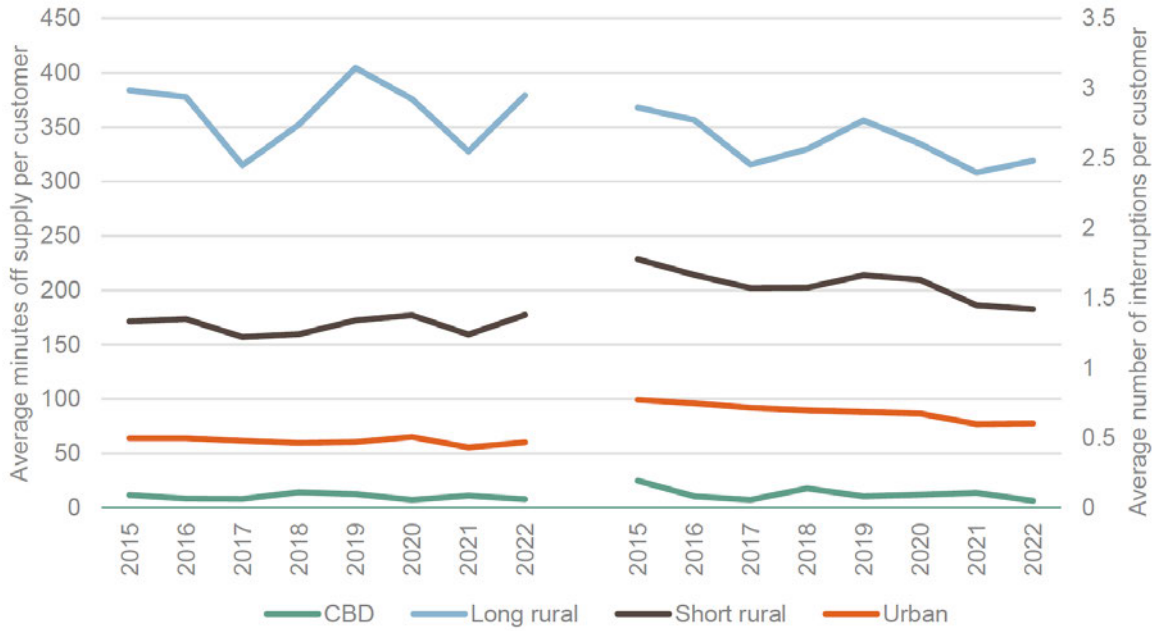

Figure 1: outages by duration and number for feeder type[6]

A customer investing in a generator or uninterruptable power supply has already ensured they have a degree of resilience to meet their specific needs. Not all customers can afford to invest in their own resilience solution, but it is questionable whether a DNSP investing in "resilient" or "hardened" assets, such as stronger poles, is the appropriate option to support all customers. There may be other solutions, that are not and should not be delivered by the DNSP, that would better support vulnerable customers, such as funding individual customer or community resilience measures[7,8]. DNSPs investing in "resilience" may or may not result in resilient electricity for a downstream community or customer.

The AER will have to make decisions on what constitutes an "appropriate" investment in "network resilience", particularly for the impending Victorian DNSP revenue determinations. It is a concern that the AER's contends that at this stage there is no requirement for:

> "*a definitive statement of whether particular types of resilience investments proposed by networks are appropriately determined to be network services*"[9], page 7

The VNR should not progress further without the AER working with customers and DNSPs to identify appropriate resilience investments, given the complexity of defining resilience and the likely tension between what DNSPs view as a resilience solution and expressed customer resilience preferences. This engagement between the AER, customers and DNSPs should be a joint collaboration, perhaps including the Victorian government, as part of the Victorian DNSP revenue determination process.

Resilience does not have a simple definition, and the "4Rs" model from New Zealand[10] offers a framework to explore and describe resilience.

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[6] https://www.aer.gov.au/system/files/2023-Electricity-network-performance-report.pdf
[7] https://assets.nationbuilder.com/boomerangalliance/pages/295/attachments/original/1657688880/TEC_Autonomous_Resilience_20220630_final_clean_sm.pdf?1657688880
[8] https://www.energy.vic.gov.au/about-energy/news/news-stories/strengthening-energy-resilience-during-extreme-weather
[9] https://www.aer.gov.au/system/files/2024-07/23072024%20-%20Draft%20Decision%20-%20Value%20of%20Network%20Resilience%202024.pdf, page 7
[10] https://www.civildefence.govt.nz/cdem-sector/the-4rs#:~:text=The%20New%20Zealand%20integrated%20approach,%2C%20readiness%2C%20response%20and%20recovery

Figure 2: 4Rs Resilience Circle

Resilience is made of four activities covering (risk) reduction, readiness, response and recovery. Other models describe this as risk assessment, risk reduction, contingency management and learnings.

DNSPs typically focus on risk reduction through investment in "hardened" network equipment that will withstand severe weather, growing their Regulated Asset Base. Current and pending work that will impact the regulatory and legislative frameworks within which DNSPs operate also focuses on risk reduction, such as the requirement for Victorian DNSPs to undertake vulnerability assessments[11].

In contrast, in the Victorian Network Outage Review Interim Report, the customers impacted by the February 2024 storms focused on Response and Recovery and the Panel also focused on Readiness[12].

The current market body, federal government and Victorian government focus on investment in risk reduction is likely to unnecessarily drive investment in DNSP-led technical-heavy asset resilience solutions, such as islandable microgrids, increasing costs for consumers, while not delivering broad customer electricity resilience.

Where-as customers would like DNSPs to demonstrate better readiness, improved and more rapid responses and recovery, with a particular emphasis on DNSPs better communicating with customers throughout the pre- and post-event phases.

DNSPs may reasonably be expected to identify network assets that are vulnerable to some severe weather events. This should be relatively straightforward for bushfires and flooding (proximity to forest and water course/coast respectively) and extreme heat, but recent significant outages, such as 13 February 2023 in Victoria, were the result of small-scale meteorological features (thunderstorms) and strong winds that are less easy to predict or mitigate on a location-by-location basis[13].

Often the most damaging severe weather events to impact networks can only be forecast via short-term weather forecasting and in the case of convective cells, the actual location of a cell may only be forecast on the scale of minutes to hours (via radar).

[11] https://www.energy.vic.gov.au/__data/assets/pdf_file/0030/594930/network-resilience-review-final-recommendations-report.pdf
[12] https://www.energy.vic.gov.au/__data/assets/pdf_file/0021/710409/interim-report-network-outage-review-2024.pdf
[13] https://www.energynetworks.com.au/assets/uploads/220307-Networks-building-climate-change-resilience.pdf

This is because global climate models are gridded on a scale of 150 x 150 km, while a thunderstorm will be less than a kilometre wide. Down-scaling global climate models may help for some climate predictions, but weather and seasonal forecasting has a more significant role in identifying likely severe weather impacts, meaning that DNSPs need to be much more agile in their approach to readiness and work much more closely with meteorologists[14] (see table 1).

Climate-related hazard	Observed and predicted contribution from climate change	Ability to provide POE or ARI information
Heatwaves and extreme heat events	Increased frequency of large-scale heatwaves and record high temperatures.	Climate models do a good job at resolving temperature changes and spatial patterns, though future changes are dependent on emissions which reflect social and economic factors.
Bushfire weather risk	Longer fire season with more extreme fire danger days.	Climate change contribution to fire weather risk can be modelled with some regional resolution. Factors other than climate (vegetation, management) may be as important as climate and are not well understood or resolved in current models.
Extreme wind	Wind speeds are likely to decline overall, but the highest winds associated with local storms and tropical cyclones may increase.	Range of future uncertainty is large, and changes are likely to be quite modest. Remains difficult to predict the highest winds associated with small-scale convection/storms and tropical cyclones.
Rainfall	Reduced reliability of cool seasonal rainfall, likely increase in heavy rainfall during the warm season.	Rainfall changes in the cool season, and particularly southwest Australia well understood. Changes in extreme rainfall remain quite uncertain, as to changes in rainfall in the warm season.
Coastal storm surge	Increased frequency of coastal storm surge inundation (on top of sea level rise)	Increases will occur in most locations, with an increasing dominance of tide driven flooding which is greatest in southern and eastern parts.
Cyclones and tropical storms	Decreased frequency but possible increase in intensity	Climate models show fair consistency, but detailed local projections remain uncertain. Changes in weather patterns such as El Nino which are quite uncertain may lead to large regional shifts.
Thunderstorms, lightning and hailstorms.	Some evidence of increased frequency of thunderstorms for parts of eastern Australia.	*Climate models do not resolve processes behind thunderstorms and lightning. Proxies such as convective available potential energy (CAPE) are available but vary considerably between models making a consistent prediction difficult.*

Table 1: Confidence in predicting severe weather using climate models. Prediction confidence reduces to the bottom of the table[15]

Given the likelihood that the most severe weather events cannot be predicted on within 5-year regulatory timeframe, the AER and DNSPs need to focus on resilience solutions that are mobile, agile and responsive so they can move to where the impact is being felt, supporting customers where and when an event occurs[16], rather than investing in fixed solutions that may fail or may not actually be located where needed[17].

Distribution and transmission network assets are aging[18] and the AER needs to appropriately balance maintenance and repair expenditure with any "resilience" investment. DNSPs may have reduced expenditure by minimising asset replacement programs[19], which results in old assets lingering in the field that will be less able to withstand the more intense climate change exacerbated weather now experienced.

As an example, Ausnet's transmission towers were largely built to a previous version of the AS 7000 standard that did not include any specifications to withstand downdrafts (of the type typically

[14] https://www.ergon.com.au/network/outages/storms-and-disasters/storms-and-disaster-preparation-checklist
[15] https://www.climatechangeinaustralia.gov.au/en/projects/esci/
[16] https://www.powercor.com.au/media-and-resources/media-centre/prepared-communities-are-resilient-communities-this-spring/
[17] https://bsgip.com/wp-content/uploads/2024/05/Challenges-and-opportunities-for-grid-tied-microgrids-1.pdf
[18] https://www.aer.gov.au/system/files/2023-10/State%20of%20the%20energy%20market%202023%20-%20Full%20report_1.pdf
[19] https://www.energynetworks.com.au/news/energy-insider/2021-energy-insider/ignoring-a-bath-curve-is-a-slippery-slope/

experienced during thunderstorm conditions and the cause of the 2020 Cressey tower failures). The AER rightly would not support Ausnet replacing all of its current towers to meet the current AS 7000 standard because that would place an enormous cost burden on Victorian consumers, but without a targeted replacement investment program, transmission towers will continue to fail when exposed to severe downdrafts.

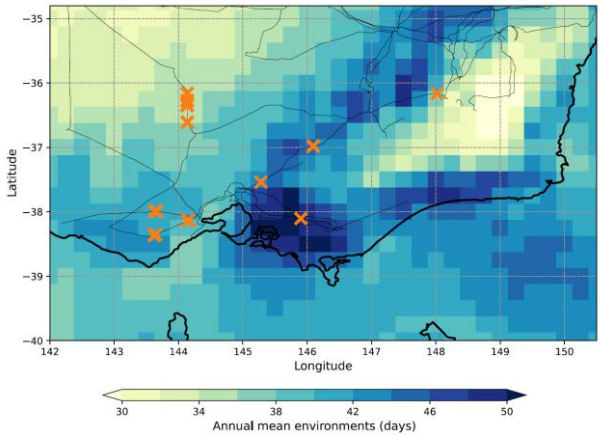

Figure 3: Potential regions in Victoria subject to severe convective downdrafts[20]

Given the potential lack of equity attached to DNSP resilience investments associated with a specific vulnerable feeder and the risk that even the resilience solution will fail when confronted with severe weather and the risk that the severe weather will impact a part of the network that has not be treated to be resilient, DNSPs might be better to focus on resilience solutions that are mobile and that can be moved to impacted customers following an event (response)[21].

This will require DNSPs to think innovatively and to focus more on an expectation that assets will fail and less on preventing failure.

While accepting the need for the AER to develop a VNR, it is still concerning that the VNR does not accurately represent consumers willingness to pay. The work of Electricity North-West Limited in the UK, demonstrated that their residential customers placed a lower value on electricity as outages became more prolonged[22].

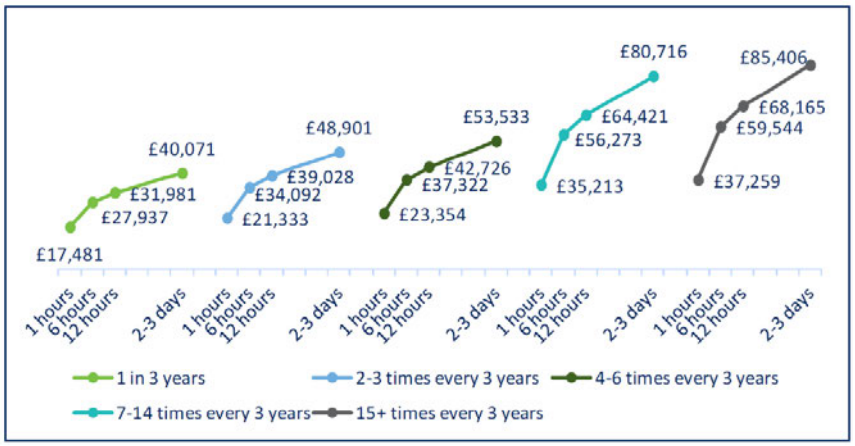

Figure 4: UK electricity customers valued electricity more highly the more outages they had experienced, but valued electricity less the longer outages continued

[20] https://www.climatechangeinaustralia.gov.au/en/projects/esci/esci-case-studies/case-study-wind-transmission/
[21] E.g. https://statements.qld.gov.au/statements/47536; https://www.powercor.com.au/power-outages-and-emergencies/emergency/storm-safety
[22] https://www.enwl.co.uk/globalassets/innovation/enwl010-voll/voll-general-docs/voll-phase-3-report.pdf see page 21

A conceptual diagram (figure 5) of the Australian approach versus the UK assessment demonstrates that VNR based on option 2, a multiple of the Value of Customer Reliability (VCR) may significantly over-value consumers' willingness to pay for resilience, even combining with option 1, a rational alternatives cap to minimise the cost to consumers.

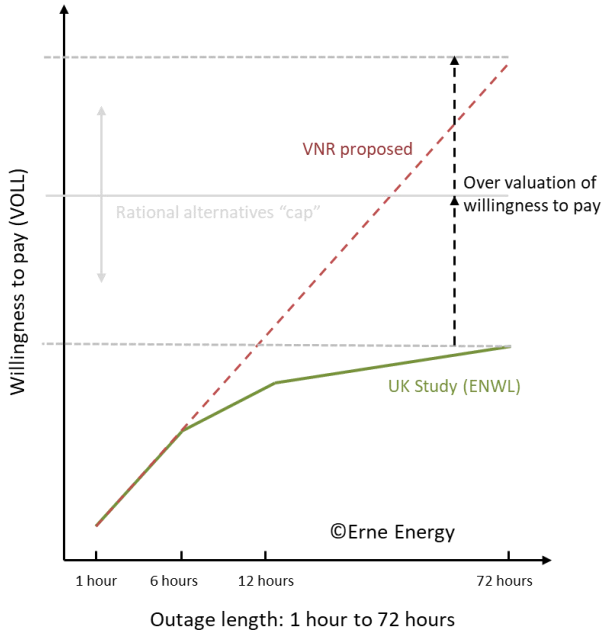

Figure 5: Risk that VNR over-values consumers' willingness to page

Rather than a VNR it may be more appropriate to consider incentivising DNSP performance during Major Event Days (MEDs). Currently, outage minutes related to MEDs are excluded from the Service Target Performance Incentive Scheme (STPIS) which results in poor outcomes for consumers. Numerous DNSPs demonstrate improving reliability when MEDs are excluded (as the STPIS allows), while consumers are experiencing increasing minutes without electricity.

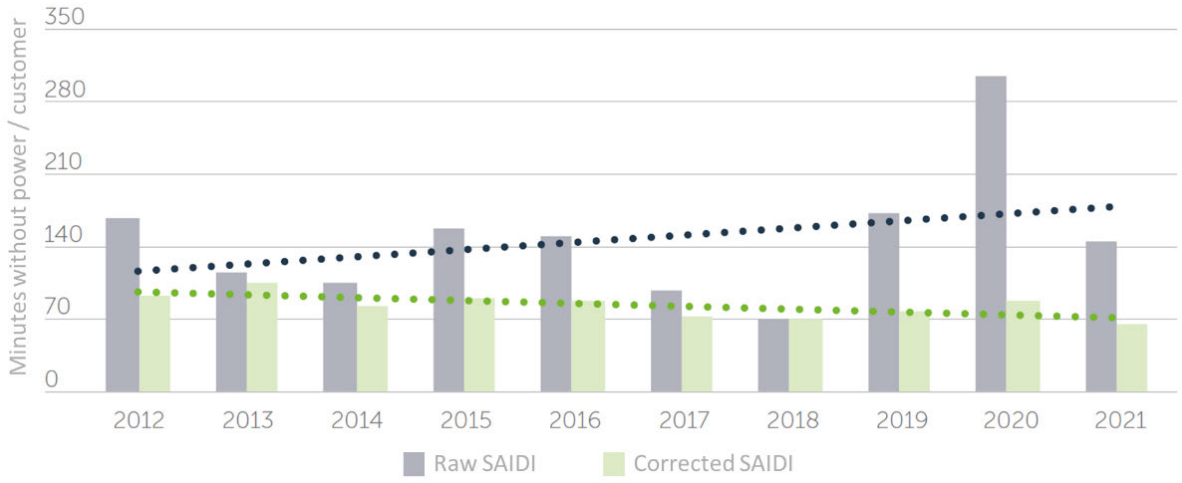

Figure 6: Showing increasing minutes without power (black dots – worsening reliability) when MEDs are included and showing reducing minutes without power (green dots – improving reliability) when MEDs are excluded for the assessment of reliability performance under the STPIS[23]

[23] https://yoursay.endeavourenergy.com.au/73936/widgets/358165/documents/224415

Ensuring that DNSPs focus on rapid response and recovery following a MED, may address the increasing number of minutes related to these events, which are typically the result of severe weather[24]. MEDs are likely to increase but may not do so at a consistent rate since seasonal variability (El Nino, La Nina etc.) influences the type of severe weather experienced in Australia[25]. A focus on approaches to MEDs would also capture readiness and risk reduction as options to improve customer outcomes for prolonged outages, addressing all the aspects of network performance that customers say matters before and after a storm.

Thank you for the opportunity to comment on the VNR Draft Decision. Please just get in touch if you need further information.

Yours Sincerely

Dr. Jill Cainey

[24] https://www.energy.gov/sites/prod/files/2017/02/f34/Chapter%20IV--Ensuring%20Electricity%20System%20Reliability%2C%20Security%2C%20and%20Resilience.pdf
[25] https://www.energynetworks.com.au/assets/uploads/220307-Networks-building-climate-change-resilience.pdf