Part of Energy Queensland

7 June 2024

Mr Kris Funston
Executive General Manager
Australian Energy Regulator
vnr2024@aer.gov.au

Dear Mr Funston,

Value of Network Resilience 2024

Ergon Energy Corporation Limited (Ergon Energy) and Energex Limited (Energex), both distribution network service providers (DNSPs) operating in Queensland, welcome the opportunity to provide a response to the Australian Energy Regulator (AER) on its Issues Paper, Value of Network Resilience (VNR) 2024 (the Issues Paper).

Network resilience is just one component of overall community resilience and to this end, we work closely with other essential service entities, government departments (e.g., police, fire, and health) and humanitarian organisations following significant and prolonged natural and unnatural disasters.

In preparation for these disasters, network resilience was factored in the development of Ergon Energy's and Energex's 2025-30 regulatory proposals including, for specific resilience related investment for:

- proposed works to protect critical network infrastructure by raising assets in flood zones;
- installing covered conductor, sparkless fuses and pole wraps in bushfire prone areas;
- new outage response capability to be delivered through mobile generators and mobile substations; and
- enhancing our cyber security capability to ensure the security of our infrastructure, given recent cyber-attacks on other essential service providers.

Ergon Energy and Energex are confident that their 2025-30 regulatory proposals, including their proposed resilience related investments, have struck the right balance between the many considerations that are important to customers, including, affordability, reliability, service, safety, and resilience.

Whilst the timing for incorporation of the VNR in our revised regulatory proposals poses some challenges, we will apply all reasonable and practicable endeavours to integrate any value developed as part of this review when submitting our revised proposals.

In addition to the information in our 2025-30 regulatory proposals, we welcome the opportunity to assist the AER with additional information on our internal and external experiences during different widespread and long duration outages (WALDO) events to assist in its VNR review.

Ergon Energy's and Energex's responses to the questions are included as an attachment to this submission. Neither this cover letter, nor our detailed responses to questions, contain confidential information.

Should the AER require additional information or wish to discuss any aspect of this submission, please contact either myself, or Lindsay Chin on [redacted].

Yours sincerely

[redacted]

Alena Chrismas
Manager Regulatory Affairs

Telephone: [redacted]
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Encl: Attachment A – Table of detailed comments

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Attachment A – Table of Ergon Energy's and Energex's detailed comments

Question	Ergon Energy's and Energex's detailed comments
Questions on outage scenarios, unserved energy, and criteria for assessing potential approaches	
1. What outage length do you consider is the most important for us to focus on? (e.g., 1 day, 2-3 days, 7 days etc.)? Please explain why you consider this outage length is the most important.	One-day. We consider that this period encompasses all extreme weather event type impacts. While the two to three days period is the lower end of the restoration time-period resulting from widespread impact from a cyclone coastal crossing, or a major flood event, the one-day period is indicative of the restoration time-period following an extreme heatwave event. It may be appropriate to consider the Queensland Competition Authority's Electricity Distribution Network Code and GSL values for Reliability Duration that govern Ergon Energy and Energex when determining what outage length should be the focus. For ease of reference, the relevant extract is described below: ***Reliability GSL*** *for each interruption to its premises which, if connected to:* i. *a CBD feeder — lasts longer than eight hours.* ii. *an urban or short rural feeder — lasts longer than 18 hours; or* iii. *a long rural or isolated feeder — lasts longer than 24 hours.*

[redacted]

Question	Ergon Energy's and Energex's detailed comments
2. How granular do you think the values need to be (e.g., specific feeders, etc)? Please explain why you consider this level of localisation is important.	The values should be to the specific feeder level[redacted] Post an extreme weather event, it is typically recorded and managed at the feeder (circuit breaker operation) or feeder component (line recloser operation) level. A feeder protective device (circuit breaker or recloser) will open either, because of a sustained fault condition, or for safety, because of a wires down/flooding/fire report. Feeder level granularity also allows for historical feeder performance analysis of extreme weather events. Recent cyclone events highlight that networks within relatively small geographical areas are impacted in different ways. Exposure to faults varies within the geographical area (even major coastal towns) and from feeder to feeder. Values at a specific feeder granularity will permit more targeted investment towards network resilience.
3. Do you have any views on the use of unserved energy to derive a $/kWh value for network resilience?	The value of unserved energy is a value that is representative of the "normal" cost of energy. An unserved energy derived $/kWh value for standard outage types applied for widespread and long duration outage (WALDO) calculations is going to dilute and not represent the true value a residential customer would place on avoiding a long duration outage. For the cost/benefit analysis of any network investment to build network resilience against extreme weather events, the value would need to be suitably adjusted from the current standard outage to reflect the direct and indirect/social cost to the community of that unserved energy. We recommend for consistency in terminology, that the AER adopt Regulatory Information Notice terminology, that is, 'energy not supplied' (ENS), instead of 'unserved energy'.
4. What are your views on the assessment criteria we have developed for considering the potential methodological options?	At this early stage, the listed assessment criteria are a sound assessment approach. The challenges in developing a methodology that can be applied to current and upcoming determinations are generally understood.
5. Are there any additional assessment	The additional burden of the social costs would need to be included. In general, the methodology to calculate Value of Customer Reliability (VCR) for standard outages is not inclusive of the broader social costs of a WALDO event.

[redacted]

Question	Ergon Energy's and Energex's detailed comments
criteria we should include? Please explain why.	[redacted]
Questions on potential approaches	
6. Are there any additional potential approaches, other than those listed above, that we should consider? Why?	In considering any additional potential approaches, it should be remembered that network resilience is about risk and safety, and as such, should be transparently considered and modelled. At the same time, any capital and/or operating expenditure investment plans associated with managing unplanned WALDO events, should be consistent with the National Electricity Objective. In the first step, a distribution feeder can be classified with physical, conditional, customer (including distributed energy resources), loading (including served energy and ENS, and its ratio), environmental (and other) attributes. With regards to WALDO ENS events, an appropriate range for a particular feeder category and NSPs should be specified. The VNR model can corelate customer risk characteristics with network/feeder profiles and environmental specifics to develop a dynamic area-network-customer model, capable of simulating different contingency scenarios, with realistic risk likelihood and impacts. This may also lead to the creation of another category ("Worst Resilience Feeders"), when combined with the above referenced other criteria. Experiences in managing Worst Performing Feeders, Safety Net zone substations and sub-transmission feeders and networks exposed to major event day type of events should also be explored when considering potential approaches. We also believe, that given the complexity of this topic and climate change variables, the AER should carry out these works and surveys in partnership with universities and other similar academic institutions, in close coordination with DNSPs, including ourselves.
7. Do you have a preferred approach to	Ergon Energy and Energex consider that several approaches have merit. However, in the short-term using a multiple of the VCR for standard outages (for example, doubling of VCR for the VNR as the appropriate dollar justification

[redacted]

Question	Ergon Energy's and Energex's detailed comments
valuing network resilience? If so, why do you prefer that approach?	value for resilient projects) appears to be the mo[redacted] the timeframes for some DNSPs to integrate. In the long-term, a model to estimate a value, in combination with a retrospective survey of an extreme event, appears to be the most comprehensive approach.
8. Do you have any views on how we might use a combination of approaches?	In addition to our responses to the above questions, we consider that any modelling to determine a VNR must have regard to relevant customer survey(s). For technical modelling, we support further analysis of other methods to gain a better understanding of the broader benefit quantification of VNR and customers' willingness to pay (WTP), and willingness to accept. For example, analysing socioeconomic status, tangible, and intangible costs, health, and safety (e.g., with sewerage and water), and social impacts of WALDO can be particularly challenging (e.g., assessing emotional distress, lost productivity, business restart costs and potentially increased crime). In using a combined approach, we suggest modelling WTPs for different categories of customers (including low-income communities, worst served customers, solar-export and flexible Electric Vehicle charging customers) on all feeder categories with a comprehensive risk assessment. As stated in the AER's issue paper, the results will have a high correlation to the recent impact from a WALDO.
Questions on Option 1 - Using rational alternatives as an upper bound	
9. Do you think we should include an upper bound on the costs consumers may be willing to pay to avoid prolonged outages? Please provide reasons for your view.	It is a practical assumption that an upper bound limit is required as a part of any modelling of VNR due to the socio-economic aspect of customers connected to a network. However, placing an upper bound on customers' WTP may restrict viable network investment. A customer's personal WTP in the longer term to avoid future prolonged outages against the incurred direct and indirect/social cost of a WALDO is yet to be investigated. The existing combined contingent valuation and scenario modelling may not capture the true WTP of a customer who has experienced a WALDO event. A direct cost survey of residential customers is a more suitable approach compared to a direct/indirect cost determination.

[redacted]

Question	Ergon Energy's and Energex's detailed comments
10. Can you see any potential challenges in calculating an upper bound on the costs consumers may be willing to pay to avoid prolonged outages?	The assumption that a rational customer is likely [redacted] an extreme weather event assumes that those options are available, and that the customer can afford those alternatives. Customers with different levels of socioeconomic status may respond completely differently in any survey response. With regards to cost, the least-cost of backup self-generation would need to include the capital purchase of generation, and the cost incurred by a customer to monitor and refuel the generation for the prolonged period. The additional safety risk of using back-up self-generation for a prolonged period would also need to be a consideration. To determine customers' WTP, our recommendation is to move away from a least-cost approach to a true cost approach.
11. If we do include an upper bound, do you have a view on the least-cost backup self-generation solutions we should explore?	As stated above, the least-cost backup self-generation would need to factor the capital cost, and the cost incurred by a customer to monitor (resulting in possible loss of income) and refuel the generator for the prolonged period. There also needs to be a clear understanding that self-generation is unlikely to cover normal supply usage like cooking and cooling/heating. These additional costs to a customer are not, but should be, included in a least-cost of backup self-generation analysis. Further factors that should be considered in any upper bound calculation are the cost to the customer to purchase replacement groceries, cooking implements, and takeaway or restaurant meals. There would also need to be consideration of business income losses from a prolonged outage.
12. If we do include an upper bound, do you have a view on which approach (least-cost backup self-generation or temporary accommodation costs) is preferred? Should we explore a combination of these approaches?	Of the two approaches, our preference would be to use the true cost of back-up self-generation, with consideration of capital costs, running costs, possible income loss and other out of pocket expenses likely to be incurred by the customer.

[redacted]

Question	Ergon Energy's and Energex's detailed comments
Questions on Option 2 - Using a multiple of the VCR for standard outages	
13. Is this approach appropriate for outages greater than 12 hours? Please explain why.	Yes. The consideration of the additional burden placed on customers from a prolonged outage is a critical element for consideration.
14. Can you see any potential advantages in using this approach?	Leveraging the VCR for standard outages with a multiple applied will be relatively easy to understand and can be applied to existing models where VCR was utilised.
15. Can you see any potential challenges in using this approach?	A potential challenge is that accuracy can be open to interpretation.
16. Do you have any views on whether this approach could be implemented, and values produced within the required timeframe?	Of the options provided, this option is the least problematic to implement.
Questions on Option 3 - Extrapolating the VCR for standard outages beyond 12 hours	
17. Do you believe this approach is appropriate to value consumer resilience for outages greater than 12 hours? Please explain why.	It may provide an appropriate approach to outages greater than 12 hours. However, it does not factor in the extra burden that is likely to be experienced by customers from an extreme weather event.

[redacted]

Question	Ergon Energy's and Energex's detailed comments
18. Can you see any potential advantages in using this approach?	Extending the application of an existing methodology is not without merit. Using existing information from a (very large business) direct cost survey may also provide insight into the true cost of a prolonged outage.
19. Can you see any potential challenges in using this approach?	It is difficult to see how a direct cost survey of very large business customers provides a value of network resilience to the broader customer base, or for a single residential customer. We consider it may present a skewed view of the data points.
20. Do you have any views on whether this approach could be implemented, and values produced within the required timeframe?	Our preference would be that a direct cost survey of residential customers is undertaken as a priority. However, this option may not be able to be completed in the required timeframe.
Questions on Option 4 - Conducting follow-up surveys to actual prolonged outages	
21. Do you believe this approach is appropriate to value consumer resilience for outages greater than 12 hours? Please explain why.	We agree that a direct cost survey-based approach has merit. However, it should be used in combination with other options. While existing surveys determine customer sentiment following standard duration power outages, for extreme weather events, there is only a hypothetical understanding of the true direct and indirect/social costs to customers, and the willingness to pay for future avoidance of long duration outages.
22. Can you see any potential advantages in using this approach?	This approach provides a clearer understanding of both the social costs and customers' WTP to avoid similar prolonged outages.

[redacted]

Question	Ergon Energy's and Energex's detailed comments
23. Can you see any potential challenges in using this approach?	The timeliness of the survey is critical. Also, as s[redacted]us overseas studies have found no significant differences between customers with experience and those without. However, this needs to be tested within a modern Australian context.
24. Do you have any views on whether this approach could be implemented, and values produced within the required timeframe?	The approach is centred around having a natural disaster event to then retrospectively survey affected customers. It is highly improbable that a natural disaster event will occur outside of the typical storm season (with the exclusion of a major fire event) for most DNSPs, which puts in doubt that this approach could be implemented within the required timeframe.
25. Do you have any views on whether residential and/or business survey outcomes from one outage event or network could be used as a proxy for other outage events or networks?	Our preference is that any survey is conducted after an extreme weather event, that broadly impacts a community. It is reasonable to expect that customer sentiment of any large-scale network/community impacting event could be used as a proxy for other networks.
Questions on Option 5 - Using modelling to estimate a value	
26. Do you believe this approach is appropriate to VNR for outages greater than 12 hours? Please explain why.	In-principle, we support this approach. However, we agree with the AER that it may be challenging to select a suitable model and undertake calibration within the timeframes for this review.

[redacted]

Question	Ergon Energy's and Energex's detailed comments
27. Do you have any views on which model(s), if any, may be appropriate for estimating a VNR?	Pending a further review of the draft model and [redacted] Australian extreme weather event, we support the input/output model approach for estimating a VNR but with an additional social cost component (e.g., 30%), and an adjustment of the upper limit.
28. Can you see any potential advantages in using this approach?	The advantage is that this approach is inclusive of social costs.
29. Can you see any potential challenges in using this approach?	The limitations of the model around how social costs are estimated, and the setting of an unserved energy upper limit, remain unresolved.
30. Do you have any views on whether this approach could be implemented, and values produced within the required timeframe?	Modelling would require further surveying of customers to quantify the social costs incurred by customers from a broad community impacting event.
Questions on Option 6 - Exploring other cost data	
31. Do you believe this approach is appropriate to value network resilience for outages greater than 12 hours? Please explain why.	No, as this approach seems the least mature in its potential development.

[redacted]

Question	Ergon Energy's and Energex's detailed comments
32. Can you see any potential advantages in using this approach?	The approach may be utilised to validate other [redacted]utput models.
33. Can you see any potential challenges in using this approach?	The available data sources are not yet identified. No analysis has been performed to date.
34. Are there any data sources that you think would be useful for this type of analysis? Do you know who may be able to supply the data you have identified?	Ergon Energy and Energex provide no comments.
35. Do you have any views on whether this approach could be implemented, and values produced within the required timeframe?	It is unlikely that this approach could be implemented in the required timeframe.