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29 January 2024

Joint Distribution Business Customer Engagement Workshop Report

Resilient Network Investment Framework

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1 Glossary and Terms

Term	Description
Australian Energy Regulator (AER)	The regulator of the wholesale electricity and gas markets in Australia. It is part of the Australian Competition & Consumer Commission, and enforces the rules established by the Australian Energy Market Commission.
Community resilience	The ability of communities to withstand and recover from the impacts of natural disasters.
Department of Energy, Environment and Climate Action (DEECA)	Victorian Government department responsible for overseeing the provision of secure and sustainable energy across the state.
Distribution Businesses	Electricity Distribution Businesses manage the distribution of electricity from the transmission network to homes and business. Also referred to as Distribution Network Service Providers (DNSPs).
Ex-ante funding	Funding which is secured in advance of a crisis or extreme event occurring.
Ex-post funding	Funding which is secured after a crisis or extreme event has occurred.
Resilience Investment Framework	Framework in development by the distribution businesses to provide structure, guidance, and criteria for resilience investment decision-making.
National Electricity Market (NEM)	The wholesale market through which generators and retailers trade electricity in Australia's eastern and southern states.
National Electricity Rules (NER)	Govern the operation of the NEM. These rules are established by the Australian Energy Market Commission.
Network reliability	The probability of a system, device, plant, or equipment performing its function adequately for the period of time intended, under the operating conditions encountered.
Network resilience	Network resilience is the ability to withstand and recover from the effects of a natural hazard or disaster.
Network Service Provider (NSP)	A person who owns, operates, or controls a transmission or distribution system.
Regulatory Reset	Every five years, the distribution businesses prepare a fully costed business plan (or regulatory proposal) for the review and approval of the AER. This is called an Electricity Distribution Price Review. But we refer to it simply as the regulatory reset.

2 Context setting

The impacts of climate change on electricity supply and distribution are already present and increasing. In response to these impacts, the distribution businesses are placing a greater emphasis on investment that builds and maintains network resilience. To guide such investment, the Resilience Investment Framework is being developed by Victorian Distribution Businesses for the 2026-2031 Regulatory Reset Proposal.

The purpose of the framework is to provide structure, guidance, principles, and criteria for resilience investment decision-making. The distribution businesses are working together to establish a uniform strategy to resilience investment across the state, which enables more meaningful engagement with stakeholders who will benefit from this consistent approach.

The Australian Energy Regulator (AER) and the Department of Energy, Environment and Climate Action (DEECA) have released guidance around investment funding decision making, including for resilience. AER guidance requires that genuine engagement with customers on their needs be undertaken. Extensive consultation has been conducted to date with customers at both a 'broad & wide', and 'deep & narrow' scale, to understand customer vulnerabilities, needs and priorities.

Distribution businesses are now engaging further with customer groups to educate, establish customers' current understanding of resilience concepts, introduce decision-making principles, and gather customer experiences.

Climate change impacts on electricity supply and distribution are increasing in severity and frequency

Explicit **investment in network resilience** has not happened in the past

Distribution businesses are working together to develop a **robust framework** for resilience investment

The purpose of the framework is to provide structure, guidance, principles, and criteria for resilience **investment decision-making**

The **AER** and **DEECA** have released guidance around investment funding decision making which includes a focus on customer needs and consultation

2.1 Climate change impacts on electricity distribution

To investigate the growing impacts of climate change on the electricity distribution network and the communities in which they operate, the distribution businesses engaged AECOM to conduct a climate change study. The study aimed to understand the vulnerabilities across the state which will impact the distribution network, including key climate hazards such as extreme rainfall, extreme heat, bushfires, extreme wind, and sea level rise.

Extreme weather events and natural disasters across Australia in recent years have highlighted the importance of both network and community resilience. Floods, storms, bushfires, earthquakes, cyclones, and extreme heat all pose a risk to the network, as well as to the communities reliant upon the network to meet their needs. These key hazards can destabilise, damage, or destroy critical distribution assets such as transmission lines or substations and leave communities without electricity during prolonged outages.

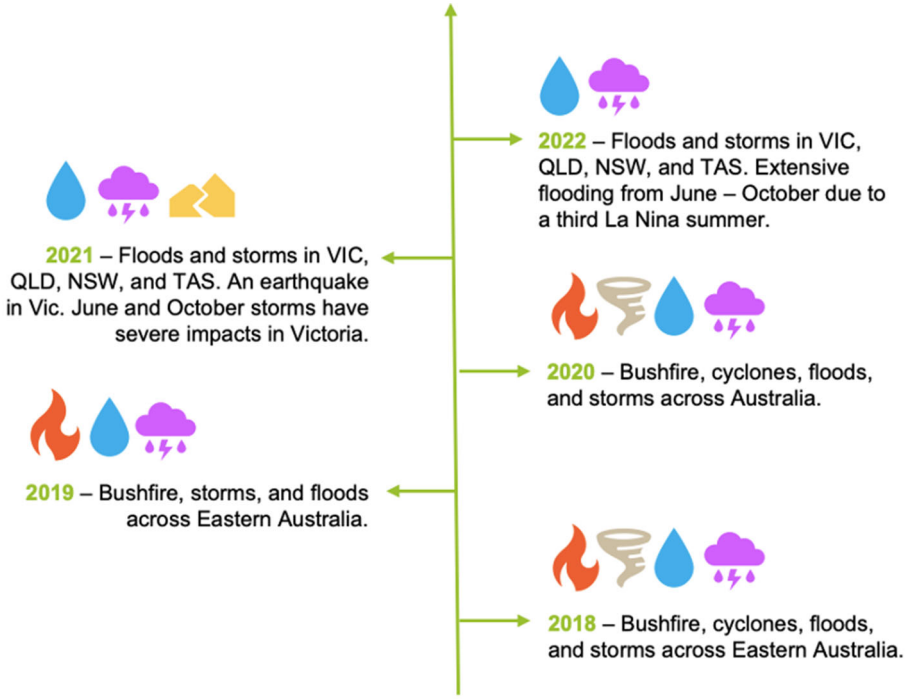

Figure 1 Examples of declared disasters across Australia since 2018. Adapted from: https://www.disasterassist.gov.au/find-a-disaster/australian-disasters

Extreme weather events are not new. The increased frequency and severity of these events due to climate change, as well as growing customer dependency on the electricity network, is requiring distribution businesses to adapt the way they plan for disruptions and operate their networks to avoid future outages and restore power safely, efficiently, and quickly during emergency events.

Science shows that increasing global emissions are having far-ranging impacts on Victoria's climate. The AECOM climate change risk investigation found that distribution assets have different levels of exposure to climate hazards. As shown in the table below, exposure to climate hazards varies across asset types as well as distributor service areas.

Table 1 Relative exposure of different asset types to climate hazards for each distribution business (Source: AECOM Climate Change Risk Assessment 2023)

Relative exposure of different asset types to select hazards for each distribution business		Distribution (>22 kV) lines	Distribution (<66 kV) lines	Transmission lines	Distribution Substations	Transmission, Zone and Terminal Substations
Yellow < 5% Orange = 5% to 10% Red > 10% n/a = not assessed	**United energy**					
	Extreme rainfall (flooding)			-		-
	Bushfire			-		-
	Extreme wind (vegetation)			-	n/a	n/a
	Sea Level Rise (2040)			-		-
	Sea Level Rise (2070)			-		-
	Powercor					
	Extreme rainfall (flooding)			-		
	Bushfire			-		
	Extreme wind (vegetation)			-	n/a	n/a

Relative exposure of different asset types to select hazards for each distribution business		Distribution (>22 kV) lines	Distribution (<66 kV) lines	Transmission lines	Distribution Substations	Transmission, Zone and Terminal Substations
	Sea Level Rise (2040)			-		-
	Sea Level Rise (2070)			-		-
	CitiPower					
Yellow < 5% Orange = 5% to 10% Red > 10% n/a = not assessed	Extreme rainfall (flooding)			-		
	Bushfire	-	-	-	-	-
	Extreme wind (vegetation)			-	n/a	n/a
	Sea Level Rise (2040)			-	-	
	Sea Level Rise (2070)			-	-	-
	Jemena					
	Extreme rainfall (flooding)		-	-		
	Bushfire		-	-		-
	Extreme wind (vegetation)		-	-	n/a	n/a
	Sea Level Rise (2040)		-	-	-	-
	Sea Level Rise (2070)		-	-		
	AusNet					
	Extreme rainfall (flooding)					
	Bushfire					
	Extreme wind (vegetation)				n/a	n/a
	Sea Level Rise (2040)					-
	Sea Level Rise (2070)					-

In response to the growing impacts of climate change on people and the environment, the distribution businesses are acting on their commitment to improve resilience, including through the following measures:

- **Targeted outage preparation media campaigns and early engagement:** Pre-summer media campaigns are launching with specific messages for life support and vulnerable customers regarding contingency planning. This is in addition to pre-storm messaging and the development of new tools to identify and target specific customers during and after major storm events, such as via SMS and social media platforms.
- **Advanced forecasting and weather analytics:** Using advanced outage prediction tools combining weather forecasts and operational data, distribution businesses are better able to anticipate and respond to weather impacts on their networks and communities. This helps distribution businesses to determine when a response will be needed, and where staff should be allocated to restore power safely and quickly.
- **Improved coordination with Emergency Management Victoria (EMV) and local councils:** Distributors are continuing to formalise and expand the number of councils they engage with for emergency management planning, including by positioning an Electricity Emergency Management Liaison Officer at the EMV State Control Centre during major events.
- **Prioritisation of restoration:** Distributors prioritise restoration primarily based on safety considerations and the number of customers off supply. By targeting the highest numbers of

customers off supply first, distribution businesses reduce vulnerability arising from extended periods without power for the largest part of their customer bases.

- **Mobile Engagement Response Vehicle (MERV) on-the-ground community support:** MERVs are being made available for deployment during extended outages, to provide information to the impacted community and meet immediate electricity needs, such as phone charging, cellular phone reception, refrigeration, and hot water.
- **Mutual aid:** This involves changes to agreements between Victorian networks (for support during events limited to individual DNSP areas) and formalising agreements with networks outside of Victoria (for support during state-wide events).
- **Inter utility coordination:** In place, sharing of learnings between operational centres was ramped up substantially following COVID-19 and 2021 extreme weather events. An inter-utility group (including water utilities, NBN etc) is now in place to improve emergency preparedness and coordination post- event.
- **Enhancing critical customer grid resilience:** ARENA funding has been sought by distribution businesses to deploy batteries at several critical water treatment plants across the Gippsland water network.
- **Postponing non-critical planned outages**: To provide relief to customers that have experienced prolonged unplanned outages during major storm events, distribution businesses may postpone planned outages for non-critical works where doing so will not impact the safety and reliability of the network.

2.2 Regulatory context

The regulatory context that the distribution businesses operate within is governed by the following pieces of guidance:

The Better Resets Handbook – Towards Consumer Centric Network Proposals which seeks to encourage networks to better engage and have consumer preferences drive the development of regulatory proposals.

The Electricity Distribution Network Resilience Review which outlines steps networks should take to better prepare for and respond to extreme weather in the short, medium and long term, including engagement with consumers drive the development of regulatory proposals.

Network Resilience – a note on key issues which presents the AER's guidance on defining network resilience, explains how network resilience is funded within the NER, describes how NSPs can demonstrate funding aligns with long-term consumer interest, and explains an NSP's role in supporting community resilience.

Industry practice application note – Asset replacement planning which provides guidance on how NSPs could meet NER requirements for demonstrating the prudency and efficiency of network asset investment on asset retirement and de-rating decisions.

In 2022, the Victorian Government's Expert Panel for the Electricity Distribution Network Resilience Review released their short-, medium- and long-term final recommendations to the Minister of Environment and Climate Action. The Government's response to the review was released in late 2023, after this engagement was completed.

The key findings of the review were:

- Network and community resilience need strengthening in the face of increasing extreme weather due to climate change.
- Substantive reforms to reduce the likelihood and impact of prolonged power outages from storms and other extreme weather events.

- DEECA expect distribution businesses to identify resilience solutions and investments when developing their regulatory proposals for 2026-2031.

Table 2 Summary of recommendations from the Electricity Distribution Network Resilience Review (DEECA, 2022)

Short term (by 2025)	Medium term (from 2025)	Long term
• Distributors should identify locations with highest risk of prolonged outages and propose options to reduce that risk. • Government should assess the proposed options for cost-benefit and determine the preferred solution and funding mechanism. • These measures would be a new obligation for distribution businesses under the Victorian legislative framework, with penalties for non-compliance. • The Minister would also have additional powers to direct distribution businesses to take actions where necessary.	• Distributors should develop and update a 5-yearly Network Resilience Plan which takes an all-hazards approach to risk mitigation for the purposes of reducing the likelihood of prolonged outages. • The Network Resilience Plan would have to be approved by a regulator, consistent with the framework for Bushfire Mitigation Plans. • Distributors would be required to comply with the Network Resilience Plan, with penalties for non-compliance.	• DEECA should work with the AER to support the assessment of customer willingness to pay to avoid wide area, long duration outages (WALDO). • DEECA should propose a National Electricity Rule (Rule) change to the capital expenditure objectives to specifically account for resilience. • DEECA should propose a Rule change for the AER to incorporate a new regulatory mechanism to drive proactive investments in network resilience.

2.3 Network resilience and the role of distributors

2.3.1 Network resilience, network reliability, and community resilience

Network resilience and community resilience are different but related concepts.

A resilient electricity network can assist in building community resilience; however, this also relies on the support of many other entities such as government bodies, individuals themselves and other critical infrastructure operators.

While supporting community resilience is a shared responsibility across multiple entities, distribution businesses play a vital role in maintaining, protecting, and restoring it during emergency events. The current role of the distributor is to:

- Restore power quickly, safely, and efficiently during/ after extreme weather events,
- Maintain a safe and reliable distribution network through prudent asset replacement decisions,
- Adapt asset management, operations, and investment programs to efficiently respond to and manage the effects of climate change,
- Provide timely and relevant information on outage cause and restoration times during events,
- Administer Prolonged Power Outage Payments (PPOP) when requested to support State Government,
- Resource and support community hubs where required/ requested relative to the nature/ scale of the incident,
- Support State Control Centre (EMV) arrangements through the provision of an Energy Emergency Management Liaison Officer
- Assist with municipal planning to strengthen local council/ community preparedness, and
- Coordinate with critical utilities to respond to critical services requests for assistance during emergencies.

Expectations regarding the scale and scope of this role are now evolving.

2.3.2 Funding and the regulatory reset process

The Australian Energy Regulator (AER) is the economic regulator of energy networks in all states and territories except Western Australia. The AER sets the revenue that distributors can recover and prices that are charged.

The proposals cover investments, pricing plans and rates of return. The Resilience Investment Framework will guide these proposals.

The AER's assessment criteria include:

- efficiency of costs
- quality of engagement with customers
- projected demand for energy
- age of infrastructure
- operating and financial costs
- network reliability and safety standards.

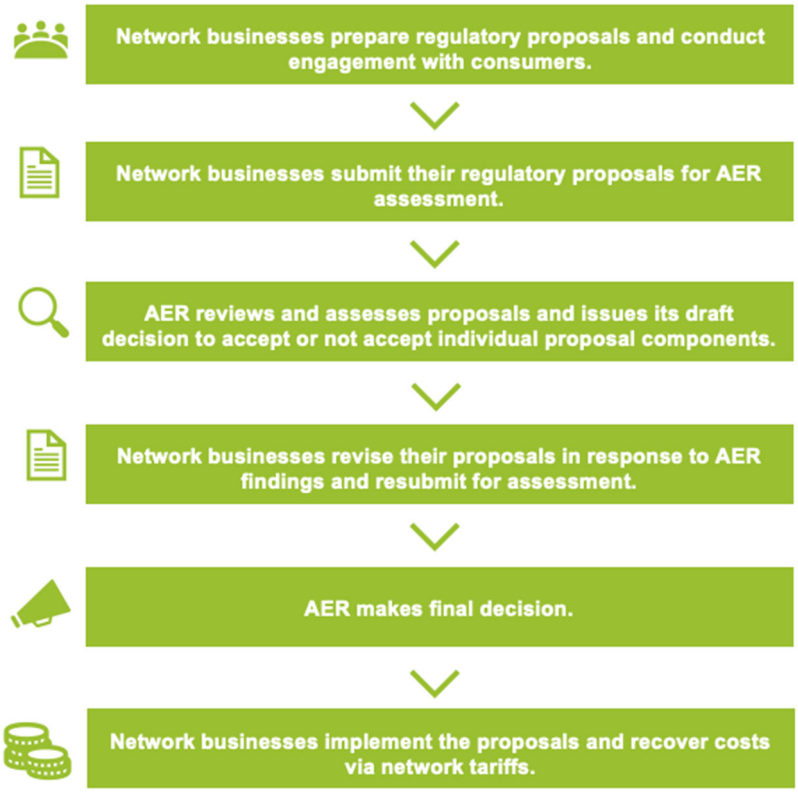

Figure 2 Summary of the regulatory reset process

To manage network risks from a weather-related event, an NSP can request two types of funding:

Ex-ante funding in its revenue proposal, forecasting the likely costs to be incurred in the upcoming five-year regulatory control period.

Where weather-related events are foreseeable, it may be efficient for NSPs to be funded ex-ante to manage these risks as part of good industry practice. NSPs are expected to prudently anticipate and efficiently manage these events themselves. Such ex-ante funding could include funding to prevent or mitigate risks to the network.

This includes upfront funding for proactive and reactive works. For example, it might include funding for network hardening, but also upfront funding for community liaison supporting their disaster recovery planning (some of which may not be executed until after a storm).

Ex-post funding after a revenue determination, applying for the recovery of actual costs incurred after extreme weather-related events through the cost pass through mechanism.

The timing and costs of extreme weather events are far less predictable. In those cases, it may be more efficient for network repair costs to be passed through as damage actually occurs, rather than paying for proactive measures that may not be required (or may not be sufficient) through the ex-ante funding.

An ex-post approach, however, will likely result in an ongoing deterioration in customer lived experiences, and may be higher cost overall (given repair costs under duress would be higher than a planned equivalent).

2.3.3 Value of customer reliability

In assessing the benefits of any potential investment, distribution businesses typically rely on the value of customer reliability (VCR) determined by the AER. The VCR measures the value placed by customers on avoiding outages. The AER's most recent review of VCRs in 2020, however, only provided a measure for outages of less than 12 hours (i.e. shorter-duration outages).

When considering resilience initiatives, the focus is on longer-term outages.

- The AER previously attempted to estimate the costs of Widespread and Long Duration Outages (WALDO), but this study was discontinued in 2020 due to challenges with determining an appropriate modelling approach.
- The AER is commencing its next VCR review in Q4 2023, which must be completed by 31 December 2024. While details are not currently available, this review may seek to determine the customer value placed on avoiding prolonged outages and a 'value of resilience'.
- AusNet's Quantifying Customer Values (QCV) Study (currently in flight) and Powercor's Customer Values research (being refreshed) will also quantify a value that customers place on avoiding prolonged outages.

2.3.4 Applications for resilience funding

To support applications for resilience funding, NSPs must demonstrate:

1. A causal relationship between the proposed resilience expenditure and the expected increase in extreme weather.
2. The proposed expenditure is required to maintain service levels and is based on the option that achieves the greatest net benefit of the feasible options considered.
3. Consumers have been fully informed of different resilience expenditure options, including the implications stemming from these options, and that they are supportive of the proposed expenditure.

Distributors are able to pass through the costs of responding to extreme weather events. The pass-through provisions of the NER recognises that a distributor can be exposed to risks beyond its control, which may have a material impact on costs. A cost pass through enables a distributor to recover (pass through to customers) the costs of defined yet unpredictable, high-cost events that are not built into approved revenues. Extreme weather events that cause widespread damage and outages would satisfy the “natural disaster” definition of a pass through event. If the cost incurred exceeds the network-based threshold, it would satisfy the materiality threshold.

This reduces networks’ financial exposure to high impact and unpredictable events. However, the disadvantage is that if an event does occur, customers are exposed to prolonged outages, and any material costs of responding and repairing the network are ultimately borne by customers. The costs might also be higher (compared to planned and preventative resilience works), as the costs to undertake work under emergency conditions are more expensive. Further, the lived experience of the customer will deteriorate with an increased frequency of events.

2.4 Decision making

The AER expects to see evidence of prudent and efficient decision-making on key projects and programs included in regulatory proposals. This involves:

1. Identification of the need for the investment – networks and communities at risk of extreme weather events,
2. Quantitative cost benefit analysis assessing all feasible options to show that the preferred option maximises net benefits (including non-network options), and
3. Evidence of fully accounted for trade-offs between capital expenditure and operating expenditure to show that the preferred option is prudent and efficient.

The distribution businesses’ risk-based investment planning approaches align with these requirements. The need to invest is justified by a robust assessment of network risk, and a comprehensive assessment of network, non-network, and operational solutions.

The **Resilience Investment Framework** will establish criteria, guidance, and structure for evaluating and prioritising resilience investments.

3 Customer engagement

In October 2023, the Victorian electricity distribution network providers – AusNet, CitiPower, Jemena, Powercor and United Energy – hosted the Resilience Investment Framework Customer Workshop.

The workshop was an opportunity for stakeholders to shape the development of joint resilience investment principles ('the Principles'), which will underpin the Resilience Investment Framework and be used by the distribution businesses to prioritise and invest in network resilience through to the year 2031.

During the workshop, participants were asked about their needs and desired outcomes for network resilience and shared their lived experiences during outage events to help inform the framework. This report presents key themes, feedback and discussion points gathered during the workshop.

The distribution businesses have chosen to work together to develop the Principles in order to respond to a common set of customer and community needs, and broaden the range of perspectives heard through joint engagement. This aims to achieve consistency in the frameworks for identifying, assessing, and proposing solutions in light of the outcomes of the Victorian Government Network Resilience Review, and also consistency in the incorporation of findings from the climate change risk assessment work undertaken by AECOM.

3.1 Purpose of engagement

The purpose of the workshop was to set out the distribution businesses' rationale and intention for developing joint resilience investment principles, and to inform stakeholders of both the regulatory framework for resilience investment and the work currently being undertaken by distribution businesses to improve network resilience.

The workshop was an opportunity for stakeholders to share their knowledge and experiences of energy resilience issues, and for distribution businesses to identify gaps in their understanding of customer and community needs. Ensuring the Principles are shaped by stakeholder engagement will help the distribution businesses to make balanced and informed decisions that align with customer preferences. It will also help to inform and improve the design of future stakeholder involvement in the development of the Principles.

3.2 Timeline of engagement

Distributors will continue to engage with stakeholders, either jointly or individually. Future stakeholder engagement will be guided by stakeholder preference and feedback. Immediate and long-term priorities are identified in the timeline below.

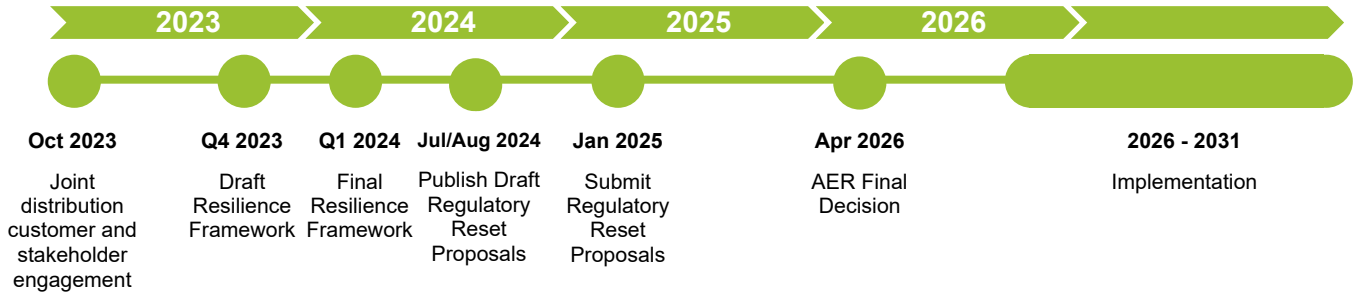

Figure 3 Engagement timeline

3.3 Participants

A diverse range of participants were selected by the distribution businesses and invited to attend the workshop via email and/or phone call. Prior to the workshop, participants were sent pre-reading material (see Appendix B) to introduce the content of the session.

Over 73 participants representing 40 organisations attended the Resilience Investment Framework Workshop. The workshop was also attended by community members from the distribution businesses' customer panels and Victorian farmers. The table below lists the organisations represented by participants in the workshop.

Table 3 Participating organisations

- Ambulance Victoria
- Australian Energy Regulator
- Baw Baw Shire Council
- Benalla Rural City Council
- Boroondara City Council
- Cardinia Shire Council
- City of Glen Eira
- City of Greater Bendigo
- City of Stonnington
- Coliban Water
- Committee for Greater Shepparton
- Country Fire Authority
- Department of Energy, Environment and Climate Action
- Department of Jobs, Skills, Industry and Regions
- East Gippsland Shire Council
- Emerald Community House
- Erne Energy
- Food and Fibre Great South Coast
- Frankston City Council
- Goulburn Valley Water
- Indigo Power
- Latrobe City Council
- Maribyrnong City Council
- Moira Shire Council
- Monbulk Emergency Management Group
- Moorabool Shire Council
- Mornington Peninsula Shire
- Mums of the Hills
- Murrindindi Shire Council
- nbn Australia
- North East Water
- Northern Grampians Shire Council
- Parks Victoria
- South Gippsland Shire
- St Vincent de Paul Society
- Towong Shire Council
- Victoria Police
- West Wimmera Shire Council
- Yarra Ranges Shire Council
- Yarra Valley Water

3.4 Agenda and format

The workshop was highly interactive and enabled open communication between facilitators, distribution businesses, technical specialists, and participating stakeholders. Throughout the workshop, participants were presented with relevant information and prompted to share their thoughts, feedback, questions, and experiences for further discussion.

Feedback was provided by participants in a number of ways including through verbal discussions, comments in the virtual meeting chat, and through posting of comments on an online collaboration space (MIRO). The MIRO board template is depicted below and included a dedicated section for each point of discussion. Participants were encouraged to use virtual sticky notes to add their feedback to the board.

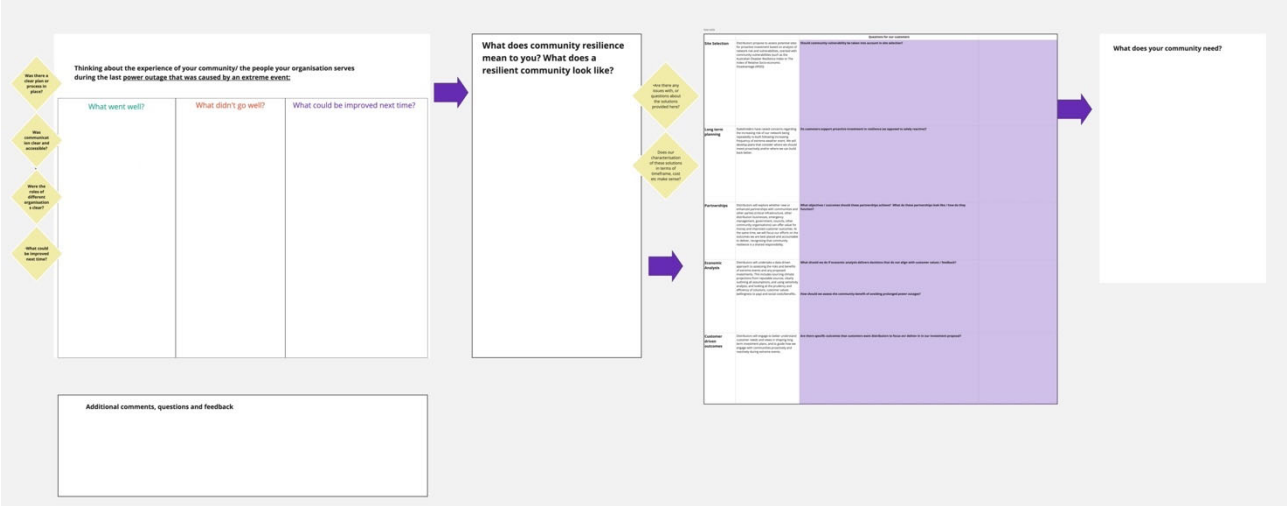

Figure 4 Engagement workshop Miro board snapshot

The workshop took place in the following format.

1. Welcome and introductions

To begin the workshop, the facilitator introduced participating groups, delivered an Acknowledgement of Country, discussed housekeeping arrangements, and thanked attendees for their presence and participation. The facilitator also outlined the objectives of the workshop and provided a summary of the pre-reading material.

2. Climate change impacts

Representatives from AECOM then delivered a presentation of the outcomes of their climate change impact assessment study prepared for the workshop. This included an explanation of the scope, methodology, and outcomes of the study.

3. Applying climate change modelling

The distribution businesses offered insight into how climate change modelling and data is currently being incorporated into risk and economic assessments. Case study examples were presented to illustrate this.

4. Stakeholder experiences: Extreme weather events and power outages

Participants were directed to the MIRO board to share their lived experiences of power outages related to extreme weather. Participants were asked to detail aspects that went well, aspects that did not go well, and potential areas for improvement from the last power outage caused by an extreme weather event.

5. Defining key terms

To contextualise workshop discussions, key terms including network reliability, network resilience, and community resilience were defined through collaborative discussion and MIRO board comments. Discussion centred around the difference between network reliability and network resilience, and what customers understood community resilience to mean.

6. Potential solutions

A range of potential solutions to increase network resilience were presented for discussion and participant feedback. Participants were asked to assess whether the distribution businesses' categorisation of solutions relating to cost, the implementation timeframe, impacted customers, and type of approach (reactive or proactive) were appropriate. The following solutions matrix was presented to participants to form the basis of the discussion.

Table 4 Solutions matrix

Solution	Cost			Implementation timeframe			Impacted customers		Approach	
	Low	Medium	High	Short	Medium	Long	Whole of network	Targeted	Proactive	Reactive
Improved communication prior to and during extreme weather events	✸			✸			✸	✸	✸	✸
Microgrids and community batteries in vulnerable locations		✸			✸			✸	✸	
Community hub support		✸			✸			✸	✸	
Mobile Emergency Response Vehicles	✸			✸			✸		✸	
Standalone Power Systems (SAPs)		✸			✸			✸	✸	
Critical service provider customer battery back-ups & SAPS		✸			✸			✸	✸	
Large portable generators for deployment during extreme events		✸		✸			✸		✸	
Targeted network hardening (e.g., pole and conductor replacement, improved switching)			✸			✸		✸	✸	
Vegetation management		✸		✸				✸	✸	
Targeted undergrounding			✸			✸		✸	✸	
Support for community resilience planning via community engagement officers	✸			✸				✸	✸	
Support with implementation of community resilience planning			✸		✸			✸	✸	✸

7. Decision making

Trade-offs required in decision making, primarily between cost and level of service, were discussed. The proposed principles for investment drafted by the distribution businesses were discussed, prompted by guiding questions. These principles included site selection, long term planning, partnerships, economic analysis, and customer driven outcomes.

8. Community priorities

Participants were asked to share via MIRO the priorities of their communities or of the communities their organisation serves in light of workshop discussions.

9. Next steps and future engagement

The distribution businesses made a commitment to continue engaging with customers either jointly or individually. Participants were invited to complete a survey to identify their preferred methods for future engagement, and to provide feedback on the session.

4 Customer feedback: Key themes

During the interactive elements of the workshop, participants were invited to share their feedback, questions and suggestions in response to various prompts and guiding questions. Feedback gathered verbally, via the comment function, and on the MIRO board during the workshop has been collated and summarised into key themes in the following pages.

4.1 Investment and cost sharing

Context

The possible distribution of costs between safe and vulnerable communities associated with investment in resilience building emerged as a prevalent theme during workshop discussions.

Customer feedback

- Some participants raised concerns about equity issues involved in “propping up” or building resilience in climate-exposed communities through raised tariffs to the whole network. One participant commented that “pricing structures need to be reflective of where you live.”
- Some participants wanted to see that the investment costs would be matched by “savings” elsewhere, though it was noted the benefits are sometimes difficult to quantify.
- Many participants expressed interest in the distribution businesses sharing cost benefit analysis assessments publicly as they relate to potential solutions.

Recommendations

1. Share cost benefit analyses publicly to offer transparency into resilience investment decision-making and community benefit assessments.
2. Further consider the distribution of costs between safe and vulnerable communities to address possible equity issues.
3. Consider assessment models that identify potential benefits in the form of savings associated with risk reduction to explain investment decisions.

4.2 Communication

Context

The topic of communication was a recurring point of discussion throughout the workshop, with many participants suggesting both proactive and reactive measures to build network and community resilience. Feedback about communication was most commonly raised when participants were asked about their lived experience of power outages, what did not function well and could be improved in preparation for future outages, and what community resilience means and looks like to them. It was also the most commented on when participants were asked to define what their communities need to improve resilience.

Customer feedback

Before an outage event (proactive measures)

- Better pre-emptive communication of potential outages due to severe events was suggested by many participants to support community preparation.
- Many participants also agreed that better and more targeted communication with Culturally and Linguistically Diverse (CALD) and First Nations communities was needed to better understand their specific communication needs.

During and after an outage event (reactive measures)

- The loss of communications due to power loss was a major point of concern for most participants.
- Some participants commented that communications and notifications during outages were done well while others raised issues with communications during an event, noting that notifications were slow.
- Many participants would like to see better social media coverage during events and real-time data sharing through communication between distribution businesses, other critical service providers (e.g. telecommunications, gas etc), and local councils.
- Many participants noted that communications regarding the timeline to restore power could be improved. Some participants shared a preference for a “more pessimistic” Estimated Time to Recovery (ETR) to be communicated rather than an optimistic ETR.
- During and post event communications were considered a key element of community resilience by some participants.

Recommendations

1. Consider options to improve pre-emptive communication of outages.
2. Engage more directly with CALD and First Nations communities to assess their needs relating to communications and engagement.
3. Explore potential improvements in communications during and after events through increased collaboration with other critical service providers and councils, improvements in ETR accuracy, and real-time data sharing.

4.3 Backup and relief measures

Context

When asked about their experience before, during and after power outages, participants commonly made reference to the backup and relief measures available to and needed by their communities.

Customer feedback

Before an outage event (proactive measures)

- Successful backup and relief measures identified by individual participants included:
  1. Ensuring key facilities (fuel stations, evacuation centres) had back up power,
  2. Having back up components available for swift restoration of damaged assets and infrastructure,
  3. The Strengthening Telecommunications Against Natural Disasters (STAND) technology installed in East Gippsland Shire was provided as a successful example.

- Interest was expressed in the following improvements to backup and relief measures by multiple participants:
  1. Battery backup in neighbourhoods and at critical emergency locations,
  2. Longer life batteries for National Broadband Network (NBN) nodes and power input points,
  3. Backup power for community relief centres,
  4. Faster deployment of dispatchable backup generators or mobile SAPS (standalone power systems),
  5. Increased Distributed Network Service Provider (DNSP) attendance at community hubs to enhance community education.

During and after an outage event (reactive measures)

- Reactive steps to improve backup and relief measures identified by many participants included:
  1. The swift deployment of large generators as they are sometimes difficult to source during events,
  2. Ensuring fuel stations have power and roads are accessible to allow for refuelling.

- Powercor's "creative solutions" implemented to restore power during the Shepparton floods were noted as being well received by industry.
- Some participants identified community relief hubs as a priority in building community resilience, so long as the purpose is clearly stated and differentiated from other relief sources such as places of last resort.
- Many participants raised concern that road closures have significant impacts in allowing relief supplies to enter the area and repair crews to undertake repairs.

Recommendations

1. Consider the capacity of the distribution businesses to deploy backup batteries in vulnerable communities and at critical emergency locations.
2. Explore possible measures to address concerns regarding road closures during events to ensure relief can reach impacted communities.

4.4 Infrastructure protection and recovery

Context

The impact to electricity infrastructure and assets as a result of extreme events and power outages emerged as a key theme of discussion throughout the workshop.

Customer feedback

- There was an impression amongst some participants that some key electricity infrastructure (such as substations) and critical infrastructure from other utilities (e.g., water) are not adequately protected.
- To improve preparedness, a participant suggested having replacement components readily available for deployment in the event of damage to existing infrastructure.
- The undergrounding of powerlines was repeatedly mentioned by participants as a proactive opportunity to improve infrastructure resilience and protection.
- Participants recognised the value of trees and vegetation for their cooling and carbon sequestration properties; however, vegetation was considered by a participant to be damaging to above ground powerlines. As needed vegetation clearance, rather than cyclical clearance, was proposed as a solution.
- Most customers expressed their appreciation for the visible effort made by distribution businesses to restore outages, however, there was an impression that critical infrastructure was not adequately protected during restoration processes following events.
- Prioritising the protection and restoration of fuel stations to allow refuelling during an event was considered important by many participants.

Recommendations

1. Prioritise the protection and restoration of critical infrastructure, particularly fuel stations, throughout all stages of outage events.
2. Increase proactive measures to adequately protect critical infrastructure prior to outage events.
3. Collaborate with other service providers (e.g., water) where necessary to ensure critical utilities are protected.
4. Consider vegetation clearance frequency around above ground powerlines to prevent damage to infrastructure due to falling branches in extreme weather conditions.
5. Consider the opportunity to underground powerlines where possible to enhance resilience and unlock co-benefits including increased tree cover, reduced urban heat island effect and domestic cooling energy demand.

4.5 Coordination and collaboration

Context

Building community resilience is a shared responsibility achieved through collaboration across multiple entities including between distribution businesses, service providers, local councils, customers, and communities. Coordination and collaboration between these actors were prevalent themes during discussions, and predominantly raised as a point of future improvement and what participants perceived their communities to need more of.

Customer feedback

- There was agreement amongst many participants that enhanced coordination and collaboration is needed during and immediately after outages between distribution businesses, councils, and other service providers (e.g., NBN and water) to improve restoration efficiency.
- This form of collaboration, particularly between distribution businesses and service providers, was seen as beneficial by some participants in avoiding the duplication of efforts to develop resilience and respond to emergency events.
- Some interest was expressed in distribution businesses including community leaders in their emergency management preparation processes.
- There was also some interest in proactively extending collaboration to enhance climate resilience in the form of a working group to improve knowledge sharing practices.
- It was also raised that collaboration can also allow for continual improvement where the sector and organisations review and learn from emergency events.
- It was noted that many potential solutions presented by the distribution businesses during the workshop reflected this principle of collaboration.

Recommendations

1. Increase collaboration and coordination between distribution businesses and service providers to improve restoration efficiency and avoid the duplication of efforts.
2. Identify options to more actively involve community leaders in emergency management preparation.

4.6 Community resilience

Context

Various proactive and reactive measures to further develop community resilience were proposed by participants during the workshop. Broadly, the discussion of these measures centred around a need for greater preparedness, connectedness, customer engagement, and sensitivity to vulnerable communities as climate impacts and extreme weather events become more prevalent.

Customer feedback

- Proactive measures to support resilience suggested by many participants included:
    1. Community education and preparation before emergency events,
    2. Empowering the community to improve their emergency preparedness through access to the correct information,
    3. Opting for infrastructure that enables a degree of community self-sufficiency (e.g., distributed power or islandable / isolated networks / microgrids).
- There was agreement that both metro and rural communities need support to implement renewable technologies in synergy with network resilience measures. Some concern was raised regarding the net zero transition potentially impacting resilience building efforts.

- The significant impact that large outages have on community health and wellbeing was repeatedly noted by participants, especially during extended communications outages with these impacts felt more strongly by vulnerable customers and communities.
- A correlation was drawn by some participants between community resilience and connectedness. That is, community resilience is often stronger in areas of high connectedness (i.e., strong, varied relationships between a range of organisations, agencies, and individuals).
- Participants suggested that during outage events there should be better availability of MERVs, particularly in rural areas.
- A participant cited *Collaborating4Inclusion* as an example of an effective engagement model to enhance resilience.

Recommendations

1. Consider opportunities to perform network upgrades through islandable and isolated networks and microgrids.
2. Plan and initiate a longer-term transition to more de-centralised systems and distributed storage to improve resilience.
3. Enhance community education on individual resilience measures.
4. Inform organisations of the capabilities of MERVs and deploy them in rural areas during outages.

5 Customer feedback: Principles

Prior to the workshop, the distribution businesses worked collaboratively to prepare five proposed joint resilience investment principles to guide decision-making processes. These were designed to underpin resilience investment and include the principles of site selection, long term planning, partnerships, economic analysis, and customer driven outcomes. Each principle was presented to workshop participants along with a prompting question to stimulate discussion and feedback. The principle, questions and participant responses are summarised in the following pages.

5.1 Site selection

Context

Distributors propose to assess potential sites for proactive investment based on analysis of network risk and vulnerabilities, overlaid with community vulnerabilities (such as the Australian Disaster Resilience Index or The Index of Relative Socio-economic Disadvantage).

To test the robustness of the assessment criteria for areas of proactive investment, participants were asked the following question: **Should community vulnerability be taken into account in site selection?**

Customer feedback

- There was strong support for the inclusion of community vulnerability as a factor in site selection. More than 25 participants answered yes to this question via the MIRO board and through the chat function.
- Some participants noted that consultation with vulnerable communities is needed to further evidence the desire to consider community vulnerability in the site selection process.
- Many participants considered First Nations engagement critical to inform site selection near communities, sacred sites, and Native Title land.
- There was support amongst some participants for standardised climate modelling across DNSPs to inform vulnerability assessments and ensure consistency.
- In some MIRO board responses, it was suggested that the term “vulnerability” should consider socio-economic factors as well as structural (infrastructure) vulnerabilities.
- Three participants raised concern about the distribution of costs between safe and vulnerable communities as an area needing further consideration in their responses.

Recommendations

1. Site selection should take into account:
   - Geographic variations in climate vulnerability,
   - Variation is socio-economic factors across the region,
   - Variations in structural (infrastructure) vulnerability across the region,
   - Location of Native Title Land and First Nations’ sacred sites, informed by consultation with First Nations people and communities.
2. All distribution businesses should use the same standardised climate modelling to inform climate vulnerability assessments.
3. Distribution businesses need to consider the distribution of costs between communities.

5.2 Long term planning

Context

Stakeholders have raised concerns regarding the increasing risk of the networks being repeatedly re-built following an increasing frequency of extreme weather events. Distributors will develop plans that consider where they should invest proactively and/or where they can build back better.

To better understand the balance of customer interest between proactive and reactive investment, participants were asked the following question: **Do customers support proactive investment in resilience (as opposed to solely reactive)?**

Customer feedback

- Customers overwhelmingly supported the idea of both reactive *and* proactive resilience investment.
- The distribution of costs was a major point of concern amongst a large number of participants.
- Some participants suggested that robust cost benefit analyses must underpin proactive investment, and that these models should be made publicly available.
- The concept of “building back better” was seen by the majority of participants as desirable, however, there was some confusion regarding what the phrase means with some participants wanting more context and clarity around what “business as usual” and “building back better” mean.
- Many participants perceive proactive investment as a cost-effective long-term risk reduction measure which in turn reduces the need for frequent and costly reactive measures to emergency events.
- Collaboration across other service providers was perceived to improve outcomes by some participants.
- Some frustration was expressed by participants regarding the continual replacement of infrastructure following outage events. During “building back better” efforts following these events, it was suggested by a participant that burnt power poles could be replaced with concrete poles, rather than new timber poles, to reduce future risk to the asset.

Recommendations

1. Proactive investment should be supported by:
   - Robust cost benefit analyses and economic models that are communicated to customers,
   - A clear definition of what “building back better” means in practice and in comparison to the current context.
2. Proactive investment, as well as reactive investment, should be prioritised in resilience building activities.
3. Consider opportunities for collaboration across service providers in order to improve resilience building outcomes for customers and communities.
4. Consider how assets and infrastructure can be “built back better” following damage caused by extreme events.

5.3 Partnerships

Context

Distributors propose exploring whether new or enhanced partnerships with communities and other parties (critical infrastructure, other distribution businesses, emergency management, government, councils, other community organisations) can offer value for money and improved customer outcomes. At the same time, distribution businesses also proposed focusing efforts on the outcomes they are best placed and accountable to deliver, recognising that community resilience is a shared responsibility.

To gather feedback and suggestions regarding the how these partnerships operate in practice, participants were asked the following questions: **What objectives / outcomes should these partnerships achieve? What do these partnerships look like / how do they function?**

Customer feedback

- There was a preference amongst participants for partnerships to prioritise win-win scenarios addressing multiple issues for customers, and some interest in shared resourcing models for community outreach with local councils.
- Many participants suggested that partnerships should involve a clear definition of roles and responsibilities in increasing resilience.
- There was a strong desire amongst participants for distribution businesses to work with water, gas, telecommunications, local councils, and community groups in resilience planning. This sentiment was reinforced through participant feedback following the session which included the suggestion for future engagement workshops to include more service providers. However, it was acknowledged that these services are each at different stages of resilience investment planning.

Recommendations

1. Clearly define and communicate roles and responsibilities within partnerships in developing and delivering resilience plans.
2. Consider how the shared responsibility of building network and community resilience can best be approached through collaboration and partnership between distribution businesses, other service providers, local councils, and impacted communities. For example, through the definition and pursuit of shared customer outcomes.
3. Prioritise partnerships in which multiple customer issues can be addressed simultaneously.

5.4 Economic analysis

Context

Distributors propose to undertake a data-driven approach to assessing the risks and benefits of extreme events and any proposed investments. This includes sourcing climate projections from reputable sources, clearly outlining all assumptions, and using sensitivity analysis, and looking at the prudency and efficiency of solutions, customer values (including the willingness to pay) and social costs/benefits.

To better understand customer values with respect to cost benefit analyses and the distribution of resilience investment costs, participants were asked the following questions: **What should we do if economic analysis delivers decisions that do not meet customer expectations? How should the AER and/or policy makers respond in these circumstances?**

Customer feedback

- There was some agreement amongst participants that customer values should be an input to cost benefit analyses. Some participants questioned this assumption by asking how social costs and benefits can be measured in this process, whether current economic analyses are robust enough, and suggested that further engagement and data collection was necessary to understand the relationship between customer values and benefit analyses.
- It was suggested that the distribution businesses submit a rule change request to update the National Electricity Law and Rules to align with current values.
- The following suggestions were also raised by individual participants:
    - There should be an incentive scheme for Major Event Days (MEDs) that is distinctly different from the Service Target Performance Incentive Scheme (STPIS).

    - The Australian Energy Regulator should also develop wide and long duration outage events (WALDOs) as Values of Customer Reliability (VCRs) are not fit for purpose for resilience investment.
    - The suggestion not to rely on the Capital Expenditure Sharing Scheme (CESS) and Efficiency Benefit Sharing Scheme (EBSS). Increased government oversight is needed to diversify decision making power from only the AER.
- There was a suggestion that the distribution businesses should share cost benefit analyses of solutions publicly.
- Participants suggested that the assessment of community benefits from avoiding power outages should consider environmental benefits, emissions reduction, emotional and social distress, lost opportunity costs, lost income, and secondary financial impacts.

Recommendations

1. Consider customer values in future cost benefit analyses for solutions and publicise outcomes.
2. Consider environmental benefits, GHG emissions reduction, emotional and social distress, lost opportunity costs, lost income, and secondary financial impacts in the assessment of community benefits due to avoided outages.

5.5 Customer driven outcomes

Context

Distributors will engage to better understand customer needs and views in shaping long term investment plans, and to guide how they engage with communities proactively and reactively during extreme events.

To assist in the prioritisation of customer needs and views in long-term investment plans, participants were asked the following question: **Are there specific outcomes that customers want distribution businesses to focus on/ deliver in in our investment proposal?**

Customer feedback

Multiple suggestions and pieces of feedback were raised by individual participants in the discussion of this principle, including that:

- Distributors must demonstrate their preparation for a changing climate to customers to instil confidence in local level preparedness.
- At-risk communities, who are sometimes also the most financially disadvantaged, need to be consulted to understand their willingness to pay for resilience measures.
- Distributors should utilise council contacts to understand who to engage with regionally and rurally.
- Distributors need to learn from the mistakes of power companies internationally, for example Pacific Gas and Electric Company in the US.
- The benefit to all Victorian customers should be considered in network reliability and resilience assessments.
- Day-to-day outages should not be considered in the same way that outages caused by extreme events are.
- There was agreement amongst participants that engagement undertaken by distribution businesses should extend beyond obligations set out by compliance requirements, and should be human-centric, purposeful, and make efficient use of participants' time.

Recommendations

1. Distributors should incorporate the principle of customer driven outcomes into all operations and practices, not just resilience investment.
2. Distribution businesses should engage with at-risk communities to understand their willingness to pay for resilience measures.

3. Distribution businesses should work with local councils to identify organisations and communities to engage with regionally and rurally.
4. Distribution businesses should demonstrate preparation for climate change to instil confidence in at-risk communities.
5. Distribution businesses should take learnings from similar international organisations in driving resilience investment.
6. Distribution businesses should strive for human-centric engagement practices, beyond the compliance level of engagement, and continue to value customer input in decision-making processes.

6 Future engagement

Throughout workshop discussions, many participants expressed their fatigue with “checkbox” or compliance-based engagement, particularly when undertaken with First Nations individuals and communities. There was agreement amongst participants that there is a need for genuine, human-centred engagement extending beyond compliance.

The idea of a separate resilience planning workshop was also suggested between the distribution businesses and other agencies and organisations, including water corporations, gas networks and telecommunications providers.

The results of a poll completed at the conclusion of the workshop indicated that workshops are the preferred delivery method for future engagement activities. The distribution businesses have committed to continued engagement with customers in the preparation of the Resilience Investment Framework, either individually or jointly.

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Appendices

A Participants

Appendix A: Workshop participants

Over **73 participants** representing **40 organisations** attended the Resilience Investment Framework Workshop. The workshop was also attended by community members from the distributors' customer panels and farmers.

- Ambulance Victoria
- Australian Energy Regulator
- Baw Baw Shire Council
- Benalla Rural City Council
- Booroondara City Council
- Cardinia Shire Council
- City of Glen Eira
- City of Greater Bendigo
- City of Stonnington
- Coliban Water
- Committee for Greater Shepparton
- Country Fire Authority
- Department of Energy, Environment and Climate Action
- Department of Jobs, Skills, Industry and Regions
- East Gippsland Shire Council
- Emerald Community House
- Erne Energy
- Food and Fibre Great South Coast
- Frankston City Council
- Goldburn Valley Water
- Indigo Power
- Latrobe City Council
- Maribyrnong City Council
- Moira Shire Council
- Monbulk Emergency Management Group
- Moorabool Shire Council
- Mornington Peninsula Shire
- Mums of the Hills
- Murrindindi Shire Council
- nbn Australia
- North East Water
- Northern Grampians Shire Council
- Parks Victoria
- South Gippsland Shire
- St Vincent de Paul Society
- Towong Shire Council
- Victoria Police
- West Wimmera Shire Council
- Yarra Ranges Shire Council
- Yarra Valley Water

B Pre-reading material

Powering Victoria

Together

Joint Victorian Distribution Businesses Resilience Framework Preparation Workshop

Pre-Reading Material

September 2023

Contents

Glossary, Terms and Acronyms

Australian Energy Regulator (AER)	The regulator of the wholesale electricity and gas markets in Australia. It is part of the Australian Competition & Consumer Commission, and enforces the rules established by the Australian Energy Market Commission.
Community resilience	The ability of communities to withstand and recover from the impacts of natural disasters.
Department of Energy, Environment and Climate Action (DEECA)	Victorian government department responsible for overseeing the provision of secure and sustainable energy across the state.
Distribution Businesses (Distributors)	Electricity Distribution Businesses (distributors) manage the transmission of electricity from power generation facilities to homes and business
Ex-ante funding	Funding which is secured in advance of a crisis or extreme event occurring.
Ex-post funding	Funding which is secured after a crisis or extreme event has occurred.
Resilience Investment Framework	Framework in development by the distributors to provide structure, guidance, and criteria for resilience investment decision-making.
National Electricity Market (NEM)	The wholesale market through which generators and retailers trade electricity in Australia's eastern and southern states.
National Electricity Rules (NER)	Govern the operation of the NEM. These rules are established by the Australian Energy Market Commission.
Network reliability	The probability of a system, device, plant or equipment performing its function adequately for the period of time intended, under the operating conditions encountered.
Network resilience	Network resilience is the ability to withstand and recover from the effects of a natural hazard or disaster.
Network Service Provider (NSP)	A person who owns, operates or controls a transmission or distribution system.
Regulatory Reset	Every five years, the distributors prepare a fully costed business plan (or regulatory proposal) for the review and approval of the AER. This is called an Electricity Distribution Price Review. But we refer to it simply as the regulatory reset.

Introduction

Summary

This pre-reading material will prepare customers with background knowledge to support participation in the *Joint Victorian Distribution Businesses Resilience Investment Framework Preparation Workshop*. The workshop will provide an opportunity for you to share your thoughts, ask questions and inform the components of the framework and how it might be applied by the networks.

The impacts of climate change on electricity supply and distribution are already present and increasing. Historically, investment in networks for the explicit purpose of increasing resilience has not occurred. To enable such investment, the *Resilience Investment Framework* is being developed by Victorian Distribution Business for the 2026-2031 Regulatory Reset Proposal.

The purpose of the framework is to provide structure, guidance, principles and criteria for resilience investment decision-making. The distributors are working together to establish a uniform strategy to resilience investment across the state, which enables more meaningful engagement with stakeholders who will benefit from this consistent approach.

The Australian Energy Regulator (AER) and the Department of Energy, Environment and Climate Action (DEECA) have released guidance around investment funding decision making, including for resilience. AER guidance requires that genuine engagement with customers on their needs be undertaken. Extensive consultation has been conducted to date with customers at both a 'broad & wide', and 'deep & narrow' scale, to understand customer vulnerabilities, needs and priorities.

Distributors are now engaging further with customer groups to educate, establish customers' current understanding of resilience concepts, introduce decision-making principles and gather customer experiences.

Climate change impacts on electricity supply and distribution are increasing in severity and frequency

Explicit **investment in network resilience** has not happened in the past

Distributors are working together to develop a robust framework for investment

The purpose of the framework is to provide structure, guidance, principles and criteria for **resilience investment decision-making**

The AER and DEECA have released guidance around investment funding decision making which includes a focus on **customer needs and consultation**

Why engage on, and develop a **joint** resilience investment framework?

- To respond to a common set of customer/ community needs
- To broaden range of customer and community perspectives heard through joint engagement
- Achieve engagement synergies and reduce burden on stakeholder time
- To achieve consistency in:
  - Frameworks for identifying, assessing and proposing solutions
  - Approach to addressing outcomes of Victorian Government Network Resilience Review
  - Incorporation of findings of foundational AECOM climate change risk assessment work undertaken jointly.

Distributors will apply the resilience investment framework to develop the resilience projects and programs included in their Revenue Proposals for the 2026-31 regulatory period

Purpose of the workshop

- Set out the Distributors' rationale and intention for developing a joint Resilience Investment Framework
- Inform stakeholders on:
  - The regulatory framework for resilience investment
  - The steps we are taking now to improve network resilience
- Gather customer knowledge and experiences of energy resilience issues, and identify gaps in our understanding of customer and community needs
- Collaborate on principles and approaches that will help the distributors make balanced and informed decisions that align with customer preferences
- Design future customer involvement in the development of the Framework

Climate change impacts

Climate change impacts

The joint distributors are committed to understanding the risks posed by the changing climate (both to our networks, and the communities we support). We have engaged AECOM to conduct a climate change study to understand the vulnerabilities across the state which will impact our networks. This study considered the key climate hazards described below:

Key climate hazards considered in the first-pass AECOM climate change risk assessment, and the potential impacts on our network

Extreme rainfall
Much of Victoria is projected to experience more frequent and intense extreme rainfall events by 2070.

Flooding can cause the destabilisation of foundations or asset inundation causing damage, and it can limit access to assets.

Extreme heat
There is projected to be an increase in the number of extreme heat days and more frequent heatwaves across Victoria.

This can cause sagging of power lines, faults in communications equipment, and damage to substations.

Bushfires
The number of high-risk bushfire days per year by 2070 is projected to increase.

Increased bushfires can damage or destroy assets, particularly transmission and distribution lines.

Extreme wind
Projections suggest an increase in the frequency and severity of extreme winds, however there is low agreement among climate models.

This poses a risk mainly to overhead distribution and transmission lines.

Sea Level Rise
Sea levels around Australia are rising.

This could cause increased corrosion of metal assets, inundation, saline groundwater intrusion, or destabilisation of asset foundations.

Extreme events and resilience

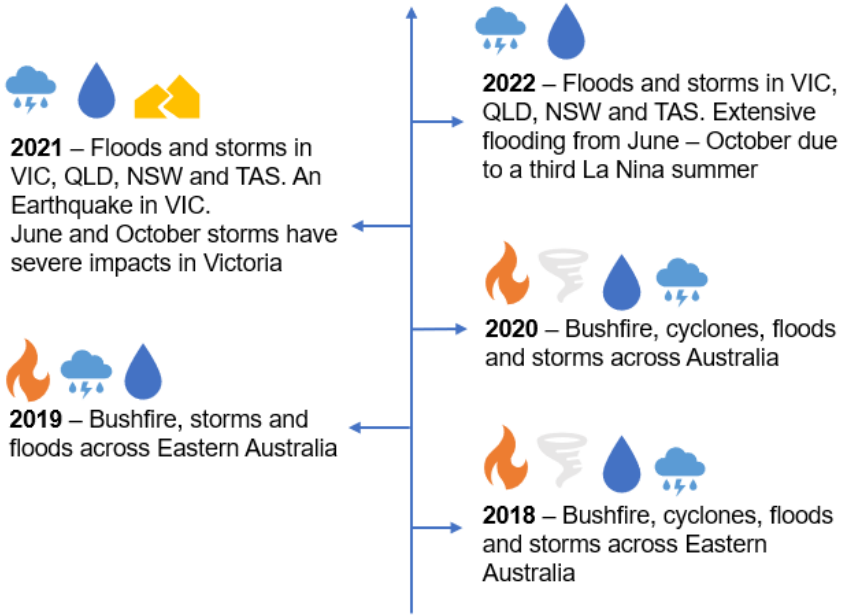
While supporting community resilience is a **shared responsibility across multiple entities**, our primary role and focus during emergency events is the **safe, efficient and quick restoration of power**

Recent major weather events across the country have highlighted the importance of not just network, but also community resilience.

Storms, wind, fire, floods and heat can all impact the network and our customers who rely on it to meet their needs.

Customers are increasingly dependent on electricity in every aspect of their lives, including during prolonged outages.

While extreme weather events are not new, the increased frequency and severity of these events due to climate change, as well as growing customer dependency on electrification, is requiring us to change the way we plan for and operate our networks.



Examples of declared disasters across Australia since 2018
Source: https://www.disasterassist.gov.au/find-a-disaster/australian-disasters#

Climate change impacts

Science shows that increasing global emissions are having far-ranging impacts on Victoria's climate.

The AECOM climate change risk investigation found that distribution assets have different levels of exposure to climate hazards. As shown in the table on the right, exposure to climate hazards varies across asset types as well as distributor service areas.

Relative exposure of different asset types to select hazards for each distribution business

Yellow < 5%

Orange = 5% to 10%

Red > 10%

n/a = not assessed

(Source: AECOM Climate Change Risk Assessment, 2023)

	Distribution (<22 kV) lines	Distribution (> 66 kV) lines	Transmission lines	Distribution Substations	Transmission, Zone and Terminal Substations
United Energy					
Extreme Rainfall (flooding)			-		-
Bushfire			-		-
Extreme wind (vegetation)			-	n/a	n/a
Sea Level Rise (2040)			-		-
Sea Level Rise (2070)			-		-
Powercor					
Extreme Rainfall (flooding)			-		
Bushfire			-		
Extreme wind (vegetation)			-	n/a	n/a
Sea Level Rise (2040)			-		-
Sea Level Rise (2070)			-		-
CitiPower					
Extreme Rainfall (flooding)			-		
Bushfire	-	-	-	-	-
Extreme wind (vegetation)			-	n/a	n/a
Sea Level Rise (2040)			-	-	
Sea Level Rise (2070)			-	-	-
Jemena					
Extreme Rainfall (flooding)		-	-		
Bushfire		-	-		-
Extreme wind (vegetation)		-	-	n/a	n/a
Sea Level Rise (2040)		-	-	-	-
Sea Level Rise (2070)		-	-		
AusNet					
Extreme Rainfall (flooding)					
Bushfire					
Extreme wind (vegetation)				n/a	n/a
Sea Level Rise (2040)					-
Sea Level Rise (2070)					-

In the face of climate change, distributors are acting to improve resilience

Targeted outage preparation media campaigns and early engagement

Pre-summer media campaigns with some specific messages for life support and vulnerable customers regarding contingency plan preparation. 'Pre storm' messaging and development of new tools to identify and target (using SMS & social media) specific customers during/after major storm events

Advanced forecasting and weather analytics

Using state-of-the art outage prediction tools that combine weather forecasts and operational data, we are better able to anticipate and respond to weather impacts on our network and communities. This information helps us determine when/where a response will be needed and where to allocate staff so that they are positioned and equipped to restore power safely and quickly

Improved coordination with EMV and Councils

Position Electricity- Emergency Management Liaison Officer at the EMV State Control Centre during major events; continuing to formalise and expand the number of councils we engage with for emergency management planning

Prioritisation of restoration

Distributors prioritise restoration primarily based on safety considerations and the number of customers off supply. The rationale behind this is that power should be restored in a safe way and only inspected power lines should be re-energised. By targeting the highest numbers of customers off supply first, we will reduce vulnerability resulting from extended periods without power for the largest part of our customer base. When considering prioritisation of single customers off supply, customers that are prioritised include critical infrastructure, Life Support Customers and hospitals, retirement villages.

Mobile Engagement Response Vehicle (MERV) on-the-ground community support

To be available for deployment during extended outages, to provide information to the impacted community and meet immediate electricity needs, such as phone charging, cellular phone reception, refrigeration, tea/ coffee/ hot water

Mutual aid

Involves changes to agreements between Victorian networks (for support during events limited to individual DNSP areas) and formalising agreements with networks outside of Victoria (for support during state-wide events)

Inter utility coordination

In place, sharing of learnings between operational centres was ramped up substantially following COVID and 2021 extreme weather events. Inter-utility group (including water utilities, NBN etc) in place to improve preparedness and coordination post-event

Enhancing critical customer grid resilience

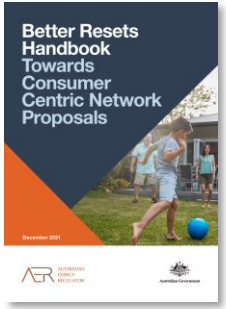
ARENA funding sought to deploy batteries at several critical water treatment plans across Gippsland Water network

Postponing non-critical planned outages

To provide relief to customers that have experienced prolonged unplanned outages during major storm events, we may postpone planned outages for non-critical works where doing so will not impact the safety and reliability of the network.

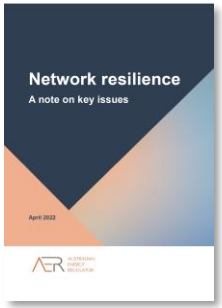
Regulatory context

Regulatory context

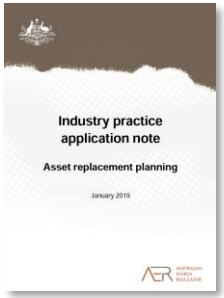


Better Resets Handbook – Towards Consumer Centric Network Proposals
(AER, Apr 2022)
seeks to encourage networks to better engage and have consumer preferences drive the development of regulatory proposals.

Electricity Distribution Network Resilience Review
(DEECA, Apr 2022)
outlines steps that networks should be taking (beyond existing practices) to better prepare and respond to extreme weather in the short, medium and long term. This includes better engagement with consumers to have their preferences drive the development of regulatory proposals. The Victorian government's response to this review is due to be released as soon as this month.

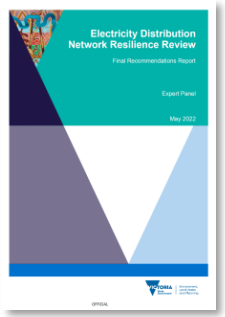


Network Resilience – A note on key issues
(AER, Apr 2022)
presents the AER's guidance on defining network resilience, explains how network resilience is funded within the NER, describes how NSPs can demonstrate resilience funding is in the long term interests of consumers, and explains an NSP's role in supporting community resilience.



Industry practice application note – Asset replacement planning
(AER, Jan 2019)
provides guidance and examples on how NSPs could meet NER requirements for demonstrating the prudency and efficiency of network asset investment on asset retirement and de-rating decisions, but does not explicitly mention climate change or resilience.

Regulatory context



In 2022, the Victorian Government's Expert Panel for the Electricity Distribution Network Resilience Review released their short, medium and long term final recommendations to the Minister of Environment and Climate Action, which are currently under consideration.

The key findings were:

- **Network and community resilience need strengthening** in the face of increasing extreme weather due to climate change.
- **Substantive reforms** to reduce the *likelihood* and *impact* of prolonged power outages from storms and other extreme weather events.
- DEECA expect distributors to identify resilience solutions and investments when developing their regulatory proposals for 2026-2031.

Short Term (by 2025)

- Distributors should identify locations with highest risk of prolonged outages and propose options to reduce that risk
- Government should assess the proposed options for cost-benefit and determine the preferred solution and funding mechanism
- These measures would be a new obligations for distributors under the Victorian legislative framework, with penalties for non-compliance
- The Minister would also have additional powers to direct distributors to take actions where necessary

Medium Term (from 2025)

- Distributors should develop and update a 5-yearly Network Resilience Plan which takes an all-hazards approach to risk mitigation for the purposes of reducing the likelihood of prolonged outages
- The Network Resilience Plan would have to be approved by a regulator, consistent with the framework for Bushfire Mitigation Plans
- Distributors would be required to comply with the Network Resilience Plan, with penalties for non-compliance

Long Term

- DEECA should work with the AER to support the assessment of customer willingness to pay to avoid wide area, long duration outages (WALDO)
- DEECA should propose a National Electricity Rule (Rule) change to the capital expenditure objectives to specifically account for resilience
- DEECA should propose a Rule change for the AER to incorporate a new regulatory mechanism to drive proactive investments in network resilience

Distributors’ role in managing network and community resilience

The distributors' primary role during emergency events is the safe, efficient and quick restoration of power

While supporting community resilience is a **shared responsibility across multiple entities**, our primary role and focus during emergency events is the **safe, efficient and quick restoration of power**

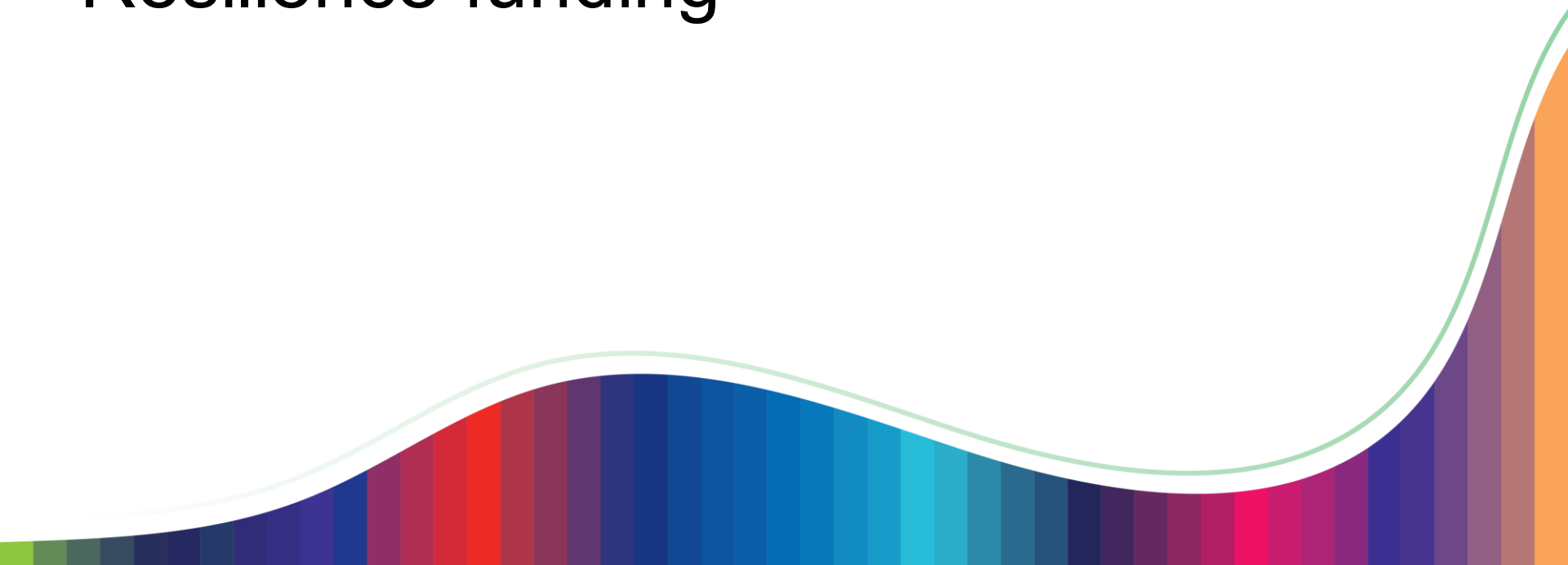
Expectations on the **scale and scope** of our roles are also evolving

Our role encompasses:

- Restore power quickly, safely and efficiently during/ after extreme weather events
- Maintain a safe and reliable distribution network through prudent asset replacement decisions
- Adapt our asset management, operations and investment programs to efficiently respond to and manage the effects of climate change
- Provide timely and relevant information on outage cause and restoration times during events
- Administer Prolonged Power Outage Payments (PPOP)* when requested to support State Government
- Resource and support community hubs where required/ requested relative to the nature/ scale of the incident
- Support State Control Centre (EMV) arrangements through the provision of an Energy Emergency Management Liaison Officer
- Assist with municipal planning to strengthen local council/ community preparedness
- Coordinate with critical utilities to respond to critical services requests for assistance during emergencies.

* Additional, government funded relief payments over and above Guaranteed Service Level (GSL) scheme payments that impacted customers may also be eligible for

Resilience funding



Network resilience, network reliability and community resilience

Network reliability	The probability of a system, device, plant or equipment performing its function adequately for the period of time intended, under the operating conditions encountered.
Network resilience	Network resilience is the ability to withstand and recover from the effects of a natural hazard or disaster.

Network resilience and **community resilience** are different but related concepts.

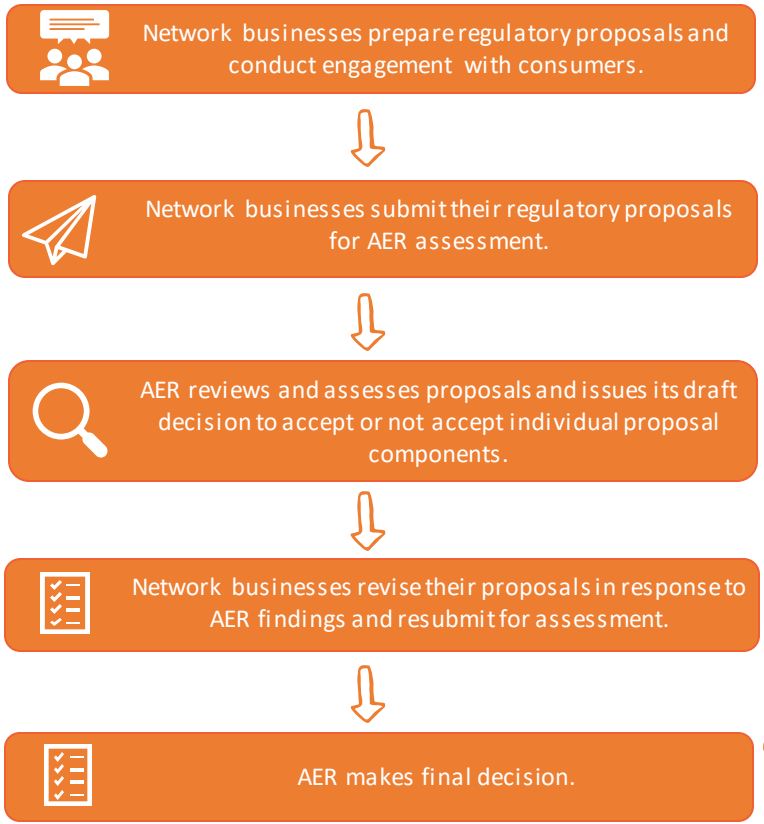
A resilient electricity network can assist in building community resilience, however this also relies on the support of many other entities such as government bodies, individuals themselves and other critical infrastructure operators.

During the resilience investment framework development process, we will discuss the concept of community resilience with our customers to discover what this means in different communities and explore the role distributors have in contributing to it.

Funding: The regulatory reset process

The **Australian Energy Regulator (AER)** is the economic regulator of energy networks in all states and territories except Western Australia.

The AER sets the maximum revenue and prices that network businesses can recover from users of their networks.



The proposals cover investments, pricing plans and rates of return. **The Resilience Investment Framework will guide these proposals.**

AER's assessment criteria include:

- efficiency of costs
- quality of engagement with customers
- projected demand for energy
- age of infrastructure
- operating and financial costs
- network reliability and safety standards.

Funding approaches: ex-ante and ex-post

To manage network risks from a weather-related event, an NSP can request funding:

- **Ex-ante funding** in its revenue proposal, forecasting the likely costs to be incurred in the upcoming five year regulatory control period

- **Ex-post funding** after a revenue determination, applying for the recovery of actual costs incurred after extreme weather-related events through the cost pass through mechanism

Where weather-related events are **foreseeable**, it may be efficient for NSPs to be funded ex-ante to manage these risks as part of good industry practice. NSPs are expected to prudently anticipate and efficiently manage these events themselves. Such ex-ante funding could include funding to prevent or mitigate risks to the network.

This includes upfront funding for proactive and reactive works. For example, it might include funding for network hardening, but also upfront funding for community liaison supporting their disaster recovery planning (some of which may not be executed until after a storm)

The timing and costs of **extreme weather events** are far less predictable. In those cases, it may be more efficient for network repair costs to be passed through as damage actually occurs, rather than paying for proactive measures that may not be required (or may not be sufficient) through the ex-ante funding.

An ex-post approach, however, will likely result in an ongoing deterioration in customer lived experiences, and may be higher cost overall (given repair costs under duress would be higher than a planned equivalent).

Source: Network Resilience – A note on key issues (AER, April 2022)

Funding approaches: value of customer reliability

In assessing the benefits of any potential investment, distributors typically rely on the value of customer reliability (VCR) determined by the AER

The VCR measures the **value placed by customers on avoiding outages**

The AER's most recent review of VCRs in 2020, however, only provided a measure for outages of less than 12 hours (i.e. shorter-duration outages)

When considering resilience initiatives, the focus is on longer-term outages

- The AER previously attempted to estimate the costs of Widespread and Long Duration Outages (WALDO), but this study was discontinued in 2020 due to challenges with determining an appropriate modelling approach
- The AER is commencing its next VCR review in Q4 2023, which must be completed by 31 December 2024. While details are not currently available, this review may seek to determine the customer value placed on avoiding prolonged outages and a 'value of resilience'
- AusNet's Quantifying Customer Values (QCV) Study (currently in flight) and Powercor's Customer Values research (being refreshed) will also quantify a value that customers place on avoiding prolonged outages

Funding approaches: Applications for resilience funding

To support applications for resilience funding, NSPs must demonstrate:

1. A causal relationship between the proposed resilience expenditure and the **expected increase in extreme weather**.

2. The proposed expenditure is required to **maintain service levels** and is based on the option that likely achieves the **greatest net benefit** of the feasible options considered.

3. Consumers have been **fully informed of different resilience expenditure options**, including the implications stemming from these options, and that they are supportive of the proposed expenditure.

Source: Network Resilience – A note on key issues (AER, April 2022)

Distributors are able to pass through the costs* of responding to extreme weather events

The pass through provisions of the NER recognises that a distributor can be exposed to risks beyond its control, which may have a material impact on costs. A cost pass through enables a distributor to recover (pass through to customers) the costs of defined yet unpredictable, high cost events that are not built into approved revenues.

Extreme weather events that cause widespread damage and outages would satisfy the "natural disaster" definition of a pass through event

If the cost incurred exceeds $7m, it would satisfy the materiality threshold

Pros

- Reduces networks' incentive to over-design and over-build the network – therefore, reducing bills for customers
- Reduces networks' financial exposure to high impact and unpredictable events

Cons

- If an event does occur, customers are exposed to prolonged outages, and any material costs of responding and repairing the network are ultimately borne by customers
- The costs might be higher (compared to planned and preventative resilience works), as the costs to undertake work under emergency conditions are more expensive
- Customer lived experience will deteriorate with increased frequency of events

* Where these costs are material (i.e. exceed 1% of annual distributor revenue); noting that distributors have previously absorbed these costs in some circumstances, but this is expected to become more challenging given expected increases in the severity and frequency of these events

Customer feedback and lived experiences

Customer engagement

Distributors are engaging with customers throughout the development of investment frameworks, with the following key objectives

Understand customers' current level of knowledge about the regulatory reset process and the role of distribution businesses in resilience

Listen to customer experiences relating to extreme weather outages or maintenance programs and identify specific customer issues

Gather customer knowledge and lived experiences to inform decision-making principles, trade-offs and the desired customer outcomes we can deliver

Inform customers of the regulatory reset and investment framework development process

Educate customers on the implications of climate change on electricity supply

Provide an opportunity for customers to ask questions and guide future engagement activities

Customer engagement: Feedback received

Disaster recovery and climate change adaptation

- Networks must adapt to changing climates, including extreme events
- There is a need for versatile disaster recovery programs that are focused on supporting communities
- Networks can help communities become more resilient through community batteries and microgrids

Cyber-security

- Networks must be able to withstand hostile attacks on the grid

Affordability and equity

- Geographic inequality in both reliability and cost is not desirable
- There should be a minimum standard level of service for everyone
- Better infrastructure is required in rural areas to support economic growth

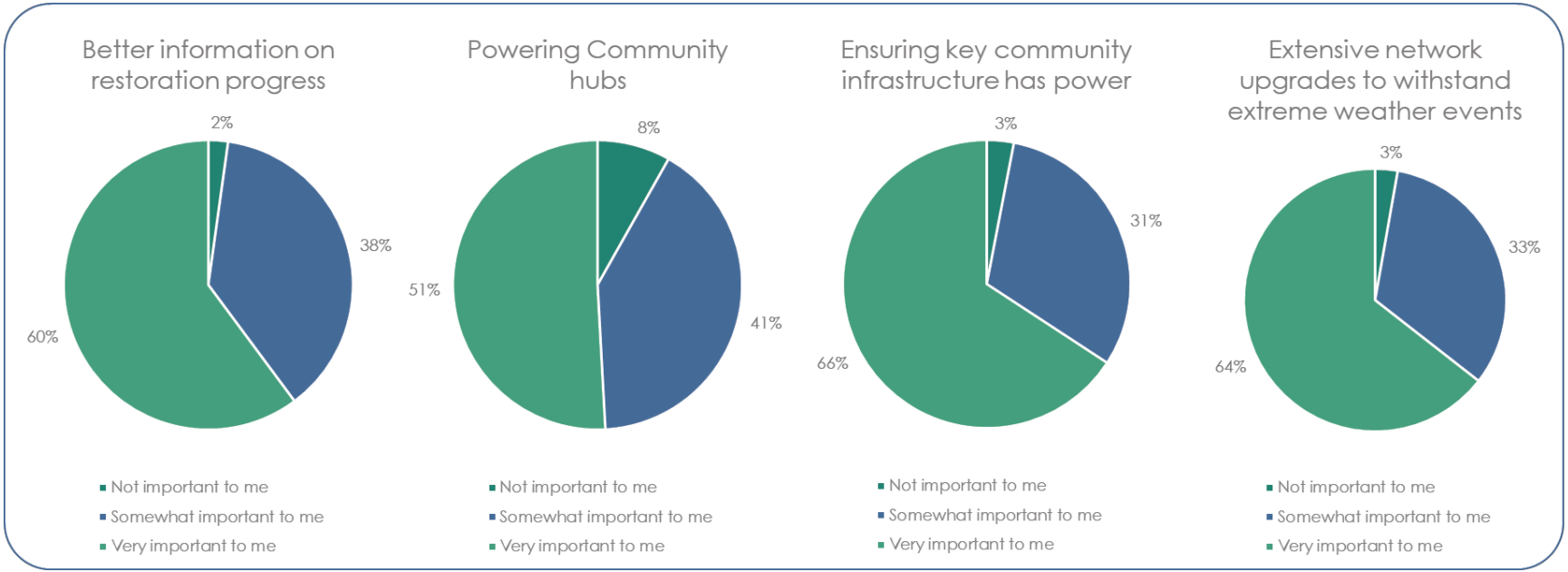
Communication

- Proactive communication of expected timeframes during unplanned outages is desired
- Site crews should share more accurate restoration time
- Transparency and honesty on restoration times is valued more than speed
- More information is needed on what distributors do and are responsible for

Source: *Broad and Wide Engagement Topic Synthesis & Activity Review* (CitiPower, Powercor, United Energy, April 2023)

Customer engagement: Feedback received

Sentiment towards community resilience during extreme weather events shows that customers place high importance on staying well informed, keeping essential systems operating and preventing the impact of severe outages



Source: Ausnet 2022 household survey (post June and October 2021 storms)

Customer engagement: Financial cost of power outages

During the outages following the June 2021 storm:

79% of households in reported incurring financial losses as a result of the outage

Just over 1 in 3 (36%) households **purchased a generator** at a median cost of $1,200. A further 8% reported **hiring a generator** at a median cost of $200.

15% paid for **accommodation** at a median spend of $500.

Households also put a value on other **miscellaneous costs** (including lost work, food spoilage and emergency assistance) at a median of $500.

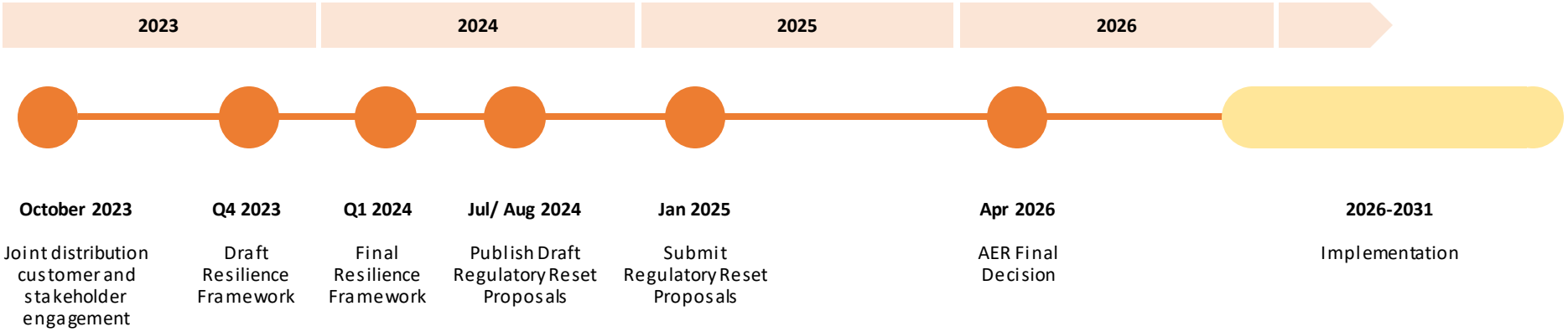
Some households reporting experiencing very **considerable financial losses** bringing the average losses for households in affected communities to $3,537 (median $1,200).

The financial losses from the October 2021 storm were reported as being roughly **half** of the above.

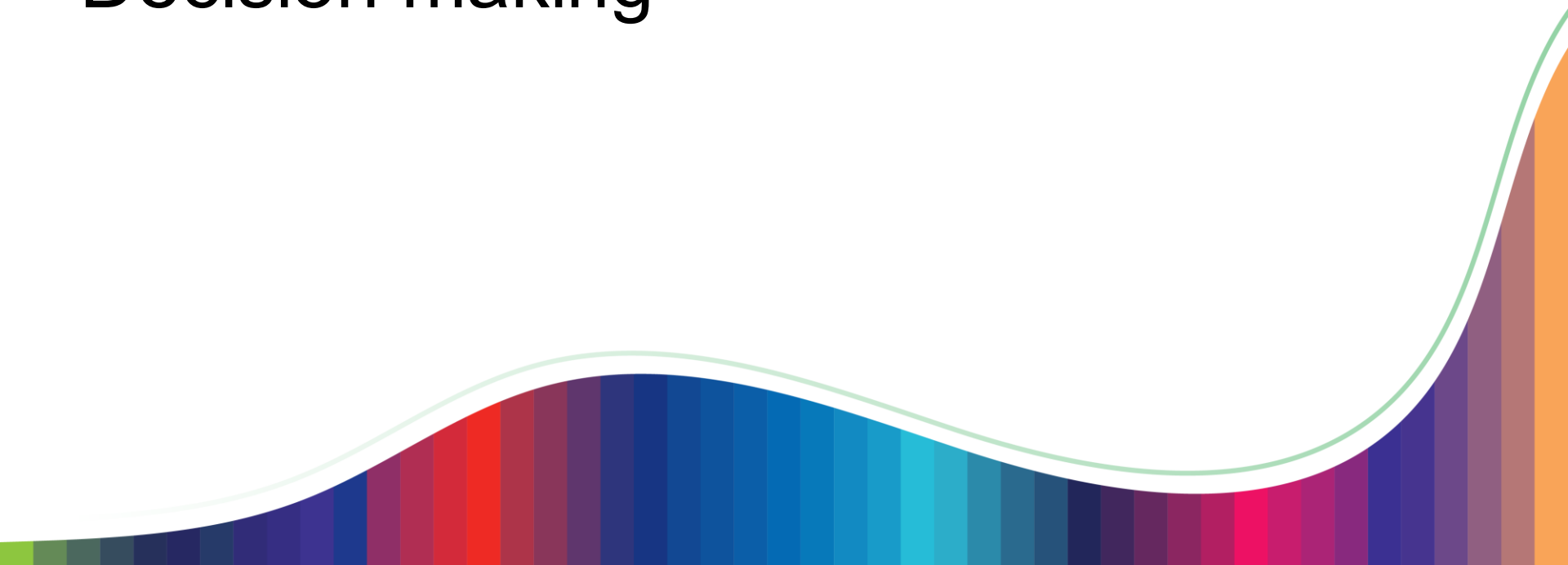
Source: Ausnet 2022 household survey (post June and October 2021 storms)

Customer engagement: Next steps

Distributors will continue to engage with customers, either jointly or individually. Future engagement will be guided by customer preference and feedback.



Decision making



Decision making

The AER expects to see evidence of **prudent and efficient decision-making** on key projects and programs included in regulatory proposals.

This involves:

1. Identification of the **need for the investment** – networks and communities at risk of extreme weather events;
2. Quantitative **cost benefit analysis** assessing all feasible options to show that the preferred option maximises net benefits (including non-network options); and
3. Evidence of fully accounted for **trade-offs between capital expenditure and operating expenditure** to show that the preferred option is prudent and efficient.

Our risk-based investment planning approaches align with these requirements.
We justify the need to invest with a robust assessment of network risk, and undertake comprehensive assessment of network, non-network and operational solutions.

The Resilience Investment Framework will establish criteria, guidance and structure for evaluating and prioritising resilience investments.

Potential solutions

Solution	Cost			Implementation timeframe			Impacted customers		Approach	
	Low	Medium	High	Short	Medium	Long	Whole of network	Targeted	Proactive	Reactive
Improved communication prior to and during extreme weather events	✸			✸			✸	✸	✸	✸
Microgrids and community batteries in vulnerable locations		✸			✸			✸	✸	
Community hub support		✸			✸			✸	✸	
Mobile Emergency Response Vehicles	✸			✸			✸		✸	
Standalone Power Systems (SAPs)		✸			✸			✸	✸	
Critical service provider customer battery back-ups & SAPS		✸			✸			✸	✸	
Large portable generators for deployment during extreme events		✸		✸			✸		✸	
Targeted network hardening (e.g., pole and conductor replacement, improved switching)			✸			✸		✸	✸	
Vegetation management		✸		✸				✸	✸	
Targeted undergrounding			✸			✸		✸	✸	
Support for community resilience planning via community engagement officers	✸			✸				✸	✸	
Support with implementation of community resilience planning		✸			✸			✸	✸	✸

References

- AECOM. (2023). *Climate Change Study for Victorian Electricity Distribution Businesses - Phase 1*.
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Resilience Framework Customer Workshop

Customer workshop

9 October 2023

We acknowledge the Traditional Custodians of the land on which we work and live, and recognise their continuing connection to land, water, and community.

We pay our respects to Elders past, present and emerging.

Agenda

1.30	Introductions
1.40	Workshop Objectives
1.45	Recap of Pre-Reading material
1.55	Climate Change study
2.10	Tell us your experience: Extreme weather and power outages
2.40	Coffee / stretch break
2.50	Defining key terms
3:05	Solutions Matrix
3:15	Principles for decision making
3:45	Community priorities
3:50	Next Steps and Future Engagement
4:00	Workshop Close

1. Introductions

Participants

Customers		
Australian Energy Regulator	Energesis	Northern Grampians Shire
Baw Baw Shire Council	Food and Fibre Great South Coast	Omeo CFA
Benalla Shire Council	Foundation for Rural & Regional Renewal	Powercor
Borough of Queenscliffe	Frankston City Council	Regional Development Victoria
Cardinia Shire Council	Golden Plains Shire Council	South Gippsland Shire Council
Central Goldfields Shire Council	Goulburn Valley Water	St Vincent de Paul Society
Central Victorian Greenhouse Alliance	Indigo Power	Stonnington City Council
CFA	Latrobe Shire Council	Towong Shire Council
City of Greater Bendigo	Monbulk Emergency Management Group	Victoria Police
Coliban Water	Moorabool Shire Council	Wellington Shire Council
Committee for Greater Shepparton	Mount Alexander Shire Council	West Wimmera Shire Council
Contacted Powercor for invite	Moyne Shire Council	Yarra Ranges Shire Council
DEECA	Mums of the Hills	Yarra Valley Water
East Gippsland Shire Council	NBNCo	
Emerald Community House	North East Water	

Distributors
CitiPower, Powercor, and United Energy
Ausnet
Jemena

Facilitators/ Presenters
Nation Partners
Jenni Forrester
Rob Turk
Emma Hawkins
Shannon Regan
Eleni Sgardelis
AECOM
Allan Klindworth
Tanya Milnes

2. Workshop objectives

- Set out the Distributors' rationale and intention for developing a joint Resilience Investment Framework
- Inform stakeholders on:
  - The regulatory framework for resilience investment
  - The steps we are taking now to improve network resilience
- Gather customer knowledge and experiences of energy resilience issues, and identify gaps in our understanding of customer and community needs
- Collaborate on principles and approaches that will help the distributors make balanced and informed decisions that align with customer preferences
- Design future customer involvement in the development of the Framework

3. Recap

What is a distributor?
Electricity Distribution Businesses (distributors) manage the transmission of electricity from power generation facilities to homes and business

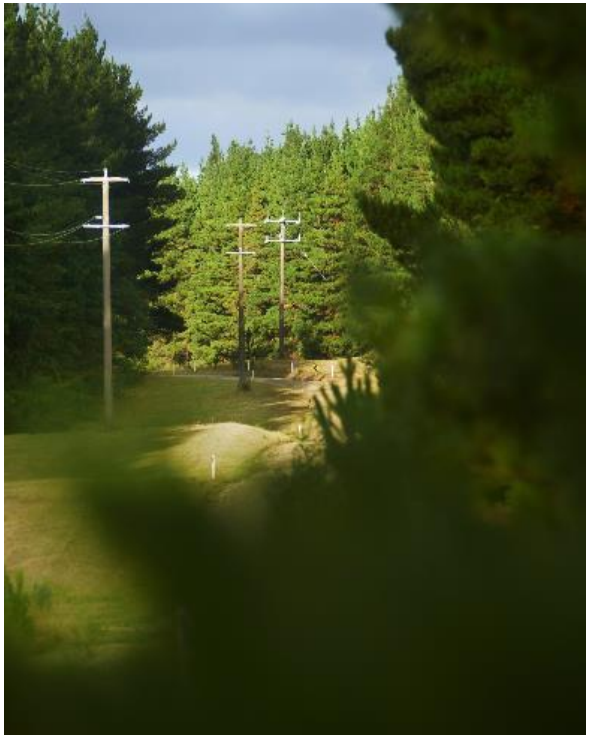
Climate change impacts on electricity supply and distribution are increasing in severity and frequency

Explicit proactive investment in network resilience **has not happened in the past**

Distributors are working together to develop a robust framework for investment

The AER and DEECA have released **guidance** around investment funding decision making which includes a focus on customer needs and consultation

Community resilience is more than just network reliability and network resilience - distributors need to **work with community** to find solutions and build resilience together



3. Recap

Regulatory Reset	The Regulatory Reset Proposal process occurs every 5 years
The Framework	The 2026-2031 proposal will include a ‘Resilient Infrastructure Investment Framework (the Framework)’
Customer needs	The Framework must be designed to align with the needs and preferences of electricity customers

4. Climate change impacts

• Climate Change Study
• – Phase 1

Art by
Bianca
Gardiner
Dodd

Prepared on behalf of Victorian Electricity Distribution

9th October 2023

Delivering a better world

aecom.com

Overview

1. Scope & Methodology
2. Outcomes
3. Q&A

1

Scope & methodology

Scope & Methodology

Task 1

Identification of Climate Hazards and Impacts

1. Select time horizons and representative concentration pathways
2. Review previous assessments and literature
3. Identify relevant climate hazards and variables
4. For each hazard, identify potential impacts (risks) on network and customers

Task 2

Hazard Mapping

1. Identify and collate hazard data
3. Overlay asset and hazard data using ArcGIS
4. Assess relative exposure of assets to hazards across the network

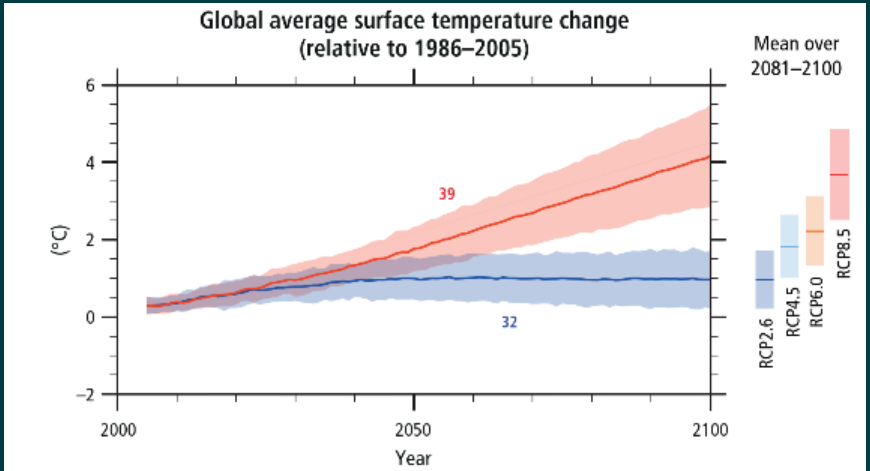
Task 3

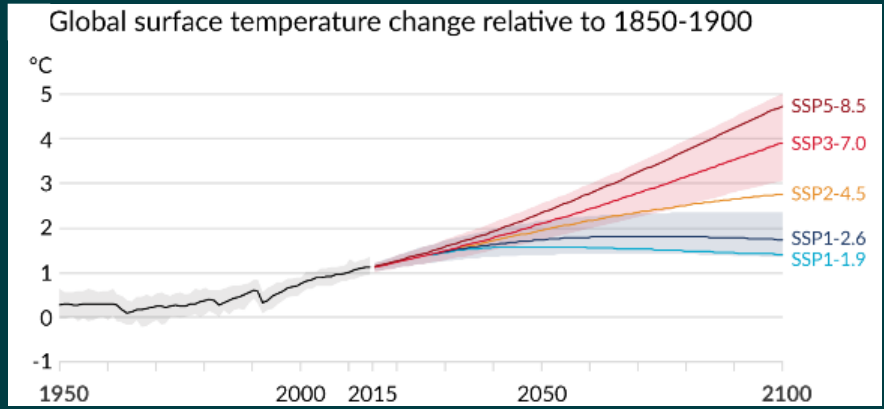
Documentation of Findings

1. Draft a brief report that provides a summary of risks and commentary on distribution of exposure to hazards

Horizons and projections selected for the study

Time horizons	Representative concentration pathways	Share socio-economic pathways
2030	RCP4.5 and RCP8.5	SSP2-4.5 and SSP5-8.5
2070	RCP4.5 and RCP8.5	SSP2-4.5 and SSP5-8.5





Source: IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate

Source: IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

2

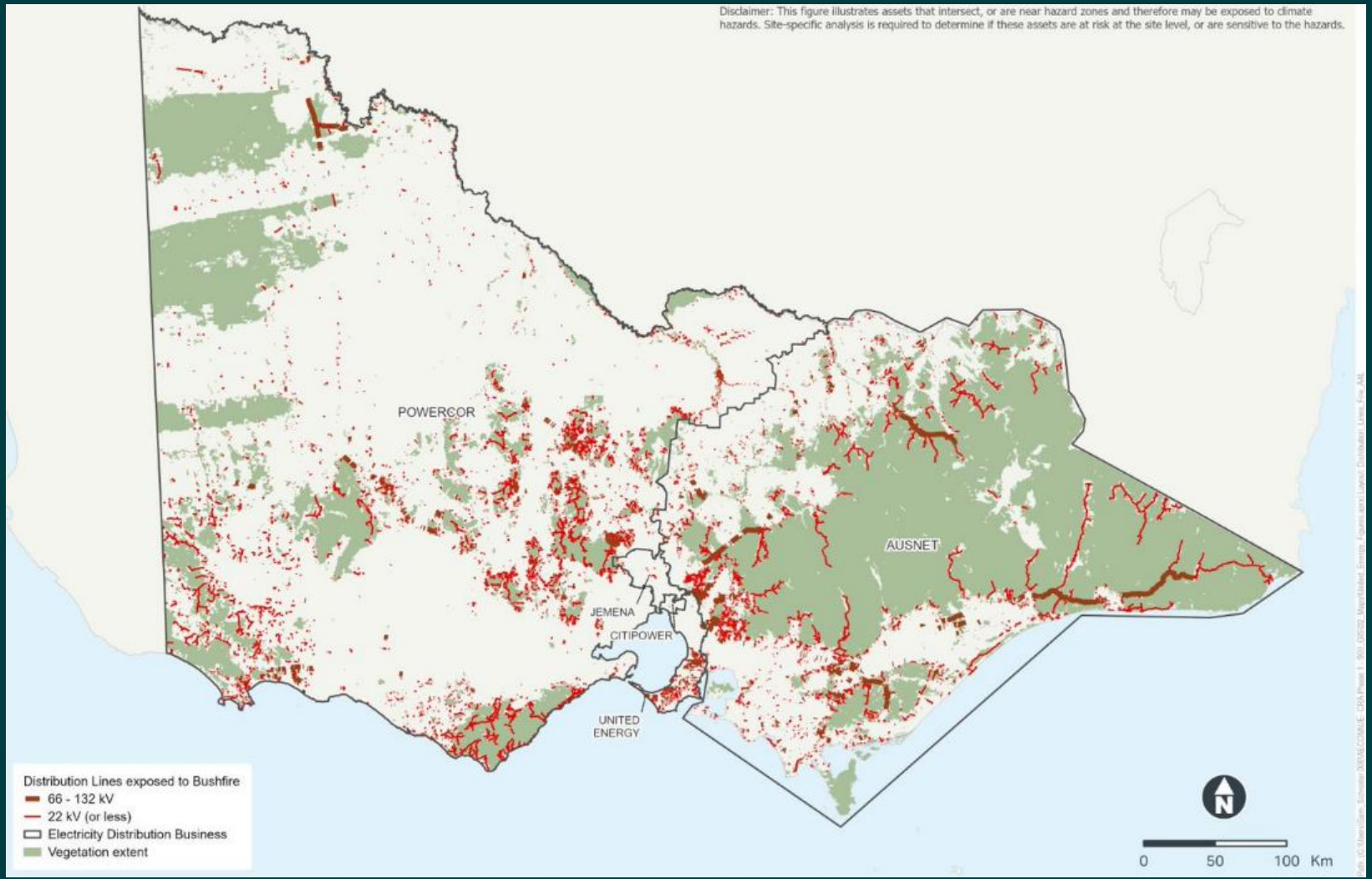
Outcomes

Assets with identified climate risks

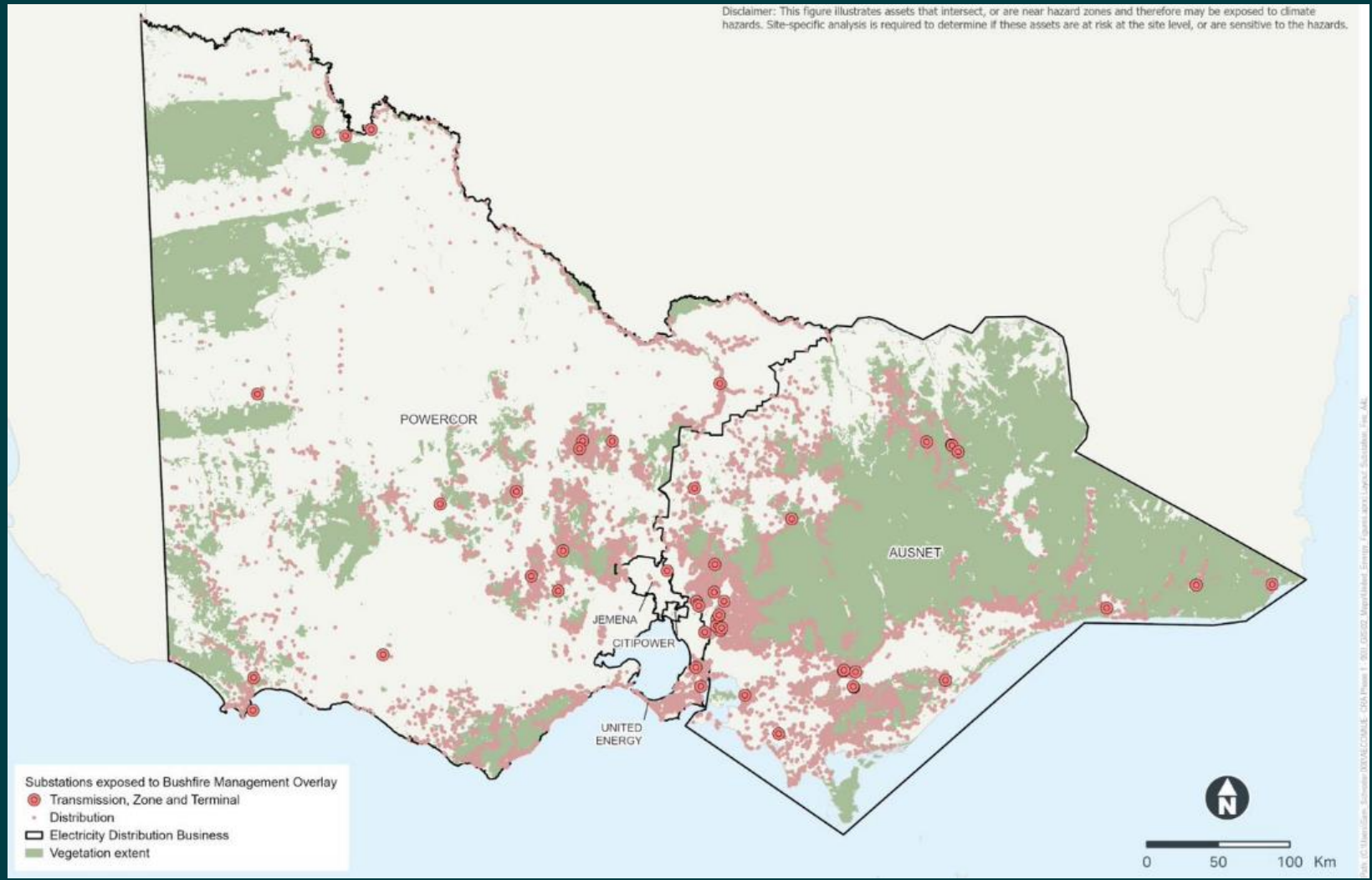
	Bushfire	Extreme Rainfall (flooding)	Extreme wind	Extreme Temperature (heatwaves)	Drought	Lightning	Sea level rise	Coastal inundation	Increase average temperatures	Increased CO_2
Overhead lines (T&D)	X		x	x	x	x				
Substations	x	x	x	x			x		x	x
Poles and towers	x	x	x		x			x		x
Underground cables					x		x	x	x	
Communications equipment	x	x		x						
Customer	x	x		x						

Outputs of exposure analysis

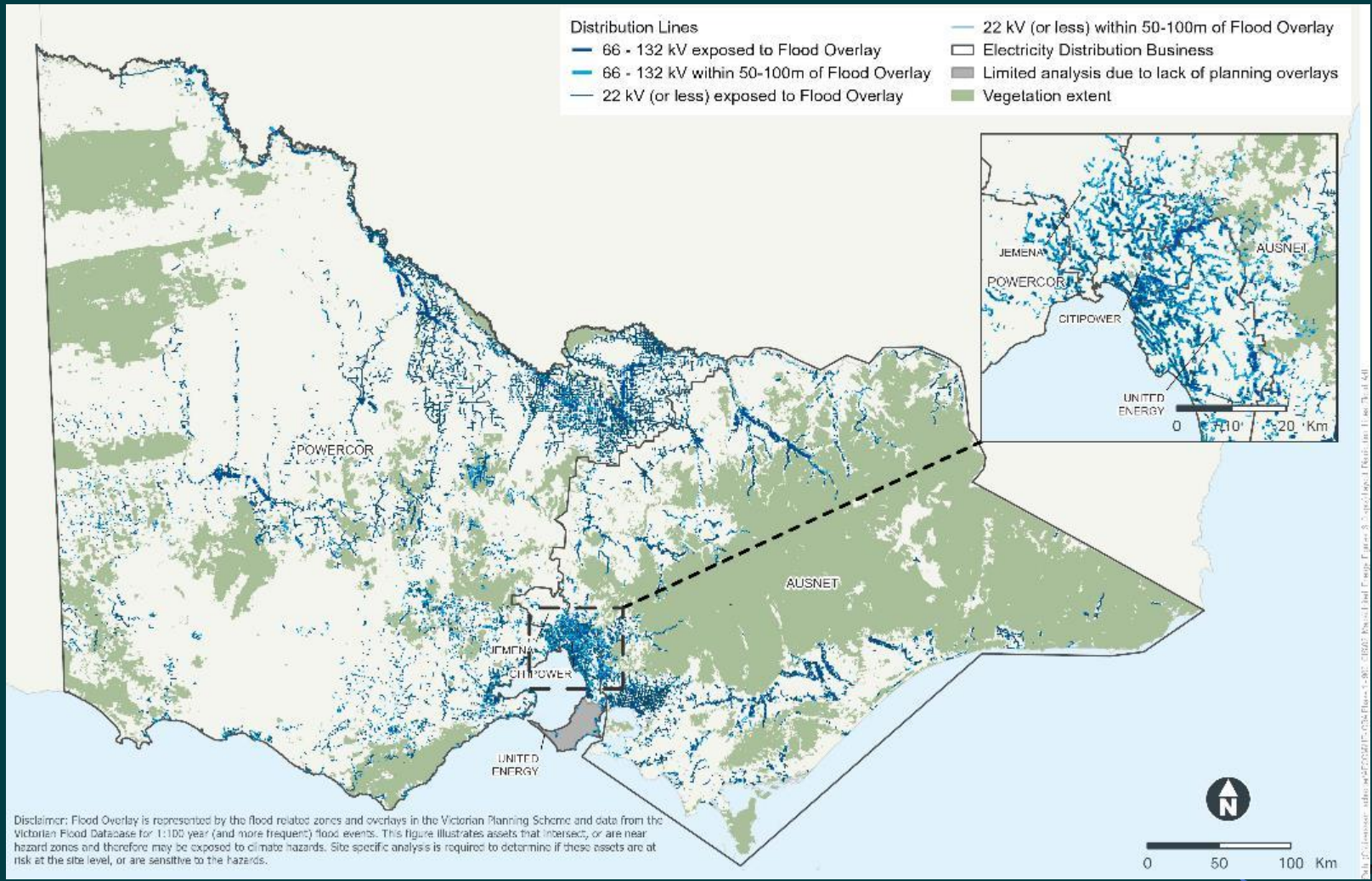
Bushfire


Disclaimer: This figure illustrates assets that intersect, or are near hazard zones and therefore may be exposed to climate hazards. Site-specific analysis is required to determine if these assets are at risk at the site level, or are sensitive to the hazards.
POWERCOR
AUSNET
JEMENA
CITIPOWER
UNITED ENERGY
Distribution Lines exposed to Bushfire
66 - 132 kV
22 kV (or less)
Electricity Distribution Business
Vegetation extent
N
0
50
100 Km

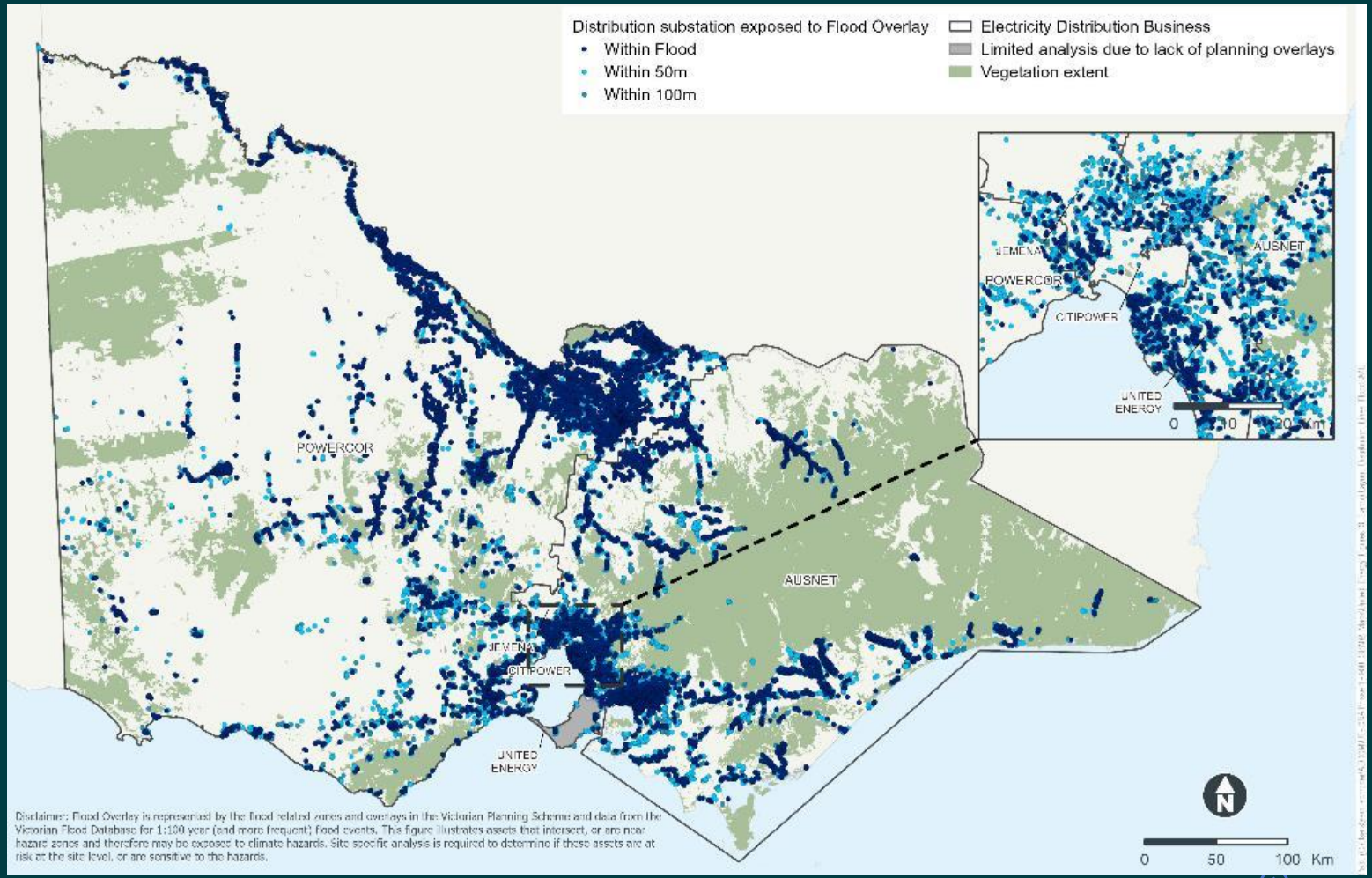
Bushfire


Disclaimer: This figure illustrates assets that intersect, or are near hazard zones and therefore may be exposed to climate hazards. Site-specific analysis is required to determine if these assets are at risk at the site level, or are sensitive to the hazards.
POWERCOR
AUSNET
JEMENA
CITIPOWER
UNITED ENERGY
Substations exposed to Bushfire Management Overlay
Transmission, Zone and Terminal
Distribution
Electricity Distribution Business
Vegetation extent
N
0
50
100 Km

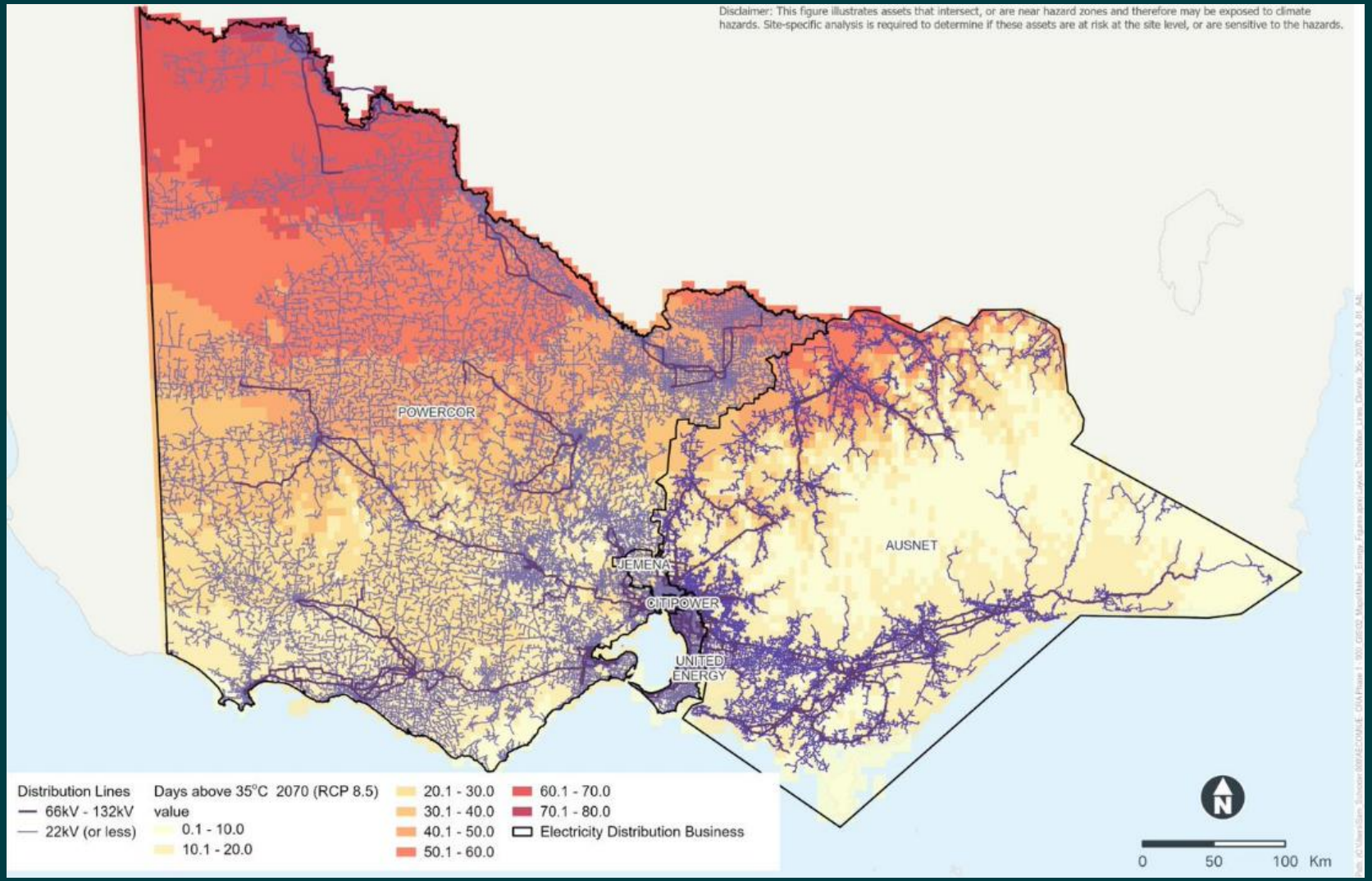
Flooding


Distribution Lines
66 - 132 kV exposed to Flood Overlay
66 - 132 kV within 50-100m of Flood Overlay
22 kV (or less) exposed to Flood Overlay
22 kV (or less) within 50-100m of Flood Overlay
Electricity Distribution Business
Limited analysis due to lack of planning overlays
Vegetation extent
POWERCOR
AUSNET
JEMENA
CITIPOWER
UNITED ENERGY
0 10 20 Km
0 50 100 Km
N
Disclaimer: Flood Overlay is represented by the flood related zones and overlays in the Victorian Planning Scheme and data from the Victorian Flood Database for 1:100 year (and more frequent) flood events. This figure illustrates assets that intersect, or are near hazard zones and therefore may be exposed to climate hazards. Site specific analysis is required to determine if these assets are at risk at the site level, or are sensitive to the hazards.

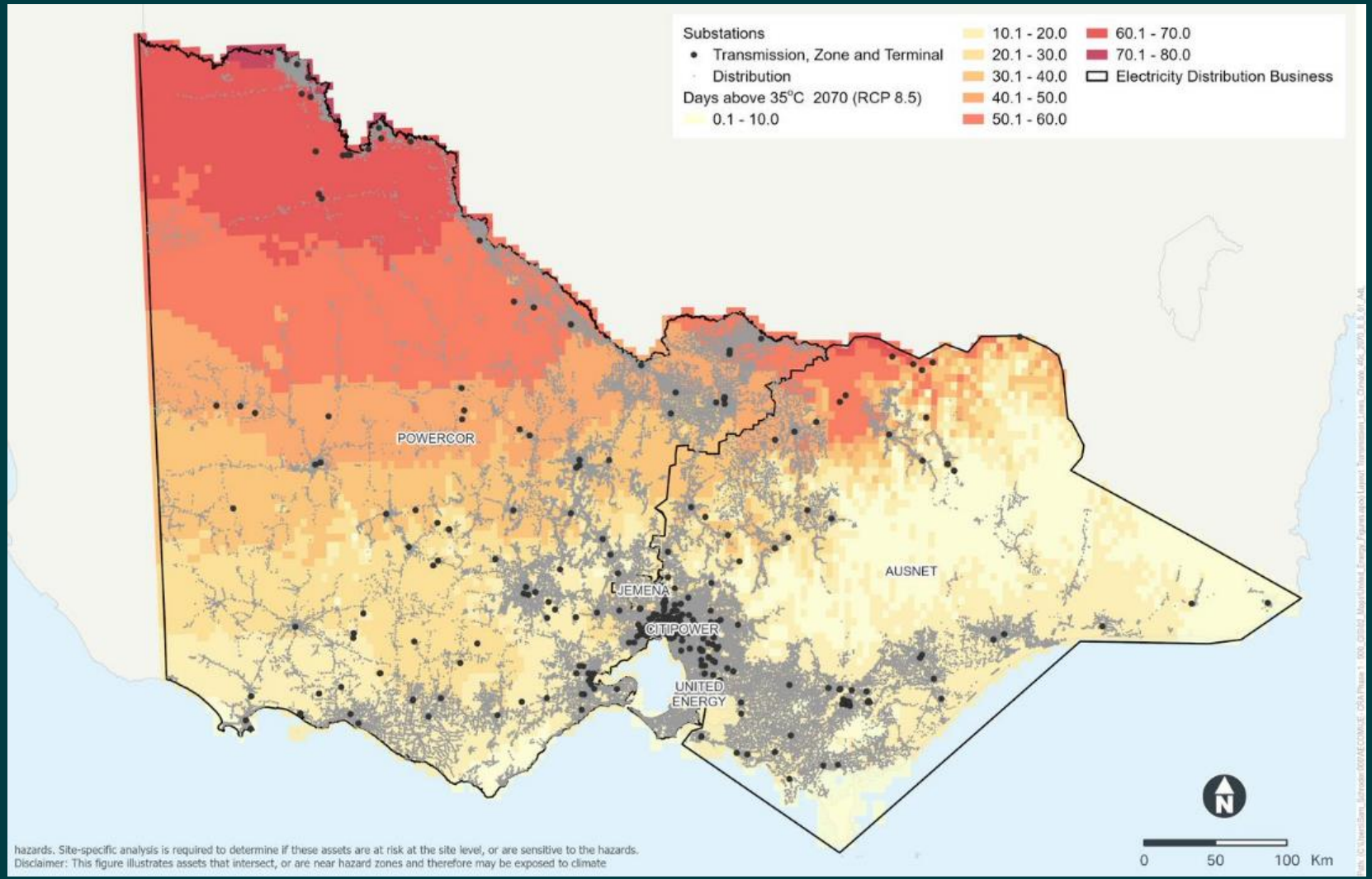
Flooding


Distribution substation exposed to Flood Overlay
Within Flood
Within 50m
Within 100m
Electricity Distribution Business
Limited analysis due to lack of planning overlays
Vegetation extent
POWERCOR
AUSNET
JEMENA
CITIPOWER
UNITED ENERGY
Disclaimer: Flood Overlay is represented by the flood related zones and overlays in the Victorian Planning Scheme and data from the Victorian Flood Database for 1:100 year (and more frequent) flood events. This figure illustrates assets that intersect, or are near hazard zones and therefore may be exposed to climate hazards. Site specific analysis is required to determine if these assets are at risk at the site level, or are sensitive to the hazards.
N
0
50
100 Km

Days above 35°C

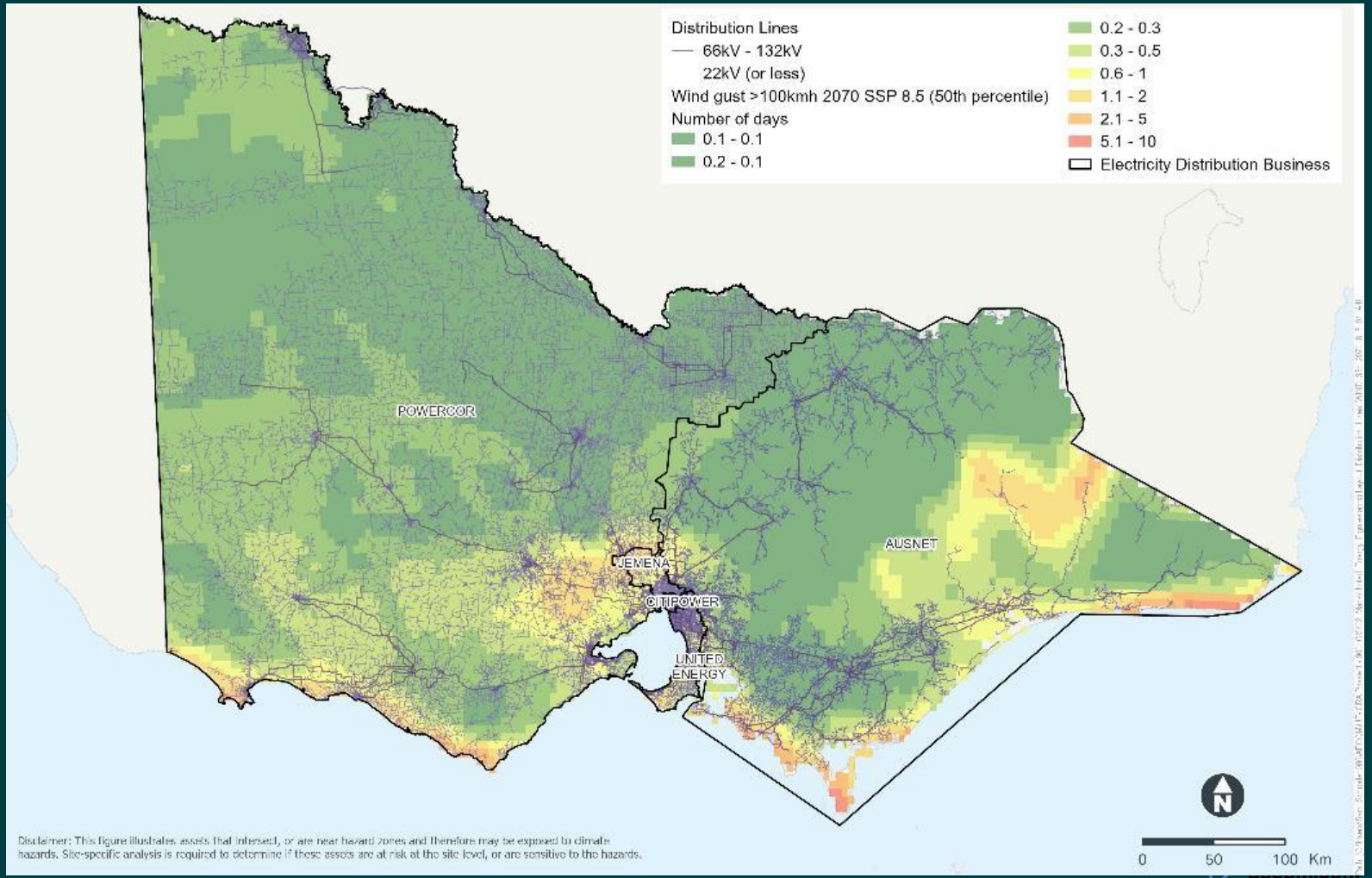


Days above 35°C

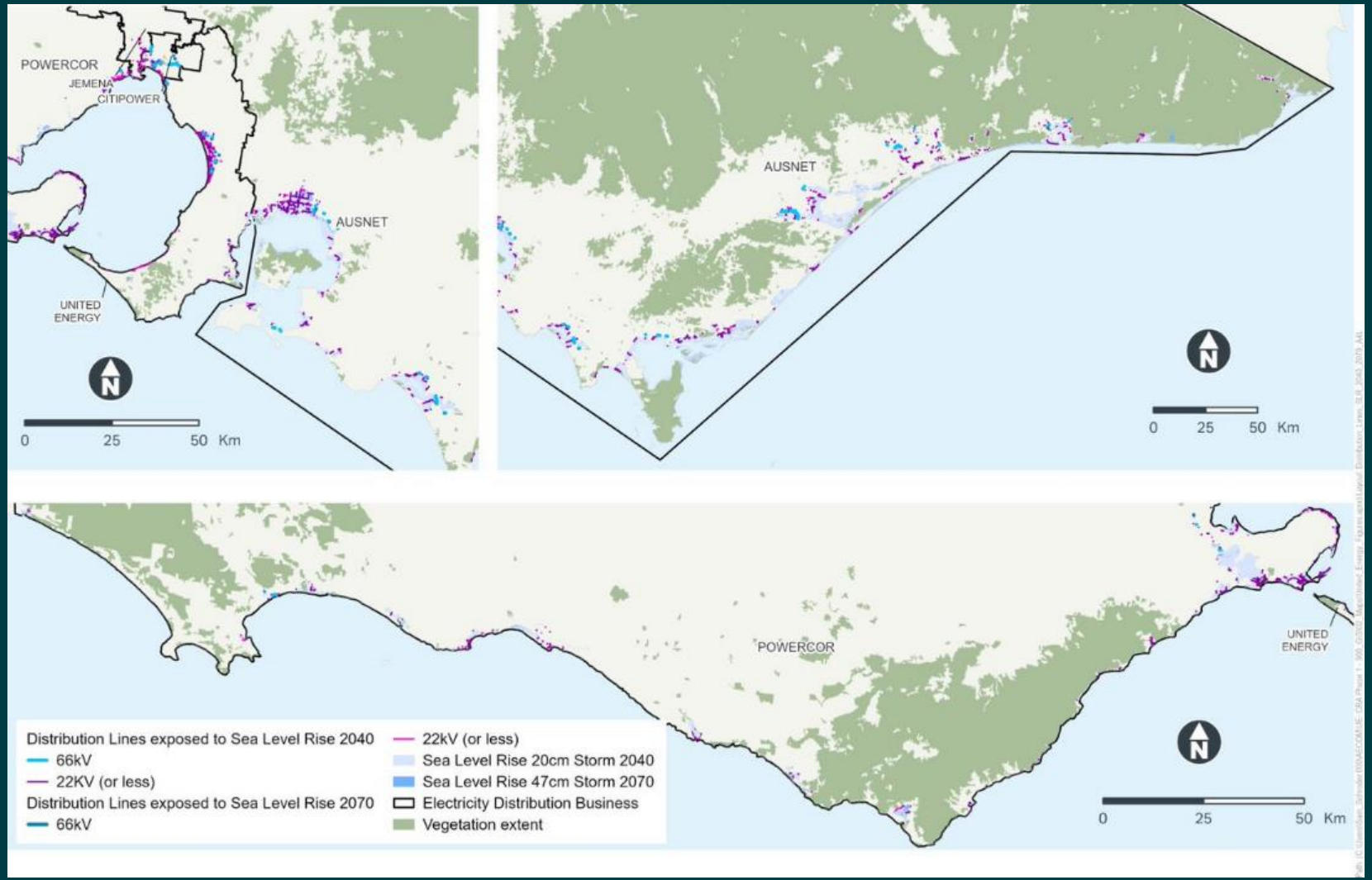


hazards. Site-specific analysis is required to determine if these assets are at risk at the site level, or are sensitive to the hazards.
Disclaimer: This figure illustrates assets that intersect, or are near hazard zones and therefore may be exposed to climate

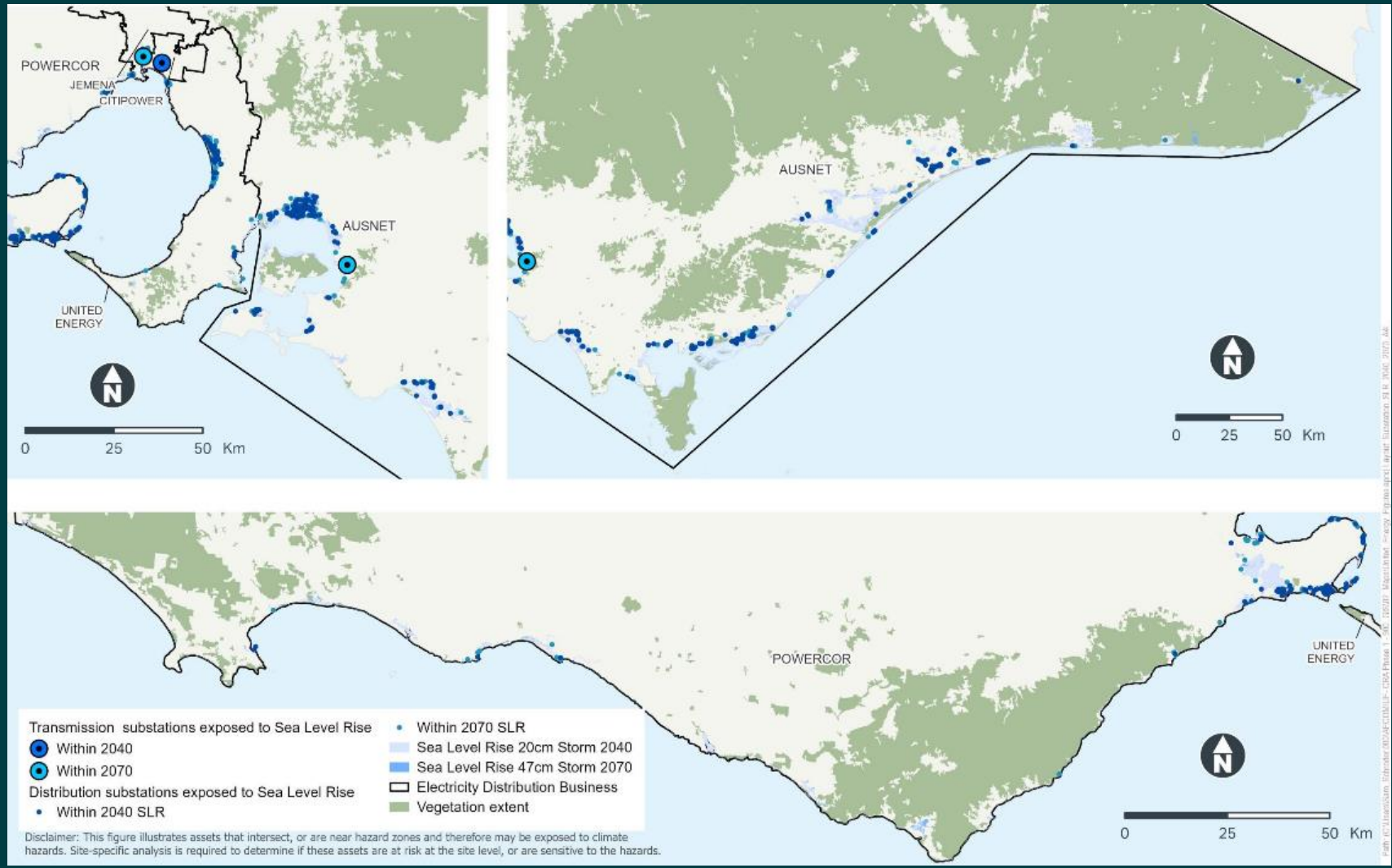
Number of days max wind gust > 100 km / h



Sea Level Rise / Coastal Inundation



Sea Level Rise / Coastal Inundation



3

Q&A

AECOM

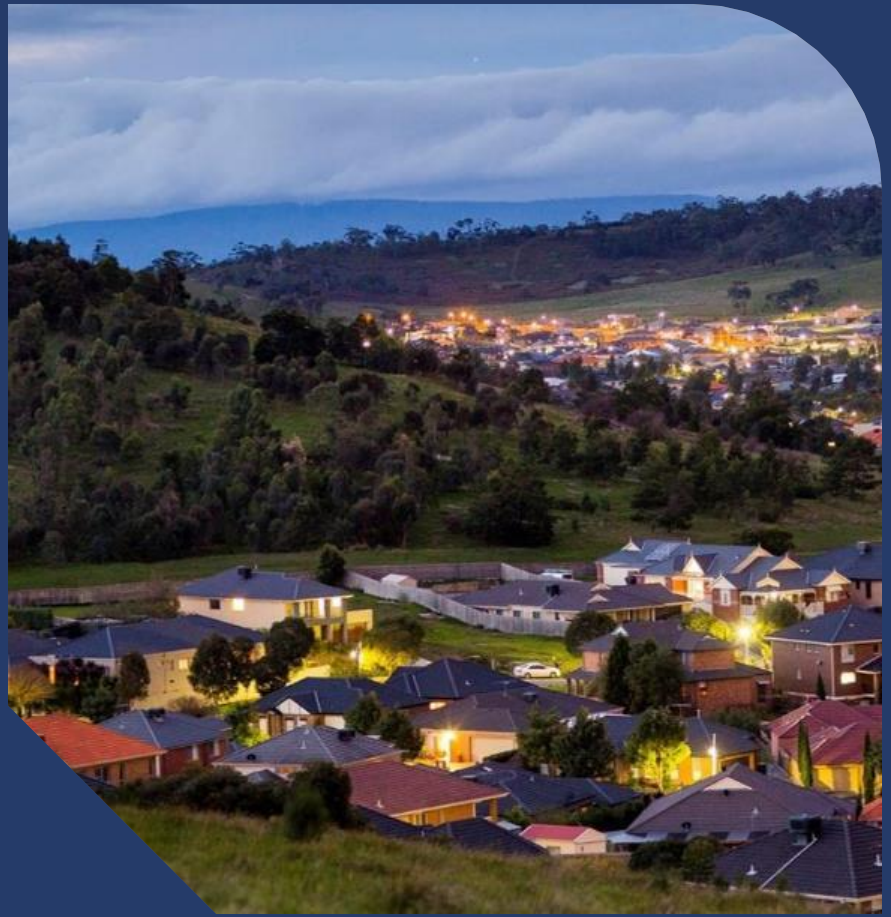
Delivering a
better world

AusNet

How we are applying climate change modelling to our network

Joint Vic DB Resilience Stakeholder Forum

9 October 2023



We are incorporating climate change data into our risk and economic assessments

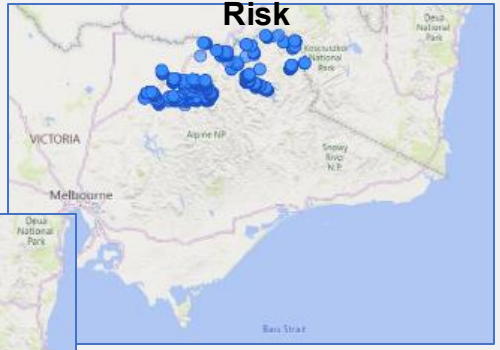
Results from the AECOM Climate Change Study concluded that weather impacts are forecast to become more frequent and severe over the period to 2030, 2050 and 2070, increasing network risk.

To manage these impacts and maintain service levels in the face of climate change, we are assessing a range of proactive strategies to build network strength, improve operational response.

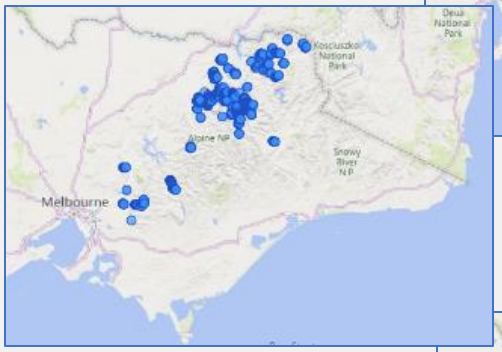
To assess which areas are most likely to be impacted/most vulnerable, the following weather conditions and forecasting horizons are being considered.

- Maximum temperatures
- Annual number of days above 35° and 40° degrees
- Assets located within bushfire management zones
- Vegetation extent across the state
- Forecasted sea level rise impact during storm events
- Inundated assets during flooding events
- Annual days with 20mm or greater rainfall
- Annual days above 100km/h windspeeds.

Assets Exposed to High Heat Exposure/Bushfire Risk



Assets Exposed to High Rainfall & Wind



Assets Exposed to Inundation and sea level rise

We are also analysing historical severely impacted locations to pinpoint high risk areas

Note: Colours show unique assets

Extreme heat, bushfire, high rainfall/ wind and sea level rise identified as most critical hazards for AusNet distribution

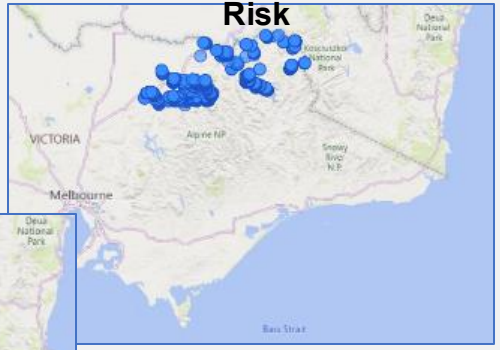
For the AusNet distribution network, the three most critical hazard scenarios that we are assessing risks (and solutions) for are:

1. *Extreme heat and bushfire vulnerable zones*
2. *High rainfall and wind affected areas*
3. *Sea level rise risk during storm events & flooding*

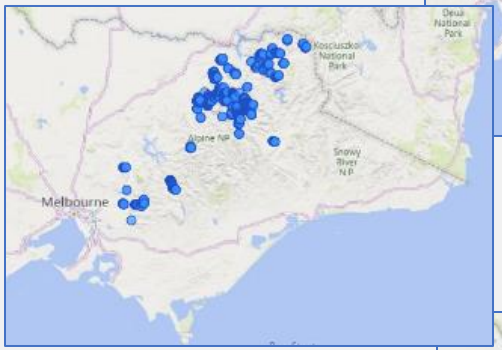
To manage the risk presented by these hazards, a variety of solutions are being considered **(more on these later)**:

- Pole replacements
- Conductor replacement (with undergrounding & covered conductor)
- Increased switching equipment in key areas
- Spare equipment for quicker replacement/restoration
- Additional targeted vegetation management.

Assets Exposed to High Heat Exposure/Bushfire Risk



Assets Exposed to High Rainfall & Wind



Assets Exposed to Inundation and sea level rise

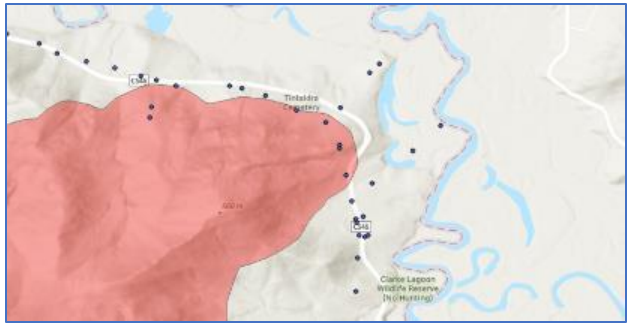
Non-network solutions being assessed include SAPS, microgrids/community batteries, mobile generation and emergency response vehicles

Case Study | High temperature and Bushfire risk in Corryong

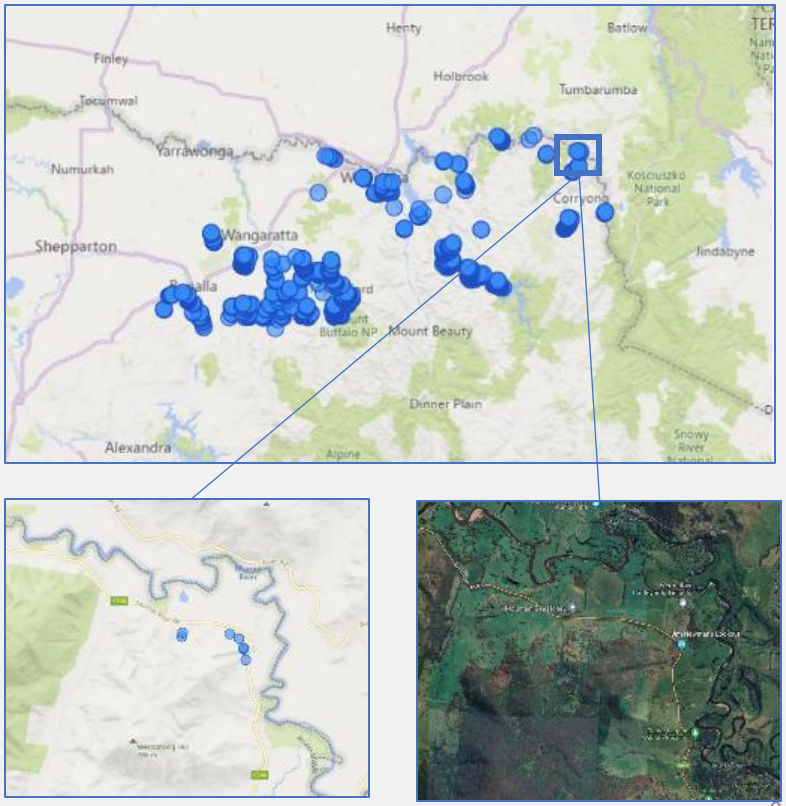
Example: Using the *high maximum temperature and days above 35°* and 40° to analyse bushfire zones on the network can help highlight potential at risk areas during summer.

Shown in the images is a section of our network located in a heavily vegetated area near Corryong. The identified section is expected to experience an increase in the number of high to very high heat days per year as well as the maximum temperature experienced.

Assets Intersecting with Bushfire Zone



Assets Exposed to high temperatures, high heat days and located in bushfire zones

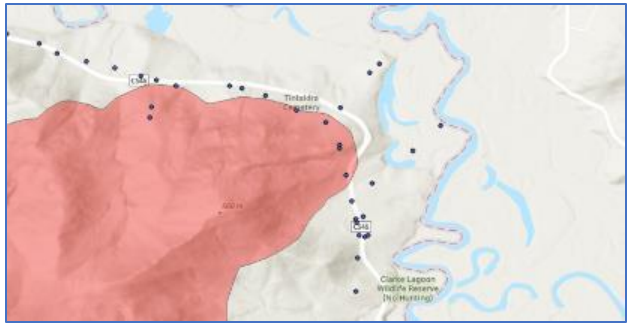


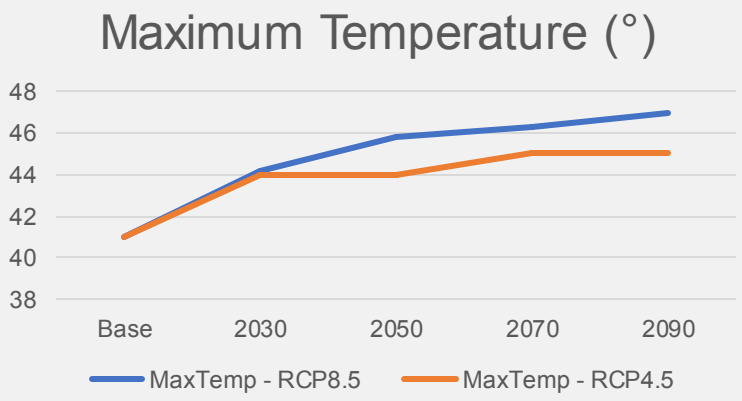
Case Study | High temperature and Bushfire risk in Corryong

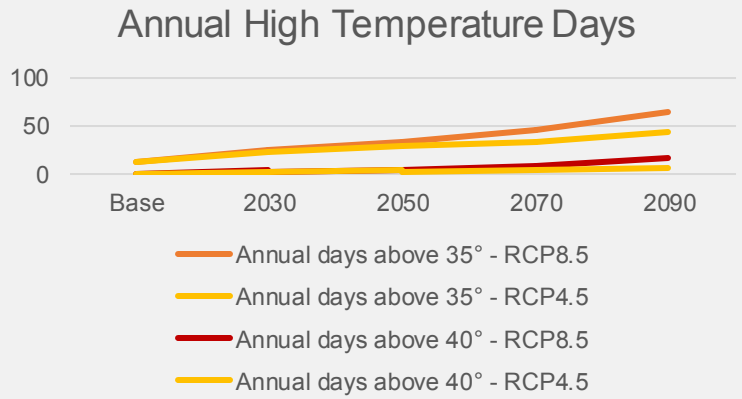
Recognising that a combination of high heat and being in bushfire zones exposes the assets to higher risks of fire damage, pole and line assets in the area will be exposed to greater risk.

A proactive approach can be taken to mitigate this risk, with potentially viable solutions being either undergrounding the sections, pole replacements with fire resistant materials performing or a combination of both options. **We are currently assessing costs and benefits to identify the most efficient solutions (at this location and across our network).**

Assets Intersecting with Bushfire Zone



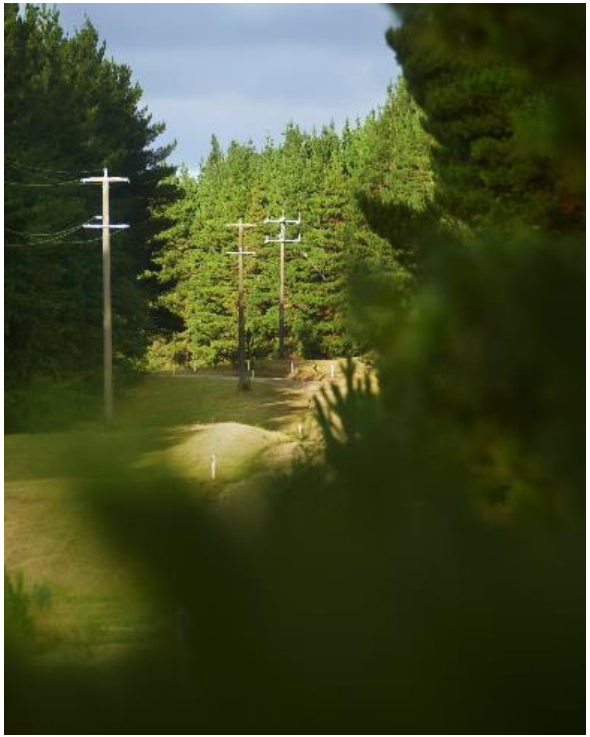




5. Tell us: Extreme weather & Power Outages

Thinking about the experience of your community/ the people your organisation serves during the last power outage that was caused by an extreme event:

- What went well?
- What didn't go well?
- What could be improved next time?



10-minute break

Recap: Investment Principles

Why do distributors need a framework?	Increasing severe weather and a greater reliance on electricity require an increasing focus on network resilience. Proactive investment in infrastructure resilience has not been accommodated in the regulatory framework in the past.
How do distributors intend to use the framework?	Distributors are working together to develop a robust framework to support our networks and the communities they serve to be resilient in a changing environment.
What is the timeline for the framework?	The Resilient Infrastructure Investment Framework is intended to be finalised by the end of 2024.

6. Defining key terms

Network Reliability	The probability of a system, device, plant or equipment performing its function adequately for the period of time intended, under the operating conditions encountered.
Network Resilience	Network resilience is the ability to withstand and recover from the effects of a natural hazard or disaster.
Community Resilience	 **What does community resilience mean to you?** **What does a resilient community look like?**

7. Solutions

- Are there any issues with, or questions about the solutions provided here?
- Does our characterisation of these solutions in terms of timeframe, cost etc make sense?

Solution	Cost			Implementation timeframe			Impacted customers		Approach	
	Low	Medium	High	Short	Medium	Long	Whole of network	Targeted	Proactive	Reactive
Improved communication prior to and during extreme weather events	✸			✸			✸	✸	✸	✸
Microgrids and community batteries in vulnerable locations		✸			✸			✸	✸	
Community hub support		✸			✸			✸	✸	
Mobile Emergency Response Vehicles	✸			✸			✸		✸	
Standalone Power Systems (SAPs)		✸			✸			✸	✸	
Critical service provider customer battery back-ups & SAPS		✸			✸			✸	✸	
Large portable generators for deployment during extreme events		✸		✸			✸		✸	
Targeted network hardening (e.g., pole and conductor replacement, improved switching)			✸			✸		✸	✸	
Vegetation management		✸		✸				✸	✸	
Targeted undergrounding			✸			✸		✸	✸	
Support for community resilience planning via community engagement officers	✸			✸				✸	✸	
Support with implementation of community resilience planning			✸		✸			✸	✸	✸

8a. Decision making: Trade-offs

- Decisions to invest in network resilience need to take into account the concept of trade-offs
- There are trade-offs between cost / expenditure and the resilience or Level of Service.
- There are also trade-offs in investment timing. Reactive investment results in longer duration outages which may be avoided by proactive investment, however proactive investment does not eliminate all risk of outages.
- Dedicated support from distributors in development of robust community resilience plans will provide higher level of service but will require expenditure recovered from all customers

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8b. Decision making: Principles

Questions for our customers

Site Selection	Distributors propose to assess potential sites for proactive investment based on analysis of network risk and vulnerabilities, overlaid with community vulnerabilities (such as the Australian Disaster Resilience Index or The Index of Relative Socio-economic Disadvantage (IRSD))	**Should community vulnerability be taken into account in site selection?**
Long term planning	Stakeholders have raised concerns regarding the increasing risk of our network being repeatedly re-built following increasing frequency of extreme weather event. We will develop plans that consider where we should invest proactively and/or where we can build back better.	**Do customers support proactive investment in resilience (as opposed to solely reactive)?**
Partnerships	Distributors will explore whether new or enhanced partnerships with communities and other parties (critical infrastructure, other distribution businesses, emergency management, government, councils, other community organisations) can offer value for money and improved customer outcomes. At the same time, we will focus our efforts on the outcomes we are best placed and accountable to deliver, recognising that community resilience is a shared responsibility.	**What objectives / outcomes should these partnerships achieve?** **What do these partnerships look like / how do they function?**
Economic Analysis	Distributors will undertake a data-driven approach to assessing the risks and benefits of extreme events and any proposed investments. This includes sourcing climate projections from reputable sources, clearly outlining all assumptions, and using sensitivity analysis, and looking at the prudency and efficiency of solutions, customer values (willingness to pay) and social costs/benefits.	**What should we do if economic analysis delivers decisions that do not align with customer values / feedback?** **How should we assess the community benefit of avoiding prolonged power outages?**
Customer driven outcomes	Distributors will engage to better understand customer needs and views in shaping long term investment plans, and to guide how we engage with communities proactively and reactively during extreme events.	**Are there specific outcomes that customers want distributors to focus on/ deliver in in our investment proposal?**

9. Community Priorities

Based on your understanding of your residents / the communities that your organisation serves and taking into account the conversations we have had today,

<u>What does your community need?</u>

miro

10. Future engagement

- Distributors will continue to engage with customers, either jointly or individually
- Future engagement will be guided by customer preference
- Any questions or issues that have not been discussed today can be raised via email or on the MIRO board.

esgardelis@nationpartners.com.au

- The MIRO board will stay open until the end of the day so please feel free to continue to add your thoughts after the workshop.

How would you like to be engaged and kept up to date throughout this process?

Thank you

Powering Victoria

Together