



14 July 2023

## Business case Climate Resilience Program 2024-29

# **Executive Summary**

As the impacts of climate change set in, the frequency and intensity of extreme weather events will increasingly impact our services and the communities they serve. Ausgrid's 1.8 million customers are rapidly electrifying their homes and businesses, making the resilience of our services even more important. Ausgrid is aiming to mitigate the impacts of increasing extreme weather events on our customers in a sustainable way and our customers have strongly supported this objective. In addition, the Security of Critical Infrastructure (**SOCI**) Act requires Ausgrid, as far as it is reasonably practicable to do so, to minimise material risks, including those exacerbated by climate change. With these drivers in mind, our customers and stakeholders have made it clear that they expect Ausgrid to invest in climate resilience.

This business case applies the investment framework we co-designed with the Reset Customer Panel called *Promoting the long-term interests of consumers in a changing climate: A decision-making framework* (the Framework). In doing so, we have developed an investment program for 2024-29 that represents a 'least-regrets' approach incorporating community and stakeholder feedback using network and non-network strategies to mitigate the impacts of climate change. The proposal has been informed by climate experts who modelled the impacts of climate change on our services and found that by 2050 we can expect a 26% increase (on average) in exposure to climate risks across our network area<sup>1</sup>. By 2050 we can expect a similar increase in climate related asset failures (24%) and climate related interruptions experienced by our customers (also 24%).

Increasing concerns in our communities about these impacts has driven a clear directive from our customers. Over a 12-month period they have consistently, and despite cost-of-living pressures, reinforced that investing in resilience is a top priority (Figure 1). Our customers also expect that Ausgrid, as an essential service provider, should play a role in broader community resilience and they have presented us with a compelling ask to carefully consider what this means ahead of the 2024-2029 regulatory period.



Figure 1: Our customers have consistently and clearly prioritised resilience investments for 2024-29

With these drivers, Ausgrid has been working with our customers and stakeholder to consider options to improve energy resilience before, during and after outages relating to major events. In considering options across this spectrum, within Ausgrid's role as an NSP to support community resilience, we have aligned with best-practice emergency management and resilience frameworks, including the



<sup>&</sup>lt;sup>1</sup> Climate modelling results under a medium emissions scenario Representative Concentration Pathway (RCP) 4.5.

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Prevent/Mitigate, Prepare, Respond, Recover (PPRR) framework<sup>2</sup>. We have worked with the community to co-design program packages that deliver risk prevention and risk mitigation to deliver a balanced investment portfolio (detailed in Appendix C) that seeks to both reduce the increasing probability of climate related outages and reduce the impact and consequences that increasing climate change risk has on the communities we serve.

To ensure we take a prudent, measured, 'least regrets' approach our 2024-29 program involves a highly targeted, customer co-designed pilot focusing on the three local areas in our network with highest need. This will allow us to test and refine our approach to building resilience and greatly increase our certainty in scaling and repeating effective investments in future regulatory periods. It is also an approach that aligns to the Implementation Plan we developed to give effect to the Framework we co-designed with the RCP.

Our resilience related capital expenditure and operating expenditure proposed for 2024-29 to address increasing climate risks is outlined in Table 1 and detailed in Appendix C.

Table 1: Summary table of climate resilience business case

Executive Summary							
	During the 2024-29 period, the program will deliver a balanced investment to:						
Key Objectives of the program	<ul> <li>Maintain overall climate risk to 2050 in line with existing levels;</li> <li>Improve equity of network outcomes during major climate events for different customer groups;</li> <li>Incorporate intergenerational equity considerations by balancing costs and risks to by customers and communities today, with the costs and risk faced by future generations;</li> <li>Maximise overall community benefit through engagement and collaboration with communities and other resilience actors</li> </ul>						rent nd risks faced ture on with
Customer	<ul> <li>Mitigate growth in climate risk;</li> <li>Improve equity of electricity supply outcomes during major climate events.</li> </ul>						
benefits	<ul> <li>Balance intergenerational equity</li> </ul>						
	<ul> <li>Maximise overall community benefit</li> </ul>						
	• A	ER Guidance I	Note – Networ	k Resilience –	A note on key	issues	
Regulatory	<ul> <li>National Electricity Objective;</li> </ul>						
Requirements	<ul> <li>National Electricity Rules – Expenditure Objective Criteria</li> </ul>						
<ul> <li>Security of Critical Intrastructure Act</li> </ul>							
Expenditure		FY25	FY26	FY27	FY28	FY29	Total
forecast	Capex	\$22.2 M	\$34.1 M	\$42.7 M	\$37.5 M	\$34.1 M	\$170.6 M
Direct only	Opex	\$0.8 M	\$1.2 M	\$1.5 M	\$1.3 M	\$1.2 M	\$5.9 M
redi F 124)	Total	\$23.0 M	\$35.3 M	\$44.1 M	\$38.8 M	\$35.3 M	\$176.5 M

We are proud to have joined with our community in co-developing these resilience packages and in taking a proactive step in ensuring our network and our customers are prepared and resilient in the face of a changing climate.



<sup>&</sup>lt;sup>2</sup> Australian Journal of Emergency Management (2022), PPRR and AIIMS: a whole-of-government strategy in NSW (July 2022 Edition), p.65.

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# **1. Introduction**

As the impact of climate change sets in, critical infrastructure providers have a clear role in efforts to prepare communities to cope. Ausgrid, as a critical infrastructure provider, is also required by the SOCI Act to as far as it is reasonably practicable to do so, to minimise material risks, including those hazards exacerbated by climate change. In order to build resilience, the NSW State Infrastructure Strategy also requires Ausgrid to *"Develop place-based resilience and infrastructure adaptation strategies that assess local risk and incorporate infrastructure and non-infrastructure solutions for vulnerable locations."*<sup>3</sup> Both NSW Government strategy and federal legislation is supporting the intervention of critical infrastructure companies like Ausgrid to appropriately invest to minimise the risk associated with all hazards. This investment is also required to meet the expectations of the community, stakeholders and the National Electricity Objective (**NEO**).

### Definition of resilience targets major events only

Resilience is defined as "the network's ability to continue to adequately provide network services and recover those services when subjected to disruptive events". For this reason, this business case tests whether there is an identified resilience need by assessing our current and expected network performance during climate related major events. 'Reliability' has been excluded from scope, in that these proposed resilience investments are not targeting, nor are they expected to have a material impact on, day-to day reliability outcomes.



Figure 2: Resilience addresses major events only.

This business case only considers investments that represent an uplift from 'Business-as-Usual', ensuring that there is no duplication with other programs in the Regulatory Proposal.



<sup>&</sup>lt;sup>3</sup> NSW State Infrastructure Strategy 2022

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### Ausgrid has addressed requirements of the AER Resilience Guidance Note

In developing this resilience proposal, Ausgrid has addressed all aspects of the AER's Resilience Guidance Note and the Co-designed Resilience Framework. In Section 2, we explain how we have met these guidelines. Further, in Appendix A we have completed a Regulatory Stocktake.

# Ausgrid is staying true to our role as a Distribution Network Service Provider (DNSP), whilst acknowledging that the community and government expects all resilience actors to strengthen their postures.

Ausgrid's role in Emergency Response collaborations is to provide energy resilience. This is coordinated via the Energy and Utility Services Functional Area and using the Australian Interagency Incident Management System (**AIIMS**). This business case assesses how Ausgrid should keep pace with the reforms to the AIIMS doctrine, incorporate lessons from various disasters, as well as meeting new expectations of the community who have acknowledged the benefits of community resilience. In doing so, we have considered guidance from the NSW Critical Infrastructure Resilience Strategy which calls upon infrastructure providers like Ausgrid to *"view the community as active partners in critical infrastructure resilience, and a valuable resource before, during, and after an emergency*"<sup>4</sup>. The NSW State Infrastructure Strategy also requires infrastructure providers to consider infrastructure and non-infrastructure resilience strategies. We have considered non-infrastructure investments where they allow greater flexibility, are more cost effective, or better target the needs of the community.

### This business case follows a traditional structure and comprises of the following:

- Guidance Checklist (Section 2)
- Identifying the Need (Section 3)
- Developing Options (Section 4)
- Assessing Costs and Benefits (Section 5)
- Recommendations (Section 6)





<sup>&</sup>lt;sup>4</sup> NSW Critical Infrastructure Resilience Strategy 2018

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## To support the business case, we provide additional evidence in the following appendices and attachments:

- Regulatory Stocktake (Appendix A)
- Alignment With Other Resilience Actors (Appendix B)
- Resilience Solution Descriptions (Appendix C)
- Customer Support and Willingness To Pay (Appendix D)
- Climate Resilience Engagement Material (Attachment A)
- bd Infrastructure Climate Resilience Mid-Term Report (Attachment B)
- Reset Customer Panel Independent Report (Attachment C)

#### Other supporting relevant documents include:

- Att.5.5 Climate resilience program 31 Jan 2023
- Att.5.5.a Resilience implementation plan 31 Jan 2023
- Att.5.5.b Climate impact assessment 31 Jan 2023
- Att.5.5.c Climate resilience framework 31 Jan 2023
- Att.5.5.d Climate resilience CBA model 31 Jan 2023
- Att.5.5.e KPMG Partner letter for climate impact assessment work 07 Nov 2022
- Att.5.5.f Risk Frontiers letter for climate impact assessment work 31 Oct 2022



# 2. Guidance Checklist

### **AER's Network Resilience Guidance Note**

The AER Note on Network Resilience April 2022 (AER Guidance Note) acknowledges that Network Service Providers (NSPs) play an important role in the provision of essential services to communities in the lead-up to, during, and after a natural disaster. It also takes the view that network and community resilience are related concepts and that a resilient network can assist in building community resilience.

The AER Guidance Note states that electricity distributors must meet certain expectations to support the prudence and efficiency of ex ante expenditure on resilience programs. These expectations are set out in Table 2 along with our assessment of whether we have been able to satisfactorily address them. The column 'more information' lists the section of this business case where each of the AER's expectations are addressed in more detail.

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Table 2	Our accace	nont against the	AED Cu	idanco Noto
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AER expectation	Our response	Addressed	More information
Expectation 1			
There is a causal relationship between the proposed investment and the expected increase in extreme weather events	<ul> <li>Our cost benefit analysis establishes the required causal relationship by applying a 'probabilistic' approach that accounts for the inherent uncertainty associated with the timing, location, and scale of the impacts of extreme weather events. This approach involved: <ol> <li>understanding the 'baseline' climate risks and impacts on the network</li> <li>modelling changes to network and customer impacts informed by projected changes from the best available models of the relevant climate 'perils', and our understanding of asset vulnerabilities</li> <li>examining the prudence and efficiency of alternative mitigation strategies having regard to their cost and expected effectiveness at mitigating climate risk</li> <li>using an investment 'hurdle' to select options based on their costs and benefits calculated on a probabilistic basis.</li> </ol> </li> </ul>		Section 5.2
Expectation 2.1			
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 consideredOur economic modelling of alternative risk mitigation options identifies the most cost effective option to maintain existing service levels through the mitigation of as much projected growth in climate as possible, while still meeting an investment hurdle that unlocks the most benefits for the community compared to other feasible options.		~	Section 5.2



AER expectation	Our response	Addressed	More information
Expectation 2.2			
We expect proposals for resilience-related expenditure to demonstrate: there is or likely to be an increase in network risk	Our climate and network impact modelling demonstrates that in all credible scenarios there is likely to be a material increase in network risk over the period from today to 2050. This growth in risk has then been monetised using the AER's value of customer reliability ( <b>VCR</b> ) and other metrics in accordance with our value framework.	~	Section 3.3
the benefit of the resilience-related funding (for instance, further avoiding or reducing the frequency or duration of outages) outweighs the costs of the investment	The benefits of our 2024-29 resilience program outweigh the forecast costs by a factor of 1.7. To put an economic value on the outages that customers experience due to climate events, Ausgrid has used the AER's latest VCRs. This is in lieu of a commonly accepted widespread and long duration outages ( <b>WALDO</b> ) value. We consider that the use of VCRs produces a cautious estimate of the benefits from investing in climate resilience. This is given that, on average, a WALDO value would place a higher value on unserved energy, although potentially with a diminishing tail.		Section 5.2
the preferred funding option provides more net benefit against other feasible options	We undertook extensive engineering and economic analysis to compare the relative costs and benefits of different investment solutions in different locations across the network, embedding the priorities of our customers, to select a preferred funding option that unlocks the most net benefits.	$\checkmark$	Section 5.2
in testing the different options available to address the change in network risk, we expect NSPs to consider the impact of emerging investment in stand- alone power systems (SAPS) and other non- traditional network options like community batteries	<ul> <li>Our regulatory proposal submitted in January 2023 includes an innovation portfolio that seeks to conduct trials and pilots to develop new options to address ongoing needs. This program has informed current options for inclusion of: <ul> <li>a \$19.8m in community battery investment spread across our network growth and customer energy resources (CER) expenditure categories</li> <li>a trial of Standalone Power Systems (SAPS) to demonstrate their technical feasibility and potentially deliver the most cost effective supply to customers on the edge of our distribution network.</li> </ul> </li> <li>Both are under the oversight of NIAC as part of the innovation program.</li> <li>Our LGA engagement sought customer views on SAPS but it was not preferred by the groups, mostly due to the limited number of customers it could help for the cost, and so were not considered in the business case.</li> </ul>		Attachments 5.7 and 5.8a of our regulatory proposal. Attachment A – Climate Resilience Engagement Material (the Engagement Material) (slide 160)
AER expectation	Our response	Addressed	More information
Expectation 3.1			
Engage with their consumers on how its ex-ante funding will ensure any risks to manage extreme weather events are	We have been clear with all customers that the risk of paying twice exists and have provided them with a high level indication of the degree of risk for each solution discussed. The way we presented the 'risk of paying twice' is set out in the Engagement Material (see. slide 352 as an example)	~	Section 3.2 of Attachment B - bd Infrastructure Climate Resilience 9

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allocated efficiently between consumers and businesses. Businesses should also demonstrate that the proposed project/program proposal does not make consumers worse off by bearing the risk to manage weather uncertainties twice. It would not be in consumers' interest for them to be funding a business's recovery of actual costs from an unpredictable event (i.e. through a cost pass through) as well as funding the same risk up- front in a business's revenue proposal	Extensive engineering and economic analysis helps manage the risk of paying twice, which reduces over the longer term as benefits accumulate.	Mid-Term Report (the Resilience Mid-Term Report) provides an assessment of our approach against the AER requirements. The way we presented the 'risk of paying twice' is set out in the Engagement Material (see. slide 352 as an example)
Expectation 3.2		
Work collaboratively with affected communities, and other responsible entities involved in disaster management, to understand what the communities' genuine needs are to plan and prepare for, as well as recover from a natural disaster	Ausgrid invited other resilience actors to contribute to and participate in our Local Government Area (LGA) workshops (Councils, NBN, Telstra, Optus, Hunter Water, NSW Reconstruction Authority). We are actively working towards strengthening our partnerships with these entities by agreeing to memorandum of understandings.	Appendix B
Expectation 3.3		
We are also interested in the degree of input these stakeholders have had in developing the proposed resilience related expenditure	<ul> <li>We took the following steps during our engagement process:</li> <li>customers were invited to develop prioritised outcomes in LGA workshop 1 that would guide how we developed local resilience solutions</li> <li>in LGA workshop 2, customers were able to develop additional solutions for Ausgrid to include in our modelling</li> <li>the proposed resilience solutions were retested and prioritised in LGA workshops 2 and 3.</li> <li>We also engaged the VoC Panel to evaluate both quantitative and qualitative inputs as well as their own lived experience.</li> <li>They were asked to answer a range of questions to determine both the level of willingness to pay and the split / differences across the specific regions and Whole of Network spend, as well as providing detailed qualitative evidence to support their answers.</li> </ul>	Appendix D Section 3.2 of the Resilience Mid-Term Report
Expectation 3.4		

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Consult with its wider consumer base on their preferences for bearing resilience-related costs to address localised impacts. We would expect NSPs to explain to its customer base that the benefits associated with upfront investment in resilience expenditure to address a localised low probability, high consequence event outweigh the costs	<ul> <li>The VoC Panel was made up of customers from across the network area including locations where climate resilience poses a limited threat to the network, and where we expect climate related impacts. The mix of customers' lived experience across the group was: <ul> <li>56 - Customers that will face bill increases, have no immediate climate resilience threat, and will not benefit from the proposed local investment.</li> <li>13 - Customers that will face bill increases, and a climate resilience threat, and will not benefit from the threat, and will not benefit from the proposed local investment.</li> <li>6 - Customers that will face bill increases, and a climate resilience threat, and benefit directly from the proposed local investment.</li> <li>The VoC Panel discussed the risk of paying twice and the benefits attributed to the selected solutions by the community. This informed their willingness to pay responses with respect to upfront investments in building resilience.</li> </ul> </li> </ul>	~	Appendix D
Expectation 3.5			
We would also be interested in evidence of customers' willingness to pay for the proposed expenditure. We expect these studies to be based on genuine engagement where different feasible options to address the network are explained to customers, as well as any trade-offs, and they are satisfied that the proposed expenditure should be prioritised over other proposals by the business.	We obtained evidence of customers' willingness to pay, framed in terms of bill impacts in the current economic environment, as well as trade-offs and the prioritisation of solutions given their respective costs, benefits, and risks.	~	Appendix D
Additional expectation			
The role of NSPs in supporting network resilience is a collaborative one with other responsible entitiesAER will consider the delineation of roles that different entities have in supporting network resilience-related funding for the community	We are actively working towards strengthening our partnerships with other resilience actors by agreeing to memorandum of understandings. We are committed to continue this collaborative effort but remain confident that the portfolio of initiatives proposed is aligned with the common distribution services which DNSPs are responsible for.	~	Appendix B



### Criteria in the co-designed investment framework

Table 3 Our assessment against the investment framework

#	Requirement	Addressed	More information
1	Modelling must be mature enough to support a credible forecast.	$\checkmark$	Section 3.2
2	Investment decisions are based on the risks to customers using modelling of weather-related perils overlayed with their expected impact on customers.	$\checkmark$	Section 3.3
3	All resilience solutions should be considered (network, non- network and community).	$\checkmark$	Section 4
4	There should be collaboration and coordination between Ausgrid and other resilience actors.	$\checkmark$	Appendix B
5	Ausgrid needs to demonstrate a causal relationship between the proposed resilience expenditure (by category or project/program) and a reduction in customer impacts from the increase in extreme weather which would otherwise be expected.	$\checkmark$	Section 5.2
6	The suite of benefits is supported by evidence and addresses the problem statement or, where required, trials run concurrently with prioritised investments. The credible least whole-of-life cost options(s) that improve customer outcomes and/or promote the maintenance of service levels are selected.		Section 5.2
7	There must be customer support for resilience options.		Appendix D
8	Ausgrid must demonstrate that communities receiving the benefits of Ausgrid resilience investments are engaged with their reciprocal community resilience obligations.	$\checkmark$	Appendix D
9	<ul> <li>Ausgrid is conscious of the intergenerational equity issues</li> <li>Ausgrid must balance investment now with other considerations being: <ul> <li>Changes in technology or consumer needs that suggest different solutions may be appropriate in the future</li> <li>Changes in environmental conditions suggest that alternative locations are raised in priority</li> </ul> </li> </ul>	$\checkmark$	Section 3.3



# **3. Identifying the Need**

### 3.1 Problem Statement

### Climate change is driving more extreme weather

Seven of the world's hottest years occurred in the last decade<sup>5</sup>. The Intergovernmental Panel on Climate Change (**IPCC**) has stated that human influence has unequivocally warmed the atmosphere, with global mean surface temperature increasing by  $1.09^{\circ}$ C since the pre-industrial baseline (1850-1900). There is a growing body of evidence linking climate change to increased frequency and intensity of extreme weather events. Analysis updated in August 2022 suggests that 71% of global extreme weather events and trends (n=504) were made more likely or more severe by human-caused climate change<sup>6</sup>.

Australia's large arid landmass and high natural underlying weather variability leaves us especially vulnerable to climate impacts and these are already having a significant impact on the health and wellbeing of communities. Land areas have warmed on average by 1.47°C (±0.24°C) since records began in 1910, driving observed changes in heat extremes, rainfall (more time in drought, but more intense heavy rainfall events), number of dangerous fire weather days and a longer fire season<sup>7</sup>.

### Recent climate events in Australia

The 2019-2020 bushfire season, known as the Black Summer, was the worst bushfire season ever recorded in Australia. Higher than average temperatures and low moisture levels in bushfire fuels following several years of drought enabled devastating fires to burn across much of the state, with intense bushfire weather conditions continuing through most of the fire season. Between Sep 2019 and Feb 2020, 5.8 - 8.1 million hectares burned with 33 people killed by fire and 429 by smoke, 3,103 homes destroyed, extensive damage to ecosystems, utilities and infrastructure and an estimated national financial impact of over \$8 billion. The extreme weather of Black Summer was at least 30% more likely due to climate change.

It is estimated that the total financial cost of natural hazards across all sectors will average \$73-94 billion per year by 2060 without significant investment in resilience and risk mitigation<sup>8</sup>. The world is heading towards the medium emissions scenario of 3°C of warming by 2100. According to research published from the United Nations, IPCC, *Climate Change 2021: The Physical Science Basis*, 'unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to close to 1.5°C or even 2°C will be beyond reach'<sup>9</sup>. While emissions cuts will ultimately determine

6 https://www.carbonbrief.org/mapped-how-climate-change-affects-extreme-weather-around-the-world/

<sup>5</sup> https://www.giss.nasa.gov/research/news/20170118/

<sup>7</sup> http://www.bom.gov.au/state-of-the-climate/australias-changing-climate.shtml

<sup>8</sup> Australian Business Roundtable for Disaster Resilience & Safer Communities 2021, <u>http://australianbusinessroundtable.com.au/our-research</u>

<sup>&</sup>lt;sup>9</sup> https://report.ipcc.ch/ar6/wg1/IPCC\_AR6\_WGI\_FullReport.pdf

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the rate and magnitude, further climate change in Australia is inevitable<sup>10</sup> and will drive more frequent and severe climate and weather extremes for decades to come.

### Climate change mitigation is driving electrification, creating new interdependencies. Secure, stable, and low-emissions electricity supply is becoming even more important.

The decarbonisation of electricity generation and distribution, economy-wide electrification of major sectors like transport and manufacturing and energy efficiency are universal principles for the rapid removal of greenhouse gas (**GHG**) emissions and climate change mitigation<sup>11</sup>. In 2020, energy production contributed 33.6% of Australia's GHG emissions, with stationary fuel use from manufacturing, mining, commercial, residential and transport sectors contributing 38% of total emissions. Government policy, business commitments and pricing signals are already driving significant transformation across these sectors.

Access to reliable electricity is already considered fundamental to the health, well-being, and economic prosperity of the community and energy is an important input into the response and recovery of communities in the wake of disruptive events. The progressive electrification of sectors like transport, manufacturing and heating in commercial buildings will intensify the already highly interconnected and mutually interdependent nature of our infrastructure systems. New interdependencies can generate new vulnerabilities in systems and create new pathways through which failures can potentially cascade during extreme weather events<sup>12</sup>. For example, during the 2020 bushfires 818 telecommunications facilities were affected, with 514 being impacted for 4 hours or more, causing additional distress, anxiety and risks for affected communities. Most communication outages (across Australia) were due to power outages rather than direct fire damage to communication assets.<sup>13</sup>

As our collective dependency on reliable and secure electricity supply grows, and we simultaneously grapple with more frequent and intense weather events, we (Ausgrid and our customers) must carefully consider how we respond to these new interdependency risks.

## Electricity distribution is especially vulnerable to physical climate impacts, and these are already having major impacts on customers.

Ausgrid delivers an essential service to our customers through the operation and maintenance of electrical network assets exposed to the elements and susceptible to damage from extreme weather events. Ausgrid is the largest distributor of electricity on Australia's east coast, providing power to 1.8 million customers over 22,275 square kilometres. Our network area is diverse, ranging from urban cities to rural areas, with various types of topography and terrain, including highly vegetated coastal suburbs and regional areas with dispersed customers serviced by long isolated lines<sup>14</sup>. Managing network damage and outages from extreme weather and other major events is an accepted reality for any distribution network service provider (**DNSP**).

<sup>&</sup>lt;sup>10</sup> <u>https://report.ipcc.ch/ar6/wg2/IPCC\_AR6\_WGII\_FullReport.pdf</u>

<sup>&</sup>lt;sup>11</sup> https://www.science.org.au/supporting-science/science-policy-and-analysis/reports-and-publications/risks-australia-three-degrees-cwarmer-world

<sup>&</sup>lt;sup>12</sup> <u>https://www.sciencedirect.com/science/article/pii/S1877343522000550</u>

<sup>&</sup>lt;sup>13</sup> Final-Report-of-the-NSW-Bushfire-Inquiry.pdf

<sup>14</sup> https://www.aer.gov.au/system/files/Ausgrid%20-%20Att.%205.5.c%20-%20Climate%20resilience%20framework%20-

<sup>%2031%20</sup>Jan%202023%20-%20Public.pdf

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#### Windstorm impact on Ausgrid's network

Windstorm events including East Coast Lows and smaller localised events such as acute thunderstorms are growing in intensity and can have significant consequences for our customers. Storms of note in recent years include the 'Pasha Bulker' Storm in 2007 (max wind speed 135 km/h), the 'Sygna' storm in 1974 (172 km/h) and the more recent storms in April 2015 (135 km/h) and Feb 2020 (111 km/h). Extreme events such as these result in significant widespread damage to our network infrastructure and have resulted in outages for between 100-500k customers, in some cases for up to 10-12 days. In addition to these extreme events Ausgrid's service area and customers has been exposed to dozens of smaller severe storms, with impacts typically ranging from 50-100k customer outages with durations of up to 4-6 days.

Ausgrid has well-established risk forecasting that utilises historical performance data and informs the design and progressive implementation of controls to improve overall network resilience. However, over the last 10 years, there has been a divergence in the trends of outages 'with and without' the presence of weather (Figure 33), aligning our customers' lived experience with broader trends of increasing extreme weather events driven by climate change<sup>15</sup>.



Figure 3: Event count and Customer Minutes Interrupted (CMI) across the Ausgrid network FY12-21

Our historical outage data shows that while our network performance has remained relatively stable for non-weather-related events, network outages related to extreme climate events varies considerably year on year and are generally increasing. As we look to a future of intensifying extreme weather, it is critical to understand the relative impact on customers from these types of network disruptions. Over the 10-year period to FY2021, 27% of outages on our network were caused by climate events, but given their coincident nature, these have an outsized impact on customers,



<sup>&</sup>lt;sup>15</sup> <u>https://www.carbonbrief.org/mapped-how-climate-change-affects-extreme-weather-around-the-world/</u>

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accounting for 66% of customers minutes interrupted (**CMI**) (Figure 4Figure ). It is important to acknowledge the large proportion of these outage minutes occur on Major Event Days (**MEDs**), which are excluded from traditional investment considerations or reliability compliance obligations.



Overall impact on network performance

Figure 4: Comparison of climate and non-climate related event count and customer minutes interrupted over 10 years (FY12-21)

The following case study provides a recent example of the speed and scale of destruction severe storms can inflict on the network. Derecho storms are similar to East Coast Lows and overhead electricity distribution systems are particularly vulnerable to their impacts.



#### Case Study – June 29, 2023 'Derecho' storm - Ameren Illinois

A series of powerful storms hit central and Southeastern Illinois on June 29, 2023, causing widespread damage and power outages. The multi-day storm event knocked out power for an estimated 300,000 customers, making up around 25% of Ameren Illinois' customer base. The high winds and associated debris damaged or destroyed approximately 1,300 utility poles.

"Within a span of three hours, peak outages spiked to 182,000 customers in multiple counties, the equivalent of roughly 1,000 customer outages per minute. Just as we were assessing the damage and starting to make a dent in restoring those initial outages, a second intense storm hit on Friday, followed by a third storm on Saturday, causing thousands of new outages in the Metro East St Louis and Southern Illinois counties.

Our investments in grid resiliency and reliability prevented the damage from being more severe, enabling our crews to safely and quickly restore approximately 90,000, or 50%, of the initially impacted customer outages in about 24 hours." – Leonard Singh, Chairman & President, Ameren Illinois Derecho storms, characterised by long-lasting winds greater than 93 km/h, most frequently impact the Midwestern and Eastern United States during the summer. They are similar in both scale and intensity to East Coast Lows encountered in the NSW coastal regions. Like East Coast Lows in Australia, Derechos tend to occur in clusters of successive storms that complicate recovery efforts. Climate scientists project that climate change will likely make the atmospheric conditions conducive to derecho formation more prevalent. As a result, these types of severe storm events may become more common and destructive in the future.



#### Derecho 2023 – By the Numbers:

- More than 2,000 contractor personnel engaged from 12 states.
- More than **200,000 man-hours** worked.
- 1,300 poles damaged or destroyed – noting storm hardening investments and pole replacement program enabled 99.9% of our poles to survive
- · 3 Substations damaged.
- More than 2,000 vehicles and pieces of equipment in use.





## Traditional investment frameworks do not specifically target resilience investments, or recognise changing climate risks, requiring new approaches to prepare for the future.

Resilience is something that networks must consider as part of our obligations under the National Electricity Law (**NEL**). The lens through which network resilience is traditionally considered is in how it supports achievement of service level outcomes under the National Electricity Rules (**NER**), namely, to maintain the safety, quality, reliability, and security of supply. This means that under our normal reliability and replacement investment frameworks, we build assets to a standard expected to be able to withstand the direct impacts of climate events they are reasonably expected to encounter over their economic lives.

In making our investment evaluations for replacement and reliability programs, we use risk forecasting based on historical performance data, excluding MED related outages, and do not consider the probability (changing or otherwise) of those extreme weather events occurring, nor do we consider the benefits to customers of preventing climate related outages. This means that while Ausgrid continues to progressively implement a range of controls to improve network resilience, their effectiveness in the face of a changing climate is limited as the investment is not targeted on this basis.

There are two main drivers behind this:

- all investments are assessed using Value of Customer Reliability (VCR) as a decision-making criterion to balance reliability and affordability and ensure customers pay no more than is necessary for safe and reliable energy. VCR generally scales based on customer numbers and customer volume is a key determinant of a successful business case under BAU investment considerations. What this means in practice is that the application of VCR naturally drives investment in more populated areas, with less assets per customer, and this is not necessarily aligned with those areas most exposed to historical and forecast climate events; and
- customer benefits related to reducing outages associated with MEDs are excluded from network investment justifications.

The combination of these investment criteria and the inherently 'backward looking' inputs to the forecasting method, in the context of increasing climate risk, has meant that potentially prudent exante investments in climate resilience have traditionally been disregarded. Network service providers are expected to anticipate and efficiently manage foreseeable and smaller weather events as part of good industry practice under ex-ante (forecast costs) funding. For major extreme weather events, it has generally been considered more efficient to recover actual damage costs as they occur through ex-post (actual costs) funding under the cost pass through mechanism. This manages the risk to customers of over-investment through ex-ante funding that may not be required (or may not be sufficient) but does not mitigate the risk posed to customers by the extreme events themselves.

### Non-infrastructure solutions have been shown in practice to be complementary with infrastructure solutions, and more adaptable in unprecedented events.

Over recent years, New South Wales has experienced a range of disasters, including drought, bushfire, severe windstorms, thunderstorms and flood. There is a growing body of evidence that non-infrastructure solutions have been complementary with infrastructure solutions and often more adaptable to changing contexts. For example, in the 2017-2020 Sydney drought, the infrastructure



plan was found inadequate as engineering lead times had not anticipated the unprecedented low rainfall whereas community resilience, via water conservation programs, were more adaptable and able to be more easily brought forward<sup>16</sup>. Likewise, in the NSW Northern Rivers Floods, it was the community response that was most effective in adapting quickly to the changing circumstance. With this rationale, the NSW Critical Infrastructure strategy calls upon critical infrastructure providers to "incorporate infrastructure and non-infrastructure solutions for vulnerable locations."<sup>17</sup>.

Communities are unique and disasters are messy. They can have cascading impacts and challenges can materialise in ways first responders and recovery agencies don't anticipate. It is the communities themselves who are often best placed to develop and shape locally specific community resilience solutions. Our collective understanding of the potential of community resilience in a changing climate is evolving. While different organisations and jurisdictions have their own nuance around exactly how community resilience is defined, at their core all describe resilience as the collective capacity of the community to anticipate, respond and recover from shocks. As the impacts of climate change are increasingly felt, the understanding of what contributes to good community resilience is rapidly developing and will continue to evolve. Building complementary network resilience and community resilience, and how those pieces intersect, is new territory for all DNSPs.

In the case of the Black Summer bushfires, the "community had a general expectation that backup power will be provided somehow". Extensive comments to the Inquiry on this issue suggest that there is a "strong community expectation that, in NSW, electricity distributors should be required to provide backup power in natural disasters."<sup>18</sup> The Inquiry heard of some instances where multiple generators were deployed to the same location while some evacuation centres had none. In this context, the need to effectively coordinate flexible options to provide energy resilience is paramount.



<sup>&</sup>lt;sup>16</sup> https://water.dpie.nsw.gov.au/plans-and-programs/greater-sydney-water-strategy/about/rhs-cta/greater-sydney-drought-response-

plan <sup>17</sup> NSW State Infrastructure Strategy 2022 Citize NSW-Bushfire-Inqui

<sup>&</sup>lt;sup>18</sup> Final-Report-of-the-NSW-Bushfire-Inquiry.pdf

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### 3.2 Drivers to act on resilience in the 2024-2029 regulatory period

#### Our customers have clearly and consistently prioritised resilience investment

The primary driver for Ausgrid's consideration of targeted resilience investment in the 2024-2029 Regulatory Period is the clear directive our customers have given us to prioritise it. Desktop research in 2021<sup>19</sup> and extensive engagement supporting the 2024-2029 Regulatory Proposal throughout 2022 consistently demonstrated that climate resilience is a high priority for our customers, and they believe Ausgrid should be doing more to address the growing risk. In testing the Draft Plan for 2024-2029, 90% of customers 'liked' or 'loved' this investment priority, with the remaining 10% able to 'live with it'. Resilience attracted stronger support than any other investment category tested (Figure 5). Importantly, support for investment in resilience has been consistent across all streams of Ausgrid's engagement program (detailed in Appendix D).



Figure 5: Voice of Community (2022) prioritised resilience in comparison to other investments

This prioritisation by our customers sits within a broader context of shifting sentiment about climate change and the risks it poses, which has been quantified by Griffith University in the Climate Action Survey<sup>20</sup>. In 2021, almost three quarters of Australian's reported being 'fairly' or 'very' concerned about the effects of climate change, more than doubling the level of concern from similar reporting 10 years ago. While 22% of surveyed respondents already think climate change is an 'extremely serious' problem, a further 45% think it will be in 2050, and well over half believed Australia has already started to feel the effects of climate change. Finally, almost a third of respondents had personally or directly experienced at least one extreme weather or natural disaster event in the preceding year, and 47% had prior to the preceding year.

Increasing concerns about these impacts and the uncertain future they present have clearly driven the priorities our customers have given us in considering investment options. The expectation that Ausgrid, as an essential service provider, should have a role in broader community and climate resilience is clear and there is a compelling ask from our customers to consider what this means ahead of the 2024-2029 regulatory period.

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<sup>&</sup>lt;sup>19</sup> Review of customer, partner and stakeholder expectations, needs and aspirations, Nous Group, Nov 2021

<sup>&</sup>lt;sup>20</sup> https://www.griffith.edu.au/\_\_data/assets/pdf\_file/0024/1538304/Climate-Action-Survey-Summary-for-Policy-and-Decision-Making.pdf

## Improved modelling inputs and increasing certainty in climate forecasts has allowed us to forecast network impacts with greater confidence

While the fundamental basis of climate models has remained relatively constant, the inputs and outputs are continuously improving and have matured significantly over the last three decades. Climate processes and their underlying drivers are collectively understood and incorporated in models better than ever before, and this understanding continues to improve. Ongoing growth in computational power has also offered many improvements in earth system models and their predictive capability, including in their spatial resolution. There is no single 'best' model or subset of models, and climate projections vary between models, with uncertainties and levels of confidence for different parameters that need to be factored into any forward-looking risk assessment.

Despite their inherent limitations, it is important we recognise that climate models have been making projections for over 50 years and these predictions have been borne out by our observed changes in recent decades. In early 2020, analysis of climate models published between 1970 and 2007 and observed changes in global mean surface temperature determined that climate models have been generally accurate, particularly when accounting for differences between modelled and actual changes in atmospheric  $CO_2^{21}$ . There is no evidence that climate models have been superseded by more complex and sophisticated versions, their success in predicting future warming suggest that our current climate models can be considered both credible and reliable.



Figure 6: Global number of relevant loss events by peril 1980-2018. MunichRe registered 820 natural disasters causing insured losses in 2019 – three times as many as thirty years ago<sup>22</sup>

These observations do not seek to offset or counteract the identified uncertainties or limitations of climate models, including the well accepted challenges of downscaling to understand regional aspects. Based on the trend in historical observations (Figure 6) and the modelled projections, we



<sup>&</sup>lt;sup>21</sup> https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2019GL085378

<sup>&</sup>lt;sup>22</sup> https://www.statista.com/chart/22686/number-of-natural-disasters-globally/

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can say with certainty that the past is no longer a reliable predictor of the future, and we must accept the reality of changing climate conditions well into the future.

This creates a strong driver for Ausgrid (and other network service providers and essential service providers) to carefully consider how we manage this reality and balance our investments to ensure we don't lock our customers into deteriorating service and significantly increased costs in the future. We anticipate that a changing climate and the increasing likelihood and severity of extreme weather will in turn shift the historic threshold for prudent network investments in resilience (Figure 7).



Figure 7: Hypothesis: a changing climates means the threshold beyond which investment in resilience is no longer economic is shifting<sup>23</sup>

Maintaining a resilient network requires consideration of the evolving nature of the environment in which it operates and doing so while also considering the needs of a community and how it is best placed to support it over time. Key considerations to balanced and prudent network investment are valuing resilience, balancing equity and affordability, mitigating climate risk growth and timing any investments in mitigation. We're confident that we are in a better position than ever before to take a careful and measured 'least regrets' approach (described below) to deliver on our customers' expectations around climate risk mitigation though prudent and cost-effective investment. To do this well and manage the risk of over-investment, a comprehensive understanding of the climate risk exposure to our network is fundamental.



<sup>&</sup>lt;sup>23</sup> Ausgrid (2023), Promoting the long-term interests of consumers in a changing climate: A decision-making framework, p.11

## Modelling indicates a 26% increase in exposure to climate hazards in the Ausgrid network area by 2050

To better understand our climate risks, we commissioned climate scientists and modelling experts to establish a localised understanding of the climate risks faced in our network area, and how much those risks are likely to change over the coming decades. This modelling shows that, under the midrange of the modelled emissions scenarios (RCP 4.5), we can expect a 26% increase, on average, in exposure to climate risks across our network area by 2050, and 31% by 2090.<sup>24</sup> From a network perspective, our impact analysis shows that by 2050, we can expect a similar (24%) increase in climate related asset failures and associated interruptions experienced by our customers. Focusing on only climate risk growth for resilience investments manages the risk of double counting benefits with BAU replacement investment (repex) programs. Repex investments consider the benefits associated with mitigating the risk of 'unassisted' asset failures, not mitigating the risk of climate events. While overlaps and synergies between any resilience investment and other BAU investment programs like repex need to be considered and managed, they are unlikely to be material.

Both existing and projected changes in climate risk are not uniform across our network, with some areas more exposed than others. This study shows extreme heat and heatwaves present the biggest increase in climate risk posed to communities (Table 4). Detailed geographic analysis of climate risks for extreme heat, bushfire, windstorms, and floods can be found with our Regulatory Proposal (Attachment 5.5.b Climate impact assessment).

Metric	What this means	Change 2050	Change 2070	Change 2090	Confidence
Consecutive Hot Days - Total	The total number of heatwave days, where a heatwave is defined as 3 or more consecutive days > 35 deg C	103%	123%	123%	Very High
Consecutive Hot Days – Maximum	The longest run of consecutive hot days > 35 deg C	22%	24%	29%	Very High
Windspeed maximum	Speed of sustained wind gusts in m/s	3%	3%	3%	Medium
Windstorm	Primarily related to days where East Coast Lows make landfall	23%	30%	30%	Medium
Very heavy Precipitation Days	Days with more than 30mm of precipitation which is linked to flooding	20%	-4%	4%	Medium
High Fire Danger Days	Days with a forest fire danger index above 25	0%	23%	17%	High
Extreme (and above) Fire Danger Days	Days with a forest fire danger index above 50	13%	21%	11%	High
Average across network		26%	31%	31%	n/a

Table 4: Projected risk increase of climate perils on Ausgrid's network (medium emissions scenario RCP4.5)

To understand how this climate risk exposure translates to impact on our network, the modelling then considered the climate data relating to specific weather-related perils with network information



<sup>&</sup>lt;sup>24</sup> Based on Representative Concentration Pathway 4.5.

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like repair and replacement costs, asset co-ordinates and average customer disruption duration associated with an asset failure. In our co-designed Resilience Framework (Regulatory Proposal <u>Att. 5.5.c Climate Resilience Framework</u>) we committed to assessing investment decisions 'on the risks to customers using modelling of weather-related perils overlayed with their expected impact on customers'. Our approach to climate impact modelling aligns to this commitment and is set out in more detail in Figure 8.



Figure 8: 'Top-down' quantitative modelling approach to establish climate risk growth and impact forecasts.



# 3.3 A balanced, 'least regrets' approach provides a framework for incremental investment and flexibility based on program evaluation

Considering the drivers described above, the challenge for Ausgrid, our customers and regulator, is to determine what the optimal balance of proactive and reactive funding is to maintain service levels aligned with customer needs and expectations, in the face of a changing climate conditions and contemporary affordability pressures. Ausgrid has undertaken a 'bottom-up' modelling approach with our customers to complement the 'top-down' approach that informed the Regulatory Proposal in January 2023 (Figure 9). This approach supports consideration of valuing resilience, balancing equity and affordability, mitigating climate risk growth and right timing the mitigation to ensure our network investment is balanced and prudent.



Figure 9: Ausgrid's Climate Resilience Modelling Approach

## Historical exposure to extreme weather, future risk growth and capacity to cope informed additional needs assessment to prioritise Central Coast, Lake Macquarie and Port Stephens

The 'bottom-up' modelling is detailed in Section 4. Developing Options, and Appendix C. To inform this process, additional needs assessment was done to identify where Ausgrid should prioritise investment in the 2024-2029 Regulatory Period, based on criteria set by our Voice of Community (VOC) Panel in 2022 during regulatory proposal consultations (Figure0), which shows a roughly equal spilt of the total 150 votes across each investment area, with a slight priority at 38% for investments that target areas where people are vulnerable and less able to cope.







Figure 10: Voice of Community 2022 Panel responses to 'Where we should prioritise resilience investment'?

Figure 11 below shows the average number of minutes customers in different Local Government Areas (LGAs) are without supply each year (FY12-21) during climate related MED events. The median LGA on this metric is Ryde (17 minutes) whereas Lake Macquarie (195 minutes), Central Coast (251 minutes) and Port Stephen (337 minutes) exhibit significantly higher average annual minutes without supply.





The climate risks modelled in Ausgrid's climate risk assessment were:

- extreme heat days (heatwaves);
- bushfire (direct network impacts, rather than liability associated with a network fire start);
- windstorms (east coast lows, rain, wind speed);
- riverine flooding; and
- coastal inundation.

Each of these was assessed individually to understand the relative risk for suburbs in Ausgrid's network and identify those likely to be worst affected. This assessment showed that the areas of our

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network with the biggest exposure to extreme weather from climate change are the Upper Hunter (heatwave and bushfire) and the coastal regions (windstorms).

To quantify the physical risks resulting from climate change and the potential impact on Ausgrid's assets and customers, the impacts of extreme weather events were assessed using climate change forecasts, network asset information, financial data and customer data. The impact analysis was broken into three primary sets of results: rate at which assets would fail causing outages, costs to repair, and the time that customers would be without supply. Results and climate risk data was modelled for three possible future climate scenarios (RCP 2.6, RCP 4.5, RCP 8.5). These results were calibrated against historical data, external databases, international research, and internal engineering expertise. The outputs show that based on anticipated average costs each year, windstorm along the heavily vegetated suburbs on the coast will have the biggest future climate impacts within Ausgrid's network in 2050 (Figure 12). The Central Coast, Lake Macquarie, and Port Stephens all fall within this coastal belt, so in addition to experiencing disproportionately more outages from extreme weather already, they face a future in which this is expected to deteriorate more than other areas.



Figure 12: Relative impacts costs by climate peril in 2050 (left) and estimated total impact costs in 2050 (right) on medium emissions scenarios RCP 4.5

Finally, we considered vulnerability metrics to understand where in our network customers have less capacity to cope with the increasing impacts of extreme weather. This analysis considered median income, indigenous, elderly, female and rural populations, and education, as well as the percentage of bare overhead conductor. All three of our priority LGA's rank high in terms of socio-economic disadvantage, meaning as communities it is more difficult to recover from extreme weather events. This disadvantage can be neatly summarised by the Australian Bureau of Statistics Socio-Economic Indexes for Areas<sup>25</sup>, where Central Coast, Lake Macquarie and Port Stephens consistently rank in the bottom third of Ausgrid's LGAs on indices of relative socio-economic disadvantage, advantage and disadvantage, education and occupation, and economic resources.

## A 'least regrets' investment approach aligns with international best practice on climate adaptation pathways and manages intergenerational equity and affordability considerations

<sup>&</sup>lt;sup>25</sup> https://www.abs.gov.au/statistics/people/people-and-communities/socio-economic-indexes-areas-seifa-australia/latest-release

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This detailed needs assessment and targeted approach to risk mitigation are key components in Ausgrid's ability to take a precautionary approach and establish a 'least regrets' investment balance for the 2024-2029 regulatory period. 'No regrets' or 'low regrets' strategies are well-accepted approaches that manage uncertainty and investment risk by erring on the side of caution and planning well in advance. In the context of climate change, this strategy means taking climate-related investment decisions that can be justified from economic, social, and environmental perspective whether a specific climate threat materialises in the future, and this is achieved by building resilience to different hazards or risks<sup>26</sup>.

In taking these types of investment decisions for the Ausgrid network, we must take a long-term view and use these types of strategies to deal with uncertainties and trade-offs between short- and long-term goals. The time horizons on which Ausgrid operates are important. With most network assets expected to be in service over 40+ year time horizon, we must balance the long-term risk for different groups of customers from both underinvestment and overinvestment (including consideration any cost recovery under the cost pass through mechanism). A least regrets approach allows us to do this and helps address intergenerational equity by increasing the probability that investment decisions today will not result in future generations paying materially more or facing materially higher risks than they need to.

The components of Ausgrid's proposed least regrets are:

- Expenditure envelope constrained to \$202M TOTEX based on top-down modelling: The 'Balanced Risk Mitigation' approach recommended and adopted in the 2024-29 Regulatory Proposal takes a conservative approach to overall resilience expenditure. Initial economic modelling indicated resilience expenditure could go up to \$319M and maintain a Benefit cost ratio (BCR) of 1. Adopting a customer driven cap of \$202M balances customer expectations, affordability and the risk of overinvestment.
- A more conservative BCR with a lower limit of 1.2: Applying a higher BCR threshold helps to account for uncertainty in the modelling and reduces the likelihood of customers funding any investments where the benefits may not outweigh the costs.
- Collaborative design of solutions with affected communities and other resilience actors and stakeholders to ensure investments are fit-for-purpose: A transparent and participatory design process balances lived experience within affected communities, local preferences and robust scientific and engineering information to ensure ownership by affected communities and give us greater confidence that proposed investments, especially non-infrastructure, will be fitfor-purpose and deliver net benefits.
- Careful testing to ensure there is broad 'Willingness to Pay' support (Appendix D) across our customer cohorts: Through transparent communication of the costs, benefits and long-term bill impacts with representative groups of our customers ensures we are balancing long-term climate risk mitigation needs with equity and affordability considerations.
- Robust evaluation and transparent feedback and accountability to our customers: The establishment of a Climate Resilience Advisory Committee, milestone reports, continuous monitoring and a formal post implementation review will provide assurance that the program delivers it's intended benefits and provides a transparent mechanism to adapt course if necessary. This includes a commitment to re-engage with customers across the three priority local areas throughout the regulatory period to understand and quantify the impact.



<sup>&</sup>lt;sup>26</sup> (Heltberg, Siegel, Jorgensen, 2009; Siegel, 2011)

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This 'pilot' approach allows us to manage risks and build evidence to help us understand how to deliver a balanced improvement in climate resilience over the long term. By starting in a targeted way during the next regulatory period, we can address near-term issues including affordability while still making progress in reducing longer-term climate risks. Our strategy is to make changes gradually over time as we learn more, starting in the areas with highest likelihood of seeing clear and immediate benefits, rather than attempting to adapt the entire network at once. This aligns with best practices for adapting to climate change since adaptation is an ongoing process of managing risks that take place along an evolving pathway.



### 3.4 Summary of needs statements

The needs statements are summarised below. This provides the criteria that are carried through to the program cost/benefit analysis in Section 5.

Table 5: Summary of needs statements

	Regulatory Needs (from the AER Guidance Note)
A	There is a causal relationship between the proposed investment and the expected increase in extreme weather events
В	The proposed expenditure maintains service levels and is based on the option that likely achieves the greatest net benefit of the feasible options considered
С	The benefit of the resilience-related funding (for instance, avoiding or reducing the frequency or duration of outages) outweighs the costs of the investment
D	The preferred funding option provides more net benefit against other feasible options
Е	Work collaboratively with affected communities, and other responsible entities involved in disaster management
	Resilience Needs
F	Utilise climate risk models to appropriately target investments and maximise climate risk mitigation (Same as A above)
G	Take a 'least regrets' approach by targeting area most exposed to risk growth with lower capacity to cope, applying a BCR of 1.2 and top-down constrained budget
н	Assess infrastructure and non-infrastructure options (referred to as network and non-network solutions in this business case) to balance defensive and adaptive resilience postures. Adopt non-infrastructure investments when they allow necessary flexibility, are economic and better target the needs of customers
I	Invest in initiatives that support energy resilience before, during and after events to balance proactive and reactive approaches
J	Enable program to evolve as changing science, technology and investment evaluation and learning emerge in a transparent way that builds trust with stakeholders
	Customer Needs
к	Prioritise investment in resilience, with a mix of CAPEX and OPEX solutions within the \$202M customer driven investment cap
L	Align investment with customer priorities to target where extreme weather already has the biggest impact, this is expected to deteriorate the most and affected communities have limited capacity to cope (Same as F above)
Μ	Prioritise investments that customers value. Utilise local knowledge to invest in items that will work in the local context
Ν	Ensure broad support for willingness to pay



# 4. Developing Options

This Business Case builds upon the options previously submitted for the Climate Resilience Program in the 2024-29 Regulatory Proposal<sup>27</sup>. That document assessed four investment options beyond the Business-as-Usual Base Case and recommended that Ausgrid progress with a 'Balanced risk Mitigation approach' case scenario with a customer driven cap of \$202m Totex. In this Business Case Ausgrid further develops the nominated preferred in the 2024-29 Regulatory Proposal - Option 5 "Balanced risk mitigation approach, with customer driven cap" - by bringing together climate risk, engineering and community". This option has been assessed as Option 2 Co-Designed Approach in this Business Case.

#### Table 6: Options assessed in this business case

	Option	Description
Option 1	Base Case: Business-as-Usual Approach	No additional investment in resilience in 2024-29 period. Deliver existing incident response, bushfire, emergency management and innovation commitments and use existing risk management strategies to reactively respond to climate events e.g., cost pass throughs – and upgrading assets to modern equivalent standards when they are replaced.
Option 2	Co-Designed Approach: Draws together climate risk, engineering, and community insights	Resilience program has been co-designed with communities through dedicated Resilience Engagement and solution development activities. Ausgrid informed customers of engineered options and community-based resilience solutions that met their identified resilience requirements and discussed their preferences and tradeoffs. This investment was capped at \$202M totex in line with the customer driven cap.



<sup>&</sup>lt;sup>27</sup> https://www.aer.gov.au/system/files/Ausgrid%20-%20Att.%205.5%20-%20Climate%20resilience%20program%20-%2031%20Jan%202023%20-%20Public.pdf

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### 4.1 Option 1 - Business-as-Usual

### 4.1.1 Description

In the Business-as-Usual (BAU) base case, Ausgrid would not make any dedicated resilience investment, but would continue to maintain its BAU approach to weather risk management. If an extreme weather event occurs, Ausgrid will repair the infrastructure and restore the grid back to its previous BAU state (or the most up to date standard applicable).

Ausgrid would not perform any targeted network upgrades in anticipation of more frequent extreme weather events, to improve resilience during climate events. Beyond Ausgrid's BAU activities that will likely deliver some resilience benefits (see 4.1.3 below), no additional support would be provided to communities before, during, and after events, or investment in tools or support for Ausgrid to respond more efficiently during events.

### 4.1.2 Base Case Assumptions

This option has been estimated based on the assumptions presented below, which is in line with our existing measures.

- No new dedicated resilience investment for the 2024-29 period;
- The existing Ausgrid response plan used during major events;
- The existing community and climate vulnerability in each area is only considered in line with Ausgrid's existing customer support programs; and
- Climate risk is allowed to grow without direct mitigation measures

### 4.1.3 Base Case Inclusions

There are a number of initiatives Ausgrid is working on as part of BAU activities that may have resilience benefit and outcomes. They can be categorised into the areas listed below.

- Improving incident response:
  - Incident response application to allow remote access to systems for field teams;
  - Virtual emergency response storm room;
  - Website outage information improvements;
  - Enhanced social media storm messaging;
  - Enhanced government communication during storm response;
  - Cross network agreements;
  - State-wide emergency response co-ordination; and
  - Disaster playbook
- Bushfire preparedness:
  - In-house drone inspections
  - Establishing inspection credentials for service providers
  - Local council co-ordination

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- Hazard burn co-ordination
- Innovations and trials:
  - Stand alone power system trials
  - Smart Meter data trial
  - Composite pole testing and trials
  - Reclosers and sectionalisers
  - Lighter weight covered conductor testing

### 4.1.4 Costs and risk growth forecast

There is no additional resilience investment for Option 1. The BAU investments described above will be delivered and resilience benefits and outcomes may also be realised through the resilience workstream under the Network Innovation Advisory Committee's (NIAC) Network Innovation Program (NIP) trials and research. Beyond this, with no incremental resilience investment, increasing loss of supply and exacerbated customer impacts can be expected in line with projected climate risk growth and modelled network impacts.

Description	CAPEX (Real FY 24 \$m)	OPEX (Real FY 24 \$m)	Reduction in Risk	NPV (Real FY24 \$m)
Option 1	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0

### 4.2 Option 2 – Co-Designed Approach

The 'Co-designed Approach' is described as co-designed as it combines the insights of climate risk assessments, technical engineering with community desired outcomes and preferences. Customers were engaged to understand their climate resilience priorities. Investment options were assessed against the climate perils, and customers reengaged to understand which options best met their needs.

### 4.2.1 Understanding customer priorities for resilience

The process started by understanding that the VoC22 rated resilience as an investment priority, with identified priorities to 'areas where extreme weather impacts the most', 'where there is expected to be the biggest increase in outages due to extreme weather', and 'where people are vulnerable to the future impacts of extreme weather' (Figure 10 in Section 3). Using this logic, Port Stephens, Central Coast and Lake Macquarie regions were identified as requiring special consideration, in addition to the whole of network investments (See Section 3).

Our approach to understanding our customers' priorities was guided by the AER's expectations in the Better Reset Handbook about the breadth and depth of engagement. This led us to:

• Partner with 178 customers over the course of 70 hours of deliberation.

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- Run a mix of 'face-to-face' and online workshops to promote accessibility, including the provision of laptops to those who required them.
- Record LGA feedback on video so that their views could be communicated to the VoC Panel clearly and transparently 'in their own words', as well as in written form.
- Reinforce the relationship between the LGAs and VOC, specifically as it related to criteria for determining the split of funding, and willingness to pay was continually reinforced.

We also kept the expectations in the AER's Resilience Guidance Note firmly in mind when briefing customers on key concepts that would inform their willingness to pay. For example, the AER's Resilience Guidance Note discusses the efficient allocation of risks between networks and customers. We actively sought to draw our customers' attention to this matter by presenting an 'effectiveness rating' of each resilience solutions, as outlined below. This allowed customers to weigh their willingness pay for an investment against the risk of the solution failing to provide any additional benefit during an extreme weather event.

Network Aisle					Ausgrid
Product Name	Key ingredients	Bill impact (cost)	Effectiveness rating	Who does this help?	Approximate customer reach
1. Reduce outage time and frequency for most customers	Reduce impact of extreme weather through • Sectionalisers • Covered conductors	\$\$\$	*****	Is most effective at improving network performance for the most customers.	8000
2. Strengthen network for worst served	Target High Voltage network with poor performance utilising a mix of all network solutions.	\$\$\$\$		High climate risk and critical supply feeders/customers. Worst served customers.	6000
3. Protect high vegetation areas from East Coast lows	Target highly vegetated areas with • Aerial Bundles Cables • Covered conductors	\$\$	****	Tree lined streets.	3000
4. Targeted Undergrounding	Target poor performing existing overhead network by • Undergrounding	\$\$\$\$\$	****	Most effective in high climate risk and heavily vegetated areas.	1000
5. Critical Community Services* Bespoke Solutions	Strengthen the network serving critical customers* through a mix of all network solutions.	\$\$\$\$	****	Critical customers* with a high climate risk.	50*
6. Bushfire network package	Minimise bushfire risk and aid recovery through • Spreader bars • Resilient poles	\$\$\$		High fire risk rural customers.	2000
7. Isolated customer package	Network replacement for isolated customers • Stand Alone Power System • Microgrid	\$\$\$\$		Rural, remote and isolated customers who experience extended outages.	20

Another key consideration in the AER's Resilience Guidance Note is the risk of customers paying twice. To address this, we sought to make it clear to our customers that resilience expenditure would not prevent Ausgrid incurring additional costs (via a pass through application) if an extreme weather event occurs. We achieved this through access to engineering experts and the use of engagement tools. For example, we presented the 'traffic light' guide below to inform customers of the risk of 'paying twice' if a storm or other major event occurred after a resilience investment was made. The key factors in determining the risk level were based around whether or not the proposed solutions were in a fixed location and the likelihood they would be impacted by extreme weather. The relevant risk factor was outlined for each solution proposed.



The risk	tion we show we'll indicate the level of risk of paying twice	Ausgrid
	<ul> <li>the risk of paying twice is lower:</li> <li><u>isn't in a fixed location</u>, or</li> <li><u>not vulnerable to extreme weather</u></li> <li>e.g. communication campaign ahead of a East Coast low season</li> </ul>	Lower risk
	<ul> <li>the risk of paying twice exists:</li> <li><u>is in a fixed location</u>, and maybe that's the wrong location, but</li> <li>is <u>less likely to be impacted by extreme weather</u></li> <li>e.g. under grounding</li> </ul>	Medium risk
	<ul> <li>the risk of paying twice is higher:</li> <li><u>is in a fixed location</u>, and maybe that's the wrong location, and</li> <li>may <u>be impacted by extreme weather</u> and if this storm is significant we may seek <u>additional</u> funding to cover repairs</li> <li>e.g. covered conductor</li> </ul>	Higher risk

We have included a detailed assessment of the steps we took to meet the expectations in the AER's Resilience Guidance Note and the Better Reset Handbook in Appendix A.

### 4.2.2 Engineering and Resilience Assessments were conducted to understand the options

Over 40 climate resilience solutions were reviewed for consideration for inclusion in the FY24-29 Climate Resilience program proposal. From the initial list of solutions over 30 were prepared for customers consideration throughout the engagement process. Potential Climate Resilience benefits were determined for solutions by applying factors to ensure benefits were not overstated. These are shown in Table 7.

Table 7: Factors applied to ensure that benefits are not overstated

	Controls applied
1	Taking a conservative approach to applying climate scenarios, with a weighting of 70% for RCP4.5, 15% for RCP 2.6 and 15% for RCP8.5
2	Only benefits to climate resilience have been modelled
3	Applying conservative assumptions to mitigation control effectiveness. For example, the effectiveness of Covered Conductor Thin (CCT) on vegetated spans was only modelled at 25% (where some industry estimates put this at 50% and higher)
4	Quantified the value of unserved energy using VCR and not WALDO, given that a WALDO VCR is not yet defined.
5	Benefits due to projected population or load growth not modelled.
6	Descoping growth in fire start risk
7	Adopting a BCR investment hurdle rate of 1.2 to minimise risk of not achieving favourable outcomes



8	Reduction in proposed resilience investment to account for overlapping replacement expenditure (repex).
9	Only including uplift from BAU costs.

For the local government network solutions, packages were developed utilising community engagement outcomes and other supporting information in conjunction with Local Network Solution Modelling approach outlined in Figure 13. Figure 14 provides an explanation of the key steps. For all other investments, including infrastructure and non-infrastructure solutions, a traditional cost benefit assessment was conducted, similar to what is included in Appendix C.



Figure 13: Location Network Solution Modelling






Figure 14: Explanation of key local network solution modelling steps

# 4.2.3 Development of Indicative LGA and Whole of Network Budgets

The development of budgets for the Whole of Network, Central Coast, Lake Macquarie, and Port Stephens packages was an iterative process that was undertaken in parallel to the Community Engagement and solution development activities. Final indicative budgets were assigned to each LGA and the Whole of Network packages prior to Workshop 3, these were:

- Up to \$72M for WON;
- Up to \$70M for Central Coast;
- Up to \$40M for Lake Macquarie, and



• Up to \$20M for Port Stephens.

The above allocations were derived from the \$202M expenditure cap from the nominated preferred Option in the Climate Resilience Program Regulatory proposal submitted in January 2023<sup>28</sup>. Splits for the four packages were based on consideration of a multitude of decision-making criteria and supporting data. Inclusion of multiple parameters ensured the nominated breakdown was appropriate to meet the resilience needs of the areas and provided balance to whole of network considerations. Key considerations were:

- VOC 2022 preferred decision-making criteria:
  - "Better support services available to all customers before, during and after climate events"
  - "Moderately reduce climate related outages and impacts for as many people as possible"
  - o "Significantly reduce climate related outages for those people most exposed"
  - VOC 2022 preferred OPEX to CAPEX (40:60) spend ratio for bill impacts

# • Local demographics and geography including:

- Population;
- Number of Ausgrid customers;
- o Customer vulnerability; and
- Physical size and topography.
- Network characteristics:
  - Asset data: Including amount of overhead conductor, bare conductor and existing undergrounding.
  - Critical services and customers serviced by Ausgrid's network.
- Climate Impact and Risk:
  - Assessment of loss of supply and asset loss in different LGAs.
- Historical Network Performance including:
  - $\circ$   $\,$  Number of outage minutes per customer caused by extreme weather.

# 4.2.3 Working with the community to understand their preferences

To understand community preferences Ausgrid ran two concurrent deliberative engagement processes to inform both local priority LGA package and Whole of Network (WoN) package design. A deliberative process was chosen to broaden participation and provide our customers with the time, information and iteration opportunities to properly consider and advise on complex topics outside their

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expertise. This deliberative process and it's outputs are detailed extensively in Appendix D and Attachment B.

Ausgrid presented customers with a range of infrastructure and community resilience solutions and explained the relative costs and how each potential solution addressed climate perils and the community's prioritised outcomes (see Tables 8-10).

Key data provided to customers to enable them to select the solutions included:

- A description of solution benefits including whether the solution prevents outages, reduces outage length, aids customers during an event, or aids recovery post event, etc.
- An indication of the solutions effectiveness against specific climate threats e.g. windstorm, fire, extreme heat, etc.
- An indication of the risk a customer could 'pay twice' based on the flexibility/mobility, and vulnerability of each solution (described as lower, medium or higher risk)
- Estimated numbers of customers benefiting from a solution.
- Estimated solution costs across the five-year period (2024-29) and depreciation timeframes
- Bill impacts in nominal 2029 dollars (presented as annual bill impacts, the bill impact as at 2029 and the cumulative bill impacts across the entire 2024-2029 period).
- Information about Ausgrid's current services, and whether solutions were potentially better delivered by others or whether co-funding or partnership approaches could be appropriate.

More information on the detail presented and process undertaken is outlined in the Engagement Materials and Resilience Mid-Term Report and in Appendix D.

**For the Whole of Network Solutions,** these were prioritised by the VOC panel which consisted of representatives from Ausgrid's entire operating area. The VOC sessions evaluated costs and benefits and trade off alternatives to determine which solutions best met their desired outcomes. Items 1-6 (Figure 15) were prioritised by customers as being rated more important by the majority of assessments. More detail on each solution is available in Appendix C.

					Relative importance:
Solution	Least in	nportant	Most in	nportant	
	Newc.	Syd.	Newc.	Syd.	
Build back better			2	7	
Fault detection and sensors			5	4	
Data sharing platform for multi-agency resilience planning		1	1	6	
Spreader bars		1	1	5	
Community resilience plans (co-funded)	1	1	2	1	
Strategic Veg Mgt Asset Protection Zones for Substations		2		2	
Workforce protocols (incl protective equipment)		3	1	1	
Research into extreme heat		2	1		We have draw
Undergrounding		1			the line here
Research into vulnerability index	2	2		1	
Mobile community liaison centres	2	4		2	
Real time resilience warnings	4	2	1		
Education programs	1	5			
Community grant programs	4	5		1	



#### Figure 15: Whole of Network Customer Prioritisation process

## For the Priority Local Government Areas (Priority LGAs), a similar process was undertaken.

Utilising the Ausgrid Climate Risk Assessments and Engineering Information provided, LGA Customer Forums evaluated over 30 potential solutions, including traditional network solutions, solutions that utilise community services and infrastructure, communication solutions and solutions that the customers identified as gaps (i.e., solutions not previously considered by Ausgrid for example the Blackout Plan). As a result of this evaluation customers determined the solutions that they believed Ausgrid should deliver to best meet their needs and expected outcomes.

Each local area package is supported by a video of members of the community describing how they selected the solutions and how the packages work to support their unique community. These are also supported by a written submission from each LGA group on pages 55-58 of the Resilience Mid-Term Report. The videos can be accessed at the below links:



#### Packages in the communities' own words:

- Central Coast <u>https://youtu.be/WT2mZA2LP5g</u>
- Port Stephens <u>https://youtu.be/liQdDWa9SSM</u>
- Lake Macquarie <u>https://youtu.be/HC3bNnfNall</u>

## Figure 16: Priority LGA engagement videos

Importantly, these LGAs did not prioritise the same outcomes. The below tables set out each areas package of solutions (each solution is listed in priority order), showing how they align to the communities' outcomes. More details on community packages and each solution are set out in Appendix C.

Re	silience Solution in order of customer preference	Custo	Customer prioritised outcomes						
		Self Resilience	Longest Outages	Most Customers					
1	Network solutions to reduce outage and time for the most customers		~	~					
2	Energy component of community resilience plan	✓	~						
3	Ausgrid Liaison Person (1/3)	×	~	✓					
4	Community awareness and education campaign	×	~	√					
5	Local safety and outage messaging		✓	√					
6	Network solutions to protect high vegetation areas from East Coast Lows		~	~					

#### Table 8: Central Coast package of solutions



Res	ilience Solution in order of customer preference	Com	Community selected outcomes						
		Long Term	Lift Everyone Up	Mitigate Impacts					
1	Energy resilience community hub		✓	✓					
2	Ausgrid Liaison Person (1/3)	$\checkmark$	$\checkmark$	✓					
3	Blackout Plan (light)		✓	✓					
4	Reduce outage time and frequency for most customers	$\checkmark$	✓						
5	Critical Community Services Bespoke Solutions	$\checkmark$	✓						
6	Communications targeting vulnerable customers			✓					
7	Provide flexible resilience solutions with small mobile generators			~					

## Table 10: Lake Macquarie package of solutions

Re	silience Solution in order of customer preference		Outcomes						
		Vulnerable	Worst Served	Most Customers					
1	Network solutions to protect high veg areas from East Coast lows		~	✓					
2	Network solutions to reduce outage time and frequency for most customers		$\checkmark$	~					
3	Ausgrid Liaison Person (1/3)	$\checkmark$	$\checkmark$	✓					
4	Provide energy resilience to community hub	√	$\checkmark$						
5	Flexible resilience solutions with small mobile generators	✓	$\checkmark$						
6	Comms targeting vulnerable	✓	$\checkmark$						
7	Blackout Plan	✓	$\checkmark$	✓					

## 4.2.4 Ensuring the packages worked as a program

Ausgrid added two solutions to ensure the co-designed resilience packages worked as a program. These were:

- Climate Risk Assessments: an initiative to update climate risk assessments; and
- Assessment and Evaluation: initiative to set up the program to be able to transparently evolve during the implementation phase as learnings and new insights emerged.

Both initiatives are described in detail in Appendix C.

## 4.2.5 Re-engaging with the voice of the customer to ensure broad support

In June 2023, the packages were presented to the VOC Sessions and achieved broad support for willingness to pay. A summary of the VOC process and our findings regarding their willingness to pay

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for the co-designed resilience packages are set out below, with more information is available in Appendix D.

Table	11.	Summary	of	deliberative	co-desian	engagement	process
Table		Guinnary	01	ucinociative	co acoign	cingagement	<i>process</i>

Overview	Between February and June 2023, Ausgrid engaged communities in climate-vulnerable areas to develop		70 hours
	tailored packages of responses to deal with the effects of extreme weather on our energy network	<u>ऀग़ॣग़ग़</u> क़॓ऀॏक़॓ॏक़॓ॏक़॓	Of customer deliberation
	We put \$202m of resilience spend in the hands of the community. Our aim		<b>\$202.0</b> m
Approach	was to better understand their priorities, identify the resilience solutions they value the most and find out their willingness to pay for managing climate risks to our network.	\$	Our initial forecast
	Our process resulted in a community designed resilience package of \$176.5		\$176.5m
Outcomes	million (reduction of \$25.5 million) covering Whole of Network Solutions and investment in three priority LGAs (Port Stephens, Lake Macquarie and Central Coast).	\$	Community designed package
	The VOC Panel expressed a high level of comfort with our proposal in their voting for the packages (quantitative data) and in verbatim comments (qualitative information).	ŤŤŤ	<b>100%</b> Most common response to the question <i>'How</i>
Willingness to pay	When asked ' <i>How much of the</i> proposed bill increase for resilience spend are you willing for all customers to pay?' the most common response was '100%' for the Whole of Network Solutions and all three priority LGAs.	ĦĦĦĦ ĦĦĦĦĦ	much of the proposed investment are you willing to pay for?'



# 5. Assessing Costs and Benefits

# 5.1 Overview

We have undertaken detailed analysis to assess the costs and benefits of our 2024-29 climate resilience program, summarised in Table 11 with more detail in Appendix C. The proposed totex is \$176.5m.

	Willingness to Pay	BCR	CAPEX (Real FY24 \$)	OPEX (Real FY24 \$)
Whole of Network	Broad Support	2.86	\$45.3 M	\$2.4 M
Central Coast	Broad Support	1.50	\$66.7 M	\$2.0 M
Lake Macquarie	Broad Support	1.29	\$39.6 M	\$0.8 M
Port Stephens	Broad Support	1.36	\$19.0 M	\$0.7 M

Table 11: 2Proposed Resilience Expenditure

# **Community Benefits Determination**

The BCR values provided in Table 11 exclude local non-network and some WON solutions cost and benefits. These exclusions include:

- Whole of network solutions with a strategic benefit,
- LGA focused non-network solutions, and
- Port Stephens undergrounding for critical community services (item PS8)

The community has reiterated during the VoC2022 and 2023 Climate Resilience Engagement programs (Appendix D) that they want Ausgrid to invest in community solutions which are typically OPEX investments and for which benefits cannot easily be monetised. The AER has also acknowledged the challenges in assigning value to these types of investments<sup>29</sup> and encouraged NSPs to demonstrate consumer preferences. Where no direct monetised benefit can be ascribed, benefits of community and non-network solutions are assumed to be equivalent to the benefits achieved from network solutions. This assumption is supported by customer sentiment and WTP support for the proposed packages. Customer value determination is further detailed in Appendix C and D.



<sup>&</sup>lt;sup>29</sup> AER (2022) <u>Network Resilience - A note on key issues</u>, p. 10: The Values of Customer Reliability (VCRs) seek to reflect the value different types of customers place on reliable electricity under different conditions. VCRs are usually provided by NSPs to support proposed expenditure intended to maintain reliability of the network. We consider that the VCRs we published in our review in 2019 may not be appropriate to estimate the value which customers would place on avoiding or reducing the severity of larger unplanned outage events that have specific localised impacts.

With the proposed investment packages now finalised, Ausgrid will undertake detailed scoping and modelling for each of the nominated solutions, including a quantitative assessment of benefits to confirm indicative cost benefit analysis prior to revised proposal submission in October. Benefits determination of local non-network solutions (community support and communication initiatives) will also continue to be subjected to testing against the Framework in 2023. This will seek to provide further validation that the proposed OPEX and community solution expenditure is prudent and efficient.

In this section we will assess the costs and benefits of the program against:

- the AER's expectations in its Guidance Note (Section 2);
- The resilience needs developed in Section 3;
- The preferences expressed by customers.

# 5.2 Meeting expectations in the AER's Guidance Note

## **Causal Relationship Requirement**

Our approach to modelling the benefits of our resilience program establishes the causal relationship between the proposed resilience expenditure and the expected increase in extreme weather events specific to the Ausgrid service areas. This is by incorporating the inherent uncertainties in forecasting the timing, location, and scale of the impacts of extreme weather events.

Details of our approach were previously described in Section 4.2 and include:

- Engaging climate experts to develop granular, locally specific climate modelling
- Application of conservative weightings between climate scenarios so as not to overstate risk growth
- climate risk baseline and forecasts for each relevant climate peril at all relevant locations across our service area
- the number and location of assets vulnerable to climate impacts across our service area;
- climate related asset failure modes and failure rates;
- unit costs and typical restoration times for failed assets;
- availability of service teams during responses to extreme events, including availability of 'surge' resources from other DNSPs and electrical contractors;
- typical outage restoration priority;
- customer energy at risk, based on customer information at each feeder location;
- the AER's 2019 VCR decision (applicable to network solutions only); and
- assumptions regarding both the costs and effectiveness of various resilience solutions in different LGAs.

The modelling used a range of assumed effectiveness ratings for each resilience solution. Based on these effectiveness rates, we have calculated that our resilience program will deliver positive benefits for customers. Our view is that where positive net benefits can be established on a probabilistic basis there is a clear causal link between the proposed resilience expenditure and the expected increase in extreme weather events. This is underscored by the Expected Unserved Energy (EUE) benefits from our program being based on the unserved energy during major event days (MEDs), and the outages directly associated with MEDs that occur immediately before or after



an MED is triggered. A causal link for extreme heat has not yet been established and Ausgrid is undertaking NIAC research to better understand the impacts of extreme heat on our assets.

# **Maintain Service Levels Requirement**

Our assessment of costs and benefits have considered the growth in our expected climate risk relative to a 2020 baseline. It found that compared to a 'Base Case' scenario customers would face materially higher climate risks, and ultimately poorer service levels, if we do not invest in climate resilience over the 2024-29 period. In response, our resilience proposal seeks to arrest climate risk growth in a way that keeps existing services levels steady.

Resilience initiatives are intended to deliver distinct benefits in terms of service levels customers experience during extreme weather events. Resilience is defined as "the network's ability to continue to adequately provide network services and recover those services when subjected to disruptive events". For this reason, this business case tests whether there is an identified resilience need by assessing our current and expected network performance during climate related major events. Reliability benefits outside of extreme weather events have been excluded from scope, with the result that the proposed resilience investments are not targeting, nor are they expected to have a material impact on, day-to day reliability outcomes when considering the overall impact to customers from increasing climate change risks to the whole network.

The resilience forecast was developed independently of other parts of the capex program and addresses growth in climate risk over time which is not incorporated into other capex models. Probabilistic adjustments were applied to account for the potential overlap with other (non-urgent) asset replacement activities.

## **Postive Net Benefits Requirement**

The benefits from our our 2024-29 resilience forecast outweigh the costs of our planned investment of \$176.5M with a BCR of 1.7. In considering these aspects, we have been careful to ensure that the benefits are not overstated using the controls previously detailed in Section 4.

The approach to assess benefits for Climate Resilience projects is identified in Figure 17.



Figure 17: Approaches to assessing benefits

## Approach to assessing benefits



For Local Network Solutions, the BCR Benefit Cost Ratio (BCR) assesses the economic viability of the solution by taking the net present value of climate risk benefit as a ratio of the net present investment cost. The BCR values provided in Table 11 for the Central Coast and Lake Macquarie are for the total local network package and for Port Stephens Solution PS6. Climate risk mitigation benefits are assumed to accrue to 2050. Other secondary benefits of the investments, such as reduced growth in maintenance and reduction in safety, environmental and other risks are excluded from the benefit calculation.

All network investments demonstrate a positive BCR, except for Projects PS7 and PS8 that targets long term steps to ensure resilience in critical services in the Port Stephen's community. It is important to note that for this investment, the community traded off items with a positive BCR in preference to making this investment and made a deliberate request for its inclusion.

For WON items information on the assessment of benefits approach is included in Appendix C.

## **Highest Net Benefits Requirement**

In response to customer engagement outcomes from VOC22, Ausgrid adopted a BCR hurdle rate of 1.2 for the Climate Resilience program. Only solutions that have a BCR >1.2 are considered for investment. For Local Network Solutions, the evaluation process then focused on assessing the cumulative climate risk reduction achieved by implementing the solutions, as well as considering the cumulative present cost associated with their implementation. This evaluation allowed for a comprehensive analysis of both the effectiveness in reducing climate risks and the financial implications of implementing the selected solutions. From the investment candidates that achieved the hurdle rate of BCR>1.2, we took a holistic approach addressing the objectives of the program when assessing the highest net benefits. This meant that we prioritised resilience solutions that have the highest climate risk reduction when developing packages that matched outcomes that were prioritised by customers. This has meant that the program both closely targets customer resilience requirements and the mitigation of physical climate risk. See Figure 18 for the decision logic incorporated in the local network solution model.



Figure 18: Selection of preferred network solution decision logic

# 5.3 Meeting resilience needs set out in Section 3

The proposal meets the resilience priorities set out in Section 3 by:



- utilising robust climate risk models to identify the likely growth in climate risk;
- Establishes a least regrets approach. The proposal targets the most vulnerable areas and takes a constrained funding approach by utilising a BCR investment threshold of 1.2;
- Invests across the before, during, after spectrum as shown in Tables 12, 13, 14, 15 and balancing proactive and reactive postures;
- Incorporates network and non-network solutions; and
- Enabling the program to evolve as changing science, technology and investment learnings take place by implementing a dedicated Accountability and Evaluation framework.

# **5.4 Meeting resilience priorities of customers**

The proposal meets the resilience priorities set out by customers by:

- The program has a proposed cost of \$176.5 million, less than the customer-nominated cap of \$202M, with a mix of capex and opex solutions;
- Targeting customer priorities to prioritise areas where extreme weather impacts the most people, where there is expected to be the biggest increase in outages due to extreme weather, and where people are more vulnerable to the impacts of extreme weather;
- Engagement with the VOC panel established the WON priorities set out in Table 12 and engagement with communities in the priority LGAs established the priorities set out in Tables 13, 14 and 15. All of the prioritised items are included in the proposed package; and
- There is broad support for the willingness to pay, as set out in Appendix D. Quantitative and qualitative evidence has been demonstrated over 18 months of engagement.



				loril	2		14/	hon	2		EINANCIAL MET	TDICS	
		-	P	em	1		VV	nen	14		FINANCIAL ME	RICS	
•	Solution	Bushfire	Heatwave	Windstorm	Coastal	Flood	Before	During	After	CAPEX (\$m, real FY24)	OPEX (\$m, real FY24)	NPV	BCR
W1	Build Back Better Program									\$22.32 M	\$0.10 M		
¥1.1	New processes to optimise emergency repair lead times									\$1.80 M	\$0.10 M		
₩1.2	Bushfire Resistant Poles - To build back with bushfire resistant poles in bushfire areas									\$6.00 M			
₩1.3	Insulated Covered Conductors - To upgrade to insulated conductors following climatic events in highly vegetated areas									\$8.23 M		\$10.44 M	1.56
₩1.4	Increase in Sectionalised Network to reduce impact of outage and reduce impact to customers.									\$4.30 M			
₩1.5	Improve response inventory									\$1.99 M			
W2	Fault Detection & Location Sensors									\$11.80 M	\$0.00 M		
₩2.1	Fault detection and Location Sensors to reduce the time required to identify faults, isolate and restore supply.									\$11.80 M		\$79.40 M	12.89
W3	Data Sharing Program for Multi-Agency Response									\$3.00 M	\$1.00 M		
₩3.1	Establish Intelligence Liaison for needs analysis, co-design and delivery										\$1.00 M		
₩3.2	Develop better data integration to improve the way we share data with State, Regional and Local Emergency Operation Centres.									\$3.00 M			-
W4	Spreader Bars									\$7.35 M	\$0.22 M		
₩4.1	Identify LV Spans requiring LV spreader bars most at risk from storms, winds and vegetation.										\$0.22 M	\$136M	158
₩4.2	Installed LV Spreader bar installation									\$7.35 M		1.0011	
W5	Vegetation Management for Major Substations									\$0.00 M	\$0.49 M		
₩5.1	Targeted vegetation removeal at Major Substations										\$0.48 M	#2.90 M	20.21
₩5.2	Establish guidelines for suitable vegetation species to replant										\$0.02 M	\$2.00M	20.31
W6	Climate Impact Assessments									\$0.25 M	\$0.25 M		
₩6.1	Update Climate Impact Assessments									\$0.25 M	\$0.25 M	•	•
W7	Assessment & Evaluation Framework									\$0.60 M	\$0.30 M		
₩7.1	Program Evaluation and Assurance									\$0.60 M	\$0.30 M	•	
								ota		\$45.31 M	\$2.36 M		

#### Table 12: Whole of Network (WON) Solutions Proposal

\* please see Appendix C for qualitative benefits

## Table 13: Central Coast Resilience Solutions Proposal

		Peril?					W	/he	n?		FINANCIAL ME	TRICS	
#	Solution	Bushfire	Heatwave	Windstorm	Coastal Inundation	Flood	Before	During	After	CAPEX (\$m, real FY24)	OPEX (\$m, real FY24)	NPV	BCR
Central Coast													
	Non-Network Solutions												
CC1	Co-Developed Community Resilience Plan										\$0.40 M		
CC2	Shared Ausgrid Liaison Officer										\$0.33 M	1	*
CC3	Community awareness and education campaign			Γ							\$0.50 M	*	
CC4	Local safety and outage messaging										\$0.75 M		
	Network Solutions												
CC5	Network solutions to reduce outage and time for the most customers									\$37.64 M		\$22.62 M	1.50
CC6	Network solutions to protect highly vegetated areas from East Coast Lows									\$29.02 M		φ33.03 M	1.50
								Tota	al	\$66.7 M	\$2.0 M		
										* please see Appen	dix C for qualitative ber	nefits	



Table 14: Lake Macquarie Resilience Solutions Proposal

			Peril?					/her	ו?	FINANCIAL METRICS					
#	Solution	Bushfire	Heatwave	Windstorm	Coastal Inundation	Flood	Before	During	After	CAPEX (\$m, real FY24)	OPEX (\$m, real FY24)	NPV	BCR		
	Lake Macquarie														
	Non-Network Solutions														
LM1	Shared Ausgrid Liaison Officer										\$0.33 M				
LM2	Energy Resilience for Community Hub									\$0.09 M					
LM3	Small Mobile Generators		Γ							\$0.02 M		*	*		
LM4	Communications Targeting Vulnerable Customers										\$0.25 M				
LM5	Blackout Plan										\$0.25 M				
	Network Solutions														
LM6	Network solutions to protect highly vegetated areas from East Coast Lows									\$23.44 M		611 60 M	1 20		
LM7	Network solutions to reduce outage time and frequency for most customers									\$16.07 M		φ11.02 M	1.29		
								lota	al	\$39.61 M	\$0.83 M				

please see Appendix C for qualitative benefits

Table 15: Port Stephens Resilience Solutions Proposal

			Peril?					/hei	1?	FINANCIAL METRICS				
#	Solution	Bushfire	Heatwave	Windstorm	Coastal Inundation	Flood	Before	During	After	CAPEX (\$m, real FY24)	OPEX (\$m, real FY24)	NPV	BCR	
	Port Stephens													
	Non-Network Solutions													
PS1	Energy Resilience for Community Hub									\$0.09 M				
PS2	Shared Ausgrid Liaison Officer										\$0.33 M			
P\$3	Blackout Plan (light)										\$0.10 M	*	*	
P\$4	Communications Targeting Vulnerable Customers										\$0.25 M			
P\$5	Small Mobile Generators									\$0.02 M				
	Network Solutions													
P\$6	Network solutions to reduce outage time and frequency for most customers									\$10.54 M		\$3.81 M	1.36	
P\$7	Network solutions which target critical community services - CCT									\$2.98 M		^	٨	
P\$8	Network solutions which target critical community services - Undergrounding									\$5.40 M				
								Tota	ıl	\$19.02 M	\$0.68 M			

\* please see Appendix C for qualitative benefits ^ This was valued by the community above items with positive BCR. See Appendix C



# 6. Recommendations

Ausgrid recommends the Option 2 – Co-designed Approach (Section 4.2) as the preferred option as it brings together technical risk assessments, engineering and customer insights to build an optimised approach to addressing the increasing risks associated with electricity supply from climate change events.

Option 1 – Business As Usual (Section 4.1) is not recommended as it does not provide any resilience against the uplift in climate risk forecast from climate change, does not allow Ausgrid to meet its obligations under the NEO and SOCI Act, and does not address the priority customers have placed on investing in resilience.

	Option 1 Business as Usual	Option 2 Co-designed Approach
Provides resilience across climate perils prioritised by climate risk assessments	Х	✓
Works within the \$202M (totex) customer defined investment cap	~	✓
Balanced Prevent, Prepare, Respond and Recover approach	Х	✓
Includes Infrastructure and non-infrastructure components where they are more flexible, cheaper or better target customer needs	х	✓
Uses community insight about how to be effective in local areas	Х	✓
Community support	Not supported	Broad Support
Tested through the Resilience Framework	Х	✓

Table 16: Summary level comparison of the options

In line with customer and stakeholder feedback, Ausgrid proposes to invest a \$176.5m totex in resilience initiatives. This has been tested against both the regulatory and resilience frameworks.

Table 17: Proposed resilience expenditure

	Capex (\$real, FY24)	Opex (\$real, FY24)	Totex (\$real, FY24)
Whole of Network	\$45.3 M	\$2.4 M	\$47.7M
Central Coast	\$66.7 M	\$2.0 M	\$68.7M
Lake Macquarie	\$39.6 M	\$0.8 M	\$40.4M
Port Stephens	\$19.0 M	\$0.7 M	\$19.7M
Total	\$170.6 M	\$5.9 M	\$176.5M

# **Appendix A - Regulatory Stocktake**

Table 1

AER expectation		More information
Expectation 1		
There is a causal relationship between the proposed investment and the expected increase in	n extreme weather events	Section 5.2
Expectation 2.1		
The proposed expenditure is required to maintain service levels and is based on the option the greatest net benefit of the feasible options considered	nat likely achieves the	Section 5.2
Expectation 2.2		
We expect proposals for resilience-related expenditure to demonstrate:		
there is or likely to be an increase in network risk		Section 3.3
• the benefit of the resilience-related funding (for instance, further avoiding or reducing the outages) outweighs the costs of the investment	e frequency or duration of	Section 5.2
• the preferred funding option provides more net benefit against other feasible options		Section 5.2
• in testing the different options available to address the change in network risk, we expect impact of emerging investment in stand-alone power systems (SAPS) and other non-tradilike community batteries	ct NSPs to consider the ditional network options	Attachments 5.7 and 5.8a of our regulatory proposal
Expectation 3.1		
Engage with their consumers on how its ex-ante funding will ensure any risks to manage extra allocated efficiently between consumers and businesses. Businesses should also demonstrate project/program proposal does not make consumers worse off by bearing the risk to manage	eme weather events are te that the proposed weather uncertainties	Section 3.2 of the Resilience Mid-Term Report provides an assessment of our approach against the AER requirements.

twice. It would not be in consumers' interest for them to be funding a business's recovery of a unpredictable event (i.e. through a cost pass through) as well as funding the same risk up-from proposal	The way we presented the twice' is set out in the Engag (see. slide 352 as an e	risk of paying ement Material example)	
Expectation 3.2			
Work collaboratively with affected communities, and other responsible entities involved in disa understand what the communities' genuine needs are to plan and prepare for, as well as reco	aster management, to over from a natural disaster	Appendix B	
Expectation 3.3			
We are also interested in the degree of input these stakeholders have had in developing the p expenditure	Appendix B and sectior Resilience Mid-Term	n 3.2 of the n Report	
Expectation 3.4			
Consult with its wider consumer base on their preferences for bearing resilience-related costs impacts. We would expect NSPs to explain to its customer base that the benefits associated v resilience expenditure to address a localised low probability, high consequence event outweig	Appendix B and section 3.1 of the Resilience Mid-Term Report, the materials used through this process have been provided in Engagement Material.		
Expectation 3.5			
We would also be interested in evidence of customers' willingness to pay for the proposed exp these studies to be based on genuine engagement where different feasible options to address explained to customers, as well as any trade-offs, and they are satisfied that the proposed exp prioritised over other proposals by the business.	Resilience Mid-Term Repo Summary sets out the logi an engagement methodolo AER's requirements and A out the results	ort's Executive c for selecting gy to meet the ppendix B sets S.	
Additional expectation			
The role of NSPs in supporting network resilience is a collaborative one with other responsible consider the delineation of roles that different entities have in supporting network resilience-re community	e entitiesAER will elated funding for the	Appendix B	



# **Co-Designed Investment Framework**

Table 2

Additional expectation	Compliance	Overview	More information
Expectation F.1			
Ausgrid commitment for community engagement so it can understand the specific needs of the different communities in its network (p. 11)	الله الله LGA engagement	<ul> <li>We took the following steps during our engagement process:</li> <li>customers were invited to develop prioritisation principles in LGA workshop 1 that would guide how we developed local resilience solutions</li> <li>in LGA workshop 2, customers were able to develop additional solutions for Ausgrid to include in our modelling</li> <li>the proposed resilience solutions were retested and prioritised in LGA workshops 2 and 3.</li> <li>We also engaged the VoC Panel to evaluate both quantitative and qualitative inputs as well as their own lived experience.</li> </ul>	Section 3.2 of the Resilience Mid-Term Report
Expectation F.2			
<ul> <li>Before Ausgrid looks to provide resilience related investments or support to a community (investments), Ausgrid will: <ul> <li>look for partnership opportunities;</li> <li>support communities to develop their own local resilience plans; and</li> <li>work collaboratively with local communities on the design of community</li> </ul> </li> </ul>	¥ ▲▲ LGA engagement	We are actively working towards strengthening our partnerships with other resilience actors by agreeing to memorandum of understandings. We are committed to continue this collaborative effort but remain confident that the portfolio of initiatives proposed is aligned with the common distribution services which DNSPs are responsible for.	Appendix B



responses and any investments Ausgrid is intending (p.11)		The co-development of climate resilience plans (including 'blackout/communication plans') were also taken as a resilience solution to customers as part of the LGA engagement.	
Expectation F.3			
Before Ausgrid looks to provide investment or support to a local community, Ausgrid will: <ul> <li>where the benefits of a proposed</li> </ul>	Modelling	In developing options, we considered a 'base case' scenario that incorporates initiatives that Ausgrid is working on as part of our normal activities, including innovation and trials.	Section 4.1.2
investment are uncertain, trial and pilot different types of support prior to rolling them out; (P.12)		Our LGA engagement (workshop 1) informed participants that Ausgrid is trialling several initiatives to improve energy resilience.	Engagement Material (slide 51)
Expectation F.4			
<ul> <li>The Framework promotes finding the right balance in timing for investment as well as the right balance between preparatory investment and responsive investment via the cost pass through mechanism by focussing on: <ul> <li>the highest risk geographic areas from climate modelling; and</li> <li>trials and a staged roll out of new solutions, where there is a high level of uncertainty of the effectiveness of an available option (p.12)</li> </ul> </li> </ul>	Modelling	Our 2024-29 forecast includes a package of investments for the three LGAs that are most at risk from the impacts of climate change. This allows our modelling to focus on the highest risk areas and furthers the goal of arriving at the right balance between preparatory and responsive investments.	Section 3.3
Expectation F.5			



Ausgrid will distinguish between BAU investments that pre-dated this framework and new investments designed to address the increase in climate related risk, whether they are extensions of BAU programs or new programs (p.16)		Modelling	We performed a review of BAU activities that could potentially overlap with resilience. This resulted in a \$1.95 million reduction to our resilience program (see Attachment 5.5 – Climate resilience program – 31 January 2023, p. 51.	Attachment 5.5 – Climate resilience program – 31 January 2023, p. 51
	*	LGA engagement	Our LGA engagement explained the difference between resilience and reliability in reference to 'extreme weather events' (major event days). We also noted our resilience spend is in addition to our planned expenditure on safety and reliability.	Engagement Material (slides 29, 73, 279, 303)
Expectation F.6				
Ausgrid should identify which activities it is best placed to provide, and which are best provided by other resilience actors (p.22)	*	LGA engagement	Engagement tools (e.g. concentric circles outlining 'who is responsible in the supply of electricity') provided customers with the information they needed to make these decisions.	Engagement Material (slides 30, 74 and 124).
	-	Voice of community		Section 3.2 of the Resilience Mid-Term Report
Expectation F.7				
Ausgrid should partner with government, local councils, resilience organisations and local communities to assist them to develop a localised resilience plan (p.22)	*	LGA engagement	We are proactively building partnerships with other resilience actors as outlined in Appendix A. The co-development of climate resilience plans (including 'communication plans') were also taken as a resilience solution to customers as part of the LGA engagement.	Appendix B
Expectation F.8				



Ausgrid should increase its communications to customers during events so they can better prepare (p.22)	*	LGA engagement Voice of community	We engaged with customers on a whole of network program that involving information and data sharing for multi-agency planning and response.	Engagement Material (slides 178, 190, 191, 201, 204, 331, 491, 532, 533, 534, 535, 536, 537)
Expectation F.9				
<ul> <li>Local resilience plans should be built upon the following foundations:</li> <li>foster ongoing trust and confidence</li> <li>empowering communities to understand risks and encourage self-reliance</li> <li>activities to prepare for and reduce the impact of an extreme weather event</li> <li>integrated action between actors</li> <li>strong and inclusive engagement</li> <li>risk aware and forward looking</li> <li>community-led approaches and place-based planning (p.22)</li> </ul>		Modelling	Our 2024-29 forecast includes funding for an accountability and evaluation program to build trust and an Ausgrid liaison officer for community based planning.	Section 3.3 provides an overview of the accountability and evaluation program while more customer views about the need for an Ausgrid liaison officer is set out in Appendix D
Expectation F.10				
Ausgrid should consider the prioritisation of network support and funding for communities more likely to be severely impacted by extreme weather events while considering the communities capacity to cope (p.22)	* **	LGA engagement	We sought community input on customer prioritisation principles during our LGA engagement and built on this work through our willingness to pay engagement.	Section 3.2 of Resilience Mid- Term Report Appendix D
Expectation F.11				



where there are no existing partners in a specific local community with an active approach to resilience to support and foster other organisations as appropriate to develop the expertise and necessary plans (p.23)	C	Future focused	We remain committed to this expectation as we work to strengthen our partnerships with other resilience actors, particularly with Minderoo	Appendix D
Expectation F.12				
Ausgrid will consider the following overview of its historical data to inform and establish the base case: (p.25)		Modelling	See below.	
Expectation F.13				
Ausgrid's climate impact modelling will be refreshed as a minimum every reset (p.26 and p.44)	C	Future focused	We remain committed to this expectation and funding is included in our 'whole of network' program	Section 3.2
Expectation F.14				
In 2024-29 Ausgrid's climate impact assessment will indicate which Representative Concentration Pathways emissions target (or weighted combination) it is using as the basis for its impact assessment (p.28)		Modelling	We have taken a conservative approach to applying climate scenarios, with a weighting of 0.7 for RCP 4.5, 0.15 for RCP 2.6 and 0.15 for RCP 8.5.	Section 4.2.2 (Table 7)
Expectation F.15				
Depending on the proposed control and what is understood by its effectiveness, the pathway to implementation will be considered by a trial to escalate it from an unknown technology before it is widely rolled out across the network (p.28)	C	Future focused	We remain committed to this expectation.	n/a
Expectation F.16				



Ausgrid will continue to undertake research on the true value of energy supply in communities affected by severe weather events to better refine its investment approach (p.29.)	C	Future focused	We remain committed to this expectation and may include this as part of a NIAC research program	n/a
Expectation F.17				
Where the causal link between any increase in risk and damage to network assets is uncertain or further research is needed (e.g. extreme heat and heatwaves) Ausgrid will do further research to establish the causal link (p.29)		Modelling	Our cost benefit analysis establishes the required causal relationship by applying a 'probabilistic' approach that accounts for the inherent uncertainty associated with the timing, location, and scale of the impacts of extreme weather events. We are also undertaking NIAC research on the impacts of extreme heat on our assets	Section 5.2
Expectation F.18				
		Modelling		
Ausgrid needs to demonstrate fulfillment of the 9 criteria for decision-making to support claims for resilience investment and trials in 2024-29.	* **	LGA engagement	These 9 criteria and how we have fulfilled each of them is outlined in section 2.2 above.	
		Voice of community		
Expectation F.19				



Ausgrid to engage with the broader community on the prioritisation principles and understand why the community values specific options (p.34)	Voice of community	<ul> <li>We took the following steps during our engagement process: <ul> <li>customers were invited to develop prioritisation principles in LGA workshop 1 that would guide how we developed local resilience solutions</li> <li>in LGA workshop 2, customers were able to develop additional solutions for Ausgrid to include in our modelling</li> <li>the proposed resilience solutions were retested and prioritised in LGA workshops 2 and 3.</li> </ul> </li> <li>We also engaged the VoC Panel to evaluate both quantitative and qualitative inputs as well as their own lived experience.</li> </ul>	Section 3.2 of Resilience Mid- Term Report
Expectation F.20			
<ul> <li>Ausgrid must address the following in its 2024-29 resilience funding:</li> <li>1. Detail of opex and capex funded initiatives and the balance between them</li> <li>2. Flexibility in resilience option/spend categories (range of network and nonnetwork solutions has been considered)</li> <li>3. The balance between local community expectations to build back better and to build back faster after an extreme weather event</li> <li>4. The balance between preparatory and responsive expenditure</li> <li>5. How the expenditure is optimised to meet the NER objectives?</li> </ul>	Business case	We have applied these principles and expectations when putting together this business case. This includes incorporating 'Build Back Better' as a whole of network program	Section 4.2



<ol> <li>How have the learnings from the previous reg period, trials, recent events or from industry been incorporated into Ausgrid decision-making for 2024-29? Should there be a change to asset design standards?</li> <li>Has sufficient resourcing (opex and capex) been allowed for NIAC for PIR of the effectiveness of the network and non-network investments and trials and pilots? (p35.)</li> </ol>			
Expectation F.21			
<ul> <li>Ausgrid's 2024-29 resilience business case will be presented to:</li> <li>Present a holistic view of the network, nonnetwork and community based activities including BAU and trials and pilots presented by risk and will identify those activities focussed before, during and after an event</li> <li>Identify which solutions are to be led by Ausgrid, other resilience actors and the local community</li> <li>Highlight how Ausgrid selected the capex/opex expenditure including which prioritisation principles were used and how customers influenced the choices made</li> <li>Show how Ausgrid has confirmed that its customers are Willingness To Pay (WTP) for the activities</li> </ul>	Business case	We have applied these principles and expectations when putting together this business case.	Our 'holistic' view of network and non- network solutions is set out in section 4.2. Customer prioritisation, WTP and other engagement steps is assessed in Appendix D and 3.2 of the



5. Provide view of how Ausgrid prioritised investment across higher risk areas with a consideration of a communities capacity to cope (p.36.)				Resilience Mid- Term Report.
Expectation F.22				
Resilience is not one size fits all, community resilience is a shared responsibility and solutions will need to be tailored to meet the unique needs of each targeted local community. (p.37)	≣	Business case	Our approach to local engagement has led to 3 different and bespoke packages of solutions tailored to the unique needs.	Section 3.3
Expectation F.23				
Ausgrid will adopt a variety of engagement approaches to reach various stakeholders when looking at resilience options and they will be given the opportunity to participate in the decision-making process (p.37)		Voice of community	Our engagement sought the views of all Ausgrid customers and stakeholders, including retailers, local councils, commercial and industrial customers, small businesses and residential customers across the spectrum including vulnerable customers, customers from culturally diverse backgrounds and customers from across the Ausgrid network area	Section 3.2 of the Resilience Mid-Term Report
Expectation F.24				
Ausgrid has complied with its engagement framework in the preparation of its resilience business case (p.39)	*	LGA engagement	We are confident that our LGA and VOC processes complied with our engagement framework.	Section 3.2 of the Resilience Mid-Term Report
Expectation F.25		Voice of community		



		Modelling		
Ausgrid needs to demonstrate how it has satisfied the AER guidelines for genuine engagement in the BRH (nature, breadth and depth and impact of engagement) and in the AER Guidance note (p.41)	* **	LGA engagement	We outline how we have met the guidelines of the better resets handbook in the table below.	See table below
		Voice of community		
Expectation F.26				
All of Ausgrid's 2024-29 resilience expenditure will be subject to additional accountability processes including a new role for NIAC with any exceptions to be called out in the business case (p.42)	C	Future focused	We remain committed to this expectation in the framework.	Seection 3.3
Expectation F.27				
Ausgrid needs to be accountable for any departures in its resilience initiatives from those included in the 24-29 resilience business case (po.42)	C	Future focused	We remain committed to this expectation in the framework.	Section 3.3 outlines our planned accountability and evaluation program
Expectation F.28				



Ausgrid will engage with the broader community on appropriate measures of success for the frameworkin 2024-29 Ausgrid will establish baseline measures of community expectations around the communities' involvement and engagement in developing resilience solutions (P.44)	•••• Voice of community	We have diligently sought the views and expectations from customers with the widest range of lived experiences across the network, through the VOC. We also acknowledge that the RCP has commented in its report that further engagement may be required over the coming months.	Appendix D
Expectation F.29			
Before the end of the 2024-29 reg period Ausgrid and the CCC will jointly conduct a PIR of the Framework and the 2024-29 resilience decisions (p.44)	<b>Future focused</b>	We remain committed to this expectation in the framework.	Section 3.3 outlines our planned accountability and evaluation program



# **Better resets handbook**

Table 3

Expectation		Our assessment	More information
Nature of the engagement	Sincerity of engagement	<ul> <li>We have given the independent RCP oversight of our engagement program. This allowed us to test with the RCP the questions we intended to ask customers and the engagement techniques and methods that would promote meaningful, sincere feedback.</li> <li>Executive level engagement, including from the CEO, Chief Customer Officer and the EGM of Asset Management, ensured critical buy-in across Ausgrid.</li> <li>Engagement materials briefed customers on critical concepts (e.g. 'resilience versus reliability, 'risk of paying twice' etc)</li> <li>Independent facilitators bd infrastructure, MosaicLab and Gauge consulting used to ensure community views were heard, reflected and actioned appropriately.</li> </ul>	Section 3.2 of the Resilience Mid-Term Report and Engagement Material
	Customers as partners	<ul> <li>We partnered with customers by working with them to:         <ul> <li>Prioritise their resilience investments (LGA workshop 1)</li> <li>Develop additional solutions for Ausgrid to model (LGA workshop 2)</li> <li>Determine criteria for the allocation across local and Whole of Network solutions (VOC Day 2)</li> <li>Retest and prioritise resilience solutions (LGA workshops 2 and 3).</li> </ul> </li> <li>We equipped the VoC to help us understand the 'willingness to pay' of customers based on qualitative and quantitative inputs and their lived experience.</li> <li>We engaged with local commercial and industrial organisations to understand opportunities for co-funding and other partnership opportunities.</li> </ul>	Section 3.2 of the Resilience Mid-Term Report and Appendix B
	Equipping customers	<ul> <li>Customers were able to speak to a range of experts with a variety of perspectives and spoke to experts of their choice, including climate scientists (VOC 2022).</li> <li>The RCP were funded to enable them to actively participate broadly and deeply in the process.</li> <li>Engagement materials briefed customers on critical concepts (e.g. 'resilience versus reliability, 'risk of paying twice' etc).</li> <li>Engagement materials set out detailed costs, benefits and bill impacts.</li> </ul>	Section 3.2 of the Resilience Mid-Term Report and Engagement Material



	Accountability	<ul> <li>The RCP observed and reviewed our engagement and have provided an independent report of its findings.</li> <li>Independent facilitators bd infrastructure, MosaicLab and Gauge consulting used to ensure Ausgrid appropriately presented materials and ensured we were clear at all stages about how the communities views were being used, and in sharing our outputs back with the community for validation.</li> </ul>	Attachment C – Reset Customer Panel Report (the RCP Report)
	Accessible, clear and transparent engagement	<ul> <li>We ran a mix of 'face-to-face' and online workshops to promote accessibility, providing laptops to those who required them.</li> <li>LGA feedback was recorded on video so that their views could be communicated to the VoC Panel clearly and transparently 'in their own words', as well as in written form.</li> <li>Engagement materials briefed customers on critical concepts (e.g. 'resilience versus reliability', 'risk of paying twice' etc).</li> <li>The relationship between the LGA's and VOC, specifically as it related to criteria for determining the split of funding, and willingness to pay was continually reinforced.</li> </ul>	Section 3.2 of the Resilience Mid-Term Report and Engagement Material
Breadth and depth of engagement	Multiple channels of engagement	<ul> <li>Our engagement included a mix of 'face-to-face' and online workshops, with reading materials available via email and a private online portal.</li> <li>Channels of engagement included tools such as 'Group Map', quantitative willingness to pay feedback and qualitative 'verbatim' responses.</li> <li>We ran two concurrent deliberative engagement process to achieve both local co-design and global willingness to pay.</li> </ul>	Section 3.2 of the Resilience Mid-Term Report and Engagement Material
	Consumers' influence on the business case	<ul> <li>Customers guided the development of our resilience program by:         <ul> <li>Prioritising their resilience investments (LGA workshop 1)</li> <li>Developing additional solutions for Ausgrid to model (LGA workshop 2)</li> <li>Determine criteria for the allocation across local and Whole of Network solutions (VOC Day 2)</li> <li>Retesting and prioritising (LGA workshops 2 and 3)</li> </ul> </li> </ul>	Section 3.2 of the Resilience Mid-Term Report and Engagement Material
	Business case linked to consumer preferences	<ul> <li>All solutions presented in the business case have been selected and prioritised by customers.</li> </ul>	Appendix D



		<ul> <li>Our resilience program has been subject to a customer willingness to pay based on quantitative and qualitative inputs.</li> </ul>	
Clearly evidenced impact	Independent consumer support from the business case	<ul> <li>The RCP report concludes: We are satisfied that the results of the engagement program indicate customers, both those in the three LGAs subject to the trial and more broadly in Ausgrid's wider customer base, continue to provide strong support for the resilience business case submitted by Ausgrid to the AER and that the proposed investments in the resilience business case have been shaped by customers to meet their needs and preferences.</li> <li>In its report the RCP encourages Ausgrid to undertake further work in developing non-network solutions in collaboration with local councils and other resilience actors.</li> </ul>	RCP Report



# Appendix B - Alignment With Other Resilience Actors

Resilience to natural disasters, including with respect to critical infrastructure and essential services, is a shared responsibility. Governments, critical infrastructure operators, and individuals and communities, all have a role to play in understanding the risks of disruptions to critical infrastructure, ensuring that others are aware of these risks as appropriate, and prepared to manage the consequences of outages.<sup>30</sup> The *AER Note on Network Resilience April 2022 (AER Guidance Note)* recognises this influential interdependency between resilience actors and the importance of clear alignment between these parties:

"A resilient electricity network can assist in building community resilience. But many different entities have a role in supporting communities to withstand and recover from the impacts of natural disasters. Government bodies, individual themselves and several critical infrastructure operators (beyond electricity networks) have a role to support community resilience."<sup>31</sup>

The AER has set a clear expectation that the role of Network Service Providers (NSPs) in supporting network and community resilience is a collaborative one, and that Ausgrid should work closely with affected communities and other responsible entities involved in disaster management and resilience to understand communities' genuine needs. Further, throughout all of our engagement on resilience, our customers and the Reset Customer Panel (RCP) have consistently reinforced a strong view that while Ausgrid has a role to play, that it should be one appropriate in our capacity as an NSP and we should not do what others already (or should) do.

"Community centres – not just an Ausgrid responsibility. Should be a join partnership with local councils and emergency services." LM customer

"Not Ausgrid's job / Local councils should be leading this type of coordinated work / Existing authorities' responsibility" VoC2023 on mobile community liaison centres

"We feel Ausgrid's impact will be limited and that a whole of government approach is required." VoC2023 on community grant programs.

Ausgrid fully embraces the view that we should lead where it is appropriate and we have the capability and expertise, and support other resilience actors to lead where they are better positioned to do so. This is reflected in the Resilience Framework (Section 5) co-designed with the RCP, in which Ausgrid commits to a set of principles<sup>32</sup> designed to ensure we understand and operate within boundaries appropriate to our role. This view is also supported by the NSW Critical Infrastructure Strategy<sup>33</sup>, with 'Priority 1: Partner' identifying that resilience improvement is best effected when critical infrastructure providers partner in shared responsibility.

With these goals in mind, in parallel with our community engagement program (set out in Appendix D), we set out to understand other resilience actors and their priorities, share information on our resilience work, and identify suitable partnership opportunities. We have focused on:

 Understanding the interdependencies Ausgrid and others, such as telecommunications services, share and how these influence our capacity to support community resilience during extreme weather events. This has been a key focus of community feedback in sharing with us their lived experience of major events, and a well-documented risk in collective responses to disruptive events. Disruptions to one

<sup>&</sup>lt;sup>30</sup> Australian Government (2020), Royal Commission into National Natural Disaster Arrangements, Final Report, p.230

<sup>&</sup>lt;sup>31</sup> AER (2022), <u>Network Resilience - A note on key issues</u>, p. 5

<sup>32</sup> Ausgrid (2023), Promoting the long-term interests of consumers in a changing climate: A decision-making framework, p. 21

<sup>&</sup>lt;sup>33</sup> NSW Government (2018), <u>NSW Critical Infrastructure Resilience Strategy Partner, Prepare, Provide</u>, p. 18

essential service can trigger cascading failures in dependent services that significantly hamper a community's capacity to respond, a commonly cited example being communication disruptions from power outages to telecommunication networks.

- Sharing Ausgrid's approach and priorities in investing in resilience and understanding what others are doing or planning in their own organisations.
- Identifying opportunities to partner and collaborate on shared objectives and workstreams, particularly to understand whether there is a risk of duplication.

We know that shared responses are more effective. Successive disasters like the Black Summer Bushfires (2019-20) and Lismore Floods (2022) have shown the importance of collaborative approaches, and demonstrated the cascading impacts on communities when fundamental alignments aren't made. The following section describes our engagement with resilience actors, how we have aligned our respective activities and priorities, and emerging collaboration opportunities. To support a structured approach to our engagement, the RCP recommended Ausgrid encourage other resilience actors to sign a 'Letter of Intent' with us. This letter sets out our shared intention to collaborate on resilience and a commitment to identify areas or projects of mutual interest, continue knowledge sharing and consider more formal partnerships. While the letter hasn't been suitable for all stakeholders, it has been a useful tool to test opportunities and encourage robust consideration of Ausgrid's resilience work.

Figure 1 sets out a non-exhaustive map of resilience actor cohorts Ausgrid has prioritised for engagement to date. We are committed to continuing to build these and other new partnerships and fostering further alignment over the balance of 2023.



Figure 1: High-level map of key resilience actor interdependencies

## **Emergency Response Organisations**

#### NSW State Energy and Utility Services Functional Area Coordinator (EUSFAC) and Sub-Committee

Ausgrid is an active member of the Energy and Utility Services Functional Area (EUSFA) Sub-Committee as a Participating Organisation. The Sub-Committee generally meets quarterly and provides a forum to facilitate input to the NSW State Emergency Management Committee (SEMC) which provides leadership, direction, and advice for strategic and operational emergency management. Ausgrid has engaged directly with the EUSFA Coordinator (EUSFAC) on proposed resilience investments and EUSFAC has indicated their intention



to engage in on-going feedback and information sharing and a commitment to explore further opportunities to align our work. Ausgrid and EUSFAC will continue to engage on resilience investments to ensure we maintain a consistent feedback loop with broader emergency management forums, procedures and developments.

#### **Trusted Information Sharing Network**

Ausgrid is an active member of the Trusted Information Sharing Network (TISN) under the Electricity Sector Group (ESG) category. TISN is the Australian Government's primary engagement mechanism with industry on critical infrastructure and brings together stakeholders from across the critical infrastructure community, including critical infrastructure owners and operators, supply chain entities, peak bodies, academics, research institutes, and all levels of government. Ausgrid's Operational Resilience personnel attend the national weekly Community of Interest – Government and Industry briefing, which brings together all TISN emergency management sectors for updates on emerging issues and new developments in emergency management, hazards and threats. This forum provides an important and ongoing opportunity for Ausgrid to understand interdependencies and engage with other resilience actors.

#### NSW Reconstruction Authority

NSW Reconstruction Authority is a government agency dedicated to disaster prevention, preparedness, recovery and reconstruction. The Authority was established in December 2022 and, despite some significant resourcing and other internal challenges, has attended some Ausgrid resilience workshops (workshops 1 and 2) with local communities, and has been receptive of information sharing and feedback with us. While the Authority is not yet in a position to sign a formal Letter of Intent (LOI) or commit to specific projects, we have established regular information sharing forums with key staff to ensure both organisations are aware of resilience priorities and emerging work. Ausgrid and the Authority are coordinating a face-to-face resilience deep-dive with key staff for late July 2023, with Ausgrid to present to a broader staff forum shortly after. As the Authority clarifies its remit and priorities and Ausgrid continues to refine our resilience portfolio, these forums will ensure we maintain alignment and identify collaboration opportunities early.

#### Large customers

Ausgrid has engaged with larger customers, particularly commercial and industrial customers, throughout our broader Regulatory Reset 2024-29 and targeted resilience engagement programs. For the purposes of this engagement we have considered 'Large Customers' as both customers with large single point loads (traditional connections based categorisation of a large customer) and customers with large aggregate demand from many locations like supermarket chains and governments services like schools. Our resilience engagement objectives are two-fold with these customers:

- Firstly, as Ausgrid customers, we're motivated to understand larger customers' expectations, feedback and support (including willingness to pay) for our proposed resilience investments. This customer cohort will share in the cost of these investments and it is important for us to understand how these decisions impact their businesses. See Appendix D for more detail.
- Secondly, we also recognise that many larger customers have a role in supporting community resilience and their capacity to deliver this is often highly dependent on Ausgrid's network services. For example, in the 2019-20 Black Summer bushfire, electricity outages caused telecommunications failures that affected fuel service station's ATMs and EFTPOS.<sup>34</sup> The lack of power, and consequential inability to access payment facilities, prevented people from buying fuel to be able to follow evacuation orders issued by emergency services. Power outages also prevented people from using EFTPOS to buy essential goods and ATMs to access cash. These cascading failures caused significant difficulty for fire-affected communities.

It is important for Ausgrid to understand these interdependencies and work with these businesses to improve their energy resilience in the face of increasing extreme weather events. In general, our engagement revealed

<sup>&</sup>lt;sup>34</sup> Australian Government (2020), <u>Royal Commission into National Natural Disaster Arrangements</u>, Final Report, p.228

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that businesses are predominantly focused on climate change mitigation activities, citing solar panels and energy efficiency when asked to describe their resilience plans. We have focused our engagement to date on sharing information on local communities' unmet needs, resilience priorities, and our proposed resilience investments. These customers have consistently shown an interest in Ausgrid's climate impact modelling and the outputs of our engagement program.

This process has revealed new opportunities, either for these larger customers or for collaboration opportunities with Ausgrid. For example, one grocery chain indicated that Ausgrid's initial information sharing session had prompted new thinking and a series of internal discussions on how they could take a similar approach, looking at past store impacts, climate risk modelling, and resilience initiatives to shore up their operations. They see this as both a prudent economic consideration and an essential exercise in delivering on what they see as a clear responsibility to support their customers in times of need. This customer also flagged wanting to understand how they could align any of the investments they make to ensure they also deliver any benefits possible to the network. This is just one example of several that emerged through these consultations, and we can now work to refine these opportunities, with a view to pursuing formal partnerships and co-funding opportunities.

#### Utilities

Utilities, including telecommunications providers and water infrastructure providers, are in general quite sophisticated in their understanding of and planning for resilience in their own operations.

#### Energy Networks Australia (ENA) and Communications Alliance Memorandum of Understanding (MoU)

Ausgrid is party (as a member organisation) to an MoU between Energy Networks Australia and Communications Alliance with the following objectives:

- 1. Improve the safety of communities by mitigating the risks of being isolated due to telecommunications and/or power outages during emergencies;
- 2. Improve the sustainability of telecommunications and power supply services to communities affected by emergencies to support their recovery; and
- 3. Target effective collaboration and coordination between telecommunications and electricity networks and infrastructure in preparing for and responding to emergencies.

This MOU is in support of a collaborative approach to understanding how critical infrastructure, electricity networks and telecommunications network providers can cooperate during emergencies. The parties meet biannually to discuss preparations by member organisations and areas of cooperation/assistance requests for the natural disaster season. Telecommunications services NBN Co, Optus and Telstra (discussed below) are all member organisations to the MoU parties, as is EUSFAC discussed above.

#### **Telecommunications services**

Communication is critical in supporting communities to effectively respond and recover from extreme weather events and we know that the vast majority of telecommunication failures in a disaster are driven by power outages. Ausgrid has engaged with NBN Co, Optus, Telstra and TPG Telecom to understand their resilience priorities and plans. This has triggered useful discussions about Standalone Power Systems (SAPS) and backup generation options that paves the way for Ausgrid and telecommunications companies to work together on solutions that can be mutually beneficial and avoid unintended consequences. This type of collaboration is increasing the likelihood of the intended community resilience benefits being realised.

NBN Co and Optus have each signed a formal LOI with Ausgrid signalling each parties' long-term intention to discuss implementation of collaborative climate resilience projects consistent with the Ausgrid Climate



Resilience Framework<sup>35</sup> and a commitment to ongoing knowledge sharing via regular meetings. Telstra has also requested and received a copy of the draft LOI.

#### Water utilities

In a similar way to telecommunications, essential service providers like Hunter Water (water utility) play a fundamental role in supporting community resilience. We've engaged consistently with Hunter Water throughout our engagement program and are working to understand and align objectives and activities in Ausgrid's resilience program and Hunter Water's carbon and climate program strategies. Hunter Water are motivated to establish an MoU with Ausgrid to articulate our shared resilience priorities and discussions regarding the scope and coverage of this MoU are underway. Hunter Water have been sent a LOI following earlier discussions, but both parties are motivated to establish a more formal and specific agreement, particularly given the proposed resilience investments in Lake Macquarie and Port Stephens for communities Hunter Water services. Ausgrid will provide a detailed briefing of proposed resilience solutions in July to inform this agreement. Ausgrid will also seek to undertake a similar exercise with Central Coast Water (operated by Central Coast Council).

#### Councils

Ausgrid engaged with councils throughout 2022 on the development of the 2024-29 Regulatory Proposal. Councils are conscious of the need for better clarity during emergencies around roles and responsibilities and have also noted that many are setting climate targets and plans for community transition that increases reliance on electricity networks and renewable energy sources.

Ausgrid has focused our alignment efforts on the three councils relevant to our priority LGAs – Central Coast, Lake Macquarie and Port Stephens. All three councils have shown a clear willingness to engage, though in some cases this has been limited by capacity and competing priorities (particularly at end of financial year). Each council has supported Ausgrid to understand the resilience related services they deliver and how they work with their respective communities. Continued engagement with these Councils is a priority, given the significant role they play in community resilience for each area, and consistent feedback from our customers that they expect their council to play an active role in energy resilience too.

Central Coast elected to review engagement materials and workshop outputs after each workshop and provide feedback and insight directly. Ausgrid understood this to be both a result of capacity constraints and staff reservations about attending, particularly in light of community tensions resulting from Central Coast Council's recent challenges and status in administration. Despite this, staff at all levels have readily engaged with Ausgrid and have shared valuable insights. Council has recently increased resourcing for resilience and we have established a range of forums to progress shared opportunities (including those with Minderoo Foundation described below) and enhance alignment. Central Coast has committed to reviewing proposed investment packages and providing a formal letter on where they see opportunities to collaborate.

Lake Macquarie Council has been consistently supportive of Ausgrid's engagement but also didn't have staff available to attend workshops. We've taken a similar approach to engagement and have proactively shared information and outputs from workshops, with a commitment to reconvene through August and September to identify alignment and collaboration activities.

Port Stephens Council attended all three community workshops and actively participated in community discussions, sharing insights on their processes, responsibilities and capacity in responding to extreme events and helping Ausgrid and the community understand how these could align with solutions being considered. Ausgrid and Port Stephens Council are both supporting the development of a local resilience plan with Minderoo Foundation (see below) and Port Stephens Council is reviewing a draft LOI to sign with Ausgrid soon.

Local Emergency Management Committees (LEMC's)



<sup>&</sup>lt;sup>35</sup> Ausgrid (2023), <u>Promoting the long-term interests of consumers in a changing climate: A decision-making framework</u>

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Under the NSW State Emergency Plan, Councils must resource a Local Emergency Management Officer (LEMO) and convene a Local Emergency Management Committee (LEMC). Committees meet three times a year, with additional input during and after major events. They are also responsible for maintaining Local Emergency Management Plans. Council, emergency services like Police, RFS, SES etc are represented on the committees, with utilities attending as observers. Ausgrid meets this obligation now through ad-hoc and best-efforts resourcing, usually relying on regional staff to volunteer to represent Ausgrid. The resilience investment proposes to improve this integration with the addition of two liaison officers, one dedicated to focusing on the three priority LGA's and one to engage with LEMC's and other emergency management stakeholders across the rest of Ausgrid's network.

#### **Minderoo Foundation**

<u>Minderoo Foundation</u> is a registered charitable organisation which, through its Fire & Flood Resilience Initiative, aims to reduce the harm caused by fires and floods. Minderoo seeks to work with likeminded organisations on collaborations that support this goal. Minderoo is piloting and implementing their Resilient Communities Methodology and Framework<sup>36</sup> to develop community-led Resilience Plans in 50 communities across Australia. They developed a Resilience Index to identify appropriate communities and Ausgrid worked with Minderoo to identify that two of these proposed communities, Central Coast and Port Stephens, overlap with our distribution network area.

Ausgrid has signed a LOI with the Minderoo foundation to support the implementation of community-led resilience plans for these two communities to build their resilience and reduce their vulnerability to hazards. Ausgrid intends to provide funding and in-kind support to Minderoo in 2023-24 to lead the development of these plans with local council and communities, with the expanded scope for these two resilience plans including storms (in addition to fire and flood). This work will supplement the existing Council Resilience Plan Port Stephens have in place and for Central Coast it will support the development of a foundational Community Resilience Plan, which the community has identified as especially important given their challenges with Central Coast Council being in administration. Ausgrid and Minderoo are currently developing a formal agreement between the parties to deliver this project.

#### **Community Service Organisations**

Community Service Organisations assist and support individuals, families and communities in need. They offer diverse and often highly targeted services. These types of organisations are especially important in considering how we support energy and community resilience as they tend to already have trusted relationships and networks with the most vulnerable customers who have the least capacity to cope with the impacts of an electricity supply interruption. Given the large number and diversity of these organisations and groups, Ausgrid has taken a targeted approach to engagement, focusing on high value relationships that support the outcomes and solutions prioritised in our three priority LGA's. We have established relationships with Batahbah Local Aboriginal Land Council (Lake Macquarie) and Wahroonga Aboriginal Corporation (Port Stephens) and both organisations have participated in our community engagement and volunteered their sites as potential locations to support energy resilience hubs.

#### Summary

Ausgrid has valuable existing relationships with a broad and comprehensive cross-section of resilience actors and takes an active role in forums and networks that foster communication, collaboration and alignment across emergency management and response functions. In many ways our resilience engagement is a natural progression of these relationships and proposed investments have elicited an enthusiastic and supportive response from our stakeholders. Resilience actors have readily jumped at the opportunity to explore collaborations and partnerships and shown flexibility and willingness to adapt with Ausgrid to ensure our



<sup>&</sup>lt;sup>36</sup> Minderoo Foundation (2022), Resilience Communities Framework, Version 1.0

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respective work is aligned, mutually beneficial and avoids duplication. Ausgrid is committed to continuing these discussions and will progress signing of outstanding LOI's and other artefacts (listed below) and refinement of partnership opportunities between now and October 2023.

Letters of Intent and other evidence of support and alignment:

- **Central Coast Council** committed to providing a letter of support specific to the proposed Central Coast LGA investment package.
- **Port Stephens Council** signalled intention to sign Ausgrid drafted Letter of Intent, provided with a draft for review and currently in discussions internally.
- **EUSFAC** commitment to continue information sharing and a statement in support of Ausgrid's resilience work.
- **Hunter Water** interested in establishing an MoU with Ausgrid that identifies principles for collaboration and specific opportunities for resilience co-investment and co-delivery.
- Optus Letter of Intent signed by both parties, available on request
- NBN Co Letter of Intent signed by both parties, available on request
- **Telstra** signalled intention to sign Ausgrid drafted Letter of Intent, provided with draft and Ausgrid awaiting feedback.



# Appendix C - Resilience Solution Descriptions



Resilience Risk Prevention and Mitigation bow-tie. Investments in selected risk <u>prevention</u> (green items on the left) will materially reduce the increasing probability of a climate related outage occurring on Ausgrid's network. Investment in select risk <u>mitigation</u> measures (blue items on the right) will materially reduce the impact/consequence that an increasing climate change risk has to Ausgrid's network and the communities and customers we serve. Proposed resilience solutions (marked by grey circles) are discussed in more detail in the following sections.

Appendix C Structure guide				
Category	No.	Title	Page no.	
	W1.0	Build Back Better	pp.76-80	
	W2.0	Fault Detection and Location Sensors	pp.81-82	
Whole of	W3.0	Information and Data Sharing for Multi Agency Planning and Response	pp.83-85	
Network	W4.0	Low Voltage Spreader Bars	pp.86-88	
Solutions	W5.0	Asset Protection for Substations (Vegetation Management)	pp.89-92	
	W6.0	Climate Impact Assessments	pp.93-94	
	W7.0	Program Evaluation and Assurance	pp.95-96	
Local Resilience	Solutions	Package summary	pp.97-99	
Local	PS6, PS7, PS8	Network Segmentation		
Resilience Solutions -	LM6, LM7	Covered Conductor	pp.100-107	
Network	CC5, CC6	Undergrounding		
Local Non-Netwo	rk Solutions	Supporting information	pp.107-110	
Local	CC1	Community Resilience Plan (co-funded)	p.111	
Resilience Solutions –	LM5, PS3	Blackout Plan	pp.111-112	
Non-Network	LM1, CC2, PS2	Shared Ausgrid Liaison Officer	pp.112-113	
	CC3	Community Awareness and Education Program	pp.113-114	
	LM4	Communications targeting vulnerable customers	p.114	
	CC4	Local safety and outage messaging	pp.114-115	
	LM2, PS1	Energy resilience for community hubs	pp.115-116	
	LM3, PS5	Small mobile generators	p.116	
W – Whole of Network CC – Central Coast LM – Lake Macquarie PS – Port Stephens				

## **Resilience Solutions - Whole Of Network Solutions**

Project Overview			
Project Number	W1.0		
Program Alignment	Climate Resilience   Whole of Network Solutions		
Project Title	Build Back Better		
Project Objective	To replace assets damaged in climate events with more resilient alternatives		
Cost	CAPEX: \$22,315,000	OPEX: \$100,000	
Impact	Before, During, After		
Peril Addressed	Storms, Bushfire		

#### Whole of Network Solutions – W1.0 Build Back Better

#### **Opportunity Statement**

The opportunity of this program is to ensure assets being replaced, either because they have been damaged in climate events or because they have otherwise reached the end of their life, are replaced with more resilient alternatives where prudent. This program only includes uplift costs from BAU replacement for assets that have been assessed as being vulnerable to climate change.

#### Voice of Community (VOC)

The VOC stated that strengthening Ausgrid's ability to Build Back Better is their equal highest priority. In the April 23 VOC nine participant groups voted this as their most important initiative (equal highest ranked initiative), and no groups voted it as 'least important'. The community voiced that this enabled the network to be updated to better standards that would reduce the chance of subsequent outages. Ausgrid discussed with the community that this would only be applied in those parts of the network considered at higher risk of climate impacts, in way that is gradual and cost effective.

#### How this initiative differs from Business-as-Usual Scenario

The investments covered in this initiative only include the uplift costs. For example, in the "Build Back Better" program, only the difference in the cost of bushfire resistant poles and Business-as-Usual poles is included. The program also acknowledges that following an emergency, there is a need to restore services to customers as quickly as possible. As 'building back better' has a longer mean time to repair than simply replacing like for like, the program enables new work methods to be established, and provides back up power options to support customers during this necessarily extended build back phase.

#### Summary of Build Back Better Program Scope

	Workstream Title	High Level Summary of Workstream Objective	Capex	Opex
W1.1	Improve processes to enable BBB	Improve processes to replace assets with more resilient alternatives during emergency response.	\$1,800,000	\$100,000
W1.2	Uplift to Bushfire	To upgrade poles in bushfire zones following damage	\$6,000,000	



Cost / Banafit Assossment				
		Total	\$22,315,000	\$100,000
W1.5	Response Inventory	Uplift emergency inventory. Lift the target service level for critical materials from 95% to 98%.	\$1,990,000	
W1.4	Increase in sectionalising	Increase in sectionalising following climatic events or normal asset replacement in vulnerable locations.	\$4,300,000	
W1.3	Uplift to Insulated Covered Conductors	To upgrade to insulated covered conductors in highly vegetated areas following climatic events and normal replacement cycles.	\$8,225,000	
	Resilient Poles	in bushfire events and normal replacement cycles.		

### Anticipated Benefits

Reduced Risk: The installation of assets damaged in extreme weather events with more resilient alternatives will reduce the probability of supply interruption occurring during a future event. Build Back Better solutions also have a significant benefit to other customers who can have supply restored sooner due to uplift in resources and inventory and an improvement in reactive processes.

#### Net Present Value:

The Net Present Value of the total Build Back Better investment is: **NPV = \$10,438,209.** 

#### Workstream Details

#### W1.1 Develop new protocols and standards

"Build back better" during emergency response is achievable where processes support rapid deployment of alternative configuration or construction types. Implementation is constrained when processes are lengthy or design direction is unclear and ultimately quick restoration has a tendency to over-ride network improvement. Specific aspects to direct a build back better philosophy require the following:

- Operational processes defining build back better mandatory considerations during emergencies.
- Standards development or augmentation as well as "ready reckoners" and "decision trees" to facilitate rapid design decision making during emergencies.
- Establishment of the digital twin structural design components to enable quick decision making.
- Re-defining roles such as engineering support roles during emergencies to focus on "build back better"
- Data acquisition services (e.g. satellite analytics) for post storm to support network rebuilds
- Alternate power sources (e.g. generators and battery packs) to service customers during longer outages
- Training of appropriate Engineering and Field Operations staff.

ltem	Description	Capex	Opex
1	Operational processes development and maintenance	\$200,000	
2	Standards development and maintenance	\$100,000	
3	Digital twin – noting base costs provided in the current projects. This includes enhancements only.	\$300,000	



4	Software – data acquisition services	\$200,000	
5	Backup power supplies: Basis is \$4,000 for 100 units @ 3kW and 2@ 500kW (\$150,000 each).	\$700,000	\$100,000
6	Change management	\$300,000	
	Total:	1,800,000	\$100,000

#### W1.2 Bushfire Resilient Poles

Ausgrid has recently tendered and will shortly put in place term contracts for composite cross-arms and composite poles. Market and industry research has shown composite construction provides enhanced resilience against bush fires as opposed to their timber equivalents. Survival rates can far exceed those of timber poles following bushfires without significant strength reduction. Further the maintenance inspection regime for timber poles would not apply to the same extent for composite poles as they are not subject to termite attack and have higher resistance to damp and rot.

Ausgrid proposes increasing deployment of composite poles both as part of normal asset replacement programs but also as during reactive maintenance and emergency events. The cost estimates reflect only the delta increase in the material costs associated with the composite rebuild. The cost assumptions are based upon 600 poles per annum or approximate 20% use of composite poles. The nature of this work is unlikely to be related to pass through events.

ltem	Description	Capex	Орех
1	<b>Emergency:</b> Delta increase (annual) material costs based upon 20 poles p/a and delta of \$2,000 per pole	\$200,000	\$0
2	<b>Programs:</b> Delta increase (annual) material costs based upon 500 poles p/a and delta of \$2,000 per pole.	\$5,000,000	\$0
3	<b>Reactive pole replacement:</b> Delta increase (annual) material costs based upon 80 poles p.a. and delta of \$2,000 per pole.	\$800,000	\$0
	Total:	\$6,000,000	\$0

#### W1.3 Insulated/Covered Conductor Construction

Insulated/covered overhead distribution networks provide network reliability benefits without the associated large cost premiums that constructing underground cable networks present. These are applicable to the full distribution voltage range (400V and 11kV) with more limited application at the sub-transmission voltage (33kV). At the lower voltage construction uses conductor known as aerial bundle conductor (ABC) and at the high voltages the Ausgrid selected product is typically covered conductor (CC). Ausgrid currently use a version of CC called covered conductor thick (CCT) at 11kV. This is used in highly vegetated areas and primarily in urban areas. This will be discontinued in favour of CC. Specific benefits of overhead insulated/covered construction include:



- Greater resilience to vegetation growing into the network.
- Improved network reliability for storm events, e.g. smaller branches falling on conductors do not necessarily interrupt supply.
- Better protection from and to wildlife such as possums and birds.
- Quicker construction restoration after storms than bare conductor construction for low voltage circuits.
- Smaller footprint at low voltage.
- Improved safety from accidental touch or step voltages due to the insulation of the conductor (noting however that CC conductors are not considered insulated).

Use cases include the following and describe the use case and status of insulated conductor standards at the various voltage levels. In the case of program type REPEX this only represents the incremental portion of additional construction that would be insulated/covered under this program instead of bare conductor construction. Note the table references replacement options where the existing construction is bare conductor:

V	Construction & Status	Emergency	Programs	Reactive
400V	Aerial bundle conductor (ABC) used exclusively for re-build except for emergency repairs	Yes – only bare conductor by exception	Yes	Yes
11kV	Covered conductor (CC) per trial projects underway Will be used in broader capacity in more urban and leafy suburbs Unlikely to be utilised for long rural spans	Possible in future – subject to digital twin implementation	Yes – broad use proposed post-trial approval	Yes – broad use proposed post- trial approval
33kV	Covered conductor (CC) – future trial projects proposed	Unlikely	Limited use cases considered. Leafy short span environments only	Unlikely

The following additional delta costs are estimated for covered/insulated overhead networks:

Voltage	Construction & Status	Туре	Capex	Орех
	Replacement with ABC is BAU	Emergency	\$0 *	\$0
400V	Replacement with ABC is BAU	Program	\$0 *	\$0
	Replacement with ABC is BAU	Reactive	\$0 *	\$0
	Inventory uplift		\$0 *	\$0
	5km/a @ \$50,000 per km premium	Emergency	\$1,250,000	\$0
11kV	15km/a @ \$50,000 per km premium	Program	\$3,750,000	\$0
	5km/a @ \$50,000 from 2025 onwards only	Reactive	\$1,250,000	\$0
	0km/a @ \$75,000 per km premium	Emergency	\$0	
33kV	5km/a @ \$75,000 per km premium	Program	\$1,875,000	
	0km @ \$100,000 per km premium	Reactive	\$0	\$0
	Total:		\$8,225,000	\$0

\* This is already a BAU activity hence zero delta under this program



#### W1.4 Replace ELBS / ABS with Reclosers

Network sectionalisation provides benefits to customers in that faulted sections of the network can be switched in smaller blocks, the fault is isolated; thereby reducing the number of customers affected by a network fault. We currently have many thousands of manual and motorised load break switches that perform this function and a smaller number of more intelligent switching devices known as reclosers. Reclosers provide automatic and rapid reconnection where faults are transient. Ultimately reclosers will support automatic healing schemes (FLISR - fault location, isolation, and service restoration) to restore power to as many customers as possible, as quickly as possible, in the event of a permanent fault.

The work horse of such schemes is the 11kV recloser. Ausgrid now employs two specific types, the Noja recloser (\$86,000 installed) and the S&C Intellirupter (\$115,000 installed).

This Resilience program proposes replacement of up to 10 load break switches (ELBS) and air break switches (ABS) per annum with reclosers as part of emergency and reactive replacement works.

ltem	Description	Capex	Орех
1	<b>Emergency:</b> Reclosers (typically Noja 11kV @ 5 additional p/a)	\$2,150,000	\$0
2	<b>Reactive:</b> Reclosers (typically Noja 11kV @ 5 additional p/a)	\$2,150,000	\$0
	Total:	\$4,300,000	\$0

#### W1.5 Establishing new inventory

The mean time to repair (MTTR) for network post storms has a number of contributing factors. One of the relevant factors is the inventory holding of storm response or critical materials (T-Class) to cater for re-build requirements. The business currently holds critical materials at a target service level of 95%. This equates to an inventory holding that would typically satisfy the 1:20 year storm event and primarily considers holdings for overhead construction. This means that a 1:50 and 1:100 year storm event would require additional procurement or supply from other networks in Australia. This response seeks to increase inventory from a target service level of 95% to a target service level of 98% which equates to coverage of the 1:50 year storm event. This will facilitate a more rapid rebuild. Part of the change includes ensuring that caches of storm response material (Incident Buffer) are strategically located in appropriate geographical areas or LGAs.

ltem	Description	Capex	Орех
1	Post Storm Response Inventory	\$500,000	\$0
2	Increase to 98% Service Level for critical materials (T- class)	\$850,000	
3	Increase inventory holding of composite poles and cross arms. Assume one off 100 poles/cross arm combinations @4000 per set	\$400,000	
4	11kV insulated conductor base inventory	\$240,000	
	Total	\$1,990,000	\$0



Project Overview			
Project Number	W2.0		
Program Alignment	Climate Resilience   Whole of Network Solutions		
Project Title	Fault Detection and Location Sensors		
Project Objective	To reduce the time required to identify fault locations, isolate the fault and restore supply.		
Cost	CAPEX: \$11,800,000 OPEX: \$0		
Impact	During, After		
Peril Addressed	Storms		

#### Whole of Network Solutions – W2.0 Fault Detection and Location Sensors

#### **Opportunity Statement**

The opportunity is to reduce the time required to locate faults on the 11kV distribution network through the use of fault location devices such as Line Fault Indicators with remote monitoring. Remote fault location and detection significantly reduces the feeder patrol time required to identify and isolate faults on the 11kV distribution network. The benefit of fault location devices is significantly greater during adverse weather events that impact a large area. These events often result in the number of events exceeding the available patrol and restore resources, fault line indicators with monitoring ensure only faulted sections of line need to be isolated and patrolled.

#### Voice of Community (VOC)

The VOC stated that the Fault Detection and Location Sensor Project is their equal highest priority. In the April 23 VOC nine participant groups voted this as their most important initiative (equal highest ranked initiative), and no groups voted it as 'least important'. The community voiced that they favoured this initiative as it 'reduces outage time', 'saved time searching for location where the fault is' and was 'effective – big result for relatively small investment'. Some comments called it 'basic and essential'.

#### How this initiative differs from Business-as-Usual Scenario

There is no role out of Fault Detection Sensors in the Business-as-Usual Program.

#### Scope (Inclusions)

	Workstream Title	High Level Summary of Workstream Objective	Ca	pex	Opex
W2.1	V2.1 Fault Line Indicators with remote monitoring To improve Ausgrid's ability to locate and isolate faults and provide better network visibility to facilitate operational responses to significant adverse weather events.		\$1	1.8M	\$0.0
		Total	\$1	1.8M	\$0
Workstream DetailsW2.1 Fault Location Device with Monitoring					



To improve Ausgrid's operational response during significant adverse weather events it is proposed approximately 2,000 line fault indication (with monitoring) devices be installed on the 11kV distribution network. The devices are to be installed on the OH network where there is an increased risk from climate change and where they provide the most benefit in reduced feeder patrol time.

#### Cost / Benefit Assessment

#### **Benefits identified:**

- Reduced Feeder Patrol and Time to Fault Location: Fault location with monitoring helps reduce the total time Ausgrid customers are without supply. This is primarily achieved by reducing the time required to patrol and locate faults during storms. In addition to the direct benefit of reduced patrol time, better network visibility allows for improved resource co-ordination and operational response during adverse weather events.
- Reduced Public Risk: Fault line indicators with monitoring facilitate location and isolation of the damaged network without the need for manual feeder reclose attempts. A manual feeder reclose can be performed before patrolling remote or difficult to access feeders to clear transient faults. However, they present an increased risk to the public and of further damage to the network.

#### **Net Present Value**

The net present value of the investments is calculated over 15yrs to be: **\$79,402,238**.



#### Whole of Network Solutions – W3.0 Information and Data Sharing for Multi Agency Planning and Response

Project Overview			
Project Number	W3.0		
Program Alignment	Climate Resilience   Whole of Network Solutions		
Project Title	Information and Data Sharing for Multi Agency Planning and Response		
Project Objective	To improve the quality of intelligence feeding between Ausgrid and Local, Regional and State Emergency Control Centres		
Cost	CAPEX: \$3,000,000 OPEX: \$1,000,000		
Impact	Before, During, After		
Peril Addressed	All Hazards		

#### **Opportunity Statement**

This project focuses on improving Ausgrid's integration into existing emergency management functions and identifying and delivering new or improved data sharing functions to enhance resilience planning and response in climate events. This work will amplify Ausgrid's existing frameworks established under the Australasian Inter-service Incident Management System (AIIMS), improving both Ausgrid's and other agencies 'Intelligence' function.

#### Voice of Community (VOC)

The Newcastle and Sydney VOC sessions found this to be a priority. Their commentary stated that this was because they believed that 'coordination between organisations is essential', and they wanted to allow 'other agencies to have access to information that would enable them to make better decisions'.

#### How this initiative differs from Business-as-Usual Scenario

The Australian Interservice Incident Management System (AIIMS) is the recognised authoritative body of knowledge for coordinating emergencies in Australia used by all emergency service organisations. Ausgrid currently uses an outdated version (pre-2017) version of this doctrine. <u>AIIMS</u> was updated in 2017, most notably to require an Intelligence function within the structure. This was in response to capture many insights, both from formal research findings and guidance provided by a number of reviews and inquiries into the management of incidents in recent years. The importance of this intelligence function has also been highlighted in the Inquiries into the response to the Northern Rivers Floods and Black Summer Bushfires, where specific actions were placed on Critical Infrastructure providers.

#### Scope (Inclusions)

	Workstream	High Level Summary of Workstream Objective	Capex	Opex
W3.1	Establish Intelligence Liaison	Will create a full-time Ausgrid resource for 5 years for engagement in State, Regional and Local emergency mgmt. information sharing forums. The liaison will also have responsibility for needs analysis, co-design and delivery of W3.2.	\$0	\$1,000,000
W3.2	Develop better data integration	The objective here is to make small, efficient investments that leverage existing platforms and data	Capped at \$3,000,000	\$0



functions	sharing capacity.		
	Total	\$3,000,000	\$1,000,000

#### **Cost / Benefit Assessment**

This project will better align Ausgrid and other agencies with the AIIMS, improving our shared intelligence function. The workstreams acknowledge recommendations from the Lismore Flood Inquiry around the utilisation of intelligence and the coordination of multiple agencies in response, as well as Ausgrid's own experiences in recent flooding events in the Hunter and the large building fire in Sydney's CBD in May 23.

#### Workstream Details

W3.1 Improve Representation at Local and Regional Emergency Management Committees

Ausgrid's network spans 33 Local Government Areas (LGAs) and 22,275 square kilometres throughout Sydney, Central Coast and the Hunter Valley. Each LGA has a Local Emergency Management Committee (LEMC), and each also falls under one of four broader Regional Emergency Management Committees (REMC) (there are 6 in NSW). Committees meet three times a year, with additional input during and after major events. They are also responsible for maintaining Local Emergency Management Plans. Councils appoint a Local Emergency Management Officer (LEMO) to coordinate and Council, emergency services like Police, RFS, SES etc are represented on the committees, with utilities attending as observers.

Ausgrid meets this obligation now through ad-hoc and best-efforts resourcing, usually relying on regional staff to volunteer to represent Ausgrid. While helpful because participants can bring local knowledge, it results in inconsistent participation and is difficult to manage with staff movements and significant existing workloads. While our ideal scenario is to provide a primary and secondary representative for every LEMC and REMC within our network area, at the moment we can only target the REMCs and a few LEMCs.

This workstream proposes a one full-time Ausgrid resilience resource (1 FTE) to transition our LEMC and REMC participation to a proactive program that provides a consistent approach to every committee. This role would have coverage of all Ausgrid's network outside our three priority LGA's (where there is a dedicated liaison officer proposed to support much more involved activity). The key objectives of this workstream are:

- Provide a more consistent and integrated approach to Ausgrid representation on various emergency management functions.
- Develop trusted, long-term relationships with key local emergency and resilience actors to give them a direct point of contact and escalation.
- Increase first responders, site controllers and communities understanding of our network and how we manage and respond to hazards, so that when there is a significant impact, we are better positioned to respond collaboratively to deliver better outcomes (See example 1 below)

Work collaboratively with other resilience actors and emergency services to identify info and data sharing gaps and co-design and deliver solutions. The role will increase Ausgrid's capacity to integrate climate resilience workstreams with operational resilience functions that are active during an event.



#### W3.2 Deliver better data and information

Ausgrid provides detailed data to the Emergency Information Coordination Unit (EICU) under the NSW Government's Spatial Services unit on a bi-annual basis. The Emergency Services Spatial Information Library (ESSIL) combines data from 200 source agencies into seamless state-wide layers to inform multi-agency emergency planning, response, and recovery. The data is locked down due to its high sensitivity, with limited access for specific agencies, which has recently expanded to included LEMO's. Ausgrid also publishes live outage data and maps that are publicly accessible so customers can get up to date information on outages and expected duration. Stakeholder feedback indicates this information is well-utilised and valuable, with large customers like major groceries seeing it as a first port of call when something happens. In some instances, external parties have developed algorithms to scrape this from Ausgrid's site and feed into their own systems, but this can overwhelm our site and cause crashes, especially during major events. There are identified gaps that, if resolved, could increase coordination and response times in major events to reduce outage lengths and streamline response and recovery for communities interacting with multiple agencies. The exact solutions should be scoped based on comprehensive needs analysis and a collaborative design process with other agencies, facilitated by W3.1 above. However, some examples of what we could do include:

- Produce APIs to feed Ausgrid live outage data into other agencies systems. Ausgrid could co-invest with agencies to develop this work, prioritising those who might take the algorithm approach described above. The cloud-based infrastructure is already in place to enable this, so once appropriate cyber and data security assessments are made, it's a relatively cheap and simple exercise.
- Establish a new portal to share data publicly/by subscription with relevant agencies. This would require a more significant investment than individual API's but would establish a 'one-stop-shop' for cross-agency data integrations
- Invest in capacity of Ausgrid's digital twin or other existing systems like NetworkViewer to model resilience data, including predictive models. Experience shows that this gap can delay response and result in duplication of effort, potentially extending outage time. While the two solutions described above focus on 'pushing' Ausgrid data out to other resilience actors and emergency management agencies, this solution looks to increase Ausgrid's capacity to respond safely and efficiently by 'pulling' resilience data into our existing systems.

#### Key considerations:

- Under the Security of Critical Infrastructure Act (2018), spatial data is considered a risk. Ausgrid must consider what data is shared, and how, very carefully to ensure the benefits outweigh the risk.
- Data should be shared with those who have the capacity to interpret it appropriately and with an understanding of the uncertainties that come with it, especially during a major event. The liaison may have a role in upskilling data recipients to help with this.



Project Overview					
Project Number	W4.0				
Program Alignment	Climate Resilience   Whole of Network Solutions				
Project Title	Low Voltage Spreader Bars				
Project Objective	To reduce the impacts of high wind, storm and vegetation on the LV network.				
Cost	CAPEX: \$7,367,000 OPEX: \$0				
Impact	Before				
Peril Addressed	Windstorm				

#### Whole of Network Solutions – W4.0 Low Voltage Spreader Bars

#### **Opportunity Statement**

The opportunity of this program is to reduce the impacts of high wind, storm and vegetation upon the LV network during adverse weather conditions. During adverse weather events, 21% of LV supply interruptions can be attributed to adverse weather acting on bare mains. A further 30% of supply interruptions can be attributed to vegetation during adverse weather events. These events disproportionately impact LV distributors without LV spreader bars.

#### Voice of Community (VOC)

The VOC sessions held in April 2023 acknowledged this program as a priority initiative. The community commented that they liked this solution because it was a 'proactive measure to stop outages', that presented 'value for money', and are 'relatively quick and easy to implement'. They voiced that it was 'good value for money'.

#### How this initiative differs from Business-as-Usual Scenario

There is no overlap between the proposed Resilience Spreader Bar and the Business-as-Usual baseline program. Bare LV mains represents almost 9,000km of the total 13,000km (67%) of LV mains (excluding service wires). Our LV mains replacement program includes 284km of replacement for the 2024 - 2029 period and includes no spreader bar installations. This base replacement program is predominately reactive replacement and will be dominated by high density urban areas where the network is older and the public safety risk is higher. Given there is no spreader bar program in the replacement program and the small volume of replacement for the 2024 – 2029 regulatory period, there is no overlap between the proposed resilience spreader bar program and our baseline replacement program.

#### Scope (Inclusions)

	Workstream Title	High Level Summary of Workstream Objective	Capex	Opex
W4.1	Identify LV Spans requiring LV spreader bars.	This stream will implement a combination of desktop, field and emerging technologies such as LiDAR and the network digital twin to identify LV spans with the most risk from storms, winds and vegetation.	\$0	\$220,000
W4.2	LV Spreader bar	This stream will deliver the program of works identified	\$7,347,000	\$0



installation	in stream 1a.		
	Total	\$7,347,000	\$220,000

#### Workstream Details

#### W4.1 Identify LV Spans requiring LV spreader bars

A planning resource is required to identify LV spans that require LV spreader bars. Spans will be identified using a combination of desktop analysis, reliability data analysis, and emerging technologies such as LiDAR and the network digital twin. In addition, to span identification the planning resource will also prioritise LV spreader bar installation as determined by the benefits and risks.

ltem	Description	Сарех	Opex
1	Planning Resource	\$220,000	\$0

#### W4.2 LV Spreader Bar Installation

To mitigate the risk of supply interruptions due to adverse weather and vegetation on the LV network it is proposed to install LV spreader bars on bare vegetated LV spans. LV spreader bar penetration is estimated to be 98% of LV spans within bushfires areas, 80% in non-bushfire areas. LV spreader bars are highly effective at mitigating supply interruptions caused by conductor clashing. Approximately 21% of LV supply interruptions during adverse weather conditions can be attributed to self-clearing faults like conductor clashing.

ltem	Description	Сарех	Opex
1	Install LV Spreader Bars on Bare vegetated LV Spans	\$7,347,000	\$0

#### **Cost Benefit Analysis**

#### **Anticipated Benefits**

Reduced Risk: The installation of LV spreader bars is expected to reduce the number of supply interruptions during adverse weather conditions. During extreme weather events, where the number of supply interruptions exceeds resources, mitigating events such as clashing mains is directly beneficial to customers who have avoided the interruption. There is also a significant benefit to other customers who can have supply restored sooner due to the availability of resources.

Cost Savings: Avoided cost of fuse replacements and conductor damage.

#### **Net Present Value:**

The Net Present Value of the investment is calculated over 15yrs to be: NPV = \$1,569,000

#### Key Assumptions:

• A 15-year period for the NPV calculation has been applied, this is a conservative assumption based on

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the expected average lifespan for spreader bars on existing overhead mains.

- The events attributable to conductor clashing are assumed to be evenly distributed across the LV network. It is reasonable to expect bare LV mains without an LV spreader bar are more likely to experience conductor clashing. Assuming an even distribution is the conservative approach.
- Only LV supply interruptions attributable to adverse weather and self-clearing triggers that impacted bare LV mains have been included in the analysis. Where the LV mains type is unknown it is assumed to be bare.
- LV supply interruptions due to vegetation during adverse weather events have not been included in this analysis however a small portion of these events are likely to be mitigated by LV spreader bars. This benefit has not been included in the analysis.
- The LV component of climate risk due to the windstorm peril is assumed to be 17% of the total climate risk.
- From an analysis of our reliability data 21% of LV supply interruptions during major event days are attributable to conductor clashing.
- From an analysis of network data, 11% of spans on the LV network are candidates for an LV spreader bar to mitigate the risk of conductor clashing during adverse weather.
- The probability of an event occurring on a candidate span is 2.23% resulting in \$805k of expected risk to be mitigated.
- An effectiveness factor of 90% is applied.

Assumptions	Value
Estimated Total LV Spans	237,750
Estimated Covered LV Spans	66,500
Estimated Bare LV Spans	171,250
Estimated Candidate Spans	25,300
Install Cost per LV Spreader	\$472
LV component of WS Risk	17%
LV events to be mitigated by LV spreader	21%
LV Network at risk	11%
Effectiveness of LV Spreader	90%



## Whole of Network Solutions – W5.0 Asset Protection for Substations (Vegetation Management)

Project Overview				
Project Number	W5.0			
Program Alignment	Climate Resilience   Whole of Network Solutions			
Project Title	Asset Protection for Substations (Vegetation Management)			
Project Objective	To remove vegetation at risk of impacting Major Substations			
Cost	CAPEX: \$0 OPEX: \$492,633			
Impact Before				
Peril Addressed	Storms, Bushfire			

#### **Opportunity Statement**

The opportunity is to establish an asset protection zone (APZ) around major substations identified as vulnerable due to vegetation, aligning with the ISSC3 - 2016 guidelines. Previous incidents have highlighted the need for vegetation management around Major Substations. The Northern Beaches storm of 2021 resulted in a tree falling on the Dee Why West Zone (left), damaging 33kV busbars and causing an outage that affected over 30,000 customers (image right). It is anticipated that similar incidents could occur if preventive measures are not undertaken at sites which have similar vegetation.



#### Voice of Community (VOC)

The VOC has provided broad support for Establishing Asset Protection Zones around major substations. The qualitative comments at the VOC in April 2023 stated that the community found this important because it is 'proactive', 'limits potential for outages' and prevents the 'diversion of valuable resources in the time of disasters'. Whilst the community have expressed support for vegetation management for this purpose, vegetation management more broadly has not been well supported, as the community value their vegetation. For this reason, and the effectiveness of general vegetation management for windstorms, the program also involves the replanting of appropriate vegetation that are suitable in the substation precinct.

#### How this initiative differs from the Business-as-Usual Scenario

In the Business-as-Usual base case, Asset Protection Zones are only established in bushfire prone areas. This initiative will allow us to adopt the ISSC3 - 2016 recommendations for the listed substations.



#### Scope (Inclusions)

	Workstream Title	High Level Summary of Workstream Objective	Capex	Орех
W5.1	Establish Asset Protection Zones for Major Substations	To improve the safety and resilience of Ausgrid's major substations by establishing asset protection zones through targeted vegetation removal.	\$0.00	\$477,233
W5.2	Establish guidelines for suitable vegetation species to replant	To develop comprehensive guidelines identifying suitable vegetation species for replanting after removal.		\$15,400
		Total	\$0.00	\$492,633

#### Workstream Details

W5.1 Establish Asset Protection Zones for Major Substations

To comply with the ISSC3 - 2016 guidelines, it is proposed to establish asset protection zones surrounding the identified major substations, which mandates a minimum of 3m clearance that is clear to sky and extends to 10m in bush fire-prone **areas**. An audit has identified 24 major substation sites vulnerable to surrounding vegetation (below).

	Туре	Number	
Name			
KURINGAI	Transmission Substation	7190	
WARRINGAH	Transmission Substation	16600	
MEREWETHER	Transmission Substation	405	
GOSFORD	Transmission Substation	14440	
HUNTERS HILL	Zone Substation	129	
TERREY HILLS	Zone Substation	15013	
LEIGHTONFIELD	Zone Substation	1290	
UMINA	Zone Substation	12640	
NARRABEEN	Zone Substation	15002	
PENNANT HILLS	Zone Substation	965	
CLOVELLY	Zone Substation	2602	
ERINA	Zone Substation	12580	
REVESBY	Zone Substation	1287	
MENAI	Zone Substation	9900	
ADAMSTOWN	Zone Substation	256	
PELICAN	Zone Substation	222	
SEFTON	Zone Substation	3472	
MEADOWBANK	Zone Substation	4545	
CAREEL BAY	Zone Substation	15010	



	Туре	Number
Name		
DOUBLE BAY	Zone Substation	3155
LINDFIELD	Zone Substation	1193
KILLARNEY	Zone Substation	15012
ROCKDALE	Zone Substation	10998
WYONG	Zone Substation	14891

#### W5.2 Establish guidelines for suitable vegetation species to replant

This project aims to establish a set of guidelines outlining the correct species of vegetation to plant following removal. These guidelines will be developed based on a thorough assessment of plant species' resilience, growth rate, and adaptability to local conditions. This scientifically backed, location-specific selection strategy will ensure that the right trees are planted in the right place.

#### Cost / Benefit Assessment

#### Anticipated benefits

Reduced Risk: The removal of trees reduces the risk of substations being damaged by windstorms and bushfires, reducing the potential for widespread and lengthy power outages.

Cost Savings: Avoided cost associated with damage to equipment.

Net Present Value is calculated over 10 years to be \$2,913,073.

Sensitivity analysis was also undertaken on the assumptions of average outage duration, expected tree lifespan and probability that a tree falls in the correct direction to impact the asset. It still found a positive NPV.

#### **Resourcing Impacts**

Arborists: Professional arborists will be required to audit and assess the substations. They will be required to evaluate the condition of the trees, identifying any potential risks, and determining the best course of action for each tree removal.

Contractor Engagement: Contractors specialised in tree removal and vegetation management will need to be engaged. They will be responsible for the physical removal of the trees identified by the arborists. This will include labour, equipment, and waste disposal, as well as any necessary permits. Additionally, the engagement process itself will require resources, such as procurement or contract management personnel, to ensure that the chosen contractors are reliable, properly certified, and offer competitive pricing.



#### Annexure A: Key Assumptions

A 10-year period for the NPV calculation has been calculated as a conservative approach. The benefits of the project are anticipated to extend beyond this timeframe. The key assumptions that form the foundation for the analysis are below:

Category	Assumption
Substation sites	24
Total trees	68
Pre works	\$12k
Tree removal	\$290k
Site clean-up and replanting	\$177k
Replanting guideline development	\$16k
Total cost	\$495k
Benefit period (years)	10
Cost of Event	\$4.2M



Project Overview				
Project Number	W6.0			
Program Alignment	Climate Resilience   Whole of Network Solutions			
Project Title	Climate Impact Assessments			
Project Objective	To update the climate impact asse	ssments		
Cost	CAPEX: \$250,000	OPEX: \$250,000		
Impact	Before			
Peril Addressed	All climatic events			

#### Whole of Network Solutions - W6.0 Climate Impact Assessments

#### **Opportunity Statement**

The opportunity is to update Ausgrid's climate impact assessments to reflect the latest science and modelling techniques. The body of knowledge around climate science is constantly growing, and this initiative will ensure that Ausgrid is using up-to-date science to make more effective geographically targeted, efficient and prudent investments to mitigate risks presented by climate change.

#### Voice of Community (VOC)

Ausgrid has presented the Climate Impact Assessment to all VOC and priority LGA forums as an item that was very important for Ausgrid, and therefore not for consultation. The community have been supportive of this approach.

#### How this initiative differs from Business-as-Usual Scenario

There is no assessment for climate change in the Business-as-Usual option.

Scope (	Scope (Inclusions)							
	Workstream Title	High Level Summary of Workstream Objective		Capex	Opex			
W6.1	Climate Impact Assessments	A model of the climate scenarios and impacts to Ausgrid's assets, as well as a summary report.		\$250,000	\$250,000			
		Тс	otal	\$250,000	\$250,000			

#### Cost / Benefit Assessment

An updated climate risk assessment will ensure that Ausgrid is utilising the latest climate science when assessing climate perils. Ongoing Climate Risk modelling will allow Ausgrid to make informed decisions about the realistic impact of climate change on the network, and make more effective geographically targeted, efficient and prudent investments to mitigate risks presented by climate change.

#### Climate Impact Assessments

This initiative will update Ausgrid's climate impact assessment with the latest science to model all climate

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perils over the range of climate change scenarios, including the highest risk and most prone areas, with recommendations to Ausgrid to help guide future asset management strategy. Climate scenario modelling will focus on the level of risk towards future events and their likelihood, impacts to Ausgrid assets by classification, impacts to the Ausgrid network performance including but not limited to business interruption, outage response, resource availability, customer experience, and externalities such as social costs (e.g. impacts on economic activity, human health and wellbeing). Importantly, this initiative will ensure that Ausgrid owns the intellectual property of the assessment, ensuring that the body of knowledge can be shared to grow the organisation's capability. We will specifically work with others (academic institutions etc) to improve and increase confidence in modelling East Coast Lows and advancing our understanding of climate change impacts on the distribution system and the supply of standard control services.



Project Overview				
Project Number	W7.0			
Program Alignment	Climate Resilience   Whole of Network Solutions			
Project Title	Program Evaluation and Assurance			
Project Objective	To build trust with stakeholders that program benefits are delivered. To adapt the program as new insights and learnings emerge.			
Cost	CAPEX: \$600,000	OPEX: \$300,000		
Impact	Before, During and After			
Peril Addressed	All Hazards			

#### Whole of Network Solutions – W7.0 Program Evaluation and Assurance

#### **Opportunity Statement**

The Climate Resilience Program is a new investment portfolio that aims to prepare Ausgrid to meet future climate challenges. We acknowledge that it is important to build trust with all stakeholders that the investment delivers the intended benefits and that the pilot nature of the program means that there will be benefit in adapting the program as learnings emerge. For example, if we learn that an intervention was not as successful as was intended, we want to transparently be able to adjust course so that any later investments better target the needs. This program includes evaluating program success and delivery, reporting back and engaging with local communities, and refinements to the program if needed. This will assist us to build trust with stakeholders.

#### Voice of Community (VOC)

In both the Central Coast and Lake Macquarie engagement sessions, the need to provide transparency of delivering the program was raised, as well as the need to evolve the program as the effectiveness of each intervention was assessed. The Reset Customer Panel (RCP) have also consistently challenged Ausgrid on the need to build trust with our customers as we pilot these investments and remain accountable for the resulting outcomes, benefits and learnings. The RCP suggested using the existing NIAC forum as this has similar objectives, and this was supported by Ausgrid. They also recommended engaging with the local communities at the halfway point of the regulatory cycle, or after an emergency incident if this arose during the period.

#### How this initiative differs from Business-as-Usual Scenario

This program will seek to leverage some of the structures and approach of the existing Network Innovation advisory Committee (NIAC) forum, however it will be a new evaluation process that focuses on Resilience.



Scope	Scope (Inclusions)						
	Workstream Title	High Level Summary of Workstream Objective	Capex	Opex			
W7.1	Program Evaluation and Assurance	This will include the mechanisms to evaluate and assure the program including checking in with impacted customer groups.	\$600,000	\$300,000			
		Total	\$600,000	\$300,000			

#### **Benefit Articulation**

The benefit of setting up purposeful program evaluation and assurance is to ensure that the program delivers the intended investments, and that they gave effect to the outcomes that were intended. This will enable trust to be built with customers and stakeholders.

#### Investment Schedule (\$FY25)

ltem	FY25	FY26	FY27	FY28	FY29
Opex	\$40,000	\$40,000	\$175,000	\$175,000	\$170,000
Capex	\$40,000	\$80,000	\$40,000	\$120,000	\$20,000

#### Workstream Details

#### W7.1 Program Evaluation and Assurance

A Climate Resilience Advisory Committee will be established that includes Customer Panel members and experts in climate change and resilience. The Committee's role will be providing assurance that the program delivers it's intended benefits, recognising that as lessons are learnt and technologies emerge, that there should be a transparent mechanism to adapt course if required.

In addition, there will be a requirement to check in with the local area communities at the halfway point of the investment cycle, or after an emergency event, to ensure that the interventions work effectively. We will work with the RCP in coming months to develop this mechanism and we have committed to check back in with the LGAs in October to test with this evaluation mechanism will work for them.

The breakdown of the costs is shown below:

ltem	Description	Сарех	Opex
1	Ongoing engagement with local communities	\$100,000	\$100,000
2	Milestone reports to local communities	\$150,000	\$100,000
3	Ongoing Engagement with customer representatives and climate resilience experts	\$200,000	\$100,000
4	Post Implementation Review	\$150,000	\$0
	Total	\$600,000	\$300,000

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## **Resilience Solutions - Local Resilience Solutions Packages**

LGA Package Costs Summary			LGA Package Costs Summary				
	Centr	al Coast	Lake M	Lake Macquarie		Port Stephens	
Cost by LGA	Capex (FY24)	Opex (FY24)	Capex (FY24)	Opex (FY24)	Capex (FY24)	Opex (FY24)	
Total:	\$66.66M	\$1.98M	\$39.61M	\$0.94M	\$19.02M	\$0.68M	
TOTEX:	\$68.64M		\$40.44M		\$19.71M		
Proposed <u>network</u> solution investment	d n \$66.66M t		\$39.51M		\$18.92M		
Proposed <u>non-</u> <u>network</u> solution investment	\$1	\$1.98M		\$0.94M		\$0.78M	
% of total local package spend on non-network	2	2.9%	2.	3%	4.	0%	

Each community has worked with Ausgrid to develop a unique investment package specific to their local context and needs. A summary of each local package and the communities' priorities are outlined in the below tables. More detail on each solution is covered in the following sections of Local Network Solutions and Local Non-Network Solutions.

#### **Central Coast package of solutions**

Resilience Solution in order of customer preference		Customer prioritised outcomes			Cost	
		Self Resilience	Longest Outages	Most Customers	CAPEX	OPEX
1	Network solutions to reduce outage and time for the most customers		✓	√	\$37.64 M	(1124)
2	Co-Developed Community Resilience Plan	~	~			\$0.40 M
3	Shared Ausgrid Liaison Officer	✓	~	✓		\$0.33 M
4	Community awareness and education campaign	~	~	~		\$0.50 M
5	Local safety and outage messaging		~	✓		\$0.75 M
6	Network solutions to protect highly vegetated areas from East Coast Lows		~	~	\$29.02 M	
				TOTAL:	\$66.66 M	\$1.98 M

The Central Coast community is very aware of the significant size of their LGA, both in terms of geography and population, and as a result have given first priority to significant network investments to improve energy resilience for the most customers possible. They are also acutely aware that their local council is in administration and hasn't provided the community support and infrastructure they had hoped it would. As a result, many have felt the need for resilience falls to the individual, and they have therefore consistently prioritised broad based communications and enhanced notifications during outages that support self-resilience by the customer. The Central Coast community also recognise the highly vegetated nature of their community



and the risk this poses to particularly distributed infrastructure, and therefore prioritised cost-effective network solutions that target these vulnerabilities.

#### Lake Macquarie package of solutions

		Customer prioritised outcomes			Cost	
Resilience Solution in order of customer preference		Vulnerable	Worst Served	Most Customers	CAPEX (FY 24)	OPEX (FY 24)
1	Network solutions to protect highly vegetated areas from East Coast Lows		√	~	\$23.44 M	
2	Network solutions to reduce outage time and frequency for most customers		✓	4	\$16.07 M	
3	Shared Ausgrid Liaison Officer	✓	~	✓		\$0.33 M
4	Energy Resilience for Community Hub	~	~		\$0.09 M	
5	Small Mobile Generators	~	~		\$0.02 M	
6	Communications Targeting Vulnerable Customers	√	√			\$0.25 M
7 Blackout Plan		~	~	1		\$0.25 M
				TOTAL:	\$39.61 M	\$0.83 M

Lake Macquarie customers are very conscious of the inherent vulnerabilities of their local geographies, particularly high vegetated areas around the lake where there are limited alternatives to access resources and support if roads are impacted during major events. They've given strong priority to the most cost-effective network investments that protect vegetated areas and provide increased resilience for as many of their community as possible, including some of the vulnerable that will also benefit from investment in more populated areas. Lake Macquarie was the area where the Blackout Plan first initiated, inspired by Bushfire Survival Plans. By having accurate and detailed information about the specific risks a customer faces and trustworthy advice on the appropriate action they can take, they feel they'll be in a much better position to withstand the inevitable impacts of extreme weather. This planning and preparation component will increase awareness of and access to flexible energy resilience resources (community hubs and small mobile generators) during an event and targeted communication that support the most vulnerable (citing the elderly nature of their community) will help ensure these customers aren't missed.



#### Port Stephens package of solutions

Resilie	nce Solution in order of customer	Custome	er prioritised o	utcomes	Cost		
preter		Long Term	Lift Everyone Up	Mitigate Impacts	CAPEX (FY 24)	OPEX (FY 24)	
1	Energy Resilience for Community Hub		✓	✓	\$0.09 M		
2	Shared Ausgrid Liaison Officer	✓	✓	✓		\$0.33 M	
3	Blackout Plan (light)		✓	✓		\$0.10 M	
4	Network solutions to reduce outage time and frequency for most customers	~	✓		\$10.54 M		
5	Network solutions which target critical community services	~	✓		\$8.38 M		
6	Communications Targeting Vulnerable Customers			✓		\$0.25 M	
7	Small Mobile Generators			~	\$0.02 M		
				TOTAL:	\$19.02 M	\$0.68 M	

Port Stephens have developed strong community infrastructure and support systems because of previous extreme events. They feel that due to population size and other factors neighbouring Newcastle will remain a priority area for investment. Therefore, they have prioritised investments that complement existing community resilience through energy resilience investments in a hub, a liaison function and a smaller Blackout Plan. They've also prioritised a start towards a longer-term objective to strengthen the network and have chosen to support vulnerable customers and those who experience the worst outages through enhanced community programs and targeted communications.

#### Voice of Community

Each local area package is supported by a video of members of the community describing how they selected the solutions and how the packages work to support their unique community. These are also supported by a written submission from each LGA group on pages 55-58 of the Resilience Mid-Term Report. The videos can be accessed at the below links:



#### Packages in the communities' own words:

- Central Coast <u>https://youtu.be/WT2mZA2LP5g</u>
- Port Stephens <u>https://youtu.be/liQdDWa9SSM</u>
- Lake Macquarie <u>https://youtu.be/HC3bNnfNall</u>

All cost estimates for the 2024-2029 (5-year) regulatory period unless noted otherwise.

Additional customer feedback specific to individual solutions is included below.



## **Resilience Solutions - Local Network Solutions**

Solution Overview									
Program Alignment	Climate Resilience -	Climate Resilience - Local Government Area Solutions							
Solution Title	Local Network Solutions								
Project Objective	To provide flexible, cost-effective approaches to improve energy resilience								
Resilience Impact	Before, During, Afte	Before, During, After							
Peril Addressed	Windstorm, Bushfire	)							
Total cost of network solutions	Capex:	\$125.08M	Opex:	\$0M					

#### **Opportunity Statement**

Ausgrid has identified a combination of local network solutions, made up of increased segmentation, undergrounding and covered conductors, that will materially reduce the growth in risks, caused by climate change driven increases in the number and intensity of extreme weather events, to Ausgrid's network and its customers.

Ausgrid is taking a constrained, targeted, 'least regrets' approach in the 2024-2029 regulatory period and piloting our resilience investments in three local government areas (LGAs), selected in alignment with the priorities of our VoC2022 panel. The LGAs of Central Coast, Lake Macquarie and Port Stephens have been identified as the target for these local network solution investments due to their underlying level of risk (current network performance), forecast impact by climate change on future risk (future network performance) and the community's capacity to cope with the effects of climate change and long duration outages.

Ausgrid has developed a capex investment programme for local network solutions in the three LGAs of \$125.08M over the 2025-2030 period that is shown in economic modelling to deliver net benefits to customers. The local network solutions programme does not include an opex component.

#### Local Government Area Investment Packages

Ausgrid has co-designed with the community a unique investment package for each LGA that is specific to their local context and resilience needs. Each package is made up of both local network solutions (highlighted) and local non-network solutions. A summary of each local package and the communities' priorities are outlined in the below tables. All costs are per LGA for the 2024-2029 (5-year) regulatory period unless noted otherwise.



#### **Central Coast**

Resilience Solution in order of customer		Custom	er prioritised	Cost		
pre	ference	Self Resilience	Longest Outages	Most Customers	CAPEX (FY 24)	OPEX (FY 24)
1	Network solutions to reduce outage and time for the most customers		✓	✓	\$37.64 M	
2	Co-Developed Community Resilience Plan	~	~			\$0.40 M
3	Shared Ausgrid Liaison Officer	~	~	~		\$0.33 M
4	Community awareness and education campaign	~	~	~		\$0.50 M
5	Local safety and outage messaging		~	~		\$0.75 M
6	Network solutions to protect highly vegetated areas from East Coast Lows		~	~	\$29.02 M	
				TOTAL:	\$66.66 M	\$1.98 M
			NETWORK	COMPONENT:	\$66.	.66 M

#### Lake Macquarie

		Custom	er prioritised	Cost		
Resi prefe	lience Solution in order of customer erence	Vulnerable	Worst	Most	CAPEX	OPEX
		V annor abro	Served	Customers	(FY 24)	(FY 24)
1	Network solutions to protect highly vegetated areas from East Coast Lows		✓	✓	\$23.44 M	
2	Network solutions to reduce outage time and frequency for most customers		✓	✓	\$16.07 M	
3	Shared Ausgrid Liaison Officer	✓	~	√		\$0.33 M
4	Energy Resilience for Community Hub	✓	✓		\$0.09 M	
5	Small Mobile Generators	√	√		\$0.02 M	
6	Communications Targeting Vulnerable Customers	✓	~			\$0.25 M
7	Blackout Plan	~	~	√		\$0.25 M
				TOTAL:	\$39.61 M	\$0.83 M
			NETWORK	COMPONENT:	\$39.	51 M



#### **Port Stephens**

Resilience Solution in order of customer		Custom	er prioritised o	Cost		
		Long Term	Lift Everyone Up	Mitigate Impacts	CAPEX (FY 24)	OPEX (FY 24)
1	Energy Resilience for Community Hub		✓	✓	\$0.09 M	
2	Shared Ausgrid Liaison Officer	√	√	√		\$0.33 M
3	Blackout Plan (light)		√	√		\$0.10 M
4	Network solutions to reduce outage time and frequency for most customers	√	√		\$10.54 M	
5	Network solutions which target critical community services	√	√		\$8.38 M	
6	Communications Targeting Vulnerable Customers			✓		\$0.25 M
7	Small Mobile Generators			✓	\$0.02 M	
				TOTAL:	\$19.02 M	\$0.68 M
			NETWORK	COMPONENT:	\$18.9	01 M

The following sections of this document detail the highlighted local network solutions summarised in the tables above.

#### **Local Network Solutions**

Local network solutions are network-based investments that improve the resilience of Ausgrid's 11kV network in targeted locations. These solutions provide benefits to Ausgrid and its customers through reducing the number of network faults during major climate events, faster restoration of outages during major events and reduced damage to network assets. This reduces unserved energy and the cost of network repairs during and after each climate event.

The local network solutions considered are:

- **Network segmentation** installing reclosers along lines to allow for automatic restoration of temporary faults and the isolation of non-temporary faults so that less customers are affected by the fault
- **Undergrounding** replacing overhead lines with underground cables that are less exposed and therefore are less likely to be damaged during climate events
- **Covered conductor** replacing bare conductors with covered conductors, which reduces outages caused by falling/blown in branches, reducing the number of faults during major climate events

The local network solutions have been tailored to each 11kV feeder in the three target LGAs. On each feeder, an optimal mix of network segmentation, undergrounding and covered conductor was selected to maximise the net economic benefits of the proposed solutions across each LGA.

Undergrounding is the most effective of the local network solutions at mitigating climate risk. However, as it is the most expensive, increased allocation to undergrounding reduces the number of customers that can be

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supported by the programme. Therefore, undergrounding is best targeted towards HV feeders.

Reclosers are a fixed cost investment so are best applied to the densest customer areas where they can benefit the most customers. However, customers downstream of the recloser receive lower benefits while often being the customers that experience the most outages.

Replacing bare conductors with covered conductor provides a good mix of serving the most customers while prioritising the customers with the longest outages. It is cheaper than undergrounding, but in most cases more expensive than network segmentation. A mix of segmentation with some covered conductor is often the most optimal mix of solutions for Ausgrid's feeders.

The local network solutions selected by Ausgrid in the target LGAs are aimed at protecting high vegetation areas from the effects of the Windstorm climate peril (East Coast Lows). The solutions used have good coverage of the Windstorm peril, with covered conductor and undergrounding reducing both asset loss and loss of supply risks (undergrounding being the more effective of the two, but at a greater cost), while reclosers reduce loss of supply.

Undergrounding also provides protection from asset loss caused by bushfires.

The different combinations of solutions and the applicability of the combined solution to the perils and risks modelled by Ausgrid are outlined in Table 1.

#### Modelled Local Network Solutions and Peril Applicability

A/L	Asset Loss
L/S	Loss of Supply
	Solution Effective Against Peril

	Modelled Local	Description	Bus	shfire	Windstorm		
	Network Solution		A/L	L/S	A/L	L/S	
1	ССТ	Covered conductor (CCT) all bare overhead cable length. Covered conductors are more resilient than bare conductors to the effects of wind and reducing the chances of bare wires hitting each other and falling vegetation causing an outage.					
2	Recloser	Recloser placed on feeder to facilitate segmentation. Segmentation can reduce the number of customers impacted by an outage.					
3	CCT + Recloser	CCT all bare overhead cable length. In addition, a recloser will be installed downstream.					
4	UG All	Undergrounding all bare overhead cable with no limitation on feeder length. Undergrounding provides additional resilience against storms and bushfires.					



5	CCT + Recloser + UG	A combination of CCT, undergrounding and recloser.		
6	UG + Recloser	A combination undergrounding and recloser.		
7	UG 1500 m +Recloser	Undergrounding cable with a limitation of 1500m on each undergrounded segment. In addition, a recloser will be installed at the end of each undergrounded segment.		
8	UG 1000 m + Recloser	Undergrounding bare overhead cable with a limitation of 1000m on each undergrounded segment. In addition, a recloser will be installed at the end of each undergrounded segment.		
9	UG 500 m + Recloser	Undergrounding bare overhead cable with a limitation of 500m on each undergrounded segment. In addition, a recloser will be installed at the end of each undergrounded segment.		
10	CCT + Recloser Up & Downstream	CCT all bare overhead cable length with recloser upstream and downstream		

\* Coastal Induction, Heatwave and Flood Perils are not included in local network solution modelling as no solutions directly address the perils.

#### Development of Local Network Solutions to Meet Bespoke Community Resilience Outcomes

The Local Network Solution development is supported by detailed bottom-up modelling. This modelling is outlined in the figure below.



Local Network Solution Modelling



Network solution packages have been developed based on outputs from the Local Network Solution Model with the incorporation and consideration of customer engagement outcomes and additional key inputs. Key inputs to the development of solutions included:

- Climate Resilience Stocktake
- Local Resilience prioritisation principals
- Vegetation coverage
- Critical Services and critical community organisations
- Asset Data and network vulnerability to climate events



A Co-Designed Approach for Local Network Solution Development

The co-designed approach for local network solution development is depicted in the figure above. This process resulted in an extracted list of feeders (using the modelling outputs) that meets the community prioritization principals and expenditure thresholds. No feeder was double counted in the benefits or costs associated with each network solution. For example, for Central Coast if the feeder was selected for inclusion in the "Network solutions to reduce outage time and frequency for the most customers" solution it was not eligible for selection in the "network solution to protect highly vegetated areas from East Coast lows" solution.

Developing local network solutions to be tailored to meet the unique resilience outcomes of the three local areas in combination with more traditional modelling and engineering analysis has resulted in an informed, and validated Climate Resilience Network Solution mix and expenditure breakdown that is supported by the community.

#### **Cost Benefit Assessment of Network Solutions**

We have undertaken detailed economic modelling of the costs and benefits of the local network solutions proposed for Central Coast, Lake Macquarie and Port Stephens. The modelling identified the economically optimal combination of solutions, tailored to meet bespoke community resilience outcomes (see previous section), that would ensure customers receive net benefits from the climate resilience investments made by Ausgrid.

The benefits in the modelling are the reduction in climate risk attributable to the local network investments

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over a period of 25 years.

A summary of the economic modelling results are shown in the table below.

			F	Peril	?		When?			FINANCIAL METRICS		
#	Solution	Bushfire	Heatwave	Windstorm	Coastal Inundation	Flood	Before	During	After	CAPEX (\$m, real FY24)	NPV	BCR
	Port Stephens											
PS6	Network solutions to reduce outage time and frequency for most customers									\$10.54 M	\$3.81 M	1.36
PS7	Network solutions which target critical community services - CCT									\$2.98 M		۸
PS8	Network solutions which target critical community services - Undergrounding									\$5.40 M		
	Lake Macquarie											
LM6	Network solutions to protect highly vegetated areas from East Coast Lows									\$23.44 M	¢11.62 M	1.20
LM7	Network solutions to reduce outage time and frequency for most customers									\$16.07 M	φ11.02 IVI	1.29
	Central Coast											
CC5	Network solutions to reduce outage and time for the most customers									\$37.64 M	\$33.63 M	1.50
CC6	Network solutions to protect highly vegetated areas from East Coast Lows									\$29.02 M	φ00.00 IW	1.50
								ota	al	\$125.08 M		

#### Proposed Network Resilience Solutions and Expenditure

^NPV and BCR for Port Stephens is calculated for the "Network solutions to reduce outage time and frequency for most customers" item only.

#### Breakdown of Network Solutions Proposed for Each LGA

A high-level breakdown of the network solutions proposed for Central Coast, Lake Macquarie and Port Stephens is provided in the table below.

#### Breakdown of Network Solutions Proposals

	Number of 11 kV Feeders Identified for CR Expenditure Consideration	CCT (km)	Reclosers (Number)	UG (m)
Port Stephens	31	76	31	3,000
Central Coast	44	157	43	29,506
Lake Macquarie	71	186	71	5,468

Underpining the above breakdown is a detailed list of feeders and detail of the proposed solution for each 11kV Feeder identified for Climate Resilience network expenditure consideration in the three LGAs. An example of one of these feeders is shown in the figure below. Feeder ZN12580/000004 is listed under solution

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CC5 Network solutions to reduce outage and time for the most customers. Modelling and engineering analysis found that installing CCT and a recloser was the preferred option. Network solutions proposed for each 11 kV feeder will be further refined via engineering and planning activities.



Local Network Solution Feeder Example (Central Coast)



Solution Overview							
Program Alignment	Climate Resilience -	Climate Resilience - Local Government Area Solutions					
Solution Title	Local Non-Network Solutions						
Project Objective	To provide flexible, cost-effective approaches to improve energy resilience						
Resilience Impact	Before, During, After						
Peril Addressed	Heatwave, Windstor	rm, Bushfire, Floods					
Total cost of non- network solutions	Capex*: \$210,000 Opex: \$3,499,999						

### **Local Non-Network Solutions**

\*Small mobile generators and community energy resilience hubs are capex investments with an assumed 7year cost recovery and are considered non-network solutions

#### **Opportunity Statement**

This suite of solutions responds to strong customer expectations that Ausgrid should take a proactive role in improving their energy resilience, including supporting them to prepare for and manage the impacts of outages. Community resilience investments recognise the limitations of a purely infrastructure driven approach and acknowledge that the constrained CAPEX investments proposed will not mitigate the entire climate risk growth forecast in these areas. This means that customers face the real prospect of increased outages from extreme weather events and the consequent impacts of these. Each group of representatives has identified priorities and needs for their local community and worked through a structured process to consider costs, benefits and affordability and reach consensus on an investment package bespoke to their area.

Investment in locally specific, community driven non-network solutions can deliver significant community and energy resilience benefits in a way that is flexible and adaptable in the face of uncertain climate impacts. In making these investments, we can integrate energy resilience with community resilience and support impacted community to prepare, respond and recover from outages. There is a growing body of evidence that shows non-infrastructure solutions can deliver benefits complementary to infrastructure solutions and they are more responsive and adaptable to rapidly changing contexts. Ausgrid is uniquely positioned to support energy resilience, with specialist and trusted expertise and experience in energy distribution and outage management. There are few, if any, other organisations in our network area with the equivalent skills and expertise to deliver on energy-related community resilience.

#### **OPEX step change and regulatory obligations**

The OPEX based solutions described here are new activities that are not captured in our 'base year OPEX' (FY23) or the rate of change factors applied in the AER's trend escalation. They therefore fall into the category of 'step changes', representing a change from business-as-usual expenditure, that are added to, or subtracted from, the trend-adjusted base year. We have considered the scope for prudent trade-offs between capital and operating expenditure under the AER's Better Resets Handbook<sup>37</sup> and are proposing \$5.8 million (including local and whole of network non-network solutions) opex step change for the implementation of community-based resilience initiatives, fully offset by a reduction to our 2024-29 capex forecast.

In addition to an efficient capex/opex trade-off, this step-change can also be supported as a major external factor category due to climate change. Under the NSW Infrastructure Strategy 2022 and Security of Critical Infrastructure Act 2018, Ausgrid is required as a critical infrastructure provider to provide electricity supply resilience against material risks and hazards that have been accelerated by climate change. In particular, the NSW Infrastructure Strategy recommends that infrastructure providers 'assess local risk and incorporate



<sup>&</sup>lt;sup>37</sup> AER (2021), <u>Better Resets Handbook</u>, section 4.2.2.

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*infrastructure* and *non-infrastructure* solutions for vulnerable locations". The non-network solutions proposed under the step-change and described below deliver on this requirement to consider 'non-infrastructure' solutions to energy resilience and have been developed in active partnership with the community.

In proposing this step change, we're acknowledging that the top-down modelling indicated Ausgrid could spend considerably more (\$319M)<sup>38</sup> on capex investment, and in taking a constrained investment approach we are not mitigating the total growth in climate impact risk. In doing so, we accept that our customers must prepare for and withstand the reality of more frequent and/or prolonged outages and acknowledge their expectations that we support them through this.

### Non-network components of local packages Central Coast:

Re	silience Solution in order of customer	Custom	er prioritised ou	Cost		
preference		Self Resilience	Longest Outages	Most Customers	CAPEX (FY 24)	OPEX (FY 24)
1	Network solutions to reduce outage and time for the most customers		~	~	\$37.64 M	
2	Co-Developed Community Resilience Plan	~	✓			\$0.40 M
3	Shared Ausgrid Liaison Officer	~	✓	✓		\$0.33 M
4	Community awareness and education campaign	~	~	✓		\$0.50 M
5 Local safety and outage messaging			✓	✓		\$0.75 M
6 Network solutions to protect highly vegetated areas from East Coast Lows			~	✓	\$29.02 M	
				TOTAL:	\$66.66 M	\$1.98 M
		NO	N-NETWORK	COMPONENT:	\$1.9	98 M

La	ke	Mac	quarie:
	_		

		Custom	er prioritised o	Cost		
Resilie	nce Solution in order of customer preference	Vulnerable	Worst Served	Most Customers	CAPEX (FY 24)	OPEX (FY 24)
1	Network solutions to protect highly vegetated areas from East Coast Lows		✓	~	\$23.44 M	
2	Network solutions to reduce outage time and frequency for most customers		~	~	\$16.07 M	
3	Shared Ausgrid Liaison Officer	✓	✓	✓		\$0.33 M
4	4 Energy Resilience for Community Hub		✓		\$0.09 M	
5	Small Mobile Generators	✓	✓		\$0.02 M	
6 Communications Targeting Vulnerable Customers		✓	✓			\$0.25 M
7	Blackout Plan	✓	✓	✓		\$0.25 M
_				TOTAL:	\$39.61 M	\$0.83 M
		NC	ON-NETWORK	COMPONENT:	\$0.9	4 M

### Port Stephens:



<sup>&</sup>lt;sup>38</sup> Ausgrid (2023), <u>Ausgrid - Att. 5.5 - Climate resilience program - 31 Jan 2023</u>, p.34

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		Custom	er prioritised o	Cost		
Resilie	ence Solution in order of customer preference	Vulnerable	Worst Served	Most Customers	CAPEX (FY 24)	OPEX (FY 24)
1	1 Network solutions to protect highly vegetated areas from East Coast Lows		~	~	\$23.44 M	
2 Network solutions to reduce outage time and frequency for most customers			~	~	\$16.07 M	
3	Shared Ausgrid Liaison Officer	✓	✓	✓		\$0.33 M
4	4 Energy Resilience for Community Hub		✓		\$0.09 M	
5	Small Mobile Generators	~	✓		\$0.02 M	
6 Communications Targeting Vulnerable Customers		~	√			\$0.25 M
7	Blackout Plan	✓	✓	✓		\$0.25 M
				TOTAL:	\$39.61 M	\$0.83 M
		NC	N-NETWORK	COMPONENT:	\$0.9	4 M

### Proposed packages will invest in solutions that work together to complement each other

Customers have put together packages with complementary solutions that work together to maximise the benefits they can deliver. For example, Lake Macquarie has prioritised \$39.61M (almost 97%) of their investment package on network solutions. In recognising that outages will still happen, and are still quite likely to increase, they've considered what is the best combination of investments to help them cope with the various impacts of these. The Blackout Plan provides tailored and practical support with broad reach to support community to invest in self-resilience and prepare for events. The Blackout Plan is seen by the community as an effective way to promote awareness of resources available to the community during an event, including existing community hubs that have had energy resilience improvements and small mobiles generators. Recognising large elderly and other vulnerable populations, targeted communications ensure these cohorts are aware of these resources and don't get left behind. The Shared Ausgrid Liaison Person is seen as an important function to coordinate these resources, ensure they deliver value with efficiencies across the LGA's.

### Efficiency opportunities and scope refinement

Each LGA community cohort has worked through a process to prioritise solutions and design an investment package that is bespoke for their unique local context, experience, and needs. The engagement process worked independently with each community group and considered solutions with preliminary costings that would allow them to deliver benefits without further investment from other LGA's. For example, the Lake Macquarie and Port Stephens representatives both considered a 'self-contained' (fully costed) solution to deliver targeted communication to vulnerable community members. To ensure customers were well-informed of all the types of investments they could consider, Ausgrid undertook high-level, indicative analysis of the costs, benefits and potential customer reach for 18 potential network, community and communications investments. This allowed us to give customers sufficient information to properly consider their prioritisation and investment balance, while managing the risk of investing significant resources in the detailed scoping and modelling of solutions that wouldn't ultimately be considered.

With the local LGA proposed investment packages now finalised, Ausgrid will undertake the detailed scoping and modelling for each of the chosen solutions, including a quantitative assessment of benefits to confirm indicative cost benefit analysis. This process will support identification of efficiencies and streamlined delivery opportunities for solutions that appear in multiple packages and those that require similar inputs despite different targeting (for example, communications targeting vulnerable customers). This will take place Jul-Sept 2023 and is expected to deliver a refinement in costings and a clearer view of how these linkages and efficiencies can increase benefits to communities, including quantitative cost-benefit analysis.



## **Planning and coordination investments**

### CC1 | Community Resilience Plan (co-funded)

### Scope

This describes the resilience plan solution in general terms however it should be noted that this solution is only proposed for the Central Coast LGA, where the community is has identified this is a critical need and a gap that remains unresolved due to challenges with their council being in administration.

Resilience plans are well-established mechanisms to support communities to better prepare, respond and recover from extreme weather events. They are typically developed through a collaborative process with involvement from local council, community members, resilience actors and first responders, and critical infrastructure providers. While a resilience plan won't necessarily reduce the number or length of outages (unless it includes specific projects to achieve this), it can play an important role in mitigating the scale and duration of negative impacts customers face as result of prolonged outages.

This solution proposes that Ausgrid co-invest in resilience planning where those plans don't already exist. We recognise that the development of a local community resilience plan is not something that would normally sit in Ausgrid's remit, nor are we best placed to lead the process, but that it has been strongly prioritised by the community for us to play a role. As such, this solution proposes that Ausgrid partner with local council, Indigenous and other community groups, local emergency services, other essential service providers (e.g. Telcos) and resilience experts like Mindaroo Foundation to develop these plans, with a co-investment. With this approach, we expect that Ausgrid's investment can catalyse a local community resilience planning process that we can contribute support appropriate to our role as a critical infrastructure provider.

### Benefits and community feedback

- Resilience plans help communities respond better to extreme weather events and supports other communication and resilience activities to be more specific and useful to customers by providing a focal point where preparation and response plans have been agreed.
- Delivers on an identified gap for the Central Coast local community and allows complimentary investment from other resilience actors to improve overall community resilience.

**Approximate customer reach:** Benefits all community members in the Central Coast who participate (can benefit whole LGA).

Bill impact	Cost estimate	Effectiveness rating	Impact	Timing	Level of responsibility
Fast			<b>春</b> Fewer outages	🕚 Before	Standard
money	\$400k over 5 vears		套 Shorter outages	🌧 During	😿 New activity
(opex)			Welfare support	C After	Soint activity

### Community feedback:

*"I think the Central Coast LGA is too large for community to undertake this task without direction." "Strongly based on preparation for an event. And education that is 'what to do', before and during."* 

### LM5, PS3 | Blackout Plan

### Scope

This initiative takes inspiration from the Bush Fire Survival Plan designed and delivered by the NSW Rural Fire Service. The Blackout Plan would employ a similar strategy by supporting customers to understand their specific exposure to climate risk and the characteristics of their local electricity network and guiding them through a process to make their own plans for what they'll do during an extended outage. There are a range of forms this solution could take, at the most sophisticated level this could include an app (\$\$\$) and at the simplest it could be additional information on a website (\$). Ausgrid could use existing asset data to develop a vulnerability metric

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or rating system to give customers an understanding of their relative risk of an outage in an extreme weather event at a household or site level.

This investment will be more effective if created in consultation and collaboration with other resilience actors like telcos, councils and other utilities. Refinement in the scope and approach of this solution may shift some funding to capex expenditure for IT.

### Benefits and community feedback

- A blackout plan builds on generic information and education by giving customers a more granular understanding of their specific risks and empowering them to self-initiate and put their own resilience measures in place.
- Makes other communications such as those targeting vulnerable customers more effective.
- Supports customers to devise a plan considering their specific circumstances like reliance on life support equipment, electric vehicle ownership etc.
- Local investment solution for the 2024-29 regulatory period resilience pilot can deliver an adaptable solution that can be leveraged in future regulatory periods to benefit other areas.

Approximate customer reach: All community members who participate (can benefit whole LGA).

Bill impac	Cost estimate	Effectiveness rating	Impact	Timing	Level of responsibility
Fas	t \$100k (light)		<b>春</b> Fewer outages	🕚 Before	Standard
non 🔿 👘	<sup>y</sup> \$250k		套 Shorter outages	🌧 During	😠 New activity
(ope	Over 5 years		Welfare support	C After	Soint activity

### Community feedback:

"The blackout plan is so important to the general public as it's a community service to avoid confusion."

"This is a good low-cost idea. Puts the onus on the customer to pay/solve their own problems."

"Seem like a relatively small cost to benefit a great number of customers. Puts the onus back on the customer to be prepared. Useful document for the liaison officer to work with."

### LM1, CC2, PS2 | Shared Ausgrid Liaison Officer

### Scope

This solution proposes a locally based dedicated Ausgrid resource (1 FTE) to assist with the coordination of local resilience preparation, response and recovery, covering the Eastern seaboard suburbs at risk of storms and fires, specifically focused on the Central Coast, Lake Macquarie and Port Stephens. The liaison would be responsible for working with telcos, utilities, councils, local emergency services and community service organisations to improve resilience, establish better plans and during an event restore and repair services. A key focus of this role is in the planning and preparation for events, to complement existing BAU functions and improve cross-agency collaboration and communication during response.

Ausgrid's bushfire and fire start risk programs use a similar model, where a dedicated liaison engages with Bush Fire Management Committees (BFMC) and other stakeholders on a regular basis. This liaison function has delivered a significant improvement in stakeholder engagement and customers and stakeholders consistently articulate the value in having a single point of contact and an established relationship. These long-term, consistent relationships deliver additional benefits by surfacing new opportunistic opportunities that can deliver mutual benefit for Ausgrid and the network, and our partners. The effectiveness of communications campaigns, delivery of pop-ups and other physical comms, development of Resilience plans and co-ordination of items such as small generators all benefit from a local dedicated person.

### Benefits and community feedback

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- Provides an on-going resource to improve Ausgrid's integration with emergency management and resilience planning beyond reactionary response during events in the three LGAs.
- Improved relationships and better stakeholder understanding of Ausgrid's processes and capacity can
  resolve common issues that emerge in high pressure response situation, potentially leading to shorter
  outages and a more streamlined inter-agency response.
- The role is positioned to support Ausgrid's entire suite of energy resilience investments and ensure they are targeted, fit for purpose, and respond to community feedback.

Approximate customer reach: Whole of LGA



### Community feedback:

"Good to have a person with speed, knowledge and information to work across agencies at a local level"

"I believe this position would be very beneficial not only in an extreme weather event / large outage but also in planning for such events and having resources available / contact in case of emergency."

"Definitely a needed resource, but there needs to be accountability and Ausgrid support and constant monitoring of the role to determine if more resources are needed."

"Local knowledge is important. Think it's a great idea but seems a lot for 1 person to look after across 3 LGAs."

### **Communications and education investments**

### CC3 | Community Awareness and Education Program

### Scope

This solution will utilise radio, social media, digital advertising, and local papers to deliver broad educational campaigns on the importance of emergency preparedness. This aims to improve local communities and customers' ability to self-initiate and invest in their own resilience in anticipation of extreme climate events. This type of campaign can leverage Blackout Plans and other initiatives to make information more useful and maximises the benefits.

### Benefits and community feedback

- Targets lessening customer impacts during an outage, rather than preventing or shortening outages, and is designed to encourage better preparation in advance of events through customer self-resilience, with knock-on improvements in response and recovery.
- Improves customer awareness of the types of hazards an outage can present that they aren't normally
  exposed to, including access to life support machines, lack of communications, lack of refrigeration for
  medicines, food spoilage, sanitation, non-functioning traffic signals and physical hazards.
- Broad educational campaigns can reach the greatest number of customers.

Approximate customer reach: 100,000 customers







### Community feedback:

"Addresses the community needs and benefits all customers, as long as it was done right and well." "Community Education and Awareness and Ausgrid Liaison Officer are good choices."

### LM4 | Communications targeting vulnerable customers

### Scope

This solution leverages similar inputs and outputs of the blackout plan and more generic community awareness and education campaigns to deliver highly targeted communications to vulnerable customers, for example elderly, life support and indigenous customers. This type of campaign would deliver pre-event communications to help vulnerable customers understand how to prepare for an event. It would utilise mailouts, pop-in centres at nursing homes, local neighbourhood/community centres, community service organisations and other facilities/services that support vulnerable customers. The communication is highly targeted and more specific to the needs of these customer cohorts, so is unlikely to reach and impact customers in the broader community.

### Benefits and community feedback

- Targets customer cohorts at higher risk of more acute impacts from outages with less capacity to recover quickly.
- Uses outputs from other investments (Community Awareness and Education Campaign, Local safety and outage messaging) to ensure vulnerable customers access the benefits of these investments too.

**Approximate customer reach:** All nursing homes, 10,000 life support customers in each LGA where investment is made.

Bill impact Cost estimate Effectiveness rating		Impact	Timing	Level of responsibility	
Fast			Fewer outages	🕚 Before	Standard
money	\$250k over 5 vears		Shorter outages	🌧 During	😿 New activity
(opex)	,		iii Welfare support	C After	Soint activity

### Community feedback

"Need to support the vulnerable more as they may not have access to mainstream media etc, or may not understand"

"Vulnerable are most in need and often most seriously affected. It's a balance. We have a duty to our most vulnerable"

### CC4 | Local safety and outage messaging

### Scope

This investment targets an uplift in Ausgrid's existing safety and outage messaging to increase the frequency, detail and/or accessibility of the information we push out to customers, particularly during an event. Lack of access to quality, trustworthy and up-to-date information is a commonly cited cause of distress for customers



during an outage and the inability to make informed decisions and plan can prolong the impacts of the outage long after power is restored.

Our community representatives have recognised the improvements Ausgrid has made in this area already, with better outage texts and noting the value of the outage information published on our website and see room to work together to make this function even better. In addition to community co-design, this solution requires accurate and up to date contact details from retailers. Other communication investments described above could support this by ensuring customers understand the importance of providing the right details and keeping these updated.

### Benefits and community feedback

- This won't prevent outages, but it can support people to plan and better manage the consequences of an outage through more locally specific and detailed information.
- Can mitigate the impacts of an outage for customers by enabling more informed decision making.

Approximate customer reach: All customers in impacted areas (provided we have the correct contact details)



### Customer feedback:

"I love this because I think after the initial development if will be fairly low-cost item that will provide information and reassurance to a lot of people."

"Have received warnings of outages which I find very useful."

"Will reach people in their homes, or where they are located. Better than having to log on to a website."

## Flexible energy resource investments

### LM2, PS1 | Energy resilience for community hubs

### Scope

This solution leverages existing community resilience functions by bolstering their energy resilience and ability to support the community during extreme weather events and prolonged outages. For example, Ausgrid could invest in an existing local neighbourhood centre with services like emergency food supplies, family services and mental health and make it generator ready or supplied with back-up generation and stocked with outage supplies like batteries and torches. With a resilient energy supply, a community hub like this can provide community support and amenities during an outage. This could include providing information, food, water, cooking facilities, showers, telecommunication services and spaces to charge devices.

Location is important because these hubs can only be used if they are safe and Ausgrid will seek to partner with organisations whose existing sites are appropriately located and feasibly adaptable to back-up energy sources. We have already engaged with Wahroonga Community Corp in Port Stephens and Batahabah Local Aboriginal Land Centre in Lake Macquarie and both organisations are supportive and motivated to investigate their sites as potential hubs. The community resilience hubs could also be a focal point for coordination by the Ausgrid Liaison Officer (described above) and facilitate distribution of small mobile generators (below) during an event.

### Benefits and community feedback

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- This is an effective way to lessen customer impacts during an outage and promote faster recovery by giving customers a consistent, reliable source of energy resilience. This can be particularly beneficial for customers at the end of a long LV restoration tail after a major event.
- Provides a coordination point to support other energy resilience investments, for example small mobile generators and increases the capacity of existing local co-located services to support the community in times of crisis.

### Approximate customer reach: 100 customers per hub



### **Customer feedback:**

"Community relies on connection. The more connections available gives greater coverage, more cost-effective provision of services and a capacity to provide ongoing support where needed."

"It has impact before + during. Less expensive. More diversifiable."

"Need to have multiple hubs to access to may be close to the area in need."

### LM3, PS5 | Small mobile generators

### Scope

This solution proposes a relatively minor investment in a fleet (10-15) of small mobile generators that can be distributed as needed to provide emergency power. Ideally, these generators could form one of the resources available at an energy resilience hub and could be managed and coordinated by the Ausgrid liaison officer. This type of solution is already used for life support customers (though this is not a guaranteed service). This investment would provide an additional supply of generators for other vulnerable or affected customers. One small generator could provide power to one customer (e.g. to run electronics and a fridge at a household) and provide a benefit during an outage, though there will likely be a delay in getting the generator to the affected customers and in some cases this may not be possible at all, so the benefit isn't guaranteed in every situation.

### Benefits and community feedback

• Despite the challenges described, small mobile generators are a low-cost item that have the potential to provide a highly targeted but highly impactful benefit to customers, and may be particularly beneficial in certain circumstances, for example for customers at the very end of a long LV restoration tail.

### Approximate customer reach:



### Customer feedback:

"It helps the most vulnerable."

"I think it's a great idea! I just wish there were more of them."



### Alignment with the meaning of a 'distribution service'

We hold the strong view that the initiatives making up our community-based resilience program fall within the definition of a 'distribution service'. In Chapter 10 of the NER, this term is defined as:

### A service by means of, or in connection with, a distribution system.

Applying this definition, local non-network resilience solutions may not be provided 'by means of' our distribution system yet they are undoubtedly provided 'in connection with' it. This is given that the purpose of these solutions is to trade-off network capex. Local non-network resilience solutions are also a service provided 'in connection with' our distribution system as they support the community at times when this system experiences an extended outage.

It is helpful to consider the suite of other services we currently provide customers and test whether they are similar in nature to our planned community-based resilience solutions. For example, local non-network solutions like communication plans are akin to the electrical safety programs we run in schools and our 'lookup and live' service, further supporting our position they meet the definition of a 'distribution service' in the NER.

Summary of local non-network solution links to National Electricity Rules (NER)					
Relevant rule/	clause	Solution alignment			
Common Distribution Services	The planning, design, repair, maintenance, construction, and operation of the distribution network	Ausgrid's Shared Liaison will become an integral part of processes to plan, repair, and operate the network, including improving integration and alignment with emergency management			
	Procurement and provision of network demand management activities for distribution purposes	In a similar way to Ausgrid's need to work with other parties to meet demand for network services where that is likely to be the most cost-effective way of reliably meeting that demand, so too does Ausgrid need to examine non-network options to increase climate resilience. • <b>Flexible energy sources:</b> having the option to provide			
		<ul> <li>customers in exceptional circumstances with generators access to critical services via resilient energy at a hub allows us to deliver the above and are seen as cost-effective non-network solutions in this context.</li> <li>Communications: effective communication and educati with communities to help them be more resilient and able cope with extended power outages is seen as a cost-effective non-network solution in this context.</li> </ul>			
Expenditure Objectives	Meet or manage the expected demand for standard control services over that period;	During extended outages associated with emergency events, electricity consumers can be exposed to a number of hazards they are not normally exposed to, including, access to life support machines, lack of communications, spoiled food, undrinkable water, sanitation, the need to travel, non-			
	Comply with all applicable regulatory obligations or requirements associated with the provision of standard control services; maintain the safety of	<ul> <li>Flexible energy sources: localised access to small mobile generators can enable Ausgrid to meet customer demand and safety needs in exceptional circumstances. Helping customers get access to products and services that address these hazards through energy resources at a hub contributes to Ausgrid's ability to maintain the safety of the distribution system.</li> </ul>			



	the distribution system through the supply of standard control services.	<ul> <li>Communications: similarly, communication and education that helps customers be aware of and having a plan to manage some of these risks contributes to Ausgrid's ability to maintain the safety of the distribution system.</li> </ul>
Expenditure Criteria	the efficient costs of achieving the expenditure objectives;	Non-network resilience investments can complement direct network investments and ensure our overall climate resilience investment portfolio is both prudent and efficient by:
	the costs that a prudent operator would require to achieve the expenditure objectives; and	<ul> <li>Providing customers access to products and services via generators and hubs that address their needs during extended outages associated with emergency events</li> <li>Delivering education and communications regarding climate resilience, in the same way that Ausgrid provides public safety communications to complement our direct investments in delivering public safety outcomes</li> </ul>
Expenditure Factors	The extent to which the expenditure forecast includes expenditure to address the concerns of electricity consumers as identified by the DNSP in the course of its engagement with electricity consumers;	<ul> <li>Customers told Ausgrid clearly and consistently that they want and expect us to take an active role in supporting the community's energy resilience through both network and non- network solutions. The community told us:</li> <li>Better integration with emergency and other service providers will improve responsiveness to outages and support better resilience outcomes for customers</li> <li>They expect practical and personalised responses to outages</li> <li>Councils need better clarity during emergencies around</li> </ul>
	has considered, and made provision for, efficient and prudent non-network options	<ul> <li>Councils need better clarity during emergencies around roles and responsibilities</li> <li>Most have done little to no preparation or planning for unplanned outages, including less than 3 in 10 life-support customers being well-prepared.</li> <li>Planning and coordination, communications investments and flexible energy sources can all support effective coordination, planning and response for communities and enable Austrid to better meet these expectations.</li> </ul>



# Appendix D - Customer Support and Willingness To Pay

Ausgrid's 2023 engagement into climate resilience has been built on the back of extensive engagement. We have utilised both the broader regulatory reset engagement and our ongoing Voice of Community listening program which is the foundation of our business-as-usual customer feedback.

This engagement has sought the views of all Ausgrid customers and stakeholders, including retailers, local councils, commercial and industrial customers, small businesses and residential customers across the spectrum including vulnerable customers, customers from culturally diverse backgrounds and customers from across the Ausgrid network area. We have diligently sought the views and expectations from customers with the widest range of lived experiences possible across the network.

Universally the feedback has been that investing in climate resilience should:

- Be a priority for Ausgrid,
- Focus on those customers most exposed to the risk of climate change to the network,
- Encompass solutions that target prevention of outages and community resilience before, during and after an event, and
- To the extent possible should look to address inequities in the system, targeting impacted communities where traditional approaches to service restoration and funding allocation create less favourable outcomes.

Responding to this feedback has been an ongoing process, iterating and testing proposals with customers, including the RCP. As a result, changes have been made to the solutions presented in this business case post our last engagement session. We responded to customers concerns about affordability and social licence, and utilising feedback from the RCP have decided to remove the Low Voltage Aerial Bundled Cable (**ABC**) solution from the Whole of Network (**WON**) package<sup>39</sup> – reducing our total investment by \$12.2m. Because of this change the willingness to pay feedback set out in this appendix describes a higher bill impact than the bill impact currently proposed through the business case. The table below sets out the bill impacts presented to

<sup>&</sup>lt;sup>39</sup> Whole of Network was the term we used to differentiate resilience solutions that could be applied network wide or outside of our designated three trail local areas.

customers at our most recent engagement sessions in June and July 2023. The removal of ABC reduces the bill impact of the WON package from \$1.18 to \$1.03 by 2029, resulting an indicative total bill impact of \$3.17 by 2029.

Figure 1.1 Bill impacts of solutions proposed to customers

Package	Port Stephens	Lake Macquarie	Central Coast	WON package	Total	Total without ABC
Investment	\$19.7m	\$40.9m	\$69m	\$59.7m	\$189.3m	\$176.5m
Bill impact by 2029 <sup>40</sup>	+35¢ by 2029	+69¢ by 2029	+\$1.10¢ by 2029	+\$1.18 by 2029	+ \$3.32 by 2029	+\$3.17 by 2029
Total incremental bill impact over 2024-29					\$9.96 over 2024- 29	\$9.51 over 2024- 29

In seeking to provide evidence of customers willingness to pay for local investments, as required by the AER's Resilience Guidance Note, we have collected a rich evidence base of both quantitative and qualitative support, from across the Ausgrid network area. This evidence was not captured with the intent of deterministically setting a resilience investment allowance, but rather in better understanding the value customers put against both network and non-network investments, and how they consider these investments relative to the other energy and non-energy economic pressures they face. We learnt through this willingness to pay engagement that customers:

- Highly value investments in resilience.
- They expect investments in resilience to be targeted towards vulnerable customers, or to address inequities in the current system.
- They see investing now as a prudent step towards mitigating future climate related costs.
- For some customers a 'postage stamp' pricing methodology creates inequity and hence they would like to see the government and others take a greater role, so that costs are born through mechanisms where either the beneficiary of the investment pays (local government), or where capacity to pay is considered (taxation).



<sup>&</sup>lt;sup>40</sup> All bill impacts are based on the average customer using 5000kWh per annum.

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### Historical support for climate resilience investments

The below table sets out what we have heard from customers about investing in resilience through the course of our regulatory proposal development.

Figure 1.2 Customer support for investment in climate resilience

Engagement / Customer group	Date	Customer numbers	Purpose	Outcome (Resilience specific)
Desktop study of energy consumer sentiment	25 Nov 2021	<ul> <li>Analyse 30 reports</li> <li>14 customers</li> <li>22 customer reps</li> <li>7 stakeholders</li> <li>18 partners</li> </ul>	To understand customer needs and aspirations and identify gaps in existing knowledge.	<ul> <li>Ausgrid should invite customers to join the conversation on what resilience means for customers in relation to the network to ensure that solutions strengthen the resilience of communities.</li> </ul>
Event impacted focus groups	26 Nov – 13 Dec 2021	<ul> <li>12 residential</li> <li>3 small business</li> <li>2 hospitals</li> <li>4 first responders</li> </ul>	Understand the lived experience of communities exposed to extreme weather. Specifically: • Hornsby / Pennant Hills • Cessnock • Canterbury / Bankstown • Nelson Bay	<ul> <li>Residents rely heavily on electronic devices to receive updates from emergency services and where necessary request assistance.</li> <li>Prolonged power outages can increase the hardship experienced by the community by preventing access to basic amenities.</li> <li>Prolonged power outages can delay a community's recovery from a disruptive event by preventing residents from accessing social and online networks.</li> </ul>
Joint DNSP stakeholder engagement	8 Feb 2022	• 170 participants	To seek alignment across the industry on the definition of resilience, and the appropriate ways for DNSP's to develop	<ul> <li>DNSPs should support investment in locally relevant energy resilience solutions.</li> <li>Working in collaboration with communities and local institutions (e.g. councils) to strengthen networks would help build understanding of resilience, including the role of DNSPs, and empower greater customer choice to manage the impact of weather events.</li> </ul>



Engagement / Customer group	Date	Customer numbers	Purpose	Outcome (Resilience specific)
			resilience-based proposals.	• Engaging in partnerships with different specialty groups, such as emergency services or government resilience agencies would improve responsiveness to outages and enable more innovative resilience solutions for customers.
Joint DNSP engagement with local councils	16 Mar 2022	<ul> <li>47 council participants (representing 22 councils)</li> <li>3 regional organisations</li> </ul>	Understand the joint and distinct responsibilities of councils and DNSPs in supporting community resilience.	<ul> <li>There is a need for better clarity during emergencies around roles and responsibilities of emergency management stakeholders and the provision of accurate and consistent information to help communities and councils make decisions for safety and local continuity.</li> <li>Communities and councils are setting climate targets and plans for community transition that increases reliance on electricity networks and renewable energy sources, including changing use of technology for mobility.</li> <li>Increasing social isolation and declining neighbourhood connections make it harder for neighbours and communities to support each other during crises - supporting the development and maintenance of community networks, especially for vulnerable people, will enable better preparation and response for energy emergencies.</li> <li>Equitable access to electricity is key to communities being able to manage their local risks during shock events, and the lived experience of communities and councils can inform the design of local networks and emergency planning.</li> </ul>
Commercial and industrial customers	May 2021 – Jul 2022	<ul> <li>21 customers</li> </ul>	Understand consumer preferences and their lived experiences, in order to build a Draft Plan that reflects their long-term interests.	<ul> <li>Many of Ausgrid's Large connection customers, or commercial and industrial (C&amp;I) customers bear significant costs during power outages as backup power options can be prohibitively expensive or impractical.</li> <li>Others have both environmental and cost implications, particularly in relation to unplanned outages where the shutdown of machinery can't be managed in a controlled and efficient manner.</li> <li>Most commercial and industrial customers said Ausgrid should invest to improve resilience in impacted locations and share the cost - even if that meant customers (such as C&amp;I customers) who had already invested to improve their reliability paid twice, and the investment carried some risk of redundancy.</li> </ul>



Engagement / Customer group	Date	Customer numbers	Purpose	Outcome (Resilience specific)
Small business customers		<ul> <li>6 small businesses</li> <li>9 small business representative organisations</li> </ul>		<ul> <li>The impacts of planned and unplanned outages can be significant, particularly for people in vulnerable circumstances. The impacts can be financial, health, and safety related.</li> <li>Customers expect clear and prior information on planned outages, and</li> </ul>
Lived experience (vulnerable) customers		<ul> <li>10 customers</li> <li>26 small business representative organisations</li> </ul>		<ul> <li>responsive information on unplanned outages. This needs to be useful ar provide advice on what to do, and where to go.</li> <li>Customers expect practical and personalised responses to outages. This needs to be joined up across response organisations. Back-up generator and alternative power sources are often suggested.</li> <li>Reliability continues to be important, and customers are concerned about</li> </ul>
Culturally diverse customers		<ul> <li>18 customers from 3 language groups</li> </ul>		how this will be affected by the effects of extreme weather and the transition to renewables.
Life support customers		<ul> <li>3404 life support customers</li> </ul>		<ul> <li>Majority of the life support customers surveyed had done no preparation in case of an unplanned outage event such as a major storm or flood.</li> <li>Just under 3 in 10 customers mentioned being well-prepared for such events, with majority relying on back-up batteries for their CPAP machine, access to a generator or arrangements for alternate accommodation if required.</li> </ul>
Retailers		<ul> <li>24 retailer representative s</li> </ul>		• The focus should be on better and simpler support for customers impacted financially due to climate events. Particularly vulnerable customers going through hardship.
Voice of Community Panel (VOCP)	4 Jul 2022	• 45 panellists	Refine and test our understanding of consumer preferences and establish a 'whole of customer base' perspective, in order to	<ul> <li>One of the VOCP's key recommendations was to <i>Review minimum level of reliability of supply</i>:</li> <li>By delivering reliability to minimum standards, reliability for rural consumers is lower than the average experience of consumers.</li> </ul>



Engagement / Customer group	Date	Customer numbers	Purpose	Outcome (Resilience specific)
			build a Draft Plan that reflects customers long-term interests.	<ul> <li>Ausgrid should communicate (via retailers &amp; general public) the minimum reliability standards that Ausgrid is committed to, and that the difference between urban and rural consumers is almost double.</li> <li>Ausgrid should look at redistribution of support to network areas (urban vs rural) to build resilience and address service imbalance.</li> <li>Invest in network reliability in areas of highest risk of climate change e.g., an investment of \$40 million per annum long-lived capex (\$200m across 2024-29).</li> </ul>
VOCP		<ul> <li>15 panellists</li> </ul>	Understand the outcomes customers value most when considering resilience investments, in order	<ul> <li>Resilience investments should focus on supporting customers before during and after extreme weather events.</li> <li>Followed by equal weighting for reducing the impact of outages for most exposed and most customers generally.</li> <li>Investments should be targeted to people or areas with vulnerable and less able to cope customers.</li> <li>Followed by investments where extreme weather hits the most, and finally where the increase in extreme weather as a result of climate change is the greatest.</li> </ul>
Culturally diverse customers	Sep – Oct 2022	<ul> <li>12 customers across 3 language groups</li> </ul>		<ul> <li>The Arabic and Vietnamese groups prioritised pre-event investment with the idea that early investment saves money down the track.</li> <li>The Mandarin community prioritised build back better as a smart way to improve resilience.</li> </ul>
Commercial and industrial customers		6 customers	to retine the resilience investment proposal.	<ul> <li>Views varied with different levels of value placed on responding to events before, during and after they occur.</li> <li>C&amp;I customers are interested in working with Ausgrid to deliver back up sources of energy.</li> <li>Communication to all customers is key for resilience.</li> </ul>
Lived Experience Peak		• 11 organisations		<ul> <li>First priority is to reduce the number and length of outages to support those most affected.</li> <li>Secondly Ausgrid should invest to impact high numbers of customers.</li> <li>Finally improve support during and after an event.</li> </ul>



Engagement / Customer group	Date	Customer numbers	Purpose	Outcome (Resilience specific)
Representative Groups				<ul><li>Sometimes the length of an outage is more impactful than the number of outages.</li><li>Ausgrid should keep rural customers in mind.</li></ul>
Climate Change related Peak Representative groups		<ul> <li>22 organisations</li> </ul>		<ul> <li>First priority is to reduce the number and length of outages to support those most affected.</li> <li>Secondly Ausgrid should improve support during and after an event.</li> <li>Finally impact the highest number of customers.</li> <li>Also, Ausgrid should focus on resilience at key communications sites (such as at the tops of hills).</li> </ul>
Local Councils		• 19 Councils		<ul> <li>First priority is to reduce the number and length of outages to support those most affected.</li> <li>Secondly support during and after an event.</li> <li>Finally impact the highest number of customers.</li> <li>Lower the overall impact of the majority. Consider the impacts of rural communities – using vulnerability mapping.</li> </ul>
Town Hall (VOCP + representatives from other residential and small business engagement streams)	15 Oct 2022	• 20 customers	Test customers satisfaction with Ausgrid's proposed investments as set out in our Draft Plan for 2024-29, including estimated bill impacts of these investments.	<ul> <li>Resilience Investment proposal of \$204m (with an estimated \$5 bill impact by 2029), received 100% community support, the highest of any investment type set out in the Draft Plan.</li> </ul>
Be the Boss game	Sep – Oct 2022	<ul><li> 2507 players</li><li> 102 completed games</li></ul>		<ul> <li>97% of customers set the slider closer towards Ausgrid doing 'all you can' with 3% scaling towards 'do nothing'.</li> </ul>
Small business customers	Sep 2022	• 30 customers		Generally supportive of the mix of investments, prioritising resilience to prevent business disruption.



Engagement / Customer group	Date	Customer numbers	Purpose	Outcome (Resilience specific)
Submissions on Draft Plan	Sep 2022	• 34 submissions	Seek detailed written submission on all aspects of the Draft Plan for 2024-29.	<ul> <li>Strong support for Aerial Bundled Cable (ABC) co-funding program as a way of addressing climate challenges, in particular urban heat.</li> <li>It is recommended that climate impacts (observed and modelled) and protecting vulnerable communities should be considered together, rather than separately, in prioritising resilience projects and investments.</li> <li>Whenever possible, share the climate impact projections and information with the wider community and stakeholders; Transparently disclose when non-network solutions may be the lower whole-of-life cost solution and the best option to meet the long-term interest of consumers; further expand the conceptualisation of resilience and the Resilience Framework's approach through benchmarking; and contextualise communities' distinct resources and capabilities to cope with disruptive events and build community energy resilience, which will require prioritisation and tailored support from Ausgrid.</li> <li>The Resilience Framework will assist in decision making but it is heavily reliant on economic (cost-benefit) type analysis. There could be benefit in considering the investment in community support services for climate resilience which don't have clear tangible cost benefit but do support a longer-term and wide approach to building community resilience. For example, investment in joint resilience projects or climate/disaster education projects between Ausgrid and other community-based actors to reduce the impacts of disaster risks.</li> <li>Forward investment in building resilience into the network will help to reduce future impact, cost and recovery times of disaster events.</li> </ul>

This body of evidence provided the strong foundations that led us to engage with three Local Government Areas (**LGA**s) to develop bespoke solutions to the localised threat of climate change, as well as working with our broader VOC panel to develop solutions that address this risk growth network wide.

### **Evidence of Willingness to Pay**

In establishing a remit and social licence for this investment the AER's Guidance Note clearly states that a network must demonstrate that customers are willing to pay, specifically calling out willingness to pay for localised investments, which not all customers will benefit from.



The engagement approach utilised for both the local engagement and the broader VOC engagement is set out in an independent report written by BD Infrastructure – Resilience Mid-Term Report.

We have collected both quantitative and qualitative evidence from a range of customers and tested it over a period of time to ensure its reliability.

The below table sets out the quantitative feedback we have received from customers that address their willingness to pay for investments in climate resilience. It encompasses:

- Broad evidence of in-principal support for a level of spending, to demonstrate the reliability of our findings.
- Specific willingness to pay, framed in the current economic environment. This evidence has been sought from four specific cohorts of customers. These Subgroups are:
  - 1. Customers that will face bill increases, have no immediate climate resilience threat, and will not benefit from the proposed local investment.
  - 2. Customers that will face bill increases, and a climate resilience threat, and will not benefit from the proposed local investment.
  - 3. Customers that will face bill increases, and a climate resilience threat, and benefit directly from the proposed local investment, but were not part of solution development.
  - 4. Customers that will face bill increases, and a climate resilience threat, and benefit directly from the proposed local investment, and were directly part of solution development.

By structuring the willingness to pay evidence in this way Ausgrid can be confident that it represents the range of experiences across our network area, has been properly and robustly considered by customers and that the broader base of engagement findings adds to the reliability of the specific willingness to pay outcomes.

Figure 1.3 Quantitative evidence of willingness to pay over time

Customer cohort	Date	Customer numbers	Outcome
Be the Boss game	Sep – Oct 2022	2507 players	97% of customers set the slider closer towards Ausgrid doing 'all you can' with 3% scaling towards 'do nothing'.



Customer cohort	Date	Customer numbers	Outcome
		102 completed games	
Town Hall	15 Oct 2022	20 customers	100% community support for climate resilience investment of \$204m (with an estimated \$5 bill impact by 2029).
VOCP2023 (Hunter and Central Coast) Subgroups 1-3	1 Apr 2023	26 customers	84% <sup>41</sup> support for overall Regulatory Proposal - including \$202m climate resilience investment with a bill impact of \$6 in 2029.
VOCP2023 (Sydney) Subgroups 1-3	29 Apr 2023	60 customers	84% <sup>42</sup> support for overall Regulatory Proposal - including \$202m climate resilience investment with a bill impact of \$6 in 2029.
Local engagement in Central Coast, Port Stephens and Lake Macquarie: Subgroup 4	25 Feb – 28 Feb 2023	92 customers	<ul> <li>Support for a climate resilience investment capped at \$202m (with an estimated \$3 bill impact by 2029 – revised due to a change to accounting).</li> <li>Supporting of an indicative split of resilience investments: <ul> <li>Up to \$20m Port Stephens</li> <li>Up to \$40m Lake Macquarie</li> <li>Up to \$70m Central Coast and</li> <li>Up to \$72m Whole of Network solutions</li> </ul> </li> <li>All solutions proposed by the community required a minimum of 80% support to be included in their investment package.</li> </ul>
VOCP2023 (Hunter and	17 June 2023	17 customers	

 <sup>&</sup>lt;sup>41</sup> This 84% was comprised of 24% at 'Love it', 28% and 'Like it' and 32% at 'Live with it'.
 <sup>42</sup> This 84% was comprised of 5% at 'Love it', 32% 'Like it' and 47% 'Live with it'.



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Customer cohort	Date	Customer numbers	Outcome
Central Coast) Subgroups 1-3			There was strong support for investments in Climate Resilience. The detailed findings are set out in Figures 1.6 to 1.9 below. A few points of interest:
VOCP2023 (Sydney) Subgroups 1-3	24 June 2023	60 customers	• Customers with the strongest support (90% and above) came from a range of backgrounds, including many customers who face no specific climate threat themselves, and customers who face a climate threat but are not in the chosen LGA's.
Total Voice of Community Panel	Combined 17 Jun and 24 Jun 2023	77 customers (75 customers completed WTP questions)	<ul> <li>All customers who were not supportive come from the Sydney region, face high costs of living and no immediate climate threat. Interestingly this cohort of customers, while small, included customers that were supportive of the same level of investment in 2022, demonstrating the impact of the worsening economic climate on some individual's level of support. Some even noted that they wanted to support investment in climate resilience but now lacked the capacity pay.</li> </ul>
Customer cohort	Date	Customer numbers	Outcome
Be the Boss game	Sep 9/2022 – 10/– Oct 2022	2507 players 102 completed games	97% of customers set the slider closer towards Ausgrid doing 'all you can' with 3% scaling towards 'do nothing'.
Town Hall	15 Oct /10/2022	20 customers	100% community support for climate resilience investment of \$204m (with an estimated \$5 bill impact by 2029).
VOCP2023 (Hunter and Central	1/4/ Apr 2023	26 customers	84% <sup>43</sup> support for overall Regulatory Proposal - including \$202m climate resilience investment with a bill impact of \$6 in 2029.

<sup>43</sup> This 84% was comprised of



Customer cohort	Date	Customer numbers	Outcome
Coast):Subgroups 1-3			
VOCP2023 (Sydney) Subgroups 1-3	29 Apr /4/2023	60 customers	84% support for overall Regulatory Proposal - including \$202m climate resilience investment with a bill impact of \$6 in 2029.
Local engagement in Central Coast, Port Stephens and Lake Macquarie: Subgroup 4	25 Feb /2/2023 – 28/5/ Feb 2023	92 customers	<ul> <li>Support for a climate resilience investment capped at \$202m (with an estimated \$3 bill impact by 2029 – revised due to a change to accounting).</li> <li>Supporting of an indicative split of resilience investments: <ul> <li>Up to \$20m Port Stephens</li> <li>Up to \$40m Lake Macquarie</li> <li>Up to \$70m Central Coast and</li> <li>Up to \$72m Whole of Network solutions</li> </ul> </li> <li>All solutions proposed by the community required a minimum of 80% support to be included in their investment package.</li> </ul>
VOCP2023 (Hunter and Central Coast) Subgroups 1-3	17 June /6/2023	17 customers	
VOCP2023 (Sydney) Subgroups 1-3	24 June /6/2023	60 customers	<ul> <li>There was strong support for investments in Climate Resilience. The detailed findings are set out in Figures 1.6 to 1.9 below. A few points of interest:</li> <li>Customers with the strongest support (90% and above) came from a range of backgrounds,</li> </ul>
Total Voice of Community Panel	Combined 17 Jun /6/2023 and 24 Jun /6/2023	77 customers (75 customers completed WTP questions)	including many customers who face no specific climate threat themselves, and customers wh



Customer cohort	Date	Customer numbers	Outcome
			face a climate threat but are not in the chosen LGA's.
			Where did the greatest support come from?
			<ul> <li>Customers that benefit</li> <li>No climate risk</li> <li>Climate risk but don't benefit</li> </ul>
			<ul> <li>All customers who were not supportive come from the Sydney region, face high costs of living and no immediate climate threat. Interestingly this cohort of customers, while small, included customers that were supportive of the same level of investment in 2022, demonstrating the impact of the worsening economic climate on some individual's level of support decisions. Some even noted that they wanted to support investment including climate resilience but now lacked the capacity to pay.</li> </ul>

This customer engagement has been supplemented with extensive engagement on the subject of resilience with our Reset Customer Panel (RCP) who have worked with us over 100's of meetings to develop a climate resilience proposal that is in the best interests of customers, as well as providing oversight and challenge on the methodology used and the delivery of engagement. The RCP has been central to the development of the Resilience Framework and its implementation plan, as well as ensuring the engagement was held accountable to these standards.



### Voice of Community Panel 2023



75 customers, recruited from across the Ausgrid region (with recruitment conducted across all 33 Local Government Areas (**LGA**), and panellist selection ensuring representation from the majority of LGA's) provided their willingness to pay. The mix of customers' lived experience across the Subgroups was:

1. 56 - Customers that will face bill increases, have no immediate climate resilience threat, and will not benefit from the proposed local investment.

2. 13 - Customers that will face bill increases, and a climate resilience threat, and will not benefit from the proposed local investment.

3. 6 - Customers that will face bill increases, and a climate resilience threat, and benefit directly from the proposed local investment, but were not part of solution development.

Figure 1.4 The range of customer lived experience and predicted climate risk exposure.

These customers acted as an evaluation panel, considering both quantitative and qualitative inputs as well as their own lived experience. They were asked to answer a range of questions to determine both the level of willingness to pay and the split / differences across the specific regions and Whole of Network spend, as well as providing detailed qualitative evidence to support their answers. While presented statistically we would caution against using this data in a deterministic way, it is best viewed alongside the qualitative data, as an in-depth view of the verbatim comments shows some anomalies, for example some low scores are accompanied by comments requesting greater spend etc, and due to the nature of the deliberative process, small anomalies can have significant impacts on the statistical outcomes.



### **Central Coast**

Customers were asked "How much of the proposed bill increase of \$3.30 over the 5-year period (2024-29) for resilience spend in CENTRAL COAST are you willing for all customers to pay?" the below figure sets out their responses.

### Figure 1.5 Willingness to pay - Central Coast

Averages – Central Coast		
Mean	73%	
Median	95%	
Mode	100%	





Lake Macquarie

Customers were asked "How much of the proposed bill increase of \$2.07 over the 5-year period (2024-29) for resilience spend in LAKE MACQUARIE are you willing for all customers to pay?" the below figure sets out their responses.

Figure 1.6 Willingness to pay – Lake Macquarie

Averages – Lake Macquarie		
Mean	70%	
Median	90%	
Mode	100%	



### **Port Stephens**

Customers were asked "How much of the proposed bill increase of \$1.05 over the 5-year period (2024-29) for resilience spend in PORT STEPHENS are you willing for all customers to pay?" the below figure sets out their responses.

Figure 1.7 Willingness to pay - Port Stephens

Averages – Port Stephens		
Mean	73%	
Median	100%	
Mode	100%	

Customers' willingness to pay - Port Stephens 100% ≧ 75-99% Willingness to 50-74% 1-49% 0% 0 5 10 15 20 25 30 35 40 Number of customers

### Whole of Network

Customers were asked "How much of the proposed bill increase of \$3.54 over the 5-year period (2024-29) for resilience spend in WHOLE OF NETWORK are you willing for all customers to pay?" the below figure sets out their responses.

Figure 1.8 Willingness to pay – Whole of Network

Averages – Whole of Network		
Mean	83%	
Median	100%	
Mode	100%	

### **Customer reasoning and verbatims**





Much can be learnt about customers willingness to pay and the value they do or don't see in investments through the verbatim comments provided. After completing each willingness to pay question customers were asked "What are your reasons for this spend including how you felt about the benefits compared to the costs? The full set of comments can be seen in the Resilience Mid-Term Report, below is a summary of key themes.

Theme	Proportion of customers expressed this view <sup>44</sup>	Typical scores – what willingness to pay was typical for customers with this view	Customer verbatims
Ausgrid should invest in resilience to improve equality or equity – a desire to do what is 'fair' and address system inequity.	30%	Predominantly 100%	<ul> <li>Vulnerable communities require more support to be equitable.</li> <li>The geography of Lake Macquarie puts it at higher risk of a growing impact from climate events. The population is aging, so spend is likely to support those who are significantly impacted by power outages.</li> <li>Their current situation is untenable by Sydney wait time standards. Equity of access to energy is a right we all deserve.</li> <li>There is good evidence that extreme-weather-related outages are only increasing. I am of the opinion that budgets (be it household, Ausgrid or government) cannot ignore long-term costs; setting aside more/investing now allows for overall costs in the long-term to be lower and more predictable. I believe that welfare programs and taxbased solutions (a cost which varies based on income so a higher burden is carried by those better able to pay) should be used to help those who are struggling to pay their (increased) electricity bills. Ausgrid doesn't have the option to distribute cost based on location or income; I don't believe that should prevent (what I view as necessary) expenditure from occurring. The electricity network is a common good.</li> </ul>
Investment in resilience is time critical – more	10%	100%	• The proposed measures are relatively low-cost initiatives that provide value for money. The costs will be forced on us via repairs if we are not proactive.



<sup>&</sup>lt;sup>44</sup> Many customers express a number of views aligned to several different themes, this proportionality column is to provide a rough indication of how many customers primary reasoning aligned to this key theme.

Theme	Proportion of customers expressed this view <sup>44</sup>	Typical scores – what willingness to pay was typical for customers with this view	Customer verbatims
should be done sooner to offset longer term costs and impacts			• As we face increasing damages from extreme weather events, it's imperative that we prepare for and build resilience to keep our electricity supply reliable. The money spent will be readily recouped from reduced damages to the network, as well as reduced risk to the health and well-being of all our residents. It is highly likely, in fact realistically totally unavoidable, that the cost for building resilience will grow and change rapidly in the next few years. Ausgrid needs to have the flexibility and the will to confront these challenges and get whatever funding is required to adapt to the changes we face.
Ausgrid should prioritise network solutions when investing in resilience.	10%	Ranging between 50-95%	<ul> <li>I'm in strong support of the network solutions, I feel that the planning, information and support solutions need a more robust cost/benefit analysis.</li> <li>Reducing outage time and frequency is a priority as well as protection from local weather impacts is good use of budget, however I question the benefit of Ausgrid Liaison Person in addition to other proposed items.</li> </ul>
Customers' ability to pay is an important consideration – the impact of cost-of- living pressures, rising inflation etc.	10%	50% or below	<ul> <li>Taking into consideration the current cost of living, inflation and everything going up affordability is becoming more challenging for each and every household. This is a country/government issue and should not land on everyday consumers in addition to the taxes we already pay all round.</li> <li>Torn here. Part of me wants to vote 100%. The best-case scenario is not a reduction of outage downtime but keeping the status quo against possible future events which may or may not happen. In case of a major disaster Ausgrid will still need to fix the network anyway. Also, we are all facing a 25% increase in a couple of weeks which is hard to fathom.</li> </ul>



Theme	Proportion of customers expressed this view <sup>44</sup>	Typical scores – what willingness to pay was typical for customers with this view	Customer verbatims
Customers see value in resilience investments that outweigh the bill impacts.	25%	Ranging between 0-100%	<ul> <li>The resiliency measures have good benefits that will be enduring, the spend is equally shared amongst those who pay for it.</li> <li>Resilience issues are preventative and over time I am sure benefits will outweigh the costs.</li> <li>I believe that these programs have to be done sooner or later, and there is no better testing ground for them than areas that are most affected by potential climate events. If the solutions can work in the most extreme circumstances, surely it would be easier to adopt them to other LGAs.</li> </ul>
Ausgrid should work in partnership and consider who's responsible – views on the appropriate owner, which in many cases came down to a dislike of postage stamp pricing	20%	Primarily 0-60%	<ul> <li>It appears that these three LGAs will require sustained and ongoing resiliency investment over and above all other LGAs, not just for this regulatory period. It's not fair that other LGAs have to foot the bill for this. I am willing to make a partial contribution as I do take holidays there occasionally. Lake Macquarie residents should have to pay an additional levy.</li> <li>Any long-term investments would still require feasibility studies and collaboration across multiple agencies.</li> <li>Those living in the affected areas should own up to their decision of living in the specific location. If help is required, the local government or councils should be the ones who should fund and help to benefit the situation.</li> </ul>

### Testing customer comfort levels



We acknowledge that the current economic environment not only plays a part in customer decision making but creates an environment of uncertainty. We therefore wanted to test customers levels of comfort to understand how future economic changes might impact customers views. While the engagement tested the packages set out in the business case, we also wanted to understand to what extent customers would have wanted Ausgrid to do more.

Customers were asked "How comfortable are you with the group's overall spend?" the results and a selection of customer quotes are shown below. Note: the group's overall spend was an average of the groups scores and therefore varied between Newcastle and Sydney based groups.

Level of comfort	Loathe it - very uncomfortable	Lament it - uncomfortable	Live with it - neutral	Like it	Love it – very comfortable and could have spent more
Customer numbers	5	10	13	16	30
Customer reasoning	Due to current cost of living and inflation I do not agree where the overall landed. Human dignity equals human rights e.g. how would you feel if you had no power for eleven days? Empathy!	Ausgrid should re look at their current capex / opex spend and redirect some towards these areas instead if seeking approval for more. This spend is on top of the already increased bill. It may be a small amount but it will affect people a lot more than others.	Our group appear to have come to less than 100% agreement reducing the total spend that was initially requested. Whole of network spend is clearly the area all could agree on and see value in. Bundle some of LGA spend and save money. Cost of living - crystal ball would be nice.	I believe it strikes an equitable balance and is not expensive. I think it is fairly reasonable. The points put forward about tweaking the money spent on things like blackout measures was a good one. However I do not think we should be cutting funding any further.	It is a relatively small cost for resilience support for across the regional network we are all part of wherever we live. I am surprised to be at this level of comfort - but I believe that my concerns have been addressed and that the overall spend presents an overwhelming benefit to the community. I see the pilots in these LGAs as pilots an opportunity for testing. We will have to pay for climate change eventually so I see getting this right early as an investment in our future and the generations to come.

Local community feedback



As the local communities debated the best solutions to meet their desired outcomes they provided insightful commentary as to why particular solutions should be prioritised, or not, as part of their packages.

Theme	Verbatims from Central Coast (CC), Lake Macquarie (LM) and Port Stephens (PS) on solutions included in their final packages
There is benefit in having a mix of network and non-network solutions, and preparation for and support during and event.	<ul> <li>Strongly based on preparation for an event. And education that is 'what to do', before and during. CC customer</li> <li>Good combination and addresses both education, but the liaison officer can help with follow through plan. CC customer</li> <li>Community awareness. More informed customers the better. More knowledgeable people to help vulnerable customers. PS customer</li> </ul>
Local communities that have a lived experience of extreme weather place a high value on non- network solutions.	<ul> <li>Increase the proposed budget. I think the cost of community resilience plan and number of liaison officers has been underestimated. CC customer</li> <li>Cross organisation liaison would have better community benefits at low cost. LM customer</li> <li>It has impact before + during. Less expensive. More diversifiable. LM customer</li> <li>Community relies on connection. The more connections available gives greater coverage, more cost-effective provision of services and a capacity to provide ongoing support where needed.PS customer</li> </ul>
There should be some network solutions that target vulnerable and worst served customers.	<ul> <li>Upgrades and prevention in rural areas could have a bigger impact in crisis prevention and give make vulnerable communities safer in events. CC customer</li> <li>Targets more remote areas, supporting more isolated consumers. CC customer</li> <li>It's good to strengthen + make more resilient. I don't mind the extra cost on bills compared to cheaper options because I would rather pay for a stronger network + not continually forever making cheaper options. LM customer</li> <li>Like that it affects more people for less. Feel like it's a solution for the people who don't get the worst outages. Not as helpful. LM customer</li> </ul>
Customers expect Ausgrid to continually be looking for efficiencies and	<ul> <li>Good bang for buck. Benefits to high-risk customers and therefore levels the playing field across the whole area. LM Customer</li> <li>Benefits lot of customers. Preventative measure. Helps to limit outages. CC customer</li> <li>While I want to protect highly vegetated area, the cost stated is too high for the number of customers. Maybe with a reduction in cost I could probably go with this outcome. CC customer</li> </ul>



### **Commercial and Industrial customers**

Many of our commercial and industrial customers operate in the areas where we are looking to make resilience investments, we were keen to understand from these customers:

- What impact this investment would have on their businesses and business decision making (the consequences of increased prices)
- How we could work together in the local communities to better deliver resilience outcomes

Customer cohort	Date	Customer numbers	Outcome
Commercial and industrial customers	28 May - 5 Jul 2023	13 interviews with 10 customers including major supermarkets, retailers, fuel service companies, government departments.	<ul> <li>Commercial and industrial customers consistently see resilience as a valuable and necessary investment by Ausgrid and are overall very supportive of measured, pilot approach in the next regulatory period.</li> <li>However, many indicated it was hard to make a judgement on whether the investment was the right amount, indicating they might suggest less or more with more detailed consideration.</li> <li>Two businesses (large grocery chain and national fuel company) participated in follow-up interviews where Ausgrid presented bill impacts modelled on their data. In both cases, they indicated that it was a small increase, and they felt the benefits outweighed the costs. Both indicated this would provide a meaningful price signal to help them justify investment in cost recovery such as energy efficiency or renewable energy.</li> <li>Commercial businesses in particular commented on the broader context of increasing costs, both from an energy perspective and other costs like products and services. In general, this was an accepted reality and the resilience spend was seen as relatively insignificant in the scheme of things.</li> <li>Government department representatives weren't able to express a view on willingness to pay or make statements on behalf of their organisations however indicated they were pleased to see this work being done and keen to communicate this to their executives and internally.</li> <li>Most customers indicated they had fairly limited resilience planning in place, in general pointing to mitigation activities like solar panels and energy efficiency as the extent of their progress on climate change. Customers showed a high level of interest in Ausgrid's climate impact modelling, and many were motivated to explore with us in more detail (see Appendix B).</li> </ul>



# Glossary

- 2024-29 period Ausgrid's next regulatory control period from 1 July 2024 to 30 June 2029
- **ABC** Aerial Bundled Cable
- AER Australian Energy Regulator
- AIIMS Australian Interagency Incident Management System (AIIMS)
- BAU Business-As-Usual
- **BRH** Better Resets Handbook
- BCR Benefit Cost Ratio
- Capex Capital expenditure
- **CBA** Cost Benefit Analysis
- CCC Ausgrid's Customer Consultative Committee
- **CCT** Covered Conductor Thick
- CER Customer Energy Resources
- CESS Capital Expenditure Sharing Scheme
- Climate Resilience Framework (the Framework) Ausgrid's co-designed climate resilience framework called Promoting the long-term interests of consumers in a changing climate: A decision-making framework
- CMI Customer Minutes Interrupted

**Communities** – Our residential and business customers and the people and institutions who support them engage with the energy market, such as our partners (including retailers, councils, metering providers, ASP's and aggregators) and other stakeholders (including customer advocates and government agencies)

- CSIS Customer Service Incentive Scheme
- DER Distributed Energy Resources includes network assets like community batteries and SAPS and customer energy
  assets like rooftop solar, household batteries, EVs and flexible customer load such as swimming pool pumps, and electric
  hot water systems
- DNSP Distribution Network Service Provider
- Draft Plan This document
- ENA Energy Networks Australia
- EPSDD Environment, Planning and Sustainable Development Directorate
- **ERP** Enterprise Resource Planning
- ESS Energy Savings Scheme
- EUSFAC Energy & Utilities Services Functional Area Coordinator
- EUE Expected Unserved Energy
- Ex-ante funding requested by NSPs in revenue proposals based on forecasts of likely costs in the upcoming five year regulatory control period
- Ex-post funding applied for after a revenue determination for the recovery of actual costs incurred after extreme weatherrelated events the cost pass through mechanism
- FY Financial Year
- GHG Greenhouse Gas
- IPCC Intergovernmental Panel on Climate Change
- LGA Local Government Area
- LOI Letter Of Intent
- MED Major Event Days
- NEL National Electricity Law
- **NEM** National Electricity Market
- NEO National Electricity Objective
- NER National Electricity Rules
- NIAC Network Investment Advisory Committee
- NPV Net Present Value
- NUOS Network Use Of System
- **Opex** Operating expenditure
- PDRS Peak Demand Reduction Scheme
- **PIR** Post Implementation Review
- **RAB** Regulated Asset Base

- RCP Reset Customer Panel
- **RCP** Representative Concentration Pathway
- Repex Replacement expenditure
- Repex model AER's repex evaluation model
- **REZ** Renewable Energy Zone
- RFS Rural Fire Service
- SAIDI System Average Interruption Duration Index
- SAPS Stand-Alone Power System
- SCC State Control Centre
- SCS Standard Control Service
- SES State Emergency Service
- SEOC State Emergency Operations Centre
- SOCI Security of Critical Infrastructure
- STPIS Service Target Performance Incentive Scheme
- TELFAC Telecommunications Functional Area Coordinator
- Totex Total expenditure
- TSEMG Tasmanian Security and Emergency Management Group
- VCR Value of Customer Reliability
- VOCP Voice of Community Panel comprises the 45 randomly selected members of the public who represent our diverse range of residential customers in our extensive citizens jury process
- Voice of Community program Ausgrid's Voice of Community program is an initiative that focuses on improved reporting and supporting better customer outcomes
- WACC Weighted Average Cost of Capital
- WALDO Wide Area Long Duration Outage
- WARL Weighted Average Remaining Life
- WON Whole of Network, referring to solutions that apply beyond locally geographically constrained locations
- WTP Willingness to pay, a customers expressed satisfaction at the cost or bill impacts of an investment