Resilience Investments

Climate Resilience Methodology

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Endeavour Energy

POWER together

Contents

Endorsement and Approval

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Version History

Version	Edited By	Changes
0.1	Samuel Morris	Document Creation
1.0	Samuel Morris	Updated to reflect customer engagement feedback

1.Introduction

1.1. Purpose

The purpose of this method is to provide context and a framework for the activities required to ensure Endeavour meet the third of three Resilience Strategy Goals defined in the Resilience Plan, specifically Resilience Goal 3, which is to:

> Incorporate the concept of climate change resilience into investment planning

To achieve this goal, the process outlined in Figure 1, and further detailed in the following sections of this document, will be implemented.

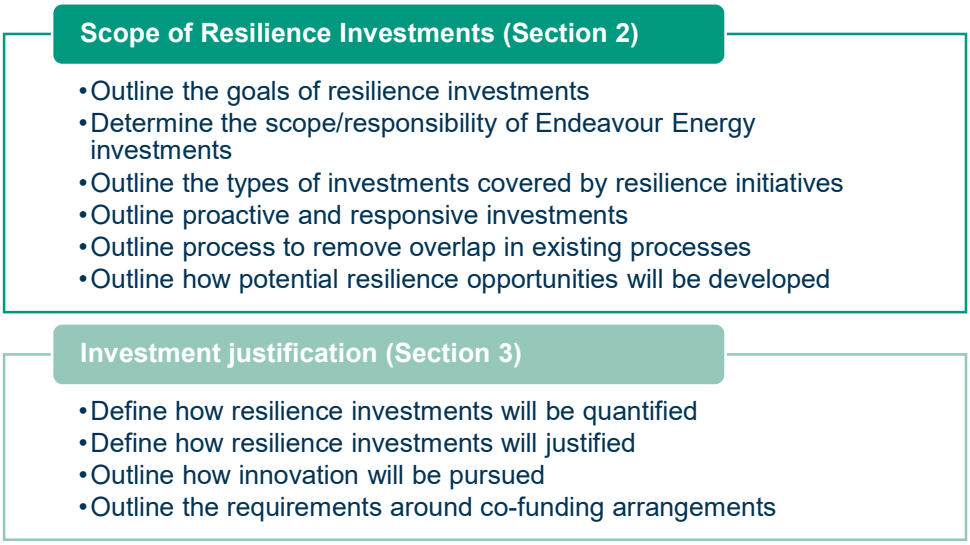

Figure 1 Resilience Treatment Planning

2. Scope of Resilience Investments

2.1. Goal of resilience investments

Investments specifically targeted for resilience deliver value for customers by providing additional support during and after a climate event. For Endeavour Energy, resilience investments have two outcomes:

- Increased network resilience to major climate events, resulting in less number and/or duration of outages experienced from customers; and,
- The ability for a community to withstand a loss of supply event.

2.1.1. Scope of Endeavour Energy Investment

A measure of a community's resilience is a function of access to a wide range of resources, leadership and knowledge. This includes, but not limited to access to the supply of electricity. Endeavour Energy's function is deliver an electrical network that meets customers needs. The provision and supply of resources and services that are outside of this scope, are not the responsibility for Endeavour Energy to provide.

As such, investments within the community resilience space are exploring ways in which Endeavour Energy can provide the electrical needs a community needs during a loss of supply event.

Access to social services, health and wellbeing, crisis support and emergency services is a function of other services. However, there are still opportunities where Endeavour Energy can support and/or collaborate with other parties who are ultimately responsible to ensure the best outcomes for the community (see Customer Method under Partnerships), however the ownership of the risks, and therefore the investments to mitigate those risks, sits outside Endeavour Energy.

2.2. Types of Resilience Investments

Investments to improve the resilience of both the electrical network and the community can be categorised as outlined in the table below.

Table 1

Category	Type of Investment	Impact on Resilience	How this will be achieved
Traditional funding arrangements	**REPEX**	Assets which fail may have increased consequences	Escalation factors, copperleaf
	AUGEX	Modification to existing assets to avoid/reduce the exposure to climate impacts	Exposure maps, planning procedures
	OPEX	Post-Event reviews to improve/adopt our response to climate events	Post-Event review processes
	CAPEX/Innovation	Introduction of new assets to reduce vulnerability to climate events. This would involve partnering with established and emerging companies.	Market testing, market engagement, benchmarking exercises, RFQs.
Non-Traditional	**Customer-focused Innovation**	Development of customer-focused innovative solutions, leveraging future network solutions.	LGA Engagement, Future Network Engagement/Development

Category	Type of Investment	Impact on Resilience	How this will be achieved
funding arrangements	**Co-Funding**	Exploring co-funding arrangements where the investment benefits both entities, which may not be cost justified by one single entity.	Proactive engagement with other utilities and private industry.

2.2.1. Proactive vs Responsive Investments

To be able to deliver a fully resilient network would come at the cost of unfavourably high cost-to-serve for our customers. Underground cabling, for example, provides protection against climate events, however still requires above-ground assets to function, and thus is not fully resilient, but most importantly, in some areas are practically unfeasible due to the exorbitant cost it would be to install (for example in areas of mainly rock embedment).

A balance between proactive investment and responsive investment, allows Endeavour Energy to provide a network that offsets risk with cost. Proactive investment allows Endeavour Energy, and our customers, to avoid long duration outages which puts strain and stress and inherent safety implications on the people, community and support service's, effected by large-scale climate events. Responsive investments (post-event), allows us to serve when and where the community require that investment. As such, a balance between these two types of investments is required.

The chosen level of investment will be informed by the following aspects:

1. Customer's preferences;
2. Customer's willingness to pay;
3. The timing and risk associated with the climate event;
4. The risk associated with the 'do-nothing' option.

2.2.2. Overlapping investments

Due to the nature of investments in the resilience space, there can be the possibility of overlap between existing REPEX and AUGEX investments. To remove this overlap, it is necessary that any interventions proposed for resilience are checked against existing project scopes. This will be achieved through project review briefings between workgroups developing CFIs.

2.2.3. Generation of potential investments

The process of identifying treatment options for climate risks is described in Section 6 of the Climate Method and summarised again here.

Risk treatment options can be categorised into two categories:

- Pre-event investment (network augmentation or network hardening); and/or,
- Post-event investment (customer support, operational responses).

Risk treatment options for can be determined several ways, some of which are highlighted in the figure below.

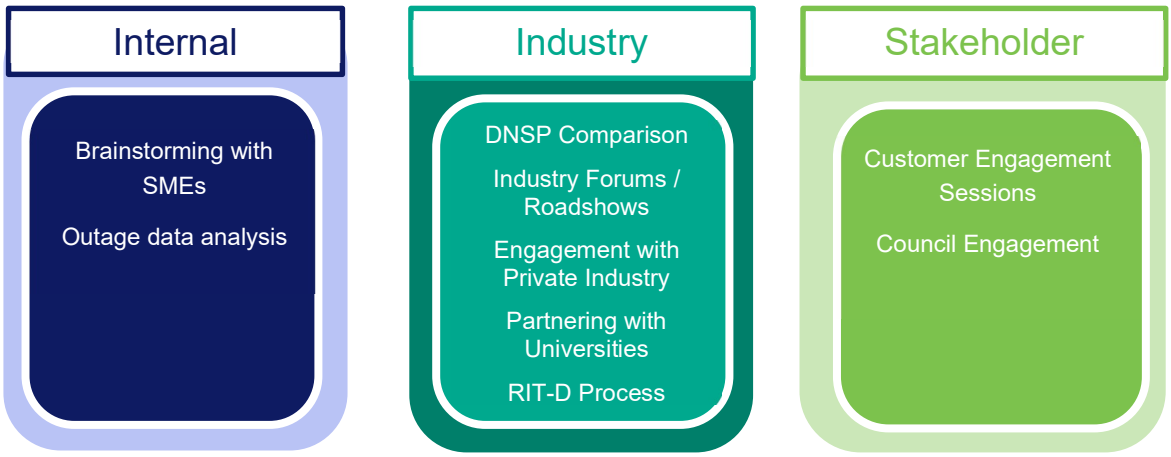

Figure 2 - Climate Risk Treatment Option Development

With each generated treatment option, to ensure Endeavour Energy is delivering a safe, reliable, and cost-effective solutions, each idea is tested for:

- Technical and economic feasibility;
- The effectiveness of the solution and residual risk, and whether this risk level is tolerable;
- Assessing whether other solutions are more effective and can be implemented in time to meet the need.

These investments follow the process outlined in our Customer Value Framework and results in CFIs to then optimised along with other network investments.

3. Resilience Investment Justification

3.1. Quantifying Resilience

To justify expenditure and also measure the effectiveness of various investments, resilience will be measured the following ways:

1. **Electrical Network Resilience** – This will be measured by the changes to outage duration for similar events over an extended period, to avoid natural fluctuations. These will be measured as average number of minutes off per customer (unnormalised SAIDI).
2. **Community Resilience to a loss of supply event** – the measure of resilience for community type investments does not have a quantified metric. Endeavour Energy seeks to see how it can help communities withstand but also recover quicker after major events. The measure and performance of this will be heavily measured by customer engagement.

3.2. Justification of resilience investments

All investments will be assessed and justified using Endeavour Energy's Customer Value Framework. The framework outlines how an asset's risk is evaluated against intervention measures. Ultimately, resilience investments are assessed like other investments - considering risks and opportunity benefits.

The approach to justifying resilience investments varies depending on the failure type that is being assessed. As outlined in Figure 6 below, for unassisted failures, Endeavour Energy utilises the Copperleaf system to model age-based failures and consequences of failures. Consequence of failures will need will be modified based on climate modelling. However, this system does not allow for integration of exposure likelihood and asset vulnerability, as such Endeavour Energy commissioned the production of an economic model to assess this risk.

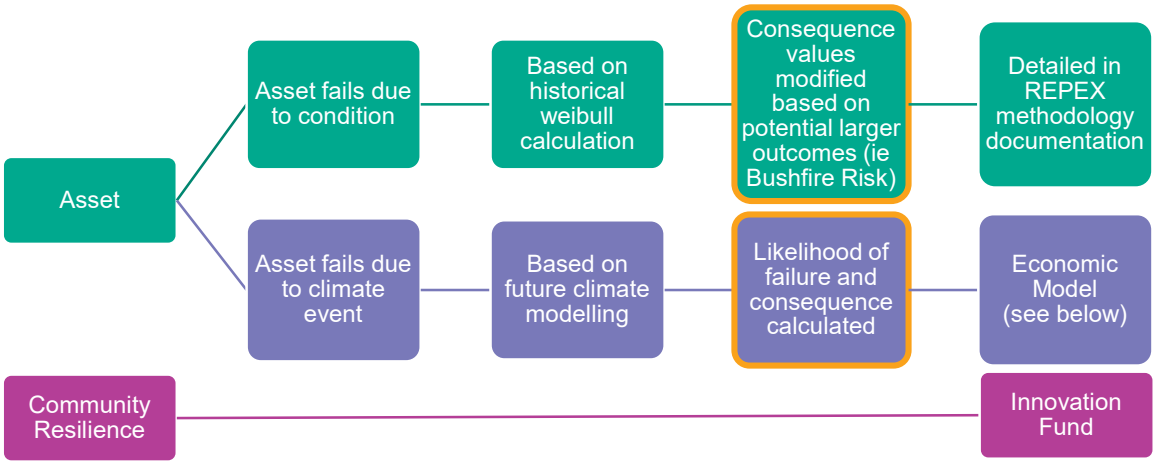

Figure 3 – Justification approaches

3.3. Innovation Funding

An Innovation Fund has been created and submitted as part of the FY25-29 Endeavour Energy Regulatory Submission and the justification and governance framework is detailed in *'Innovation Investment Framework (November 2022)'*.

The innovation fund will be a pool of funds dedicated to exploring new and emerging technologies to explore both new and potentially more efficient ways of delivery energy to customers. Within the resilience context, investments to deliver improved community resilience outcomes, such as community hubs, will be explored.

Innovation which falls into general exploration of new and novel asset management developments, will be covered under existing funding schemes.

3.4. Non-Traditional Co-Funding Arrangements

Traditionally, Endeavour Energy funds any investment into its network through the regulated funds, approved by the AER. In the interest of developing the best outcome for customers, Endeavour Energy is seeking to explore non-traditional co-funding arrangement with external companies and utilities, where there may be mutual benefit from the investment.

For Endeavour Energy to explore partnerships with external companies, the following must be met as a minimum:

1. The investment must be beneficial to the community;
2. For investment by Endeavour Energy to occur, Endeavour Energy must benefit from the investment;
3. The company with which we partner must be aligned in our core values in regards to ethical treatment of workers, safety and sustainability;

For the investment/funding to be approved, it must include, but not limited to:

1. Have a contract established, outlining deliverables from Endeavour Energy and level of investment;
2. Have a case for investment approved, following current processes, including a sensitivity analysis;
3. Any modifications/changes to the network, remain under the ownership and care of Endeavour Energy.

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Annexure A – Investment Opportunities

The following section details the possible investment opportunities (2022). Each one of these opportunities will be assessed based on its economic feasibility and the benefit to improve resilience.

The following table summarises the potential investment opportunities to improve our Electrical Network Resilience. The prioritisation of these projects has been assessed for their potential contribution to improving network resilience and ease of implementation.

Table 2 - Improvements to Electrical Network Resilience

Goal	Investment Projects	Further Explanation
	1. Increase rollout of automated switches	Endeavour Energy has over 2000 locations where it is economically beneficial to replace an existing switch with an automatic switching device. This, when paired with FLISR, allows for automatic switching and a reduction in the duration of outages experienced by customers.
	2. Investment in smart technology to create a self healing network	Continuing the rollout of FLISR, based on areas best benefited for self healing networks.
	3. Fortnightly Reliability Incident Reviews	A scheduled fortnightly meeting to discuss reliability incidents in the last fortnight, and what happened, and how we can reduce the outage duration. This will have a flow on effect in our ability to get customers re-energised quicker by learning off past incidents and identifying future preventable outages.
	4. Microgrids and SAPS	A technical review into the feasibility in pursuing additional microgrids, batteries and SAPS within Endeavour Energy's network.
	1. Utilise climate modelling to identify investments with positive Benefit to Cost Ratios	Once the financial model has been finalised by the contractor, we will be able to use replacement costs, and the risk cost to determine where replacement of assets are cost justified. Projects such as raising spans over waterways, replacement of bare conductors to covered conductors.
	2. Utilise local knowledge of troublesome areas (field staff / customers)	By running information gathering sessions with field staff, and giving staff the avenue to propose potential troublesome areas, will allow the harnessing of 'hidden' knowledge.
	3. Post Event reviews ('21 and '22 floods, 2019/20 Bushfires, Storm Response)	Undertaking large scale post-incident review, will allow Endeavour Energy to capitalise on learnings from previous events. focusing on learnings and process improvement. Explore feasibility of move/modify assets to reduce their exposure in the future (eg Padmounts to flooding)
	4. Scenario planning	Performing "What if" scenario workshops, in the event that an asset was unexpectly impacted. For example, if within the flood, we lost a zone substation – do we have a contingency plan?

Goal	Investment Projects	Further Explanation
	5. Network Outages and Impacts on reliant industries (Telecommunications, water, transport)	Through the use of case studies, develop an understand and financial model to determine the financial impact of a loss of supply on other industries. This is to aide in co-funding investment in the future.
	1. Desktop review into frequent outages	A desktop review into areas/feeders/assets which routinely get impacted by climate events. This will feed into the pursuit of more reliable technologies Endeavour Energy can utilise.
	2. Increase the rollout of EFD sensors	After a successful trial, we have plans to roll this out to 34 additional sites.
	3. Asset Management Industry comparison into resilience technologies	Performing an industry survey to identify other successful DNSP solutions addressing network resilience.
	1. Utilising climate modelling outputs within the 3D model	Inputting the climate modelling results into the 3D model to understand where potential network risks are. For example, if the wind speed is predicted to increase and/or temperature – will this cause more low main defects. In addition to see clearance to potential flood water levels.

Improving Community Resilience

Table 3 - Projects to improve the community's resilience

Goal	Investment Projects	Further Explanation
1. Improving Local Response	**1. Local Emergency Management Plan Review**	Partner with the local government agencies and determine whether each LGA has: • A local emergency plan • Whether the loss of supply has been adequately addressed • Whether each council points to Endeavour Energy in their resources (website/posters/flyers) in case of an outage • A critical resident register and checking whether life support customers have back up supply.
	2. Developing local resilient hubs	In collaboration with the local councils, identify locations where, in the occurrence of a climate event, where residents can go for shelter, telecommunication services, sustenance etc.
2. Education and Information	**3. Review in Endeavour Energy communication protocols and resources during an emergency**	Endeavour Energy's communication during an event has been regarded as excellent. Are there any further things we can do to assist in information knowledge.

Goal	Investment Projects	Further Explanation
	4. Development of education programs around preparation of these climate events	Events are going to happen – ensuring that residents are prepared in the event of a loss of supply events.
3. Other	**5. Partnering with councils to reduce vegetation trimming, but also increase urban cooling.**	Explore the possibility of introducing a tree planting/relocation program as to move vegetation away from powerlines.

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