Essential Energy

10.06.01 Resilience Risk Based Pole Replacement Investment Case

November 2022

Network Resilience Project

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Approvals

	Name	Division	Title & Function	Date
1.	[redacted]	Asset & Operations	Network Regulatory Proposal Lead	20/1/23

Revisions

Issue Number	Section	Details of Changes in this Revision
1.	N.A	Initial Issue
2.		
3.		
4.		
5.		

Table of Contents

1. Executive Summary

Business Case	10.06.01 Resilience Risk Based Pole Replacement Investment Case
Description	Essential Energy is introducing a risk-based pole replacement program to replace high risk assets that will be more prone to future failures due to climate change. To improve resilience and strengthen the network the business is proposing to replace 11,000 poles over the 2024-2029 regulatory period.
Drivers for Program	During the 2019/20 bushfires Essential Energy's network experienced widespread damage including the functional failure of approximately 2,600 poles. Whilst this particular year was much larger than any previously experienced natural event it was not an isolated event with bushfires destroying 95 poles per annum on average (exclusive of 2019/20). Essential Energy has investigated the use of composite poles and their resilience to not only bushfires but other failure modes. We have identified locations where the cost risk value for assets identifies that forward replacement with a composite pole will have a positive Net Present Value (NPV). Through climate change modelling it has been established that for parts of our network the exposure to bushfires (and other perils) will increase over time.
Risk & Value Benefits	Despite the higher upfront material cost for composite, its life expectancy, installation efficiencies, maintainance and risk reductions have shown composite to have lower life cycle costs than timber. By proactively increasing the transition from a timber based population to composite materials the overhead network will become more resillient to bushfire damage and improve recovery timeframes during natural disasters. The total net present value of this program is $67.4M predominately driven by network reliability benefit.
Options	1. Replace existing high risk timber poles with composite poles 2. Stand Alone Power Systems 3. Undergrounding 4. Replace like for like with other materials Recommend Option 1 at cost of [redacted] with NPV of $67.4M
Estimated expenditure FY$24	**2024/25**: [redacted] **2025/26**: [redacted] **2026/27**: [redacted] **2027/28**: [redacted] **2028/29**: [redacted]

All values are in full year 2023-24 real dollar terms

2. Background

Essential Energy has 1.34 million poles on the network. The total population has an average age of 37.2 years, with 25% of the population made up of untreated timber poles at an average age of 58 years.

Timber CCA poles are currently the primary distribution pole type with composite (woven fibreglass) poles as an alternate option. Timber poles are not bushfire resistant and can be subject to termite and fungal decay. Previous alternate pole materials such as concrete and steel are affected by corrosion, have additional earthing requirements as they are conductive materials and cost around 2.5 times equivalent timber poles for a similar asset life.

Based on excellent performance shown by fire exposed composite poles in the 2019/20 fires when 2,600 timber poles were destroyed (functional and conditional), Essential Energy has since increased the use of composite poles in high risk/value locations. Composite poles also currently cost around 2.5 times timber poles but have many benefits to justify their use.

In extension of Essential Energy's conditional pole replacement program, it is proposed that where justifiable through risk-value and probabilistic analysis that we replace timber poles with composite poles. As part of customer engagement, customers expressed a willingness to pay and supported this accelerated transition to improve resilience to bushfire events.

Essential Energy has undertaken analysis of our network's exposure to natural perils and how these perils will change over time due to climate change. This program of works has been limited to locations where an increased probability of failure (PoF) due to bushfire is expected. This project forms part of our Resilience Plan (**Attachment 6.02**).

3. Resilience & Climate Change

3.1 Climate Modelling

Following on from a spate of large impact environmental events and given the current widely documented climactic changes occurring within Australia, Essential Energy commissioned modelling for the impact and probability of these events occurring in the future. Third party peer reviewed climate change modelling has been performed to predict the effects of future environmental conditions on the network, refer Climate Impact Assessment (**Attachment 6.01**). This modelling shows the change in impacts from three perils: floods, windstorms, and bushfires and captures the predicted probabilities of network asset impacts under climate change scenarios defined by two Representative Concentration Pathways (RCPs), RCP4.5 and RCP8.5. These climate change scenarios are widely accepted by the Intergovernmental Panel on Climate Change (IPCC)) and are shown in Figure 1 below.

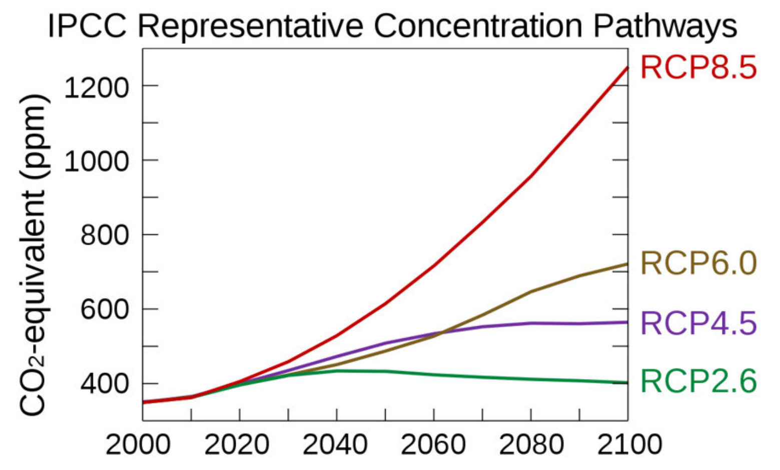


Figure 1 - RCP CO_2 ppm

The primary peril impacting the asset class of poles is bushfire. The total network impact on poles from bushfires is predicted to increase by more than 10.95% by 2050 under RCP4.5 compared to the baseline scenario (2022 calibrated PoF) of no climate change impact (see Figure 2). Section 8 below describes the approach to modifying PoF for projected climate impact.

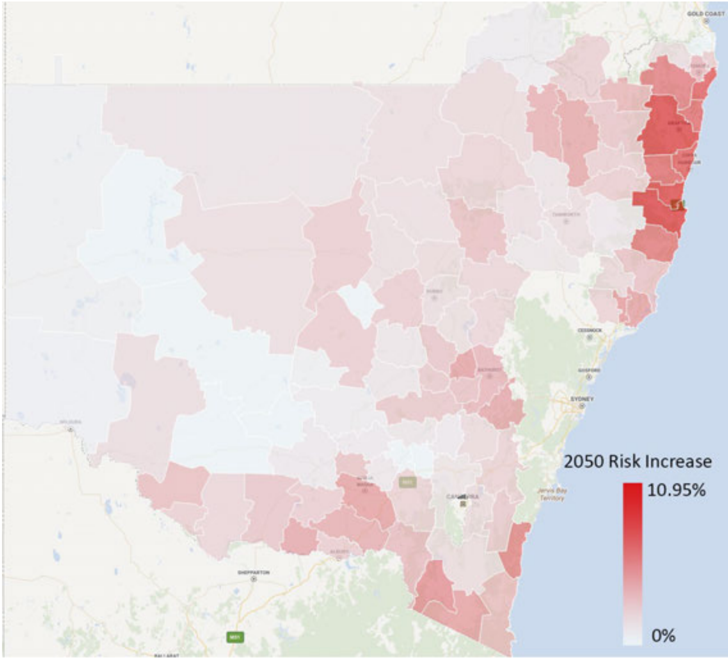


Figure 2 - 2050 Risk increase in poles risk compared to no climate change impact

As per **Figure 3** it is expected that the risk value associated with the pole asset class will increase due to both an ageing pole population, and climate change impacts.

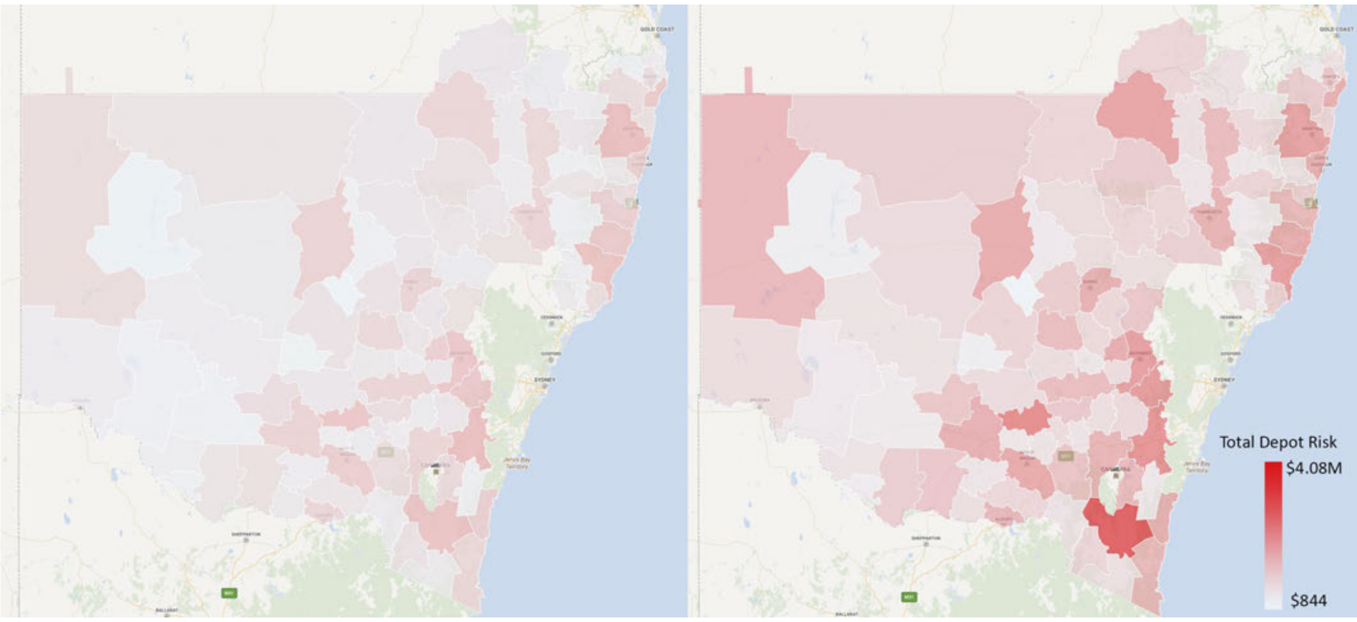


Figure 3 - Comparing risk at 2022 (left) and 2050 (right) - Inclusive of climate change impact

Assuming a linear increase of PoF from 2022 to 2070, the impact on PoF due to climate change under the RCP4.5 modelling shows a very minor increase within the regulatory period of only 1.19% uplift in certain areas (see Figure 4 and Section 8).

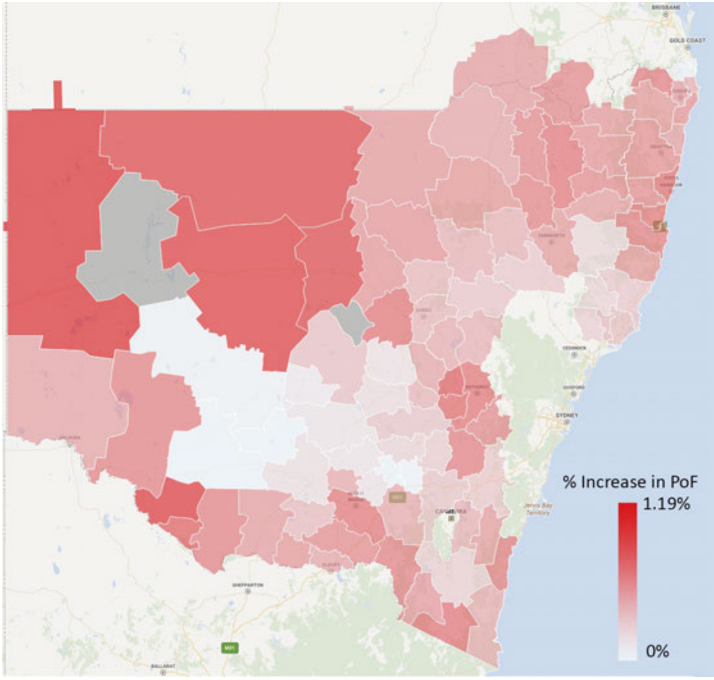


Figure 4 - Climate change only impact by 2030

Over the period of 2013 through to 2022, Essential Energy experienced 3,064 asset failures due to fire, averaging 306.4 per annum. This average has been skewed with the performance during the 2019/20 bushfires however as shown in Figure 5 this average value has been met in other years during the period. From climate change modelling under RCP4.5, it has been projected that probabilistically Essential Energy will experience 234 asset failures in 2022 increasing to 290 by 2070. Methods of forecasting and projecting asset functional failures is covered in Section 8.1

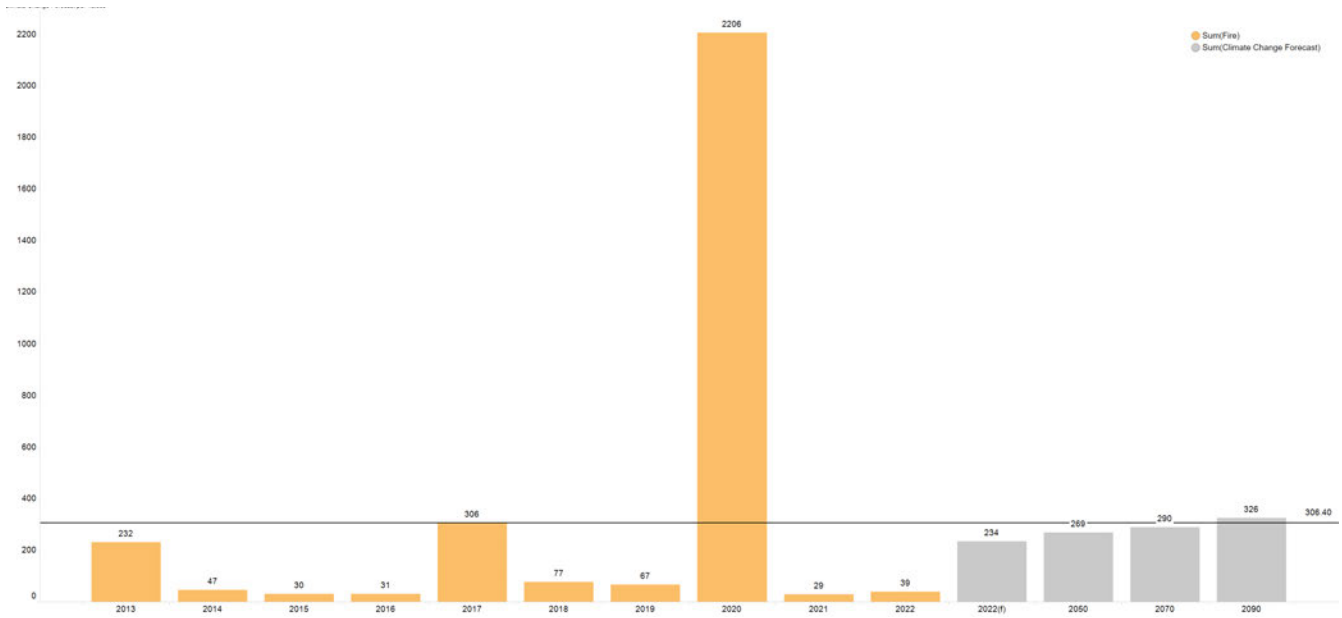


Figure 5 – Functional failures due to fire; experienced and forecast

4. Key Benefits of Composite Poles

The key benefits provided by composite poles for the Essential Energy network are summarised below.

- *Fungal and Corrosion resistant:* Fungal decay, acidic and alkaline soils, and chemical resistant. Fungal decay accounts for 55% and corrosion 6% (F2014-22) of unassisted pole failures.
- *Termite Resistant:* Not subject to termite attack, 36% (FY2014-22) cause of unassisted failures, despite maintaining a termite treatment program.
- *Life expectancy:* Accelerated ageing testing from two manufacturers and Essential Energy's in house Quality Assurance lab indicates composite pole life expectancy to be over 60 years whereas modern timber pole life expectancy is around 40 years. Evidence supports life expectancies of well over 60 years if UV coating is reapplied following exposure to bushfire.
- *Fire Resistant:* The fire-retardant laminate construction performs better than timber and alternate pole materials when exposed to bushfires. Bushfire is on average the leading cause of assisted pole failure over recent years. In fire prone locations CCA poles have been repeatedly burnt and replaced after short service lives. The CCA treatment on timber poles promotes timber combustion and afterglow, and ash and smoke from burnt CCA timber is harmful.
- *Transport & Installation:* Composite poles are one third of the weight of an equivalent timber pole. This has many benefits in transport, plant, handling, and installation efficiencies. Installation techniques are like timber poles however being lighter and available in multi-piece options, composite poles are more cost effective to transport and install in high civil cost, remote, heavily vegetated and/or difficult access sites. Three times as many composite poles as timber can often be carried on trucks and trailers when transporting from depots to installation sites.
- *Lower maintenance cost:* Composite material is not susceptible to termite or fungal decay unlike timber poles. Ongoing maintenance costs are significantly lower with no requirements to sound, dig around or drill poles. Longer term tasks due to timber contraction including hardware tightening will also be reduced. Increased use may allow composite pole based 'feeders' to be inspected less frequently (e.g.: longer than current 4.5-year interval) on a 'maintenance free' structure with composite crossarms and durable pole top construction.
- *Lower unassisted failure rate:* The condition of composite poles is easier to determine from less intrusive techniques compared to timber poles which may see unassisted failures just after their inspections every 4-5 years. As a result, unassisted failure rates are expected to be lower than timber poles. Timber poles are often subject to termite attacks causing failure over periods between inspection cycles.
- *Superior electrical and mechanical performance*: Similar mechanical strength to timber poles for a much lower weight. Better electrical insulation properties than timber poles and therefore classified as insulating in the Electrical Safety Rules (ESR). Personal Protective Equipotential Bonds which are needed for timber and conductive poles are not required on composite poles.
- *Avoided young timber pole tasks:* Material numbers of timber rot, termite treatment and pole replacement tasks have been required on CCA timber poles less than 20 years old. This was reported by tradesmen in the field and supported by database analysis mostly in inland regions prone to termite attack. It is believed that this is due to dry climates causing modern timbers grown on the coast to split, allowing termites and fungal decay to bypass the CCA treatment.
- *Disposal & Reuse* – Savings are expected in disposal costs due to the reduced weight of pole materials going to land fill. This may further improve with technological advances allowing recycling / repurposing of composite materials. Hazardous CCA timber treatments inhibit the use of timber poles for reuse, burnt CCA poles damaged in bushfires have onerous disposal requirements. It is expected that the overall higher performance composite material will present additional opportunities for reuse and therefore reduced end of life costs with respect to timber CCA.
- *Safety* – The round and uniform construction of composite poles is easier and more predictable to handle which reduces risk of manual handling and fatigue related accidents.
- *Potential CCA exposure/contamination* – Copper Chrome Arsenic is a toxic and flammable chemical. CCA treated timber is banned from use in high contact structures. Composite poles are a relatively inert material which is safe for contact with humans and animals.

5. Composite Performance

5.1 Crossarms

In 2009, Essential Energy transitioned away from treated timber crossarms to adopt composite (fibreglass) as our default crossarm material. After 13 years, 600,000 composite crossarms are installed across the network. This population has yet to experience an unassisted failure and has shown good fire resistance. The composite crossarm transition has allowed this material to mature in the field supporting Essential Energy's natural progression to composite poles.

5.2 Life Expectancy

Composite fibreglass materials have proven performance as an outdoor structural material. Composite is widely adopted with many examples of fibreglass marine and industrial equipment manufactured over sixty years ago still in service. Composite fibreglass materials themselves have been shown to improve in many structural properties with age. External coatings on fibreglass composite materials are recommended for external protection from ultraviolet (UV) light which can cause minor surface deterioration after many years of exposure.

Composite fibre/fiberglass poles were first installed in Hawaii in the early 1960s. After almost 45 years of service, these poles were removed from service and replaced, not for structural reasons but because of fibre blooming concerns from ultraviolet (UV) light exposure. These early poles did not contain the modern UV inhibitors or surface veils that provide protection for composite poles today, which allow an average life span of 80 years or more (80 years is the figure quoted extensively in North America and Europe). Composite poles for distribution and transmission applications are gaining popularity with electricity utilities internationally estimate (refer **Attachment 10.02.24 Composite Poles Transition Business Case)**.

Since these first composite poles were installed, significant advancements have been made in composite pole and polymer technology, resulting in more durable and longer-lasting poles. Through our experience with composite crossarms we have developed specific composite and UV coating testing procedures and facilities and worked with manufacturers to improve product performance.

Essential Energy's in house Quality Assurance (QA) lab has performed a range of destructive and accelerated ageing tests on composite poles including:

- Real life accelerated ageing exposure- Combining UV, salt spray, freeze and thaw cycles in one test set up with samples exposed for several months simulating decades of in-service experience.
- Standalone UV-B exposure with much harsher UV spectrum than conventional UV-A for several months. This tests the UV coating which is the primary cause of the start of degradation.
- Mechanical destruction tests – Bolt pull through, mechanical impact, deflection, installation using excavator, pole run over by excavator etc to stress test the pole to worst case and unlikely service exposure.
- Real-life fire exposure where timber poles were destroyed, but composite poles in adjoining sites were fully serviceable requiring only minor outer gel coat repair before the next fire.
- Manufacturer's tests on UV, ultimate strength, deflection, fire-resistance etc.
- Manufacturer's service history estimates both for local product currently used, and well-established products in North America. This includes Hitachi, RS Poles etc who are well-established long-term suppliers. Our own suppliers estimate 70-80 years minimum service life.

Research in pole material technology validates Essential Energy's assessments with composite utility poles shown to outperform timber throughout their lifecycle. Light poles made of polyester-reinforced fibreglass were installed in Finland in 1961 and remain in service. The manufacturer's estimate is a lifetime of at least 80 years, based on experience of installed poles and weatherproofing coatings. Some other manufacturers of composite poles state a lifetime of 120 years. A lifetime of 80 years should therefore be a cautious estimate (refer **Attachment 10.02.24 Composite Poles Transition Business Case)**.

Essential Energy is confident in the 60-year composite pole life estimate used in this business case. This is considered a conservative minimum life which has been used in our NPV calculations. Sensitivity analysis on this value has been conducted to understand the full benefits of composite poles if they can provide an 80 year life.

5.3 Composite Pole Trial

A network trial of composite poles was underway when the Kosciuszko National Park witnessed the 2019/20 bushfires. The fire exposed composite poles showed excellent fire-resistance with temperatures exceeding 600 degrees, compared to the timber poles beside them which burnt to ash. The cost impacts of major fire events are greater than the sum of the immediate replacement work which can take years. The 2019/20 bushfires subjected Essential Energy's network to unprecedented damage with total cost impacts of around $75M, requiring $34M in additional revenue to cover unexpected costs. Ongoing supply interruptions, disruption to existing priority work, maintenance and additional resource demands have contributed to exponential increases in recovery costs. The wider adoption of fire-resistant materials will increase network resilience and is likely to reduce the volume of destruction and ongoing expenses caused by such events in future.

Fire impacted composite poles are structurally intact and require minor repair to outer fire-retardant gel coat before the next fire front. This gives crews performing restoration work valuable time (it can be years before next fire front passes) to do higher value supply restoration work rather than review the integrity of fire impacted composite poles.

Figure 6 - Timber CCA poles 2019/20 bushfires. Right: Only a composite cross arm remaining

Composite poles now account for around 20% of current annual pole replacements through targeted high value replacements and wider depot area adoption. This uptake has followed design and specification development, lab and field testing, tooling, fleet, work practices and customer expectation reviews to accommodate further deployment.

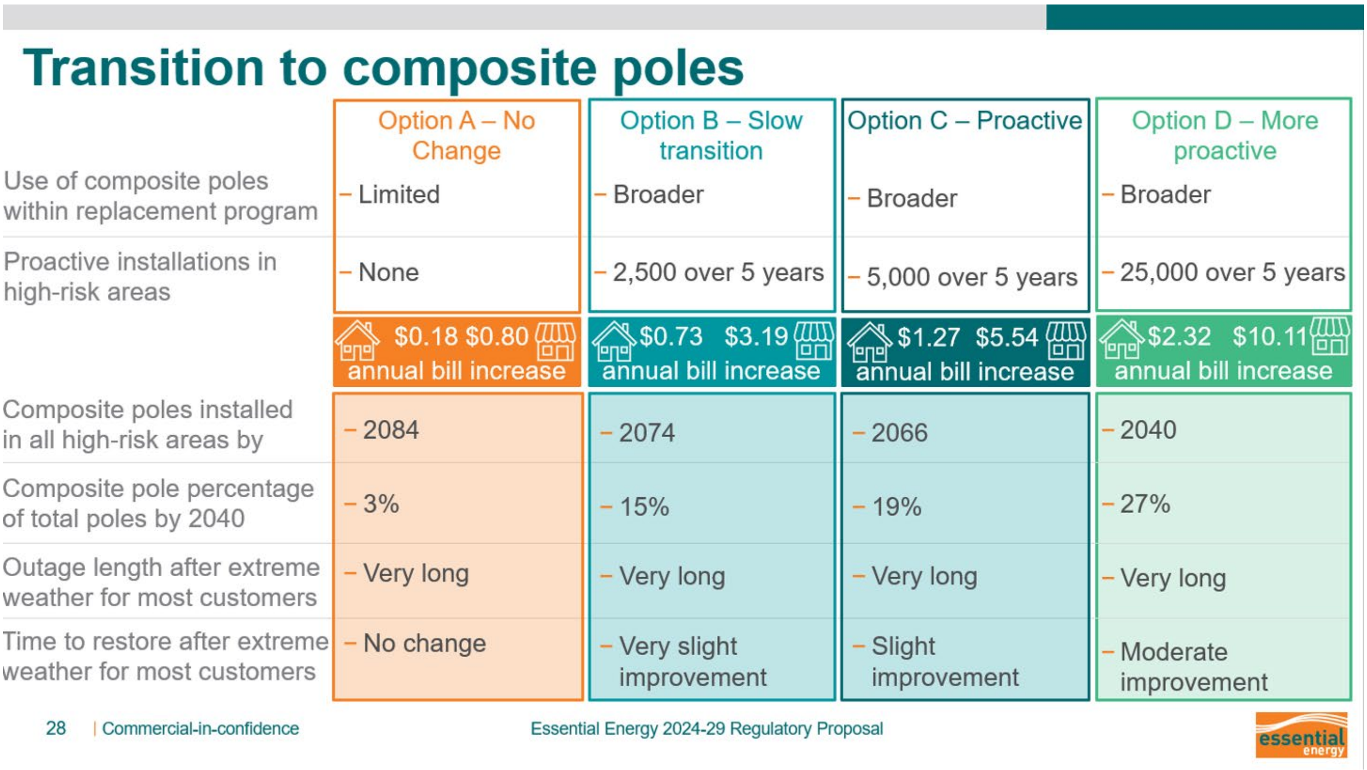
The initial adoption targeted high value asset specific locations to capture maximum benefit from composite. The installation efficiencies found through their use in these regions and the simplification of one pole material type led to complete transition to composite in several depot areas.

6. Customer Appetite for Addressing Resilience

In preparing the 2024-2029 Regulatory Proposal we engaged with customers over four phases. During the first phase conducted in October/November 2021 customers were polled on risks in operating the distribution network and how these are valued. Customers supported Essential Energy's risk metrics and placed a high level of importance on reliability, bushfire and safety.

During the second phase of engagement in February 2022 the concept of resilience was introduced to customers and how it differs from 'standard' reliability. Customers were offered a variety of scenarios to understand their appetite for investment in resilience across four options from a 'change nothing' to large scale expenditure across many assets. Several investment options were introduced, composite poles being one of the interventions identified. The outcome of this phase of engagement resulted in broad support across the two options representing the highest levels of intervention, 47% and 44% respectively. In relation to composite poles specifically this outcome related to an option around broad use of composite poles and a proactive replacement program. It must be noted that this was a directional decision process to understand willingness to pay with a number of intervention types equating to total expenditure for options.

The third phase of engagement specifically addressed individual intervention types with high level numbers to understand customer willingness to pay per intervention type. For composite poles customers were presented the slide in Figure 7.



Transition to composite poles

	Option A – No Change	Option B – Slow transition	Option C – Proactive	Option D – More proactive
Use of composite poles within replacement program	– Limited	– Broader	– Broader	– Broader
Proactive installations in high-risk areas	– None	– 2,500 over 5 years	– 5,000 over 5 years	– 25,000 over 5 years
	$0.18 $0.80 annual bill increase	$0.73 $3.19 annual bill increase	$1.27 $5.54 annual bill increase	$2.32 $10.11 annual bill increase
Composite poles installed in all high-risk areas by	– 2084	– 2074	– 2066	– 2040
Composite pole percentage of total poles by 2040	– 3%	– 15%	– 19%	– 27%
Outage length after extreme weather for most customers	– Very long	– Very long	– Very long	– Very long
Time to restore after extreme weather for most customers	– No change	– Very slight improvement	– Slight improvement	– Moderate improvement

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Figure 7 - Customer engagement on composite poles

Customers overwhelmingly supported Option D (67%) in the results of our engagement. This option included full composite usage plus additional risk based, proactive replacements up to 25,000 over the regulatory period.

During the fourth phase of engagement, due to deliverability constraints across the whole portfolio, the number of poles was reduced to 15,000. At the time of engagement calibrated modelling was yet to occur to have a fully valued position on the number of positive value assets to replace. Customers accepted the reduction in total number and still supported the move to accelerate our changeover to composite poles as detailed in **How engagement informed our Proposal (Attachment 4.02).**

7. Options

7.1 Option 1 - Composite Poles

To provide flexibility in optimisation, 27,000 poles were made eligible for optimisation based on meeting the following conditions:

- A positive 60yr NPV
- Reaching a positive Equivalent Annualised Cost (EAC) by 2034
- Having an increasing probability of failure due to climate change

These 27,000 poles (refer Figure 8) were grouped into 1,625 investments with assets of similar age, PoF, CoF and material. This allowed the Copperleaf optimisation to select investments based on achieving overall portfolio constraints on cost, risk and deliverability[1]. The total pool of expenditure equated to approximately $200M thus providing volumetric and risk value optionality for the program.

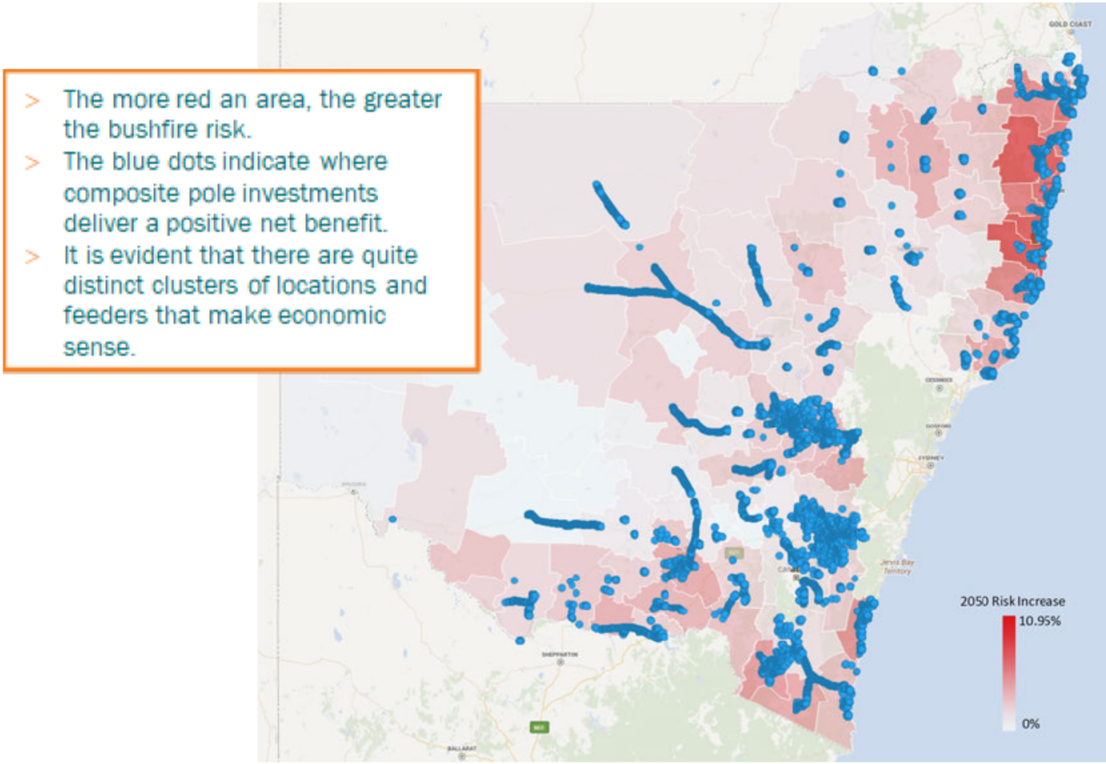

Figure 8 - Location of assets for optimisation

Following optimisation of the Repex portfolio to meet constraints applied to the whole of portfolio inclusive of increased risk due to climate change, approximately 11,000 poles were optimised into the 2024-29 regulatory period.

Option 1 – Up to 11,000 composite poles at cost of [redacted] with NPV of $67.4M

[1] Further details on portfolio optimisation and investment creation can be found in Attachment 6.03.04 – System Capital Risk and Value Based Investment methodology

7.2 Option 2 - Replace like for like or other materials

As a large proportion of risk for the timber pole population results from the increasing age of the fleet. One option would be to replace like for like with a newer timber pole or another material. Essential Energy has developed a composite pole transition business case (**Attachment 10.2.24**). Analysis has determined that when replacing timber poles with composite poles they provide the lowest total life cycle cost due to a variety of benefits.

One major aspect of the customer engagement was a willingness for expenditure to provide a more resilient network in the face of growing risk of natural perils, in this case bushfires. Whilst replacing the poles like for like (timber) would reduce age risk it would not meet customer expectation regarding resilience as demonstrated during engagement for the regulatory proposal.

Option 2 – not a feasible option given move to composite poles to address climate risk

7.3 Option 3 - Standalone Power Systems (SAPS)

Essential Energy's current SAPS strategy is focused on high cost to serve single customer installations. Over the regulatory period it is forecast that we will complete approximately 400 SAPS installations. This is expected to be at the upper limit of supplier and third-party construction companies' availability for installation. The scale required to convert customers to SAPS for the assets included in this program (~11,000) would far exceed available supply and installers.

An additional hurdle for the usage of SAPS is that the current strategy requires customer agreement to transition. Therefore, where large customer bases are involved, it is unlikely that all customers would agree to replacement of traditional 'poles and wires' with SAPS. Customer engagement research identified 43% of customers would be 'interested to very interested' in transitioning to SAPS.

For these reasons the usage of SAPS for this constraint has been excluded from further analysis for this business case.

Option 3 – not a feasible option given estimated cost and supply constraints

7.4 Option 4 - Undergrounding

Due to the large cost of undergrounding this option is only viable in the highest risk cost areas where prudency can be demonstrated. Many regions where the overhead network is most at risk due to bushfires also increases the cost of undergrounding due to site conditions such as rock, access, and site sensitivity. As such, there is a separate program of works related to undergrounding a small proportion of network (~40km) over the 2024-29 regulatory period where the risk value is sufficient to justify its usage, refer Resilience Undergrounding High Risk Locations Investment Case (**Attachment 10.06.02**). These programs will complement each other to ensure the most cost-effective solution is utilised given the particular locational conditions.

Option 4 – **broad adoption not a feasible option given estimated cost**

8. Value Justification

8.1 Climate Data Usage and Probability of Failure Impact

The initial analysis used all failure data from 2013 – 2021 across all failure modes. In relation to bushfire probabilities of failure, the data was skewed to extremely high values for all locations that experienced a fire during this observation period. For example, Bega and Moruya Depot areas had very high failure rates due to the widespread fires within those regions in the 2019/2020 bushfire season.

To reduce the impact of the observation period limits on the model outputs, a location-based probabilistic approach was taken for this failure mode. This utilised climate modelling data (**Attachment 6.01**) under climate change scenarios (RCP4.5 and RCP8.5) to give the probability of each pole being within the footprint of a fire. This data contained probabilities for current conditions as a baseline and then for the years 2050, 2070 and 2090 under the two climate change scenarios.

From this data, the number of functional failures within each depot / BFP subset of the population was calculated by summing their probabilities and multiplying by a scalar burn rate which captures the likelihood of a pole functionally failing given that it lays within a fire footprint. This scalar burn rate was calibrated such that the total number of functional failures matched the quantity seen on the network between 2013 – 2021.

This depot based PoF was utilised to 'localise' the network wide PoF Weibull model. This was achieved by removing fire related asset failures from the functional failure Weibull task data set and calibrating to the expected number of failures. These failures were then brought back into the overall PoF calculation utilising the climate change calibrated failures for the baseline scenario, to give a PoF at the reference year of 2022. This achieved an increased accuracy of the PoF at a depot level for functional failures compared to the original network wide values. As per Table 1 this has reduced the randomness of the shape parameter which is expected given the 'random' nature of the bushfire probability in this modelling.

Table 1 - Weibull parameters

Timber Type	Functional Failure (Incl Bushfire related)		Functional Failure (Excl Bushfire related)	
	Alpha	Beta	Alpha	Beta
Timber Natural Round	237.8	2.89	301.3	2.59
Timber Other	545.7	1.84	303.1	2.95

A conservative approach utilising RCP4.5 to calculate the impact of climate change on future PoF was used in lieu of more aggressive models. To project forward the PoF, a linear step change was used between the 2022 baseline value and the 2070 predicted asset failures.

8.2 Risk Benefit

The value benefit of this program has utilised the PoF modelling as outlined in the previous section and consequence models that have been developed and calibrated to actual performance. These consequence models utilise the Appraisal Value Framework (**Attachment 6.03.03**) to quantify and value the risks posed by the failure of an asset. As per Figure 9 the value generated from this program of work is predominately through network (or reliability) benefit. These benefits equate to a positive NPV of $67.4M for the expenditure over the period.

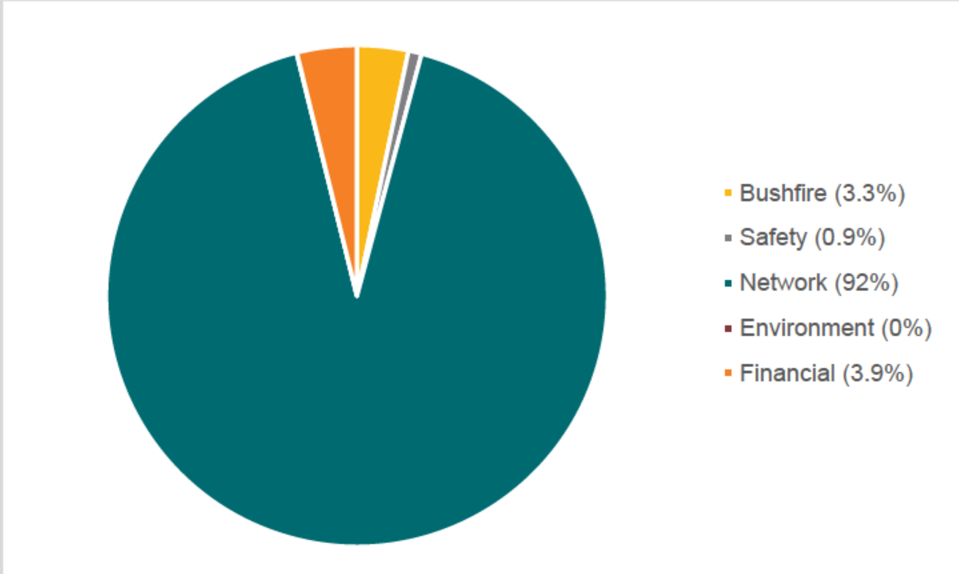

Figure 9 - Risk value by consequence type

Whilst value is driven heavily from network consequence over the 2024-2029 regulatory period this is effectively maintaining the current level of reliability for this asset class. In Figure 10 below, the baseline risk profile (inclusive of climate change PoF) represents the do-nothing scenario and the Outcome illustrates the resulting risk profile following investment.

It is important to note that Essential Energy has constrained risk at a total portfolio level and not at an individual asset class level. This allows risk to be reduced/maintained at a network wide level for investments to occur in appropriate assets where particular risks are best mitigated. Figure 10 illustrates the risk profile for Poles asset class, in particular and does not reflect the total portfolio outcome.

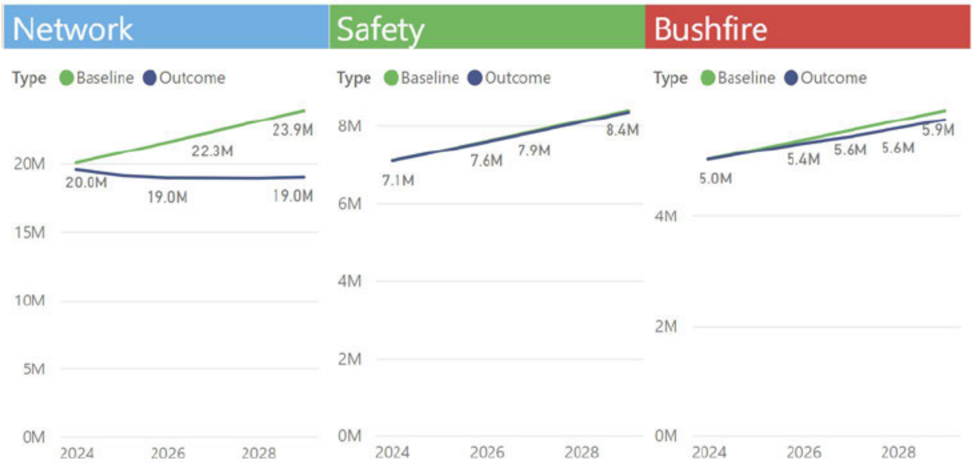

Figure 10 - Risk outcome for pole asset class (baseline includes impact of climate change)[2]

8.3 Sensitivity Analysis

To understand the impact of certain variables and their implication on the total value of the program, sensitivity analysis was undertaken. This has identified that the selected NPV period has the largest implication on value derived

[2] Unconstrained value metrics not shown. Risk is inclusive of climate change PoF increase. Bushfire is risk of EE asset starting a bushfire.

from the program. Even under the worst case scenario (Case 1) the program still has a total value ratio above one. Case 7 has been established as the basis of this business case. Regarding the sensitivity on unit cost there are varying unit costs associated with different pole construction types, for sensitivity a +/- 10% factor has been applied to these unit costs.

Table 2 - Sensitivity analysis

Metric	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9	Case 10
NPV Period	40	40	40	40	40	60	60	60	60	60
Unit Cost	Vars (+10%)	Vars (+10%)	Vars	Vars	Vars	Vars (+10%)	Vars	Vars (-10%)	Vars	Vars (-10%)
WACC Rate[3]	3.80%	3.54%	3.80%	3.80%	3.54%	3.54%	3.54%	3.54%	3.27%	3.27%
NPV (M)	$24.30	$29.64	$31	$31	$36.40	$60.64	$67.40	$74.10	$77.90	$84.70
Value Ratio	1.29	1.35	1.37	1.37	1.43	1.72	1.80	1.88	1.93	2.01

The main Repex portfolio is analysed with a 40-year NPV in Copperleaf, however this occurs due to the mix of investments across assets with varying projected lifespans. A 60-year NPV window has been deemed more appropriate for longer life assets such as composite poles.

9. Recommendation

The analysis has demonstrated that Option 1 proactive composite poles installation program can deliver positive risk value outcomes in line with customer expectations. Positive value is demonstrated for this accelerated replacement program of up to 11,000 poles at [redacted] with an NPV of $67.4M. Additional benefits include improved resilience to climate events, supply security, reduced long term maintenance and safety improvements.

Table 3 – Forecast Expenditure

2024/25	2025/26	2026/27	2027/28	2028/29
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Essential Energy's risk and value-based work approach aims to target investment in the highest value locations to provide the best possible value for the network with the resources available. An accelerated composite poles program will help deliver this value by utilising a higher performance, longer-lasting product for our pole replacements to improve the overall long-term health of the asset base and to increase the resilience of the future network. Essential Energy intends to perform a RIT-D to further justify this business case prior to commencement of the program.

[3] WACC rate used is Pre-tax real which is equivalent to a 5.58% Nominal Vanilla WACC

References

Doc No.	Document Name	Relevance
1	4.02 How engagement informed our Proposal	Reference material, justification
2	6.01 Climate Impact Assessment	Reference material
3	6.02 Resilience Plan	Reference material
4	6.03.01 Corporate Risk Management Procedure	Reference material
5	6.03.02 Network Risk Management Manual	Reference material
6	6.03.03 Appraisal Value Framework	Risk valuation
7	6.03.05 Business Rules for PoF, CoF and asset risk models	Reference material
8	6.03.06 Network Risk Calibration Approach	Reference material
9	6.04.01 Bushfire Prevention Strategy	Reference material
10	10.02.24 Composition Poles Transition Business Case	Reference material
11	10.06.02 Resilience Undergrounding High Risk Locations Investment Case	Reference material

Key Terms and Definitions

Term	Definition
$M	Dollars expressed in millions
BFP	Bushfire Priority
CoF	Consequence of Failure
CCA	Copper Chrome Arsenic timber treatment
FY	Financial Year
NPV	Net Present Value
PoF	Probability of Failure
RIT-D	Regulatory Investment Test – Distribution
VCR	Value of Customer Reliability
VUE	Value of Unserved Energy
WACC	Weighted Average Cost of Capital