REPEX 2025-2030

REPEX Ex-Post & Ex-Ante Narrative

18 November 2024

Part of Energy Queensland

CONTENTS

REFERENCED DOCUMENTS

The following table provides a list of all referenced documents that have been used as the source of truth in developing the ex-post and ex-ante narrative.

Document Number	Document title	File Type
5.4.01	Ergon - 5.4.01 - Aurecon - Validity of Ergon Energy versus Peer Comparisons for Pole Replacements - October 2024 - public	PDF
5.5.02A	Ergon - 5.5.02A - Business Case - Pole Replacement (Ex-post & Ex-ante) - November 2024 - public	PDF
5.5.01B	Ergon - 5.5.01B - Cost Benefit Analysis Enhancement Presentation - October 2024 – public	PDF
5.5.02B	Ergon - 5.5.02B – Cost Benefit Analysis Pole Examples - November 2024 - public	Excel
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5.5.01C	Ergon - 5.5.01C - RIN Repex Forecast Model Report – October 2024 - confidential	PDF
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5.5.02E	Ergon - 5.5.02E - Defect Bundling Scenario – October 2024 - public	PDF
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5.5.01B	Ergon - 5.5.01B - Cost Benefit Analysis Enhancement Presentation - October 2024 – public	PDF
5.5.03B	Ergon - 5.5.03B – Cost Benefit Analysis Pole Top Structure Examples - October 2024 – public	Excel
5.5.03C	Ergon - 5.5.03C - NPV Model - Pole Top Structure Replacement (Ex-Ante) - November 2024 - confidential	Excel
5.5.03D	Ergon - 5.5.03D – C3 Defect Information – October 2024 - public	PDF
5.5.04B	Ergon - 5.5.04B - Distribution Lines Refurbishment Guideline - REPEX – 3034999 - November 2024 - public	PDF
5.5.04A	Ergon - 5.5.04A - Business Case - Consequential Replacement - Overhead Conductors (Ex-Ante) - November 2024 - public	PDF

Document Number	Document title	File Type
5.5.01E	Ergon - 5.5.01E – Model validation- Reliability Cost Estimation – November 2024 - public	Excel
5.2.02N	Ergon - 5.2.02N - Repex Poles Failure Mismatch - November 2024 - public	Excel

1 EXECUTIVE SUMMARY

1.1 Our repex programs

Ergon Energy Network (Ergon Energy) performs a critical role in energising regional Queensland communities. How we build, operate, and maintain our network is driven by the unique and varied expectations and needs of our customers. The vast size of our distribution area and the geographically dispersed nature of our customers means that our network assets must operate under unique and challenging conditions in order to safely and reliably support our customers' domestic, commercial, and industrial needs.

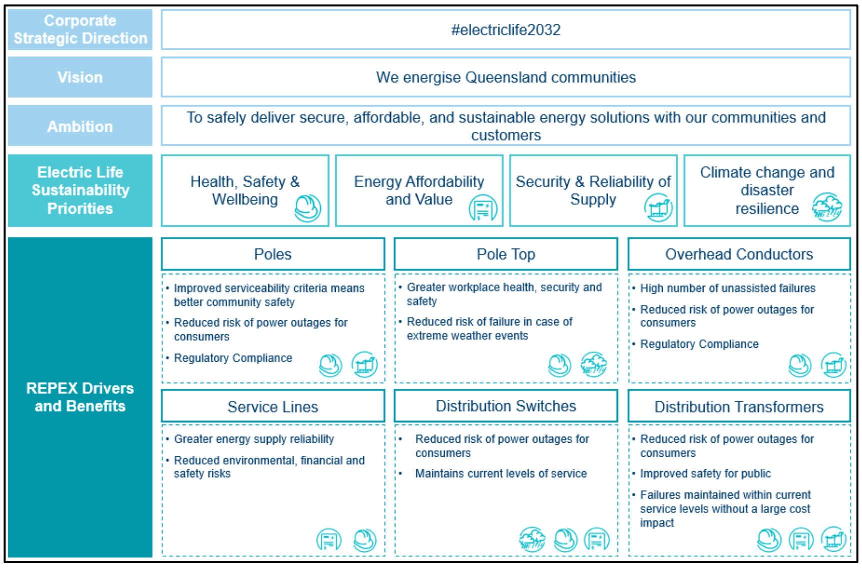
Network assets in parts of our distribution network are ageing and at risk of failure. Replacement or refurbishment of older assets like poles, powerlines and substations is critical to ensuring we meet the safety and reliability expectations of our customers and communities.

In January 2024, Ergon Energy submitted our Regulatory Proposal and supporting documentation for the 2025-30 regulatory period (Regulatory Proposal) to the Australian Energy Regulator (AER). Under the regulatory framework, Ergon Energy must include the total forecast capital expenditure (capex) that it considers is required to meet or manage expected demand, comply with all applicable regulatory obligations to maintain the safety, reliability, quality, and security of its network, and to contribute to achieving the targets for reducing greenhouse gas emissions (the capex objectives).[1]

The replacement expenditure (repex) program supports Ergon Energy's corporate strategic direction and vision to safely deliver secure, affordable, and sustainable energy solutions with our communities and customers. Figure 1 maps the strategic priorities to the drivers and benefits of each of the repex programs. Note: The asset categories 'SCADA, control and protection assets' and 'Other' are captured in Ergon Energy's repex program but not represented in the diagram below.

[1] National Electricity Rules, cl. 6.5.7(a).

Figure 1 : Driver and benefit mapping for repex programs



In September 2024, the AER released its Draft Decision on Ergon Energy's Regulatory Proposal (AER Draft Decision). The AER noted that the Draft Decision is a placeholder and has provided Ergon Energy with the opportunity to present data and other information in response to AER queries, at the Revised Regulatory Proposal stage.

1.2 Repex ex-post overview

For the 2020-25 regulatory period, Ergon Energy incurred capex above the AER's approved allowance. In response, the AER undertook an ex-post review of our capex for 2018-23 (ex-post period) in accordance with its *Capital Expenditure Incentive Guideline* (CEIG).

The AER Draft Decision did not fully accept Ergon Energy's incurred capex for inclusion into the regulatory asset base (RAB). In response to concerns regarding affordability, Ergon Energy will accept the AER Draft Decision for the purposes of the Revised Regulatory Proposal (refer to Table 1).

Table 1 : Repex ex-post period and AER Draft Decision ($ million, $2024/25)

	2018– 23 Actuals	AER 2018–23 Allowance	Overspend	AER Draft Decision	Revised Regulatory Proposal
Total repex	2,221.5	989.6	1,231.9	674	674

While the expenditure incurred during the ex-post period was greater than the allowance provided by the AER, we consider that it was prudent and necessary for us to meet our obligations to operate a safe and reliable network. The AER's Draft Decision recognised that Ergon Energy had a genuine need to make capital investments beyond the AER's forecast over the current and previous regulatory control periods, in particular in response to pole, pole top structure and conductor defects in our network.

During the ex-post period, we noted a trend of increasing unassisted pole failures, with failure rates eventually exceeding the limit as set by our jurisdictional safety regulator in 2019/20. A review of our pole inspections was conducted to ensure that we could meet our obligations as a distribution entity in Queensland. This review was independently assessed by an industry expert and resulted in an increase and timely number of pole replacements required to address the high unassisted failures of our poles.

These investments during the ex-post period will benefit customers in the long-term by improving reliability and safety outcomes through managing unassisted failures and providing environmental benefits through the avoidance of possible bushfires caused by asset failures.

The ex-post analysis has informed the level of replacement volumes for the counterfactual option in our business cases for our ex-ante (2025-2030 period) expenditure. In this way, there is a strong relationship between our ex-post expenditure and ex-ante business cases, and this document presents information on both to better explain our approach to replacement of our distribution assets. While we have accepted the AER Draft Decision in relation to the allowance, we maintain that the replacement volume during the ex-post period was prudent and efficient. This volume sets the replacement rate baseline for our ex-ante forecast.

1.3 Repex ex-ante overview

The AER Draft Decision did not accept our proposed total forecast capex for the 2025-30 period as the AER was not satisfied that it reasonably reflected the prudent and efficient costs to meet the capex objectives.

Table 2 and Table 3 provides an overview of Ergon Energy's proposed repex, the AER Draft Decision and the forecast for our Revised Regulatory Proposal, noting that our Revised Regulatory Proposal:

- accepts the reductions in allowance proposed in the AER Draft Decision for the following repex programs:
    - Distribution and Substation Transformers - both stand-alone and consequential replacements[2]
    - Distribution and Substation Switches / Switchgear - both stand-alone and a portion of our consequential replacements
    - Service Lines[3]
    - Overhead Conductors - with the exception of consequential enabling replacements of Poles, Pole Top Structures and Service Lines
    - Underground Cable

[2] The AER refers to these as opportunistic replacements.

[3] It should be noted that once Ergon Energy has access to digital meter technical registers for all sites there will be an increased requirement for defect rectification.

  - Other Assets - return to service program (RTS), Tower, DC Supply except for SCADA
- includes a revised submission and a substitute 2025-30 forecast for:
  - Poles - including opportunistic Pole Top Structures and Service Lines (Attachment 5.5.02A)
  - Pole Top Structures (Attachment 5.5.03A)
  - Overhead Conductors - only for consequential enabling replacements due to Poles, Pole Top Structure and Service Lines (Attachment 5.5.04A)
  - Clearance to ground / structure (does not include within our repex program and as such this expenditure is not discussed in this narrative as it is included within augmentation expenditure from Ergon Energy program allocation)
  - SCADA – details included in a separate business cases (Attachments 5.5.05 to 5.5.23).

Table 2 : Comparison between Regulatory Proposal, AER Draft Decision and Revised Regulatory Proposal for the 2025-30 regulatory period ($ million, $2024/25)

Asset	Regulatory Proposal ($m)	AER Draft Decision ($m)	Revised Regulatory Proposal ($m)
Asset categories – modified proposed expenditure			
Poles	815.1	420.5	744.4
Pole top structures	262.3	138.1	252.6
Overhead conductors (Consequential)	297.1	164.8	254.1
SCADA	132.9	90.6	111.3
Asset categories – accepted proposed expenditure			
Distribution transformers	152.6	118.4	118.4
Distribution switches / switchgear	88.0	70.7	69.8
Service lines	87.8	87.8	87.8
Overhead conductors (Conductor alone)	240.7	240.7	240.7
Other (Underground cables, Substation Assets)	461.3	405.6	405.9
CTG/S (*not part of this narrative as this is AUGEX*)	181.1	105.7	164.8
Total	**2,718.8**	**1,842.7**	**2,449.4**

Table 3 : Overview of total repex proposed between Regulatory Proposal, AER Draft Decision and Revised Regulatory Proposal ($ million, $2024-25) – Including and Excluding CTG/S

Total submission	Regulatory Proposal ($m)	AER Draft Decision ($m)	Revised Regulatory Proposal ($m)	Difference ($m)
Repex ($m) – Incl CTG/S	2,718.8	1,842.7	2,449.4	606.7
Repex ($m) – Excl CTG/S	2,537.7	1,737.1	2,284.7	547.6

1.4 Key issues addressed

This document supports our Revised Regulatory Proposal and addresses the concerns raised in the AER Draft Decision for both the ex-post period and our 2025-30 forecasts. This document provides detailed information to support the circumstances in which the ex-post period expenditure occurred, evidence to demonstrate why the expenditure was prudent, and how the historical volumes incurred during the ex-post period are a reasonable basis for establishing the 2025-30 forecast.

The key issues that this document addresses include:

- the uplift in pole replacement volumes during the ex-post period driven by changes to serviceability criteria and asset management practices that led to an increase in defect rates being identified. Ergon Energy ensured that the network was being maintained to continue to meet safety and reliability obligations and the actions taken during the ex-post period were prudent and represent a reasonable basis for establishing the 2025-30 forecast.
- Ergon Energy's need to address an increasing number of pole defects and to comply with section 5.1 in the Queensland Electrical Safety Code of Practice 2020 (ESCOP), which states "*An electricity entity should have a maintenance system that achieves a minimum three-year moving average reliability against the incidence of failure of 99.99 per cent a year*". Ergon Energy is looking to continue with current levels of pole replacements to ensure our compliance requirements can be met.
- demonstrating how it is not an equitable comparison to benchmark Ergon Energy's asset management practices for pole replacements against those applied by Essential Energy. This is because of the unique characteristics in Ergon Energy's operating environment and differences in network assets due to legacy design and construction practices, including pole structure factor of safety.
- the efficiency drivers and benefits in undertaking consequential replacements, due to the geographical and disperse nature of Ergon Energy's regional network. In some instances, assets such as in targeted conductor replacement program, poles, services and other assets may be replaced prior to the end of their expected useful life to realise efficiencies in the delivery of services, including avoiding wasted truck visits to more regional areas. Ergon Energy continues to refurbish these assets where practical, reissuing them to other parts of the network.

- the identification of approximately 80,000 pole top structures as being in a degraded condition. A proportion of these will be replaced through existing programs, however the remaining defective assets need to be managed in the 2025-30 period through a targeted replacement program. 7,000 additional pole top structure have been classified as C3 (emerging defects) that may result in a failure if left unattended. A proposed targeted program is incremental to our historical defect replacement program and includes the need to manage C3 emerging defects (refer to Attachment 5.5.03A).
- enhancements to our cost benefit analysis (CBA) to prove the customer benefit of our proposed programs and support the prudency of our approach to repex investments. Uplifts in the CBA include: the approach taken to determining the counterfactual; introducing prioritisation using risk-based analysis; data quality validation; and validation of modelled risk values compared to actual data (for example, using outage history and information on disposed assets).

Table 4 outlines the investment need for each of the replacement asset types for the 2025–30 period supported by the proposed solution.

Table 4 : Identified need and proposed solutions for repex

Asset	Identified need	Proposed solution(s)
Poles	Since 2015, there has been an upward trend of pole failures, primarily due to ageing low strength poles (3 kilonewton (kN)) (Refer to Attachment 5.2.02L). The improvement in defect detection and an ageing population will require Ergon Energy to sustain current period pole replacement volumes over the 2025-30 period. Also in 2017/18, changes were made to the pole nailing criteria on the back of safety concerns raised by operational staff and supported by the relevant unions (Refer to Attachment 5.2.02L).	Replacement volume of 16,600 per annum including nailing volume of 5000 per annum.
Pole top structures	Over 80,000 pole top structures have been identified as being in a degraded condition (Refer to Attachment 5.5.03A). A proportion of these will be replaced through existing programs, however the remaining defective assets need to be managed in the 2025-30 period through a targeted replacement program of 7,000 per annum. The 7,000 additional pole top structures have been identified as C3 (with emerging defects) that are likely to result in a failure if left unattended.	Replacement volume of 16,200 per annum (which includes 7,000 targeted replacements).
Consequential (overhead conductors)	Consequential replacements of pole, pole top structures and service line replacements are required due to replacement of overhead conductors. Investing in consequential replacements of these assets will achieve improved efficiency through the bundling of work orders aimed at improving operational performance (Refer to Attachments 5.5.04B and 5.5.02E). Consequential replacement of these assets is also required to ensure reliability and safety across the network.	Consequential replacement of over 13,000 Poles, over 27,000 Pole Top Structures and over 14,000 Service line assets over the 2025-30 period.
SCADA	Refer to individual business case	Ergon Energy is proposing $111.3m which is $20.3m more than the AER’s alternate forecast from the draft decision.

2 INTRODUCTION

2.1 Context

Ergon Energy Corporation Limited (Ergon Energy) is a subsidiary of Energy Queensland Limited (EQL) and is the electricity distribution network service provider (DNSP) for regional Queensland. The Ergon Energy network covers 1.7 million km^2 or 97% of the area of Queensland. We own, operate, and maintain the 'poles and wires' that deliver power to 761,000 homes and businesses from Queensland's expanding coastal and rural population centres, to the remote communities of outback Queensland and the Torres Strait.

A high proportion of the Ergon Energy network was established over 50 years ago and many network assets are nearing the end of their expected useful life. We replace and refurbish existing assets that are ageing or in poor condition to meet our reliability and safety obligations and the expectations of our communities. As a prudent operator, we have worked to optimise the expected useful life of these assets to ensure best value and outcomes for our customers and improved our asset utilisation through condition-based asset replacement. However, over the last five years, the need for asset replacement has risen due to an increasing asset failure rate, most critically our pole failure rates.

Ergon Energy is required to submit a Regulatory Proposal every five years to the AER, with the next regulatory period covering 2025-30. As part of this process, Ergon Energy developed repex forecasts and supporting documentation for assets including poles, pole top structures, overhead conductors, distribution transformers, service lines, and distribution switches and fuses. Ergon Energy's Regulatory Proposal and repex supporting forecasts and documentation were submitted to the AER in January 2024.

The AER Draft Decision was published in September 2024. In the AER Draft Decision, the AER provided feedback that Ergon Energy's business cases were difficult to interpret and lacked clarity, ultimately resulting in the rejection of Ergon Energy's proposed repex forecast. The AER noted that the Draft Decision is a placeholder as it expects any data and information gaps to be presented at the Revised Regulatory Proposal stage.

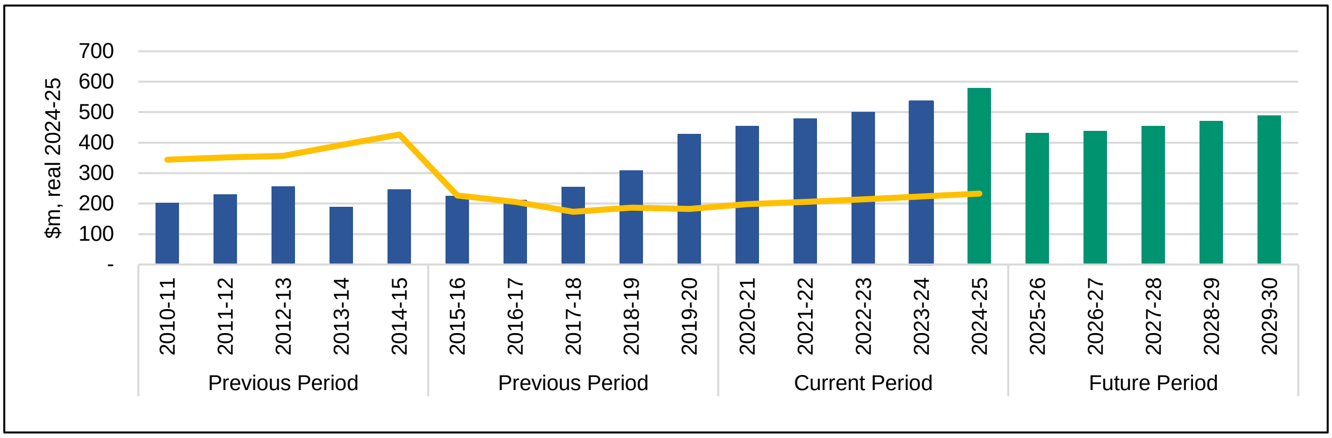
Capex on Ergon Energy's network increased in recent regulatory periods, primarily driven by our investment in defect-based refurbishment and replacement works to address the performance challenges of an ageing network and to meet community safety and reliability expectations. While the expenditure incurred was greater than the allowance provided by the AER, we consider that it was prudent and necessary for us to meet our obligations to operate a safe and reliable network. These investments will benefit customers in the long-term by improving reliability and safety outcomes through maintaining/improving service levels for customers.

Clause 6.12.2(b) of the National Electricity Rules (NER) requires the AER to include in any distribution determination, a statement on the extent to which the roll forward of the RAB meets the capex incentive objective. Where a DNSP has spent more than the AER's forecast capex, the AER may exclude capex above its forecast from the RAB if it does not reasonably reflect the capex criteria. The relevant period over which the AER made its ex-post assessment for Ergon Energy is the period 2018-19 to 2022-23.

The AER Draft Decision did not accept Ergon Energy's proposal to include all repex expenditure into the opening RAB for the 2025-30 period, allowing an amount of $674 million. In response to concerns regarding affordability, Ergon Energy will accept this element of the AER Draft Decision for the purposes of the Revised Regulatory Proposal.

Figure 2 shows Ergon Energy's actual and proposed repex over the period 2010-30, against AER allowances (as indicated by the yellow line). This graph shows that, for the period 2010-17, Ergon Energy significantly underspent against the AER allowance, due to a change in the jurisdictional security standard following the 2011 Electricity Network Capital Program (ENCAP) review undertaken by the Queensland Government. While the ENCAP review was primarily focused on reducing augmentation expenditure it meant that network assets were not being replaced to meet growth in the network and as a result, Ergon Energy efficiently extended the expected useful life of network assets. This resulted in a period of expenditure 'catch up', as some of our assets are now approaching end of life and our replacement rates need to increase to ensure ongoing reliability and safety for our customers.

Figure 2 : Replacement capex between 2010 to 2030 ($m, real 2024/25)



Source: ERG Repex Chart

2.2 Purpose

The AER Draft Decision found that Ergon Energy's supporting documentation contained information and data gaps, data discrepancies and reconciliation issues, and lack of detail and sufficient reasoning to substantiate the prudency and efficiency of its proposal. The purpose of this document is to provide the AER with the information and data to support Ergon Energy's repex position as being both prudent and efficient with respect to its ex-post performance (2018-2023 period) and the ex-ante forecasts (2025-30 period), including the rationale for investment and volumes of replacement. In regard to the ex-post and ex-ante forecast, this document aims to prove:

- Prudency: there is a clearly identified need and alignment with EQL's strategy as well as providing improved customer outcomes and benefits; and
- Efficiency: that the proposed repex benefits and services our customer at the least cost.

This document is to be read in conjunction with Ergon Energy's revised repex business cases (refer to Attachments 5.5.03A, 5.5.02A and 5.5.04A).

While Ergon Energy has accepted the majority of the AER Draft Decision, this document provides the AER with further context and justification to support the repex volumes in the ex-post period as well as support the rationale for developing the forecasts for the ex-ante period (2025-30).

3 ERGON ENERGY'S ASSET PORTFOLIO AND OPERATING ENVIRONMENT

3.1 Overview

The Ergon Energy network spans over 1.7 million km^2 and covers almost 97% of the area of Queensland. Our electricity network consists of 145,000 kilometres of overhead powerlines, 9,600 kilometres of underground power cables, one million power poles, 262 zone substations, 37 bulk supply substations and 105,000 distribution transformers.

Based on the line length, around 70 per cent of our electricity network runs through rural Queensland, typically with large distances between communities and one of the lowest population densities per network kilometre in the National Electricity Market (NEM). A high proportion of our network was established over 50 years ago and assets are nearing the end of their useful expected life.

3.2 Poles

Ergon Energy has approximately 980,000 poles within its asset portfolio, approximately 89% of the pole population is wood, 8% is steel and 3% is concrete. Approximately 19% of the pole population are older than 50 years, with another 5% expected to reach this age over the next regulatory period (refer to Attachment 5.5.02A). Despite the increase in our pole replacements, the number of poles older than 50 years is increasing year-on-year.

Ergon Energy's poles are separated into an Eastern and Western region of Queensland with approximately 50.8% in the Eastern region and 49.2% in the Western region. The distinctions between these regions include:

- **Eastern region**
    - The replacement to nailing ratio is approximately 60:40.
    - 5kN poles are the predominant pole size that becomes unserviceable, many of which are in rural areas.
- **Western region**
    - 73% of 3kN poles installed in Western areas prior to 1990.
    - 3kN Single Wire Earth Return intermediate poles dominate the unserviceable poles and failure rates in Western areas.
    - The replacement to nailing ratio is approximately 80:20 (unable to nail many 3kN poles).
    - Increased nailing from 2021 due to a change enabling the nailing of poles with a calculated limit state strength between 4.5kN and 5kN.

3.3 Pole top structures

Pole top structures are the assets at the top of the pole which support and position conductors and other equipment such as crossarms. The pole top structure population of 1.2 million is comprised of 1.15 million timber structures with most of the remaining population being composite. The age of pole top structures / crossarms is inferred from the age of poles. Currently, over 500,000 pole top structures / crossarms are operating beyond their expected useful life.

4 ERGON ENERGY'S ASSET MANAGEMENT PRACTICES

4.1 Overview

The way our network is managed and built is strongly driven by the expectations and needs of the rural and regional residents, businesses, and communities that we service. How we invest in our network in regional Queensland is also influenced by a range of challenges, including increasingly harsh climatic conditions and more intense and frequent natural disasters, including cyclones, flooding, and bushfires.

Ergon Energy's asset management practices and replacement strategies are used as the basis for determining the need for repex investments, focused on prudently addressing and replacing the right assets at the right time. Developing the repex programs is determined by either:

- **Correction of Defects (Inspection Generated) | 60% of repex investment:** Defects are identified through structured, cyclic inspection programs for known assets and areas. These defects are identified based on historical defect rates and asset conditions. Once identified, defects are addressed in a planned manner, aligned with defect policy time frames, to manage asset conditions. This approach helps mitigate risks and reduce the likelihood of unexpected failures by addressing potential issues before they escalate.

  Under this approach, forecasts are developed based on historical actual averages (refer to Attachment 5.5.01D).

- **Proactive and Targeted (Condition / Risk) | 35% of repex investment** – Under this approach, Ergon Energy targets assets prior to in-service failures or defects by utilising the condition of our assets and other tools to determine the probability of failure.

  Under this approach, forecasts for substation assets are developed using Ergon Energy's Condition Based Risk Management Model (CBRM). For overhead conductors and service lines, the CBRM is only used to prove the benefits if there is a step change in repex required compared to business-as-usual (BAU).

- **Asset Failures (in Service Failure) | 5% of repex investment:** In-service failures refer to unexpected breakdowns or issues that occur during the regular operation of assets.

  Under this approach, forecasts are developed based on historical failure rates and asset conditions to understand the probability and impact of potential failures. These failures require reactive replacements to promptly address risks and restore asset functionality, ensuring minimal disruption.

To determine the level of replacement we expect to undertake and level of investment that is prudent during a regulatory period, we assess the probability and consequence of an asset failure. The probability of a failure (PoF) is influenced by the age of the asset and the asset's condition, which also influences the optimum timing of the project or program. Factors such as safety, environment, changes in defect rates and obsolescence issues are also considered.

4.2 Comparison of Ergon Energy and Energex's Asset Management Practices

Since the 2016 merger of Ergon Energy and Energex into the consolidated entity EQL, Ergon Energy has streamlined some of our practices with Energex where it is prudent, efficient and practical to do so, based on our network characteristics. However, there are several differences in how we operate due to the size of the networks, climactic conditions, types of customers and assets installed.

In the AER and EMCa's assessment of our proposed repex programs, it was asserted that Ergon Energy had adopted Energex's pole standards and management practices, which had led to the higher pole replacement volumes.[4] While our review of our pole inspection process in 2018/19 led to a refreshed assessment methodology which aligns with best practice, and may be considered similar to Energex's approach, there are several key distinctions between the asset management approach for the two networks as outlined in Table 5.[5]

[4] https://www.aer.gov.au/system/files/2024-09/AER%20-%20Draft%20Decision%20Attachment%205%20-%20Capital%20expenditure%20-%20Ergon%20Energy%20-%202025-30%20Distribution%20revenue%20proposal%20-%20September%202024.pdf page 9

[5] Poles - Comparison of Ergon Energy and Energex Pole Serviceability Approaches

Table 5 : Comparison between Ergon Energy and Energex asset management practices[6]

Parameter	Ergon Energy	Energex
Mobility platform	FMC since 2002 (with update in 2019).	AIS since 2013.
Condition monitoring measurements	• Location of weakest point (mandatory) • Pole girth (mandatory) • Total width of splits and cracks • Minimum/maximum depth of surface rot • Solid wood measurement, if drilled • Count of drill holes 75mm above and below weakest point. External rot is automatically deducted from the pole girth and solid wood measurement by the mobile device.	• Pole diameter • Solid wood measurement, if drilled • Depth rot, if drilled External rot is not recorded in the mobile device. It is manually deducted from the pole diameter and solid wood measurement by the inspector.
Calculation of degraded pole strength – bending	**Limit State calculation** Characteristic Bending Strength values used for each strength group are from **AS/NZS 7000:2010**.[7]	**Working Stress/Factor of Safety calculation** Characteristic Bending Strength values used for each strength group are from **AS/NZS 2878:2000**.
Bending result - % strength. ***Note: The calculated strength is divided by the load and expressed as a percentage.***	**Stage 1:** The calculated LS strength is divided by the nominal LS pole strength of the pole. **Stage 2**: Used if Stage 1 result less than 100% or there is no pole disc. Compare calculated LS strength to the pole load for pole structure and wind region. Pole Structures are defined with a tip load to represent all construction scenarios across the network.	Stage 1: The calculated WS strength is divided by the calculated pole load using nominal stringing tension. Circuit data downloaded from corporate systems. Stage 2: The calculated WS strength is divided by the calculated pole load using measured sag and conductor attachment heights.
Calculation of degraded pole strength – compression	Not calculated for poles in the Ergon Energy network.	Calculated for all poles where the attached transformer is greater than 50kVA.

Note: Red font indicates changes adopted in 2019.

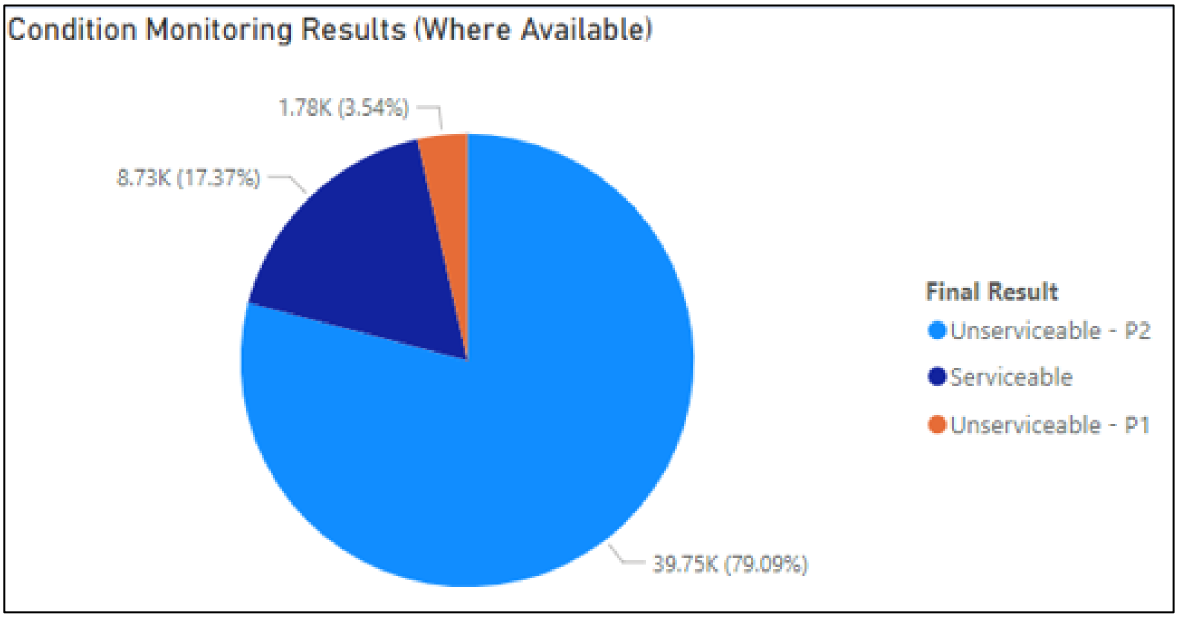
[6] Poles - Comparison of Ergon Energy and Energex Pole Serviceability Approaches
[7] Essential Energy also use AS/NZS7000 for their pole serviceability assessments.

It should be noted that if Ergon Energy was to adopt Energex's asset management practices for pole assets, then unassisted failure rates would likely increase and the Ergon Energy SWER network would be severely impacted. Importantly, Energex network has very few 3kN rated poles as per legacy design and construction practices and have had a different historical approach to pole management and pole replacement practices.

Ergon Energy's serviceability calculation was updated in 2019 (refer to Attachment 5.2.02L) to replace obsolete inspection systems, software and hardware, not to achieve alignment with Energex's practices. Any future movement towards a common approach for assessment of poles would undergo testing of the impacts of implementing a consistent approach.

When serviceability assessments are completed in the field, the data from the serviceability assessments and the calculated values are returned to the Ellipse system. Figure 3 highlights that 82.63% of unserviceable poles are purely determined based on the results of the pole serviceability calculations. 17.37% of unserviceable poles are identified based on visual assessment of the condition of the pole.

Figure 3 : Pole serviceability breakdown



Source: Root Cause Analysis Figure 26 October 2024

4.3 Ergon Energy and peer comparisons for pole replacements

Ergon Energy operates in a uniquely challenging environment, encompassing diverse and extreme climatic conditions, including high humidity, significant rainfall, cyclonic winds, and legislated performance requirements for pole reliability under the ESCOP.[8] These factors, along with a population of legacy low-strength poles, faster growth timber poles with shorter lifespans and a lower historical design safety factor, materially impact pole degradation rates and the frequency of replacements.

In the AER Draft Decision, Ergon Energy was benchmarked against Essential Energy to estimate the AER alternative expenditure because of the similar challenges with age and condition of poles faced by the two DNSPs. However, we consider comparison between Ergon Energy and Essential Energy is not valid nor appropriate, for the reasons outlined in Table 6 and as supported by the Aurecon Report[9].

[8] Electrical Safety Office, 2020. Electrical Safety Code of Practice. Available at: https://www.worksafe.qld.gov.au/__data/assets/pdf_file/0019/18343/es-code-of-practice-works.pdf.
[9] Validity of Ergon Energy versus peer comparisons for pole replacements October 2024

Table 6 : Comparison between Ergon Energy and Essential Energy operating environment

Category	Difference between DNSPs	Impact on the comparison
Climactic reasons	Essential Energy operates in less severe climates with non-cyclonic conditions. Whereas Ergon Energy has eight bio-diversity regions and a prevalence of termites in the north of its network.	The prevalence of termites as well as higher humidity and rainfall conditions experienced in the Ergon Energy network can increase degradation, rot and decay which can reduce pole life and impact pole foundations.
Safety	Ergon Energy has a design Factor of Safety of 2.5, while Essential Energy have a factor of 4. This means an 8kN Essential Energy pole would have an ultimate strength of 36.86kN, while an 8kN Ergon Energy pole would have an ultimate strength of 20kN.	Essential Energy poles have higher strength and are less susceptible to degradation over time. Poles in the Ergon Energy network may also be deemed unserviceable earlier due to the faster degradation and lower strength.
Pole type	Ergon Energy has 94,000 3kN wood poles in service, comparatively, Essential Energy do not have any 3kN poles.	These lower strength poles disproportionately contribute to almost 30% of annual pole failures, average 25% failure rate over five years and 16% unserviceability/defect rate and are likely to experience an accelerated level of degradation.
Pole materials	Ergon Energy poles are sourced from Queensland and grow faster, however have lower strength and durability.	Ergon Energy's lower strength poles can lead to increased maintenance issues and shorter lifespans.
Legislative obligations	Ergon Energy must comply with the Queensland ESCOP which has a three-year moving average pole reliability target of 99.99% per annum. Essential Energy are not subject to the same legislated mandates or challenges with low-strength poles as Ergon Energy.	Essential Energy replacement volumes are not based on the similar pole reliability targets.

Ergon Energy's asset portfolio to support its network characteristics is unique and the asset management practices have been developed specifically for Ergon Energy's asset population. This means it is not appropriate in all instances to compare Ergon Energy's asset management practices against other DNSPs, such as Essential Energy or Energex.

5 COST BENEFIT ANALYSIS

The AER Draft Decision noted a lack of robust CBA to support Ergon Energy's repex forecasts, including incorrect application of the counterfactual, overstatement of benefits, and significant errors with modelling. This chapter will address the AER's concerns and comments.

Following a workshop with the AER in October 2024, we revised our model based on the feedback and discussion during this session. We acknowledge that we have identified some areas of improvement and have updated our modelling accordingly. For clarity, our fundamental modelling approach has not changed, but rather we have continued to work with our data to ensure that our assumptions and modelling factors are calibrated to the latest data from the field.

5.1 Condition and risk modelling

Ergon Energy uses the Common Network Assets Indices Methodology (CNAIM) and CBRM to support the development of the forecasts for targeted / proactive replacements and to support the inspection driven defect forecasts developed for its repex program.

The CBRM/CNAIM involves a site-specific assessment of asset condition, consideration of the type and size of load supplied by the network, and safety and environmental risk exposure to the community and our staff to justify the benefit of the investment.

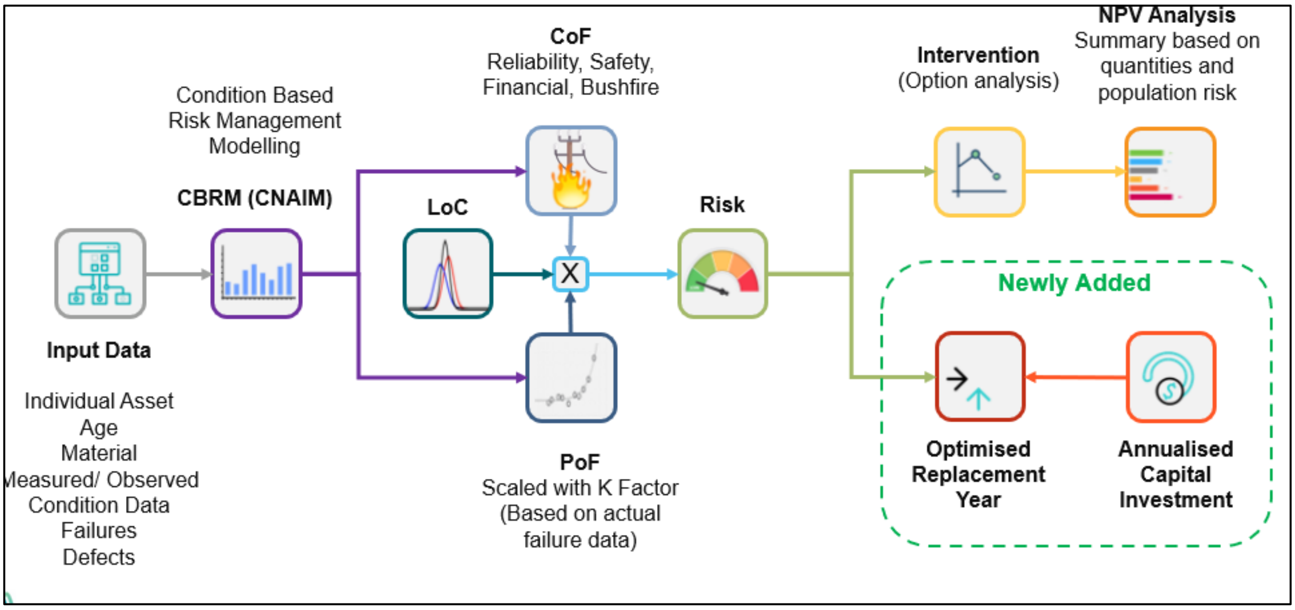
The benefits we typically expect to see from repex programs include:

- **Reliability** - unserved energy to our customers following an in-service failure of an item or plant. This generally forms a large part of the customer benefit from our sub-transmission repex. It should be noted that these programs are targeted at maintaining our existing network reliability and ensures that we do not experience an increase in unplanned outages from asset failures as the condition of our assets deteriorates over time.
- **Safety** - risk of injury or fatalities to the community and our staff associated with a catastrophic failure of equipment. Unlike our substation assets which are installed inside a fenced, secure site, most of our distribution assets are in publicly accessible areas. As such, proactively replacing assets in poor condition reduces the likelihood of these types of failures resulting in safety incidents in the community.
- **Environmental (bushfire)** - fire started following in-service failure of electrical equipment can cause bushfires. Proactively replacing equipment will reduce the likelihood of these events being caused by our assets.
- **Financial** - following an in-service failure of a distribution asset, we generally need to replace the equipment to restore supply. For distribution assets, we do not typically expect this to cost more than if we proactively replaced the item. However, our CBA factors include avoided replacement as a benefit on the basis that we will avoid this future cost.

The CBRM approach has been adopted to prove the benefit of forecasted volumes (based on defects) by obtaining the PoF and the Consequence of Failure (CoF) to derive the Net Present Value (NPV). Additionally, the CBRM / CNAIM model has been compared to the Weibull model for performance and prediction purposes. The Weibull model is used for assets that only have inspection data, instead of measured data, to predict the PoF and assist with replacement management. The shape parameter, beta (β), represents the failure rate behaviour with a value less than 1, demonstrating that the failure rate decreases with time and a value more than 1, demonstrating that the failure rate increases with time. While the scale parameter, eta (η), defines the average period when 63.2% of asset population is expected to fail. The function used to determine the PoF from an asset's time of failure is the Cumulative Distribution Function (CDF).

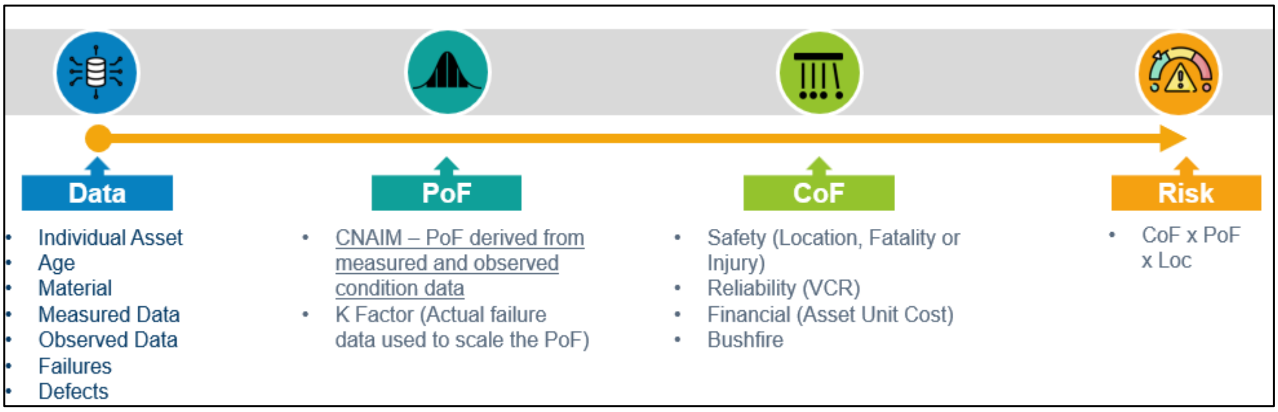
Figure 4 and Figure 5 provide an overview of the predictive modelling process and how the CBRM/CNAIM model is used to confirm the optimised replacement timing.

Figure 4 : Overview of the predictive modelling process



Source: Cost Benefit Enhancement Presentation October 2024

Figure 5 : Overview of the optimised pole model



Source: Cost Benefit Enhancement Presentation October 2024

5.2 Improvements and validation to CBA and CBRM

Ergon Energy has implemented the following improvements to the CBA and CBRM/CNAIM since the Regulatory Proposal (refer to Attachment 5.5.01B)

- introduced prioritisation using risk-based approach
- applied the benefit analysis periods based on asset expected useful life (50 years benefit for poles, 35 years benefit for pole top structures)
- compared feasible interventions
- undertaken data quality validation
- validated modelled risk value using actual data.

Additionally, during a workshop with the AER in October 2024, we were advised that Ergon Energy is required to only develop a CBA and business case where there is a proposed step-change compared to the current BAU strategy. Therefore, we have submitted an updated business case for the forecast poles repex with our Revised Regulatory Proposal, as we are proposing a step-change from the pre-2018/19 volumes to the ex-post period volumes. We have also submitted a revised business case for pole top structures to reflect the additional targeted volume of replacements from 2025/26.

5.3 Determining the counterfactual case

The AER indicated it was not supportive of Ergon Energy's proposed counterfactual options presented in the repex business cases, explaining that the BAU approach should assume that the asset(s) are not retired, and instead are operated and maintained on a BAU basis. It was suggested there was a lack of information about how the selected option was optimal and the calculation of the net benefits.

For the Revised Regulatory Proposal and updated business cases, Ergon Energy has taken the AER's Draft Decision feedback into consideration when developing the counterfactual options and has also taken into consideration the AER's *Industry practice application note for asset replacement planning.*[10] In particular, the counterfactual has been represented as the costs that consumers would incur if the asset continued to be operated under the standard operating and maintenance practices or, where applicable, 'doing nothing materially different' from the practices of the business under its usual asset management practices. Ergon Energy's usual asset management practice is to replace assets when identified as defective after inspection.

The counterfactual presented in the pole replacements business case has been updated for the Revised Regulatory Proposal to reflect the BAU volumes and rate of replacements undertaken prior to the ex-post period. This was based on feedback in the AER Draft Decision that using the ex-post period volumes and approach as the counterfactual was not efficient nor reflective of BAU or long-term practices.

Table 7 provides the counterfactual option for each of the revised business cases.

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[10] AER - Industry practice application note Asset replacement planning - July 2024.pdf

Table 7 : Counterfactual options presented in the revised repex business cases

Asset	Proposed counterfactual option
Pole replacements (ex-post)	Replacing with like-for-like wood poles at the pre 2018/19 volumes (8,000 poles per annum). This period is prior to the step change in approach and ex-post period when changes were made to serviceability criteria.
Pole tops structures (ex-ante)	Based on historical defect average (8,736 pole tops per annum). The historical average used in the counterfactual has been based on three-year actual defects averaged over the period 2020/21, 2021/22 and 2022/23. This has been used to compare the customer benefits of an additional 7,000 pole top structure replacements. The counterfactual has assumed, where possible, that pole top structures will be replaced with composite and only with wood where composite usage is not possible or feasible.

5.4 Options selection

For the Revised Regulatory Proposal, Ergon Energy revisited the NPV analysis and considered feasible options to reassess the optimal scenarios for asset replacement based on type of technology, historical replacement volumes and failure/defect rates. The details of these options are provided in the individual business cases.

6 EX-POST ANALYSIS

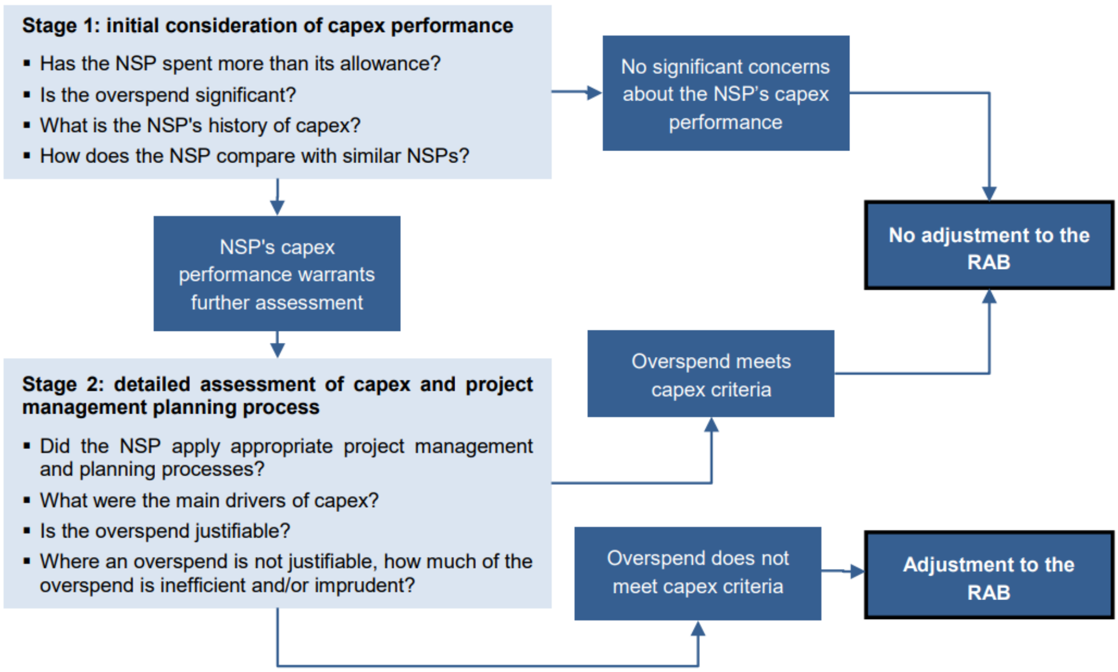
6.1 Overview

With a large volume of Ergon Energy's network being constructed in the 1970s and 1980s, a substantial number of our assets are reaching the end of their expected useful life in the current and next regulatory periods. Before the ex-post period, we took prudent actions to extend the lives of these assets between 2010 and 2017.

During the ex-post period, Ergon Energy was unable to continue implementing an asset management strategy of avoiding or deferring replacing the network assets due to compliance, safety and reliability impacts. Further deferral of asset replacements would not have been consistent with the National Electricity Objective of investing in the long-term interest of customers.

The AER conducted a staged review of Ergon Energy's capex performance during the ex-post period in line with the AER's CEIG.[11] The AER raised several issues and questions from the ex-post review. The staged review that the AER follows is outlined in Figure 6.

Figure 6 : AER ex-post review process



Source: AER Draft Decision

The largest areas of overspend in relation to repex during the ex-post period was in relation to pole, distribution switches, pole top structure and transformer assets as outlined in Table 8.

[11] AER, Capital Expenditure Incentive Guideline for Electricity Network Service Providers, April 2023,

Table 8 : **Ergon Energy actual repex by category ($ million, $2024/25)**

Asset	Ergon Energy 2018– 23 actuals	AER 2018–23 forecast	Overspend	% Change
Poles	555.5	214.2	341.3	159.4%
Pole Top Structures	343.2	109.0	234.2	214.9%
Distribution Transformers	383.9	176.5	207.4	117.5%
Distribution Switches / Switchgear	362.6	94.6	268.0	283.3%
Service Lines	124.8	62.3	62.5	100.3%
SCADA, control and protection assets	108.6	66.8	41.8	62.6%
Conductor	199.0	211.6	-12.6	-5.9%
Other[12]	143.8	54.6	89.3	163.5%
Total	2,221.5	989.6	1,231.9	124.5%

The AER Draft Decision did not accept Ergon Energy's proposal to include all the repex incurred into the opening RAB for the 2025–30 period but acknowledged that some of Ergon Energy's overspend was justified given the circumstances at the time of its investment decision (refer to Appendix A for a summary of the AER Draft Decision).

The AER Draft Decision has allowed $674 million in relation to repex during the ex-post period to be included in the RAB, which Ergon Energy has accepted. However, while we accept the decision on financial terms, we assert that the need for investment and the volumes of pole, pole top structures and service replacements and the asset management practices underpinning those volumes were both prudent and efficient and in line with sound operational practices.

The AER has also noted that the Draft Decision is a placeholder as it expects any data and information gaps to be presented at the Revised Regulatory Proposal stage. The sections below provide further information to support the drivers for expenditure during the ex-post period and provides justification for the prudency of the overspend.

[12] 'Other assets' includes 'Underground cable asset'

6.2 Justification for the volume of defect pole replacements

Chronology

Over previous regulatory periods, several decisions have impacted the volume of poles replaced during the ex-post period. Figure 7 shows the chronology of these decisions driving investment, with those significantly affecting pole replacement flagged in red.

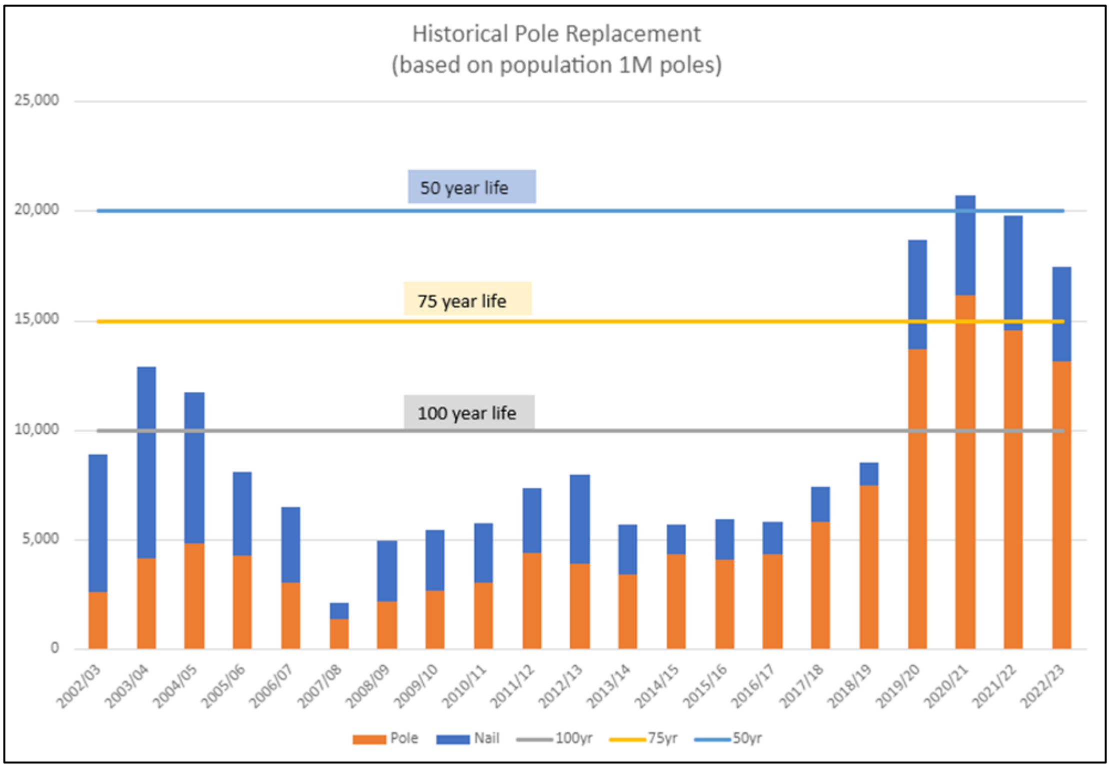
Figure 7 : Chronology of decisions impacting pole replacement volumes

Source: Presentation to the AER October 2024

Historical pole replacements

As shown in Figure 8, historical pole replacements and pole nailing were very low from the period 2008/09 through to 2016/17, with an average of about 6,500 poles replaced or nailed over this period. When considering the accepted useful life of a pole of 50 years, this is well below the reasonable replacement rate required to manage the asset. As a result of this period of very low replacement or nailing, Ergon Energy is now experiencing a period of 'catch up'. It is expected that the replacement volume is expected to remain at this rate until all 3kN poles are replaced, which would take 30 years based on the current rate of replacement of 2,700 poles per annum. However, as the poles continue to age and deteriorate, the defect volume may increase.

Figure 8 : Historical pole replacements and pole nailing population in 2002/03 – 2022/23



Source: Poles – Long Term Forecast for Catch UpSource: Root Cause Analysis Figure 2 October 2024

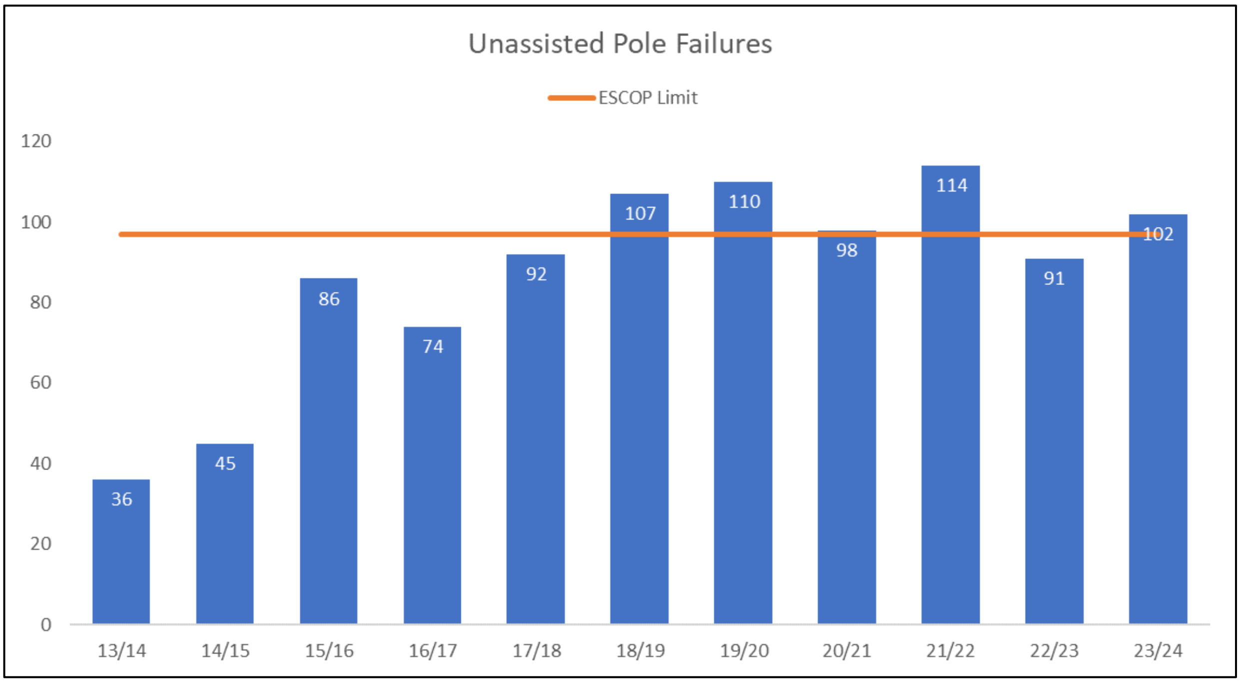
In 2017/18, Ergon Energy introduced new contracts and focused on training and retraining to ensure that pole inspectors could accurately identify unserviceable poles, resulting in a slight increase in the number of poles identified as unserviceable. During the same period, changes were made to the pole nailing criteria due to safety concerns raised by operational staff and supported by unions. This adjustment contributed to an increased ratio of pole replacements to nailing from 2017/18 onward.

Figure 9 illustrates the trend of unassisted pole failures since 2013/14. Ergon Energy conducts analyses of all unassisted failures, with full investigations initiated in cases of concern regarding inspection integrity, unusual scenarios, or safety and legal requirements. Monthly reports on unassisted pole failures support Asset Maintenance in understanding failure modes and identifying opportunities for improvement. These insights are provided to the Executive and Board to inform them of the volumes and causes of unassisted failures and the ongoing work to address them.

Each investigation into a pole failure involves a comprehensive review of the circumstances, including inspection and maintenance history, condition monitoring results, and any other relevant observations that might reveal the root cause. Photographic evidence and commentary from the field crew are documented, and physical evidence is retained whenever possible to enable a more in-depth understanding of failure modes. In instances where the pole had been inspected within the 12 months preceding the failure, a formal postmortem by a pole inspection auditor compares recent inspection results. This comparison helps identify issues related to inspection quality, inspector training requirements, process or system challenges, and reporting inconsistencies, ultimately leading to recommendations for improvement.

In relation to the three-year moving average pole failure rate, Figure 9 shows that Ergon Energy exceeded the notional annual ESCOP limit, which in turn provided the justification for increased pole repex. The 3-year rolling average has exceeded the ESCOP requirement in all but three months (September – November 2023) since January 2020.

Figure 9 : Unassisted pole failure volumes in 2013/14 to 2023/24



Source: Root Cause Analysis Figure 2 October 2024

In terms of unassisted pole failures and unserviceable poles:

- 3kN poles installed as SWER intermediate poles in western areas are the primary pole construction that have driven the higher replacement rates
- there are still 94,000 3kN poles in the network and it is likely that rate of unassisted pole failures will increase
- an intervention program option, such as a dedicated program to replace 3kN poles in Western areas has been considered as a prudent.

Given the increasing trend in pole defects from 2017/18, we considered there was a genuine need to address this increasing trend during the ex-post period.

Compliance requirements

A key driver for repex investment is ensuring compliance with electrical safety obligations. The *Electrical Safety Act* (Qld) s29 imposes an obligation that Ergon Energy (as a prescribed Electrical Entity) has a duty of care to ensure that works are electrically safe and that our network is operated in a way that is electrically safe. Further, the ESCOP details requirements for maintenance of supporting structures for lines including the expectations for supporting structure (for example, poles) reliability, serviceability, and frequency of inspection, as well as timeframes to rectify unserviceable poles, and for pole records to be kept.

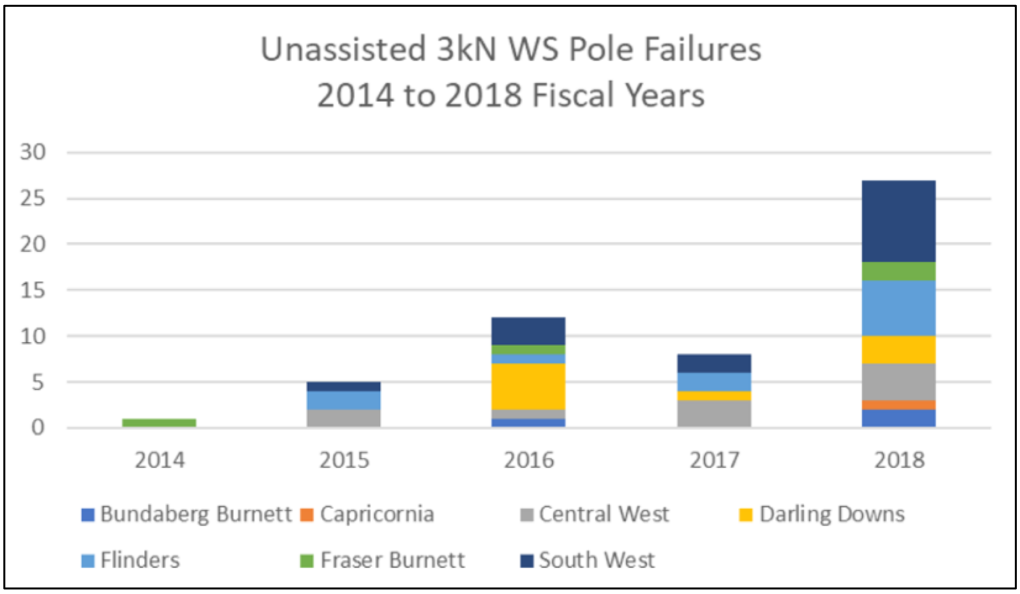
In relation to the management of poles, ESCOP specifies the following:

- a minimum three-year moving average reliability of 99.99 % per annum or an average pole failure rate of 1 per 10,000 poles
- each pole should be inspected at intervals deemed appropriate by the entity. In the absence of documented knowledge of pole performance, poles should be inspected at least every five years
- a suspect pole must be assessed within three months; an unserviceable pole must be replaced or reinstated within six months under the ESCOP.

Low strength pole

In 2018/19, significant changes were made to the pole serviceability calculations for low strength wood poles due to concerns regarding the increasing failure rates. Appendix C provides details on the impact of these changes. Figure 10 shows the increase in 3kN pole failures that occurred in 2017/18, which triggered the review of the management of low strength poles.

Figure 10 : Unassisted 3kN pole failures per location in 2014-2018



Source: Root Cause Analysis Figure 3 October 2024

Based on analysis and investigation of pole failures, concerns were raised about the durability of 3kN poles in dry areas, ability to withstand lightning strikes and identification of defects outside of the "normal" inspection zone where serviceability assessments are generally undertaken. A working group was subsequently formed to perform a detailed analysis of this problem and to develop appropriate controls.

Changes to inspection cycle

In 2014/15, a decision was made to adopt six and eight-year inspection cycles for specific pole subsets. Key impacts and considerations included:

- **Inspection Cycle Changes**: Approximately 180,000 poles moved to six or eight-year cycles, resulting in an average inspection cycle of 4.5 years, which allowed defective poles and other defects to remain in service up to four additional years.
- **Impact on Low-Strength Poles**: Many poles moved to a six-year cycle were in low-risk rural areas with low customer density, smaller conductors and tip load requirements, and installation of smaller, low-strength (3kN) poles. This decision contributed to an increase in unassisted failures among 3kN low-strength poles.

Unserviceable (US) pole audit

In September 2019, as a response to an investigation into an unassisted pole failure that was not replaced when deemed unserviceable, Ergon Energy initiated a reinspection of a random sample of 800 poles that had previously been identified as unserviceable.

Due to the higher than expected volume of poles found not to have been replaced from the random sample, the decision was made to audit approximately 23,000 unserviceable poles from the previous three years.

Analysis of a sample of wood poles inspected was also completed in 2020. The aim was to understand the predominant failure mode for every pole which failed the calculated serviceability thresholds. As a result:

- changes were made to the nailing criteria to allow the nailing of poles that failed the minimum strength criteria and had a calculated LS strength between 4.5 to 5.0kN to enable increased nailing of 3kN poles.
- additional pole nails suitable for reinforcing the smaller diameter poles were introduced.

6.3 CBA for ex-post pole (NPV outcome)

The AER Draft Decision noted there was insufficient evidence to demonstrate that historical expenditure in the ex-post period was a reasonable basis for demonstrating the prudent and efficient expenditure for the 2025-30 regulatory period.

Following changes to the serviceability, inspection cycles and defect data in 2018/19, Ergon Energy required a step change in expenditure for increased pole replacements. The counterfactual option considered in the Poles Business Case (refer to Attachment 5.5.02A) is therefore the pre-2018/19 volumes to demonstrate the replacement rate before the step change in volumes.

The options considered in the poles CBA and business case for the Revised Regulatory Proposal are:

- Option 1: Replacement of only unassisted failed poles given the historical pole failures were averaging above the three-year moving average limit set by ESCOP.
- Option 2: Replacement of 5,000 poles per annum as a low volume option to test the counterfactual and step change justification. This evaluates what will happen to the network if Ergon Energy only replaced a low volume of poles.
- Options 3, 4 and 5: Different materials (wood, concrete and composite respectively) used to replace the optimal replacement volume of 16,600.

- Option 6: Targeted replacement of 10,000 low-strength poles, as a result of their high contribution to unassisted pole failures, in addition to the optimal replacement volume of 16,600 with wood poles.

Ergon Energy has also undertaken an exercise to validate the data quality used as inputs into the CBA model as well as the outputs against actual data such as outage history and disposed assets information. As a result of the improvements and updates there has been a progression in the outputs for poles which is reflected in the poles business case.

6.4 CBA validation

The CBA for the ex-post period has been validated through the following means:

- the actual outage data was collected for each unassisted pole failure where the total outage reliability cost for FY23 was $20.7m. This is comparable with the year 1 predictive model output of $18.2m (refer to Attachments 5.5.01E and 5.5.01B)
- the model can only predict below ground degradation. By comparing the total reported below and above ground degradation to determine, the total uncaptured above ground degradation was able to be estimated. The total degradation forecast over 5 years was approx. 87,000 to 88,000, which is similar to the proposed program.
- a comparison of poles with a modelled HI greater than 8 against historical defect data showed that these poles had already been decommissioned, though this information was not promptly updated in the system due to delays in the decommissioning process. This finding confirms the model's ability to consistently predict unserviceability for poles with an HI above 8, hence these assets were removed from the model to align more closely with the actual network conditions.
- Validating the CBRM model with an alternative modelling methodology: optimised pole replacement model. The optimised pole replacement year was devised from locating the year when the annualised replacement cost is the same (or closest to) the risk/benefit year (refer to Attachments 5.5.01E and 5.5.01B).

7 EX-ANTE ANALYSIS

7.1 Overview

The AER Draft Decision concluded that a substantial proportion of the repex ex-ante forecast was not prudent and efficient. This was largely based on the AER not approving the use of ex-post and current period replacement volumes to forecast 2025-30 repex and the proposed opportunistic replacement. The AER noted that the Draft Decision is a placeholder and has provided Ergon Energy with the opportunity to present any data and information gaps at the Revised Regulatory Proposal stage.

The AER’s alternative forecast considered both top-down and bottom-up analysis, including benchmarking Ergon Energy’s replacement rate against Essential Energy to derive the alternative forecast for poles, distribution transformers and distribution switches. We do not agree with this conclusion and approach taken, with our reasoning and evidence provided in Section 4.3. The AER also proposed a 47.1% reduction to poles and other assets that were forecast to be consequentially (opportunistically) replaced with pole and conductor replacement.

Ergon Energy has revisited the ex-ante forecast volumes and expenditure to respond to the AER concerns. The revised position is now 17% less than the Regulatory Proposal in $2024/25. Table 9 provides a breakdown of the Regulatory Proposal, AER Draft Decision and our revised position for each asset class in the Revised Regulatory Proposal.

Table 9 : Comparison between Regulatory Proposal, AER Draft Decision and Revised Regulatory Proposal ($ million, $2024/25)

Asset	Regulatory Proposal ($m)	AER Draft Decision ($m)	Revised Regulatory Proposal ($m)	Revised Position
Asset categories – modified proposed expenditure and position				
Poles	815.1	420.5	744.4	Modify
Pole top structures	262.3	138.1	252.6	Modify
Overhead conductors (Consequential)	297.1	164.8	254.1	Justify for Consequential Only
SCADA	132.9	90.6	111.3	Modify
Asset categories – accepted proposed expenditure				
Distribution transformers	152.6	118.4	118.4	Accept
Distribution switches / switchgear	88.0	70.7	69.8	Accept
Service lines	87.8	87.8	87.8	Accept
Overhead conductors (Conductor alone)	240.7	240.7	240.7	Accept
Other (Underground cables, Substation Assets)	461.3	405.6	405.9	Accept
CTG/S (*not part of this narrative as this is AUGEX*)	181.1	105.7	164.8	Modify (not part of this narrative)
Total	**2,718.8**	**1,842.7**	**2,449.4**	

7.2 Justification for ex-ante expenditure

Poles

The AER Draft Decision noted inadequate justification for the opportunistic replacement proposed and insufficient evidence to demonstrate historical expenditure should be used as a basis for proposed

2025-30 regulatory period expenditure. Table 10 provides an overview of the revised proposed repex for the poles standalone program in 2025-30 period.

Table 10 : Proposed 2025 – 2030 revised replacement expenditure for poles ($ million, $2024/2025)

Year $m, direct 2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	Total
Pole Replacement	85.3	85.7	86.1	86.6	87.2	**431.0**
Pole Reinforcement	9.6	9.6	9.7	9.7	9.8	**48.4**
Total Pole expenditure	**94.9**	**95.4**	**95.8**	**96.3**	**97.0**	**479.4**
Pole Top (Consequential)	30.8	31.0	31.1	31.3	31.5	**155.6**
Services (Consequential)	6.2	6.2	6.3	6.3	6.3	**31.3**
Pole Transformer (Consequential)	7.8	7.8	7.9	7.9	8.0	**39.5**
Switch (Consequential)	7.7	7.7	7.7	7.8	7.8	**38.7**
Total Consequential	**52.5**	**52.7**	**53.04**	**53.3**	**53.6**	**265.1**
Grand Total Pole BC (Pole + Consequential)	**147.4**	**148.1**	**148.8**	**149.6**	**150.6**	**744.5**

We are proposing to continue with the ex-post period volumes for replacement of 16,600 poles per annum. This was determined based on the three-year rolling average volume of replacements and addresses reducing failure rates below ESCOP levels of <0.01% per year, improvements in defect detection and managing an ageing population of assets.

Table 11 provides the proposed volumes of pole replacements for the preferred option.

Table 11 : Proposed 2025 – 2030 revised replacement volume for poles

Volumes	2025/26	2026/27	2027/28	2028/29	2029/30	Total
Total Pole Replacement & Reinforcement volumes	16,631	16,631	16,631	16,631	16,631	**83,155**

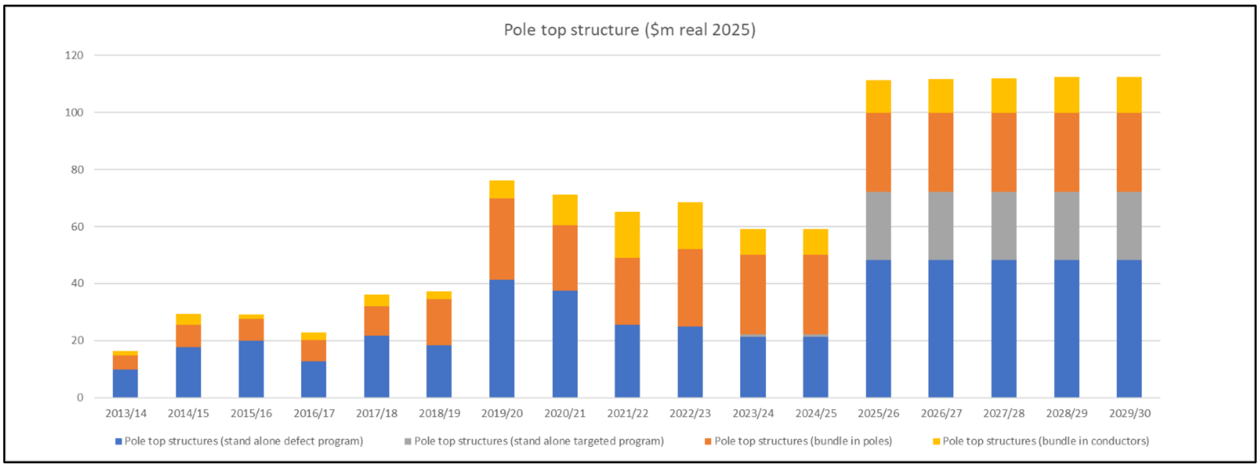
Drivers for investment in poles

Since 2015, there has been an upward trend of pole failures, primarily due to ageing low strength poles (3 kilonewton (kN)). Improved pole serviceability calculations led to higher volumes of pole replacements in the 2020 – 2025 period. Due to this change, we anticipate earlier detection of pole defects and have identified a need to replace in response to high pole failure rates within our low strength 3kN poles. As a result of the driver to maintain a serviceable population, there is a need to increase investment in the next regulatory period by maintaining 16,600 pole replacements per annum.

Pole top structures

The AER Draft Decision noted insufficient detail to support the prudency and efficiency of Ergon Energy's forecasts for pole top structures, especially for the material step up in its stand-alone targeted program. Figure 11 provides a breakdown of the pole top structure repex across the current and forecast regulatory periods and shows the proposed uplift in pole top structure stand-alone replacements and introduction of targeted program from 2025.

Figure 11 : Pole top structure programs across three regulatory periods



Source: Ergon Energy RIN REPEX Forecast 2025-30

There are a number of drivers for the uplift in the pole top structure repex and forecast volumes, but primarily in the last three years, around 80,000 pole top structures have been identified as having C3 defects or minor deterioration. In addition to this, currently, over 30% of pole top structures are operating beyond their expected life. Approximately 20% of pole top structure failures lead to conductors dropping, which poses a safety risk to the community.

While a portion of these defects are estimated to be rectified from other programs such as pole and conductor replacement, the remaining emerging defect volumes are proposed to be managed by introducing a targeted replacement of 7,000 per annum C3 defects from 2025. The 7,000 per annum targeted program is additional to the historical defect replacement program (historical defect replacement program was not targeted). This is approximately 10% of identified C3 defects and we will target these replacements in high-risk areas such as schools, pools and densely populated areas.

The targeted 7,000 per annum will focus on C3 pole top structure defects that are primarily located in coastal regions of the Ergon Energy network, where there is generally a higher level of rainfall and therefore a higher proportion of pole top structure deterioration.

Ergon Energy are planning to replace a total of 30,000 pole top structures per annum, which includes defects, opportunistic and targeted pole top replacements. Table 12 provides an overview of the revised proposed repex for the pole top structures standalone program and consequential replacement in 2025-30.

Table 12 : Proposed 2025 – 2030 revised replacement expenditure for pole top structures ($ million, $2024/2025)

Year $m, direct 2024-25	2025/26	2026/27	2027/28	2028/29	2029/30	Total
Defect	27.4	27.5	27.7	27.9	28.1	**138.5**
Targeted Replacement	22.6	22.7	22.8	22.9	23.1	**114.0**
Total Pole Top Structure BC	**50.0**	**50.2**	**50.5**	**50.8**	**51.2**	**252.6**

CBA for ex-ante pole top structures (NPV outcome)

The AER Draft Decision noted there was insufficient evidence in support of the prudency and efficiency of its forecast for pole top structures and reasoning for the material step-up in the forecast period.

For the pole top structures business case, the historical strategy was to replace only defective pole top structures, so the step change to achieve additional targeted replacement occurs in the ex-ante period. The counterfactual option considered in the pole tops business case is therefore the three-year actual defects volumes averaged over the period 2020/21, 2021/22 and 2022/23 to demonstrate the replacement rate before the step change in volumes proposed for the 2025-2030 period.

The options considered in the pole top structures CBA and business case for the Revised Regulatory Proposal are:

- Option 1: Replacement of only unassisted failed pole top structures given the historical pole failures continues to be trending upwards
- Option 2: Replacement of the forecast defect volume in addition to 3,500 targeted replacements per annum as a low volume option to test the counterfactual and step change justification. This evaluates what will happen to the network if Ergon Energy only undertook a targeted replacement of a low volume of pole top structures.
- Options 3: Replacement of the forecast defect volume in addition to 7,000 targeted replacements per annum to test the counterfactual and step change justification. This evaluates what will happen to the network if Ergon Energy undertook a targeted replacement of 10% of identified C3 defects of pole top structures.
- Option 4: Replacement of 34,528 pole tops which is slightly above Ergon Energy's combined targeted, opportunistic and defect driven planned replacement volume of 30,000 pole top structures per annum.

Ergon Energy has also undertaken an exercise to validate the data quality used as inputs into the CBA model. As a result of the improvements and updates there has been a progression in the outputs for pole top structures which is reflected in the pole top structures business case.

Drivers for investment in pole top structures

Over 80,000 pole top structures have been identified as being in a degraded condition. In addition, over 30% of in-service population are 35 years or older. A proportion will need to be managed in the upcoming regulatory period by undertaking a targeted replacement program of 7,000 per annum. The 7,000 additional pole tops have been identified as C3 (emerging defects) that may result in a failure if left unattended. A CBA analysis based on the C3 defects shows that the step change in replacements is the most efficient option.

Consequential overhead conductors

The AER accepted the ex-ante overhead conductor asset replacement program for 2025-30. However, Ergon Energy is defending its original proposed ex-ante forecasts for the consequential enabling replacement of poles, pole top structures and service lines under the overhead conductor program. As part of the replacement program for conductors, other assets that are at risk are often bundled together to ensure efficient delivery of the program.

In accordance with our 2019 Bundling Guidelines (refer to Attachment 5.5.02E), we undertake bundling of work to deliver more efficient outcomes based on a matrix and set of guidelines.[13] An example of this is bundling of P1 and P2 defects with other planned repex works like problematic overhead service wires within maintenance zones. In this instance, we consider there are sufficient efficiency (particularly in regional areas and to avoid multiple truck visits) benefits associated with replacing poles, pole top structures and service lines at the same time as reconductoring instead of replacing them at other times. Other benefits include avoided cost of multiple redeployments to the same areas, reductions in supply risk, safety advantages from reduced overall time of road closures. This also aligns to updates to service standards requirements.

Ergon Energy has maintained the proposed expenditure in the Revised Regulatory Proposal for consequential replacement of poles, pole tops and service lines (refer to Table 13).

Table 13 Proposed 2025 – 2030 revised replacement expenditure for overhead conductors ($ million, $2024-2025)

Year $m, direct 2024-2025	**2025/26**	**2026/27**	**2027/28**	**2028/29**	**2029/30**	**Total**
Poles	17.8	18.6	19.1	19.7	20	95.2
Pole tops	16.1	16.8	17.3	17.8	18.1	86.1
Service lines	4.1	4.3	4.4	4.6	4.7	22.1
Total Consequential	**38**	**39.7**	**40.8**	**42.1**	**42.8**	**203.4**

[13] Energy Queensland, *Bundling Guidelines*, June 2019

Note: we have proposed consequential replacement of other assets, such as transformers and switches, which have already been accepted by the AER so are not included within this document.

Drivers for investment in consequential overhead conductor replacements
Consequential replacements of poles, pole top structures and service lines are required under the overhead conductor replacement program. Investments in consequential replacements will achieve improved efficiency through the bundling of work orders aimed at improving operational performance; and ensures reliability and safety across the network.

8 APPENDICES

Appendix A - Response to comments on ex-post forecast in AER Draft Decision

Table 14 : AER comments on proposed ex-post repex programs

Response to AER Draft Decision | Ex-Post			
Section	**Page**	**AER raised issue**	**Ergon Energy response**
A.3.1.2	28, 35	• While Ergon Energy's decision to increase investment in poles was highlighted in a Board Paper, EMCa noted that there was no detailed business case or root cause analysis at the time, and suggested that revised business cases should have been provided to justify the additional capex.	• Refer to Section 6.3
A.3.1.2	29	• While Ergon Energy has provided a reasonable basis for the overspend on poles, more evidence is needed to fully demonstrate the prudency and efficiency of the extent of the overspend.	• Refer to section 6.3
A.3.1.2	30	• Ergon Energy did not provide evidence that it tested and considered the outcomes from applying Energex's pole management practices and standards.	• Refer to section 4.3
A.3.1.2	31	• The CCP30 questions whether bringing forward pole replacement was the prudent and efficient response: Must it all be done now? We recognise the imperative to address safety risks quickly; but again, in a capital constraint situation, risk management, prioritisation and a more measured approach may be necessary.	• Please refer to chapter 6
A.3.1.2	36	• Is there evidence of any benchmarking against other DNSPs (other than Energex) that Ergon Energy has undertaken? Was there a comparison between the bottom-up results and the revealed performance?	• Refer to Section 4.2 (Energex) and 4.3 (Essential Energy)
A.3.1.2	36	• A bottom-up reconciliation of the historical replacement volume and replacement reasons against the Ergon Energy's submitted RIN information at the individual asset level (including each asset functional location, age and other key characteristics). Explanation is required if the data does not reconcile.	• Refer to Attachments 5.5.01C and 5.5.01D
A.3.1.2	36	• There appears to be misalignment between the comments and the categorisation of failure in the detail failure data provided that requires further clarification.	• Refer to Attachment 5.2.02N

Response to AER Draft Decision | Ex-Post			
Section	**Page**	**AER raised issue**	**Ergon Energy response**
A.3.1.2	36	• A reconciliation and a detailed explanation on the identified negative balancing items and discrepancies between data sources. We would expect Ergon Energy to nominate one version to be relied on and the reason this version should be relied on. Ergon Energy noted incorrect data was submitted in its 2020–25 proposal	• Refer to Attachment 5.2.02N

Appendix B - Response to comments on ex-ante forecast in AER Draft Decision

The following tables summarise the AER position and comments on the submitted business cases and how these have been addressed in the relevant updated business cases.

Table 15 : AER comments on proposed repex programs for 2025-30

Section	Page	AER Comment	How this has been addressed
5.3	9	Ergon Energy's response of adopting Energex's pole management practices and standards has resulted in higher pole replacement than is efficient	Refer to Section 4.2
5.4	15	Ergon Energy does not provide sufficient evidence to demonstrate that its historical expenditure is a reasonable proxy for prudent and efficient expenditure in the forecast period, especially given the concerns we have about its expenditure in the ex-post period	Refer to Chapter 6 and Section 7.2
A.3	25	While we observe the increasing trend in the three-year moving average, we also note that the rate is trending downward by 2022–23.	Refer to Section 7.2
A.3.1.3	35	Evidence of defect concerns with the pole population in a specific location	Refer to Section 3.2, 6.2 and 7.2.
B.1.3.1	49	Ergon Energy has not provided adequate justification for the considerable opportunistic replacement proposed	Refer to Section 7.2
B.1.3.2	58	Ergon Energy's replacement rate should be benchmarked against Essential Energy	Refer to Section 4.3
B.1.3.1	53	We found little detail in Ergon Energy's supporting documentation, especially about the reasoning for the material step up in its stand-alone program	Refer to Section 7.2
B.1.3.1	53	In particular, EMCa placed little weight on the business case as there are several major errors including differing counterfactual volumes, and incorrect modelling.	Refer to Attachments 5.5.02C, 5.5.03C and 5.5.01B

Appendix C – Description of Wood Pole serviceability changes

Table 16 : Wood Pole serviceability changes implemented in April 2019

Change	Detailed Description	Reason for Change	Effect of Change
Change to Limit State strength calculation	Change from Factor of Safety and Working Strength calculation to Limit State calculation	Maintain consistency with overhead design calculations.	No material change
Change to Characteristic Bending Strengths	• Previous calculation used the Bending Strength values of unseasoned timber from Table 2.1 of AS/NZS 2878:2000 Timber Classification into Strength Groups • Changed to values from Table F.1 of AS/NZS 7000:2010 which were lower for each Strength Group	• Maintain consistency with values used by overhead line designers. • Consistency with Australian standard for overhead lines.	An increased number of poles failed stage 1 of the serviceability assessment and were passed to stage 2.
Reduction of inspection drill hole diameter	Inspection drill hole diameter was incorrectly hardcoded as 14mm and was changed to correct value of 12mm	Loss of section due to drill holes was calculated to be higher than actual.	A minor decrease in poles failing stage 1 and being passed to Stage 2.
Change to Pole Structure loads and logic	• Added new Pole Structures • Changed pole loads depending upon on wind region	• Previous pole loads did not reflect different wind pressures across the network. • Additional structures and logic required to ensure more accurate selection of pole tip loads.	• Some pole structure loads were increased in wind region C, resulting in an increase in unserviceable poles in stage 2 of the serviceability assessment. • Some pole structure loads were decreased in wind regions A and B, resulting in a decrease in unserviceable poles in stage 2 of the

Change	Detailed Description	Reason for Change	Effect of Change
			serviceability assessment.
Minimum Strength serviceability threshold introduced	Introduced a new serviceability threshold of Minimum Strength. Calculated Limit State strength must be ≥ 5kN Limit State to be serviceable.	• Outcome of Low Strength Pole Working Group investigation of safety concerns raised by work crews. • Alignment with Energex network minimum strength of 3kN WS	Major increase in unserviceable poles based on the calculated degraded Limit State strength. Previously the process was based on pole tip load requirements, which on SWER feeders is minimal, meaning that many Low Strength Poles passed serviceability but were unsafe for Field Staff to climb and work aloft.
Poles with less than 30mm minimum wall thickness not to be nailed	Change to the pole nailing criteria for unserviceable poles: Poles that do not satisfy minimum wall thickness criteria will no longer be nailed.	Alignment with Energex work practices	Minor decrease in nailed poles and an increase in replaced poles.
Untreated/natural poles not to be nailed	Change to the pole nailing criteria for unserviceable untreated/natural poles which were no longer to be nailed.	• Untreated/natural poles have been in use since the 1940s to 1950s and were phased out between 1962 to 1967 when CCA treated poles were introduced. Life extension (i.e. nailing) is not economical for these poles. • Pole nails are designed to support the pole in the inspection zone. The design requires a solid pole butt and foundation. Historic data indicated a higher percentage of butt failures in aged poles.	Decrease in nailed poles and an increase in replaced poles.
Poles with less than 50% remaining wood at groundline not to be nailed	Change to the pole nailing criteria for unserviceable poles: Poles that have less than 50% remaining wood at groundline	• Alignment with serviceability criteria for nailed poles. Expected life extension of pole after nailing is 15 years. Nailed poles were being	Decrease in nailed poles and an increase in replaced poles.

Change	Detailed Description	Reason for Change	Effect of Change
	will no longer be nailed.	made unserviceable one cycle after nailing. • Alignment with Energex work practices	
Poles with calculated strength less than 5kN LS not to be nailed	Change to the pole nailing criteria for unserviceable poles: Poles with calculated strength less than 5kN LS calculated will no longer be nailed.	Outcome of Low Strength Pole Working Group investigation of safety concerns raised by work crews. Expected life extension of pole after nailing is 15 years. Low strength poles 3kN WS/5kN LS were being replaced due to defects at the head of the pole between 4 to 8 years after nailing.	Major decrease in nailed poles and an increase in replaced poles.

Table 17 : Wood Pole serviceability changes implemented August 2020

Change	Detailed Description	Reason for Change	Impact of Change
Poles with calculated strength between 4.5kN and 5kN LS to be nailed	Change to the pole nailing criteria for unserviceable poles: Poles with calculated strength between 4.5kN and 5kN LS to be nailed as suitable nail size was identified	• Reduce pole replacements and increase pole nailing rates. • Request of Operations group during COVID	Moderate increase in nailed poles and decrease in replaced
Change to Pole Structure loads	• Added 3 new pole structures • Reduced pole load on one structure	• Three additional structures required to ensure more accurate selection of pole tip loads by inspectors. • Reduced required load for one structure.	Reduction in poles failing Stage 2.

9 GLOSSARY

Term	Meaning
AER	Australian Energy Regulator
AHI	Asset Health Index
ALARP	As Low As is Reasonably Practicable
Capex	Capital expenditure
CBA	Cost-benefit analysis
CBRM	Condition Based Risk Management
CNAIM	Common Network Asset Indices Methodology
CoF	Consequence of Failure
DNSP	Distribution Network Service Provider
ENCAP	Electricity Network Capital Program
ESCOP	Electrical Safety Code of Practice
EQL	Energy Queensland Limited
kN	Kilonewton
kV	Kilovolt
kVA	Kilovolt ampere
kW	Kilowatt
kWh	Kilowatt hour
LoC	Likelihood of Consequence
LV	Low voltage
NER (or Rules)	National Electricity Rules
NPV	Net Present Value
PoF	Probability of Failure
RAB	Regulatory asset base
Repex	Replacement expenditure
RIN	Regulatory information notice
SFAIRP	So Far As Is Reasonably Practicable
VCR	Value of Customer Reliability