Attachment A
Pole Replacements
Ex post Review of Ergon Energy 2018-2023 Capital Expenditure

January 2024

ERGON ENERGY NETWORK
Part of Energy Queensland

Note

This attachment forms part of Ergon Energy's justification of the ex post review of its 2018-2023 capital expenditure for submission to the AER as part of its 2025-30 Regulatory Proposal.

It should be read in conjunction the main overview document and the following attachments:

Overview of Ergon Energy RDP 2025 Ex Post Review

Attachment A	Augmentation Capex
Attachment B	Replacement Capex
Attachment B1	Poles
Attachment B2	Overhead Conductors
Attachment B3	Pole Top Structure
Attachment B4	Switchgears
Attachment B5	Transformers
Attachment B6	Underground Cables
Attachment B7	Services
Attachment B8	SCADA
Attachment C	Connection Capex
Attachment D	Non Network Capex
Attachment D1	ICT
Attachment D2	Property
Attachment D3	Fleet
Attachment D4	Tools and Equipment
Attachment E	Indirect Cost

Notes

This attachment forms part of Ergon Energy's justification of the ex post review of its 2018-2023 capital expenditure for submission to the AER as part of its 2025-30 Regulatory Proposal. It should be read in conjunction the main document.

The ex post review submission includes the following documents.

Overview Ex-post Review of Ergon Energy 2018-2023 Capital Expenditure

Attachment A	Pole Replacements
Attachment B	Overhead Conductor Replacements
Attachment C	Pole Top Structure Replacements
Attachment D	Switchgear Replacements
Attachment E	Transformer Replacements
Attachment F	Underground Cable Replacements
Attachment G	Service Replacements
Attachment H	SCADA Replacements
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Attachment J	ICT Capex

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1 INTRODUCTION

Poles and towers support electrical assets such as conductors, cross arms pole top transformers, switches, etc to deliver electricity to customers and ensure the physical separation of these electrical assets from public access. Poles and towers are also used to support additional assets including public lighting and telecommunications equipment, owned by third parties.

Our expenditure on pole replacements over the review period[1] was above the AER's forecast by $323 million ($2024-25). We have conducted a Post Implementation Review (PIR) on pole replacements to evaluate outcomes and benefits of the expenditure.

This paper provides the background and analysis of Ergon Energy's expenditure on pole replacements to identify the causes and drivers behind the increase in expenditure.

2 BACKGROUND

In our 2021-22 CA RIN 5.2, we reported a pole population of over 980,004 poles including over 869,263 wood poles[2].

Prior to 2017-18, the pole replacement rate averaged around 3,600 poles per year, representing a replacement rate of less than 0.5% per year. A replacement rate of 3,600 poles per year would imply an asset life of over 230 years which is clearly an unsustainable approach in the longer term.

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 Electrical Safety Code of Practice (ESCOP) 2020[3] – Works details requirements for maintenance of supporting structures for lines including the expectations for supporting structure (e.g. 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 2020 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 6 months.

[1] The review period as defined in NER S6.2.2A(a1) is 2018-19 to 2022-23
[2] RIN 5.2 – exclude staking of poles to avoid double counting.
[3] https://www.worksafe.qld.gov.au/__data/assets/pdf_file/0019/18343/es-code-of-practice-works.pdf)

3 ASSET MANAGEMENT PRACTICE

The historical approach to pole remediation in Ergon has been through periodic inspection and replacement or nailing of defective poles. Concerns with increasing pole failures led to an improvement in data collection of defective poles in 2017-18 followed by a review of the pole strength calculation (also called serviceability calculator) in early 2019 leading to the following changes:

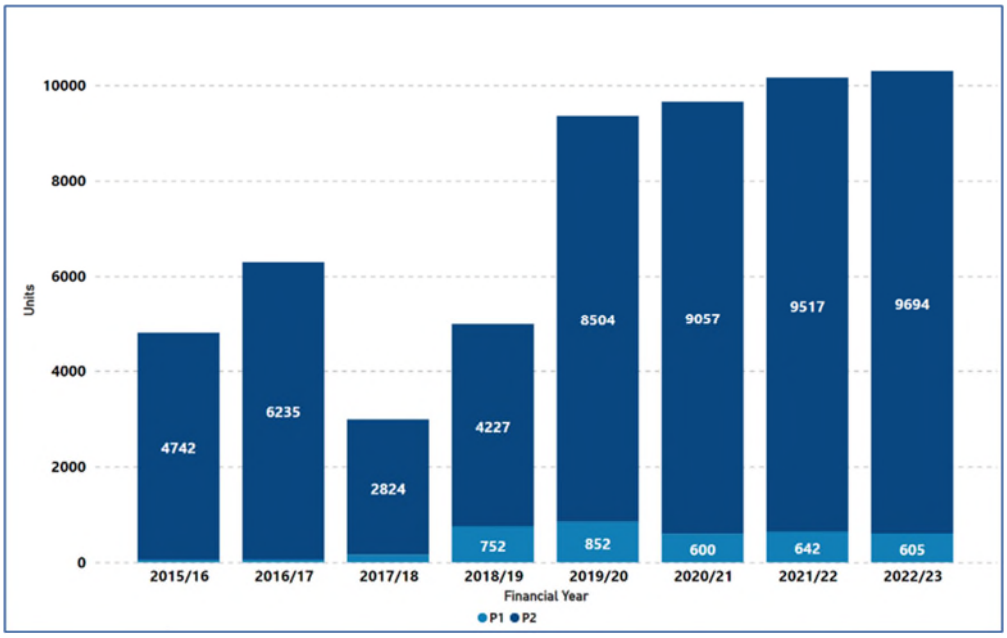
- Reduced the pole inspection cycles of six and eight years to five years; in alignment with the legislative requirement to identify defects early.
- Improved field staff training in data capture and collection.
- Improved pole inspection serviceability calculations to increase the accuracy in the estimation of residual pole strength, the classification of unserviceable poles and the estimation of pole health and probability of failure in current and future years.

These changes led to an increase in defect rates for poles being detected, resulting in a higher level of pole remediation requirements.

It is noted that the AER was advised of this change in pole strength algorithm in our 2020-25 revised regulatory proposal with details set out in Appendix J of Ergon Energy - Revised Proposal - 6.027 - Business Case Poles and Towers - December 2019.

Figure 1 below tracks the historical number of pole defects which shows a step increase in 2017-18 followed by another step change in 2019-20. The initial increase is attributed to improved data recording during that period. The step change in 2019-20 was driven by the serviceability calculation change.

Figure 1: Historical Pole defects in Ergon



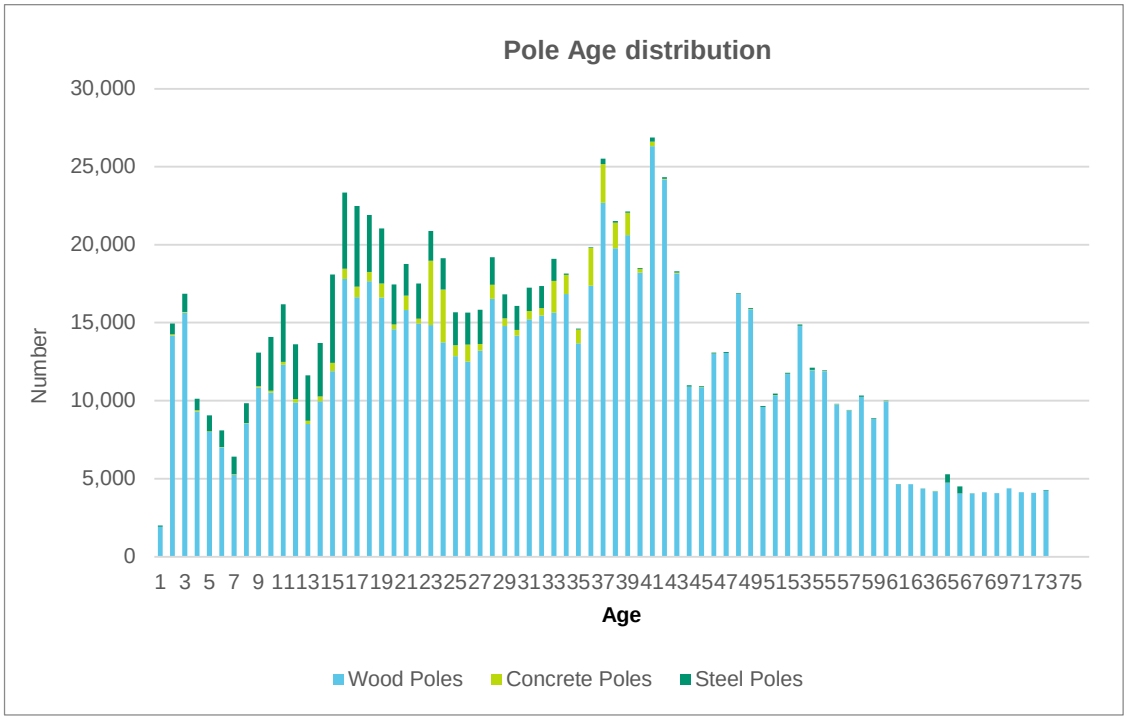
Based on an analysis of 2021-22 CA RIN 5.2, 18% (154,312 poles) of our wood poles are over 50 years old, with 1% (8,452 poles) over the age of 70.

Table 1: Wood Poles over 50 years

Decription	Quantity	%
Total Number of Wood poles	869263	100%
Number poles above 50 years	154312	18%
Number poles above 55 years	94231	11%
Number poles above 60 years	51191	6%
Number poles above 65 years	29200	3%
Number poles above 70 years	8452	1%

Our pole population by age distribution[4] is shown in the Figure 2 below.

Figure 2: Pole Age Distribution



[4] Data Source – 2021-22 CA RIN 5.2

4 POLE FAILURES IN ERGON

Information on pole and pole failures are reported annually to the AER in the Category Analysis Regulatory Information Notice (CA RIN) 2.2.

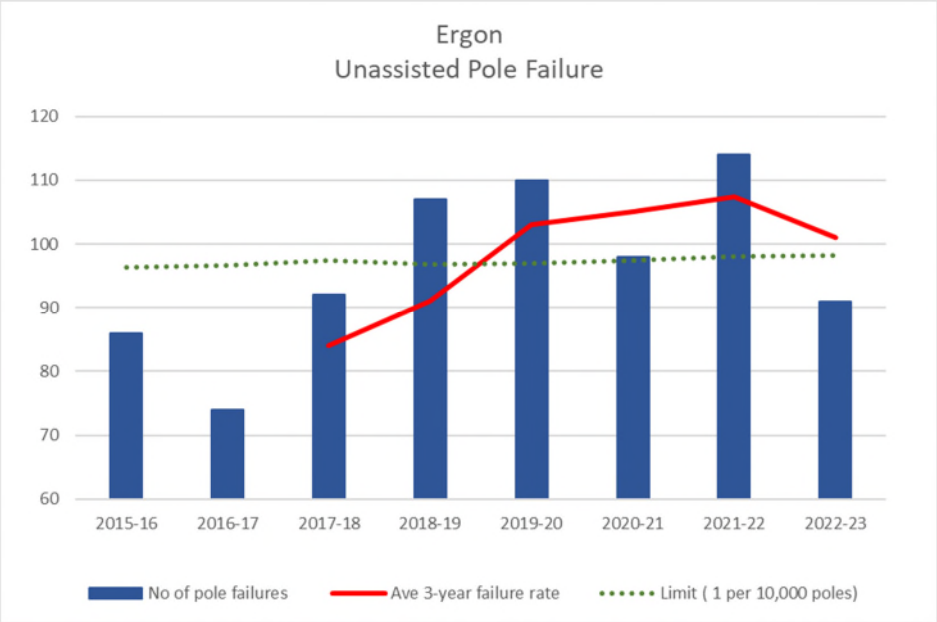
Table 2 below is a summary extracted from RIN 2.2 and RIN 5.2 from 2015-16 onwards.

Table 2: Ergon's Pole data failure rate

Year	No of poles (Note 1)	No of pole failures (Note 2)	Ave 3-year failure rate	Limit (1 per 10,000 poles)
2015-16	962,807	86		96
2016-17	965,911	74		97
2017-18	973,700	92	84	97
2018-19	968,754	107	91	97
2019-20	970,224	110	103	97
2020-21	973,804	98	105	97
2021-22	980,004	114	107	98
2022-23	982,307	91	101	98
Note 1:	Data extracted from RIN 5.2 Asset Age profile			
Note 2:	Revised data from RIN 2.2 provided and updated to the AER			

As shown in Figure 3 **Error! Reference source not found.**below, there is a clear trend of increasing pole failures in Ergon from 2017-18 onwards. Since 2019-20, Ergon Energy's three-year moving average of unassisted pole failures exceeded the ESCOP target of less than 1 per 10,000 poles. The early identification of pole defects and higher remediation has reduced rate of pole failures; but was still tracking above the regulatory target as set out by ESCOP by the end of 2022-23.

Figure 3: Unassisted Pole Failure



5 INDEPENDENT POLE ASSESSMENT AND CLASSIFICATION REVIEW

We commissioned EA Technology to conduct a review of its pole inspection and assessment methodologies to ensure that they are industry best practice.

The key findings of the review are:

1. Pole assessment algorithm (now known as the pole serviceability calculation) used is consistent with world best practice.
2. The pole assessment methodology and active pole replacements to reduce unassisted pole failure rate are a necessary response for Ergon to fulfill its obligation set out in the Electrical Safety Act (Qld).

In its review EA Technology concluded the following:

> *'Ergon Energy's Pole Assessment Algorithm is consistent with modern overhead line design methods and industry best practice in the USA, the UK, Canada and Australia. Improvements in the process made since 2017, including pole inspector retraining and modifications to the algorithm, have been delivering increasing accuracy in data and modelling results. This has led to an increased volume of pole replacements and reinforcements required, which over time will lead to a flattening off of unassisted pole failures and an improvement in the safety and reliability of the network.'*[5]

A summary of conclusions of the review is provided in Appendix B1.1.

5 EA Technology Report Pole Assessment and Classification Review (Report No: J001571) 9 July 2021

6 2015-20 DISTRIBUTION DETERMINATION

A high-level review of the 2015-20 Regulatory Determination process was undertaken to determine the basis and reasons of the AER decision on pole replacements. Unless otherwise stated, all values in this section are provided in $2014-15 as used in the 2015-20 Distribution Determination.

Table 3 is a summary of information on pole replacements from the 2015-20 regulatory determination.

Table 3: 2015-20 Pole Replacements Forecasts

	POLES 2015-2020 Determination					
$ 2014-2015 ($,000)	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	Total
Revised Regulatory Proposal	$ 16,849	$ 25,704	$ 10,684	$ 15,264	$ 15,642	$ 84,144
Repex Model Final Decision	$ 35,098	$ 37,529	$ 40,197	$ 43,155	$ 46,450	$ 202,430
AER Final Decision Forecast	$ 16,849	$ 25,704	$ 10,684	$ 15,264	$ 15,642	$ 84,144
Volume (units)	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**Total**
Revised Regulatory Proposal	4,850	6,516	3,369	4,050	4,605	23,390
Repex Model Final Decision	8,662	9,127	9,599	10,082	10,580	48,049
AER Final Decision Forecast	4,850	6,516	3,369	4,050	4,605	23,390
Unit Cost ($)	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**Average**
Revised Regulatory Proposal	$ 3,474	$ 3,945	$ 3,171	$ 3,769	$ 3,397	$ 3,551
Repex Model Final Decision	$ 4,052	$ 4,112	$ 4,188	$ 4,281	$ 4,390	$ 4,205
AER Final Decision Forecast	$ 3,474	$ 3,945	$ 3,171	$ 3,769	$ 3,397	$ 3,551

We reviewed the AER Final Decision, Attachment 6 – Capital Expenditure Ergon Energy Determination 2015-20 in relation to pole replacements and noted the following:

- Ergon submitted its forecast expenditure for pole replacement in the reset RIN.
- EMCa, the AER's consultant on capex noted that the proposed expenditure in the Revised Regulatory Proposal is broadly consistent with the last year on the 2010-15 regulatory control period as illustrated on in Figure 2 of the report6.
- It is noted that at the time of RIN submission the forecast pole replacement expenditure for 2014-15 was $16 million. RIN data reported in October 2015 for the actual expenditure in 2014-15 was $35.6 million.
- The AER noted that the unit cost submitted in the reset RIN was lower than the historical unit costs.
- The AER adopted Ergon's proposed expenditure and the unit cost7 as submitted by Ergon on the basis that the service provider's own data provided the best estimation of unit cost.
- On page 6-89 of the AER Final Decision, Attachment 6 – Capital Expenditure Ergon Energy Determination 2015-20 (footnote 203) the AER also stated the following:

  "..we have accepted Ergon Energy's proposed expenditure on pole and overhead conductor replacement ($84 million and $216 million, respectively). For these two categories, the estimates from our predictive modelling were higher than Ergon Energy's forecast. For the

[6] EMCa – Review of Review of Proposed Capital Expenditure in Ergon Energy's Revised Regulatory Proposal September 2015

7 Page 6-89 AER Final Decision, Attachment 6 – Capital Expenditure Ergon Energy Determination 2015-20

remaining four asset categories, the AER adopted the outcome of the calibrated repex model, being $242 million."

- The AER repex model forecast a total replacement of 48,048 poles over the regulatory control period compared to our forecast of 23,390 poles.

Our forecast of pole replacement volumes in the 2015-20 Regulatory Proposal and Revised Regulatory Proposal, which was accepted by the AER in their forecast, is clearly erroneous. Further Ergon's forecast unit cost unit which was noted by the AER as lower than historical unit cost was adopted. The combination of the erroneous volume and unit costs resulted in a much lower pole repex forecast for the 2015-20 regulatory control period than was necessary for us to meet our obligations.

7 2020-25 DISTRIBUTION DETERMINATION

Details of the expenditure and volume from the 2020-25 regulatory determination process is provided in Table 4 below.

Unless otherwise stated, all values in this section are in $2019-20 as used in the 2020-25 Distribution Determination.

Table 4: 2020-25 Pole Replacements[8]

	POLES					
$ 2019-2020 ($,000)	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	Total
Regulatory Proposal	$ 54,730	$ 55,256	$ 58,293	$ 60,051	$ 51,574	$ 279,904
Repex Model Draft Decision	$ 46,583	$ 51,404	$ 56,582	$ 62,160	$ 68,173	$ 284,901
AER Draft Decision Forecast	$ 46,583	$ 51,404	$ 56,582	$ 62,160	$ 68,173	$ 284,901
Revised Regulatory Proposal	$ 77,781	$ 78,364	$ 81,994	$ 83,946	$ 74,495	$ 396,580
Repex Model Final Decision	$ 43,643	$ 47,727	$ 51,906	$ 56,181	$ 60,560	$ 260,017
AER Final Decision Forecast	$ 43,643	$ 47,727	$ 51,906	$ 56,181	$ 60,560	$ 260,017
Volume (units)	**2020-2021**	**2021-2022**	**2022-2023**	**2023-2024**	**2024-2025**	**Total**
Regulatory Proposal	8,487	9,178	9,178	8,487	8,487	43,816
Repex Model Draft Decision	6,636	7,169	7,710	8,261	8,823	38,600
AER Draft Decision Forecast	6,636	7,169	7,710	8,261	8,823	38,600
Revised Regulatory Proposal	15,254	16,019	15,878	15,032	15,391	77,574
Repex Model Final Decision	5,839	6,366	6,901	7,443	7,992	34,540
AER Final Decision Forecast	5,839	6,366	6,901	7,443	7,992	34,540
Unit Cost ($)	**2020-2021**	**2021-2022**	**2022-2023**	**2023-2024**	**2024-2025**	**Average**
Regulatory Proposal	$ 6,449	$ 6,020	$ 6,351	$ 7,076	$ 6,077	$ 6,395
Repex Model Draft Decision	$ 7,019	$ 7,170	$ 7,338	$ 7,524	$ 7,727	$ 7,356
AER Draft Decision Forecast	$ 7,019	$ 7,170	$ 7,338	$ 7,524	$ 7,727	$ 7,356
Revised Regulatory Proposal	$ 5,099	$ 4,892	$ 5,164	$ 5,584	$ 4,840	$ 5,116
Repex Model Final Decision	$ 7,474	$ 7,497	$ 7,522	$ 7,549	$ 7,577	$ 7,524
AER Final Decision Forecast	$ 7,474	$ 7,497	$ 7,522	$ 7,549	$ 7,577	$ 7,524

The key points on pole replacements from the 2020-25 regulatory determination are:

[8] The regulatory process does not require a submission of a revised reset RIN with an RRP. In lieu of Reset RIN, a selection of updated RIN templates with detailed information of the forecast volumes and costs was provided to the AER. sourced from this file. To align with the AER's FD, CTG/CTS cost are re-allocated from Others to the modelled and unmodelled asset categories as per the Regulatory Proposal

- In the Regulatory Proposal submitted to the AER in January 2019, the forecast program for pole remediation[9] was based on our serviceability calculation prior to the change.
- A reset RIN[10] accompanied the Regulatory Proposal submission in January 2019 with a forecast program for pole remediation across the regulatory control period for 43,817 poles at $279.9 million.
- Pole replacements associated with the CTG/CTS program were included in the modelled repex for poles.
- The forecast repex the Regulatory Proposal also included pole replacements associated with the Childers to Gayndah 66kV line replacement.
- In its draft decision, the forecast of repex for poles remediation[11] was determined by the AER using its repex model[12].
- The AER's draft decision provided a pole replacement repex of $284.9 million[13] in accordance with the output from its repex model. The AER noted that this is higher than our proposed amount for poles of $279.9 million. However, the overall modelled repex forecast in the draft decision was $637 million compared to $765 million forecast in our Regulatory Proposal
- The Draft Decision also noted that the forecast was comparable to the actual/estimated spend of $206.8 million for the 2015-20 regulatory control period.
- It is noted that the $206.8 million for the 2015-20 regulatory control period included 2018-19 and 2019-20 pole replacements repex which was estimated data at the time of Regulatory Proposal submission. The actual spend for the 2015-20 regulatory control period as submitted in RINs was $274.7 million[14]
- After the Regulatory Proposal submission, Ergon undertook a review of the pole serviceability calculation to align it with Australian Standards AS7000
- A revised forecast was submitted with the Revised Regulatory Proposal based on the new serviceability calculation of pole strength.
- In the RRP, 64,797 pole replacements were forecast for a total cost of $331 million over the regulatory control period. This was an additional 20,980 poles and $51 million over the original forecast. This also excluded the forecast $65.2 million for pole replacements related to the CTG/CTS program which was included in the unmodelled "Other" category[15].
- The AER reallocated the CTG/CTS program across the asset categories in its final decision; effectively resulting in a forecast repex for pole replacement of $396.9 million[16]. This was effectively an increase of $117million (42%) from the Regulatory Proposal.

[9] Pole remediation refers to total of pole replacement and staked poles

[10] Ergon Energy - 17.053 - Regulatory Determination RIN template 2020-25, January 2019

[11] Pole remediation refers to total of pole replacement and staked poles

[12] AER - Preliminary decision Ergon Energy - Repex model (calibrated lives - forecast unit costs) - April 2015

[13] Page 5-19 FD -EE Distribution Determination 2020-25 – Attachment 5- Capital Expenditure – June2020

[14] Converted to $2019-20 for comparison; $245.8 million unadjusted nominal terms

[15] In the RRP, total CTG/CTS was included in the "Other" category with a revised forecast of $133 million compared to the original forecast of $14 million which was spread across asset categories

[16] Page 5-18 FD -EE Distribution Determination 2020-25 – Attachment 5- Capital Expenditure – June2020 – this expenditure includes the CTG/CTS expenditure

- Ergon Energy submitted a business case[17] on pole replacements which sets out the reasons and rationale for the significant increase in forecast repex for pole replacements.
- Appendix J of Supporting Document 6.027 describes the Change in Pole Strength algorithm.
- The AER's final decision was a repex forecast of $260.0 million[18] for pole replacement as determined from its repex model[19].
- It is noted that this repex forecast was $25 million and 4,000 units lower than the forecast in the draft decision. The AER did not provide any specific reasons for this variation other than it adopted the repex model approach in its final decision.
- The average replacement volume in the final decision of 6,908 poles per year represents a yearly replacement rate of 0.7% on our pole population of almost 1 million poles.

It is also noted that the AER's forecast in the final decision was $69.2 million for our clearance program[20] ; which was an increase from its draft decision of $14 million On the basis of 49% of clearance program allocated to poles, this should have translated to an increase of $6.9 million to $33.9 million of clearance related pole repex.

However, the AER repex forecast for poles decreased from $284 million in the draft decision to $260 million in the final decision, despite the stated increase of $27 million for clearance related pole repex.

8 HISTORICAL EXPENDITURE AND VOLUMES OF POLE REPLACEMENTS

This section presents data from various sources including Ergon Energy Revised Regulatory Proposals, AER's repex models, AER's Final Decisions, Ergon Energy's CA RIN 2.2 Repex and CA RIN 5.2 Asset age profile as submitted to the AER.

Unless otherwise stated, all values have been converted to $2024-25 for comparison purposes.

8.1 Actual 2015-20 Performance

A summary of the actual expenditure of pole replacements over the 2015-20 regulatory control period is provided in Table 5 below.

[17] RRP Supporting Document 6.027
[18] Table A.2 FD -EE Distribution Determination 2020-25 – Attachment 5- Capital Expenditure – June2020
[19] AER – Final decision Ergon Energy - Repex model (Lives Scenario Output) - April 2015 –

[20] Page 5-28 FD -EE Distribution Determination 2020-25 – Attachment 5- Capital Expenditure – June2020 – this expenditure includes the CTG/CTS expenditure

Table 5: Pole Repex 2015-2020

	POLES					
$ 2024-2025 ($,000)	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	Total
Revised Regulatory Proposal	$ 22,231	$ 33,916	$ 14,098	$ 20,141	$ 20,640	$ 111,026
Repex Model Final Decision	$ 46,311	$ 49,519	$ 53,038	$ 56,943	$ 61,289	$ 267,101
AER Final Decision Forecast	$ 22,231	$ 33,916	$ 14,098	$ 20,141	$ 20,640	$ 111,026
Actual	$ 42,978	$ 47,263	$ 59,472	$ 70,451	$ 115,526	$ 335,689
Volume (units)	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**Total**
Revised Regulatory Proposal	4,850	6,516	3,369	4,050	4,605	23,390
Repex Model Final Decision	8,662	9,127	9,599	10,082	10,580	48,049
AER Final Decision Forecast	4,850	6,516	3,369	4,050	4,605	23,390
Actual	5,957	5,817	7,399	8,546	18,700	46,419
Unit Cost ($)	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**Average**
Revised Regulatory Proposal	$ 4,584	$ 5,205	$ 4,185	$ 4,973	$ 4,482	$ 4,686
Repex Model Final Decision	$ 5,347	$ 5,426	$ 5,526	$ 5,648	$ 5,793	$ 5,548
AER Final Decision Forecast	$ 4,584	$ 5,205	$ 4,185	$ 4,973	$ 4,482	$ 4,686
Actual	$ 7,215	$ 8,125	$ 8,038	$ 8,244	$ 6,178	$ 7,560

Key observations:

- Repex in the first four years of the 2015-20 regulatory control period was consistent with the repex model but above the AER forecast which was set based on our erroneous forecast.
- The forecast 5-year replacement volume of 23,000 represented a replacement rate of less than 0.5% per year.
- The actual number of poles remediated over the 5 years was 46,419, consistent with the repex model forecast of 48,049 but well above the AER's forecast and our revised regulatory proposal forecast of 23,390 poles.
- The total repex for poles remediated from 2015-20 was $339 million compared to our forecast and the AER's forecast of $115 million (195% above forecast) and was 25% above the repex model output of $270 million.
- Prior to 2018-19, the volumes of pole remediations were below 8,000 poles per year, a replacement rate of less than 1% per year.
- The actual expenditure for 2018-19 of $70.6 million is $50.4 million and $13.6 million above the AER's forecast and the repex model respectively.
- It is noted that at the time of its regulatory proposal submission in January 2019, our 2018-19 estimated repex was $41.3 million ($2019-20) compared to the actual of $56.8 million ($2019-20)21
- In 2019-20, we doubled our pole replacements to 18,700 poles. This step increase in expenditure was driven by the need to replace more poles due to the high unassisted pole failures and new pole serviceability calculation. We advised of this change in our 2020-25 revised regulatory proposal.
- On a pole population of 968,754 poles, this represents a replacement rate of 1.9%.

- [21] $56.6 million nominal as reported in the RIN in October 2019

- Our unit cost for replacement has been relatively stable, averaging approximately $7,600 over the 5 years.

8.2 2020-25 Actual and Estimated Performance

A summary of the actual and estimated (2023-24 and 2024-25) expenditure of pole replacements over the 2020-25 regulatory control period is provided in Table 6 below.

Table 6: Pole Repex 2020-2025

	POLES					
$ 2024-2025 ($,000)	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	Total
Revised Regulatory Proposal	$ 94,151	$ 94,858	$ 99,251	$ 101,614	$ 90,174	$ 480,047
Repex Model Final Decision	$ 52,829	$ 57,772	$ 62,830	$ 68,005	$ 73,306	$ 314,742
AER Final Decision Forecast	$ 52,829	$ 57,772	$ 62,830	$ 68,005	$ 73,306	$ 314,742
Actual	$ 122,918	$ 111,922	$ 116,808	$ 99,508	$ 109,022	$ 560,177
Volume (units)	**2020-2021**	**2021-2022**	**2022-2023**	**2023-2024**	**2024-2025**	**Total**
Revised Regulatory Proposal	15,254	16,019	15,878	15,032	15,391	77,574
Repex Model Final Decision	5,839	6,366	6,901	7,443	7,992	34,540
AER Final Decision Forecast	5,839	6,366	6,901	7,443	7,992	34,540
Actual	20,680	19,754	17,417	23,205	23,205	104,261
Unit Cost ($)	**2020-2021**	**2021-2022**	**2022-2023**	**2023-2024**	**2024-2025**	**Average**
Revised Regulatory Proposal	$ 6,172	$ 5,922	$ 6,251	$ 6,760	$ 5,859	$ 6,193
Repex Model Final Decision	$ 9,047	$ 9,075	$ 9,105	$ 9,137	$ 9,172	$ 9,107
AER Final Decision Forecast	$ 9,047	$ 9,075	$ 9,105	$ 9,137	$ 9,172	$ 9,107
Actual	$ 5,944	$ 5,666	$ 6,707	$ 4,288	$ 4,698	$ 5,461

It is noted that:

- In the 2020-25 determination, our reset RIN forecast estimated an increase in pole replacement from historical trends following the implementation of the new pole serviceability calculator.
- The increase in expenditure from 2019-20 onwards was driven by the increase in replacement volumes following the implementation of the serviceability calculator and compliance requirement to meet ESCOP target limits of pole failures.
- Our unit cost for replacement has remained relatively stable during this period.
- The numbers above include consequential pole replacements from reconductoring and clearance programs (that is, poles that are replaced because of the need to replace conductor or rectify clearance issues), which are in addition to the replacement of defective poles. This is discussed further in Section 9.

8.3 Historical Trends and Performance

The charts in Figure 4 and Figure 5 compare the actual expenditure and volume of pole replacements to Ergon Energy's forecast in Revised Regulatory Proposal, AER's repex model and the allowance in AER's final decision.

Figure 4: Historical Pole Replacement Expenditure

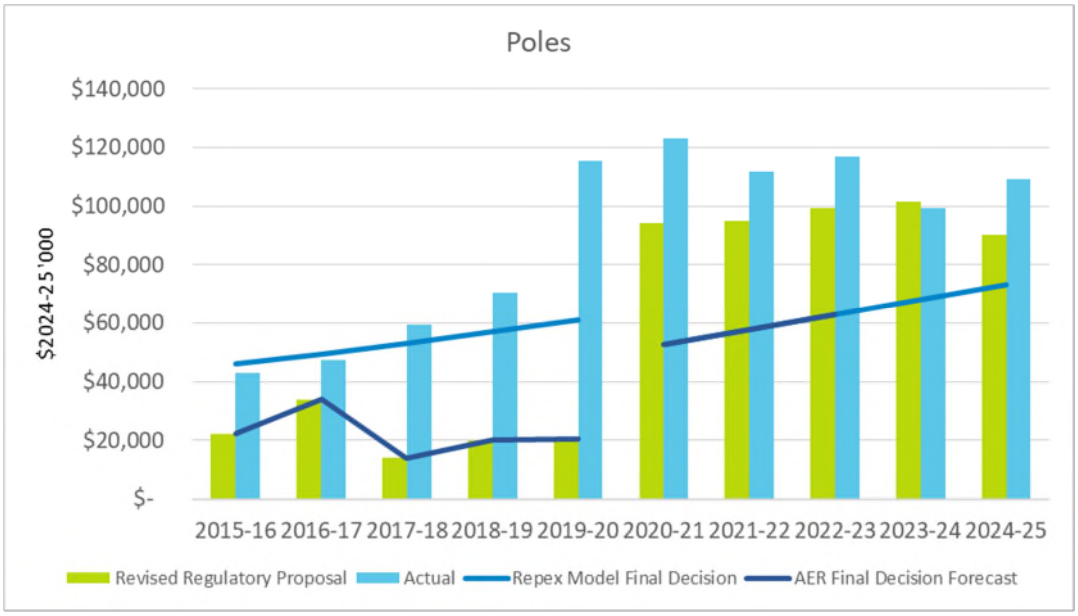
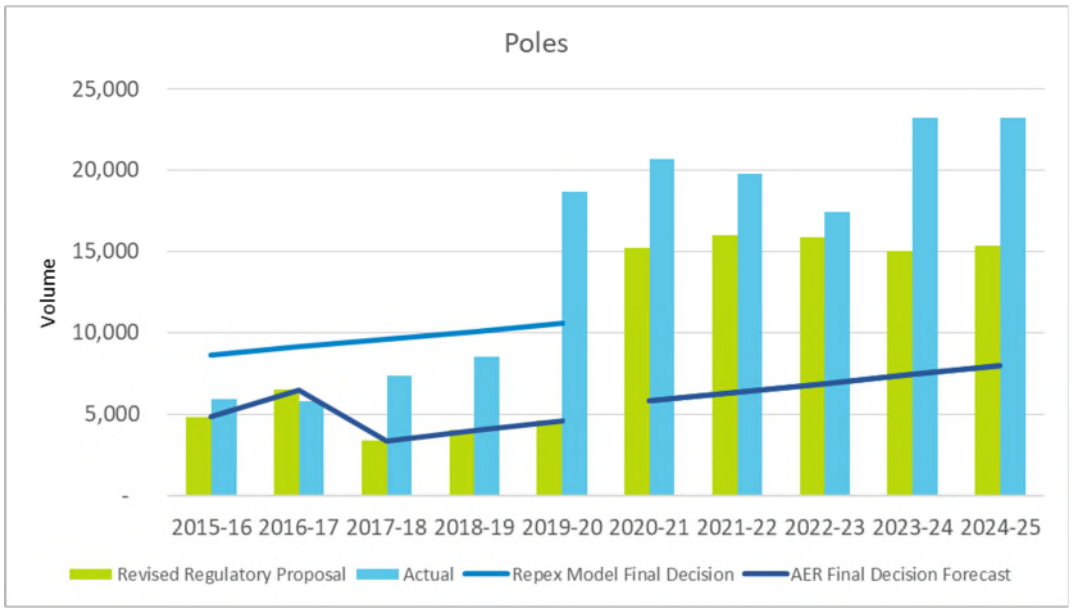


Figure 5: Historical Pole Replacement Volume



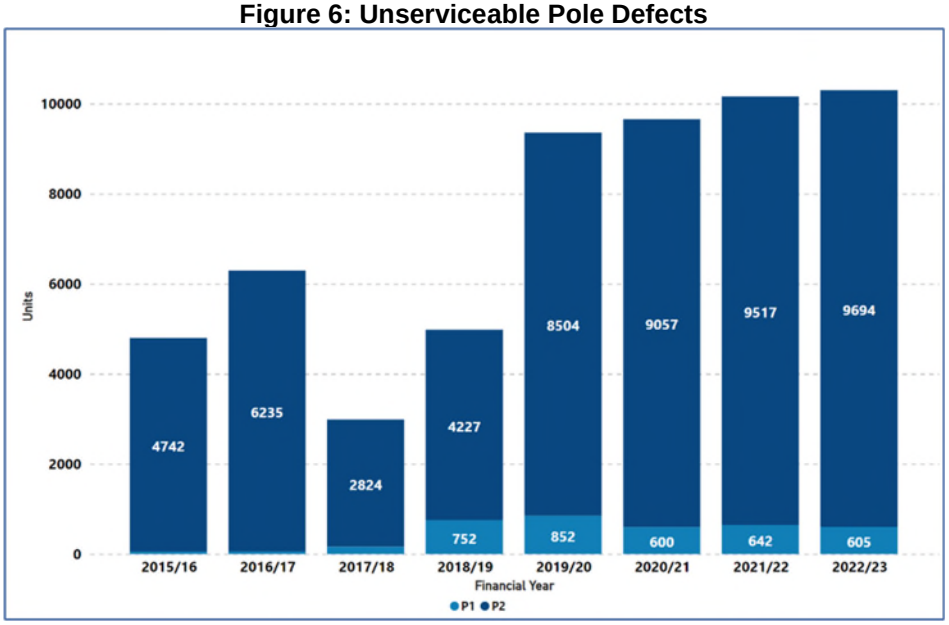
9 ANALYSIS OF INCREASE IN POLE REPLACEMENTS

To address the issue of increasing unassisted pole failures (UPF) and non-compliance with the ESCOP, a new pole inspection system and process was deployed in 2018 to improve data collection and to identify the serviceability of a pole more accurately.

Figure 6 below shows the number of pole defects identified since 2015-16. The step increase in defects found in 2017-18 was driven by the improved inspection process and data collection. The

second step increase in 2019-20 is because of the implementation of the revised pole serviceability calculator.

Figure 6: Unserviceable Pole Defects



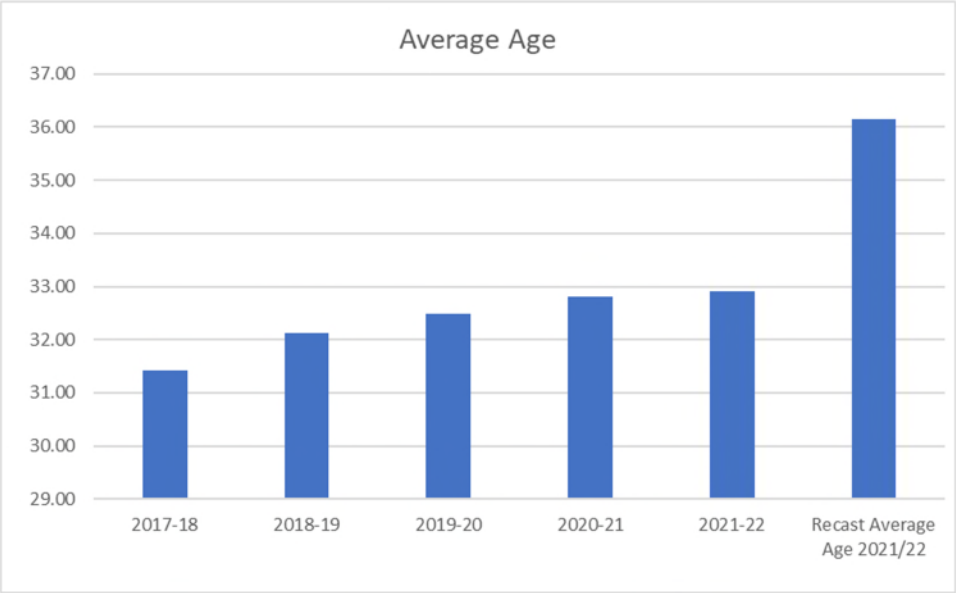
A review of annual CA RIN 5.2 from 2017-18 onwards was conducted to assess the impact of the increase in pole replacements in recent years.

As seen in

Figure 7, despite this volume of pole replacements, the average age of Ergon Energy's pole population is still increasing. The chart also shows a recast average age on the assumption that pole replacement program based the historical trend continued from 2018-19. That is, if we continued to replace only 6,000 poles annually, our average pole age would have been closer to 36 years old.

Figure 7: Increasing average age[22]

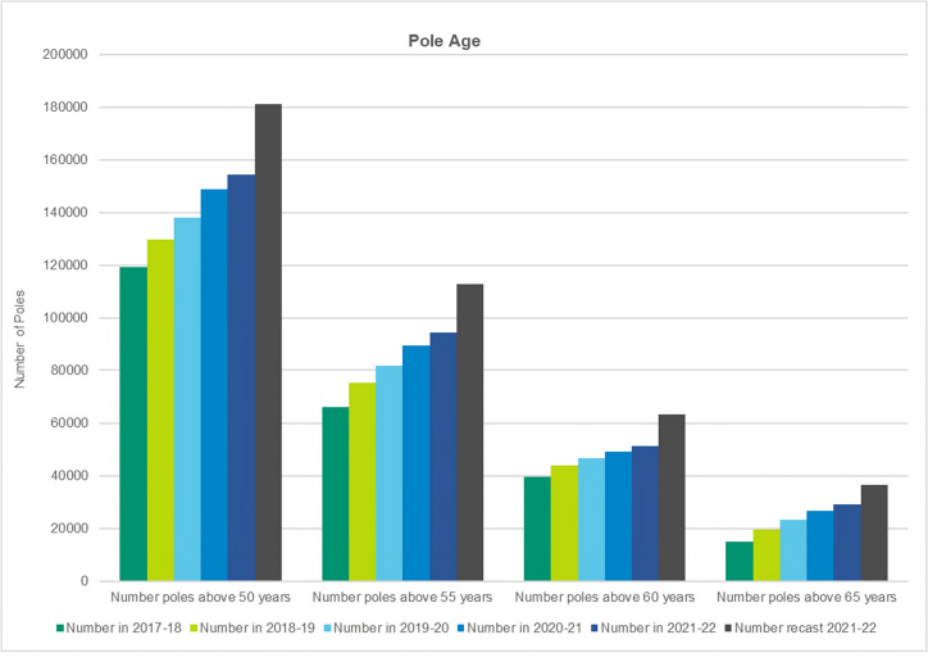
[22] Extracted from CA RIN 5.2



While the average age of our pole population is important to understand, the number of poles at the higher end of our population also helps in understanding our network. The number of poles above 50 years are also still increasing year on year as depicted in

Figure 8 below.

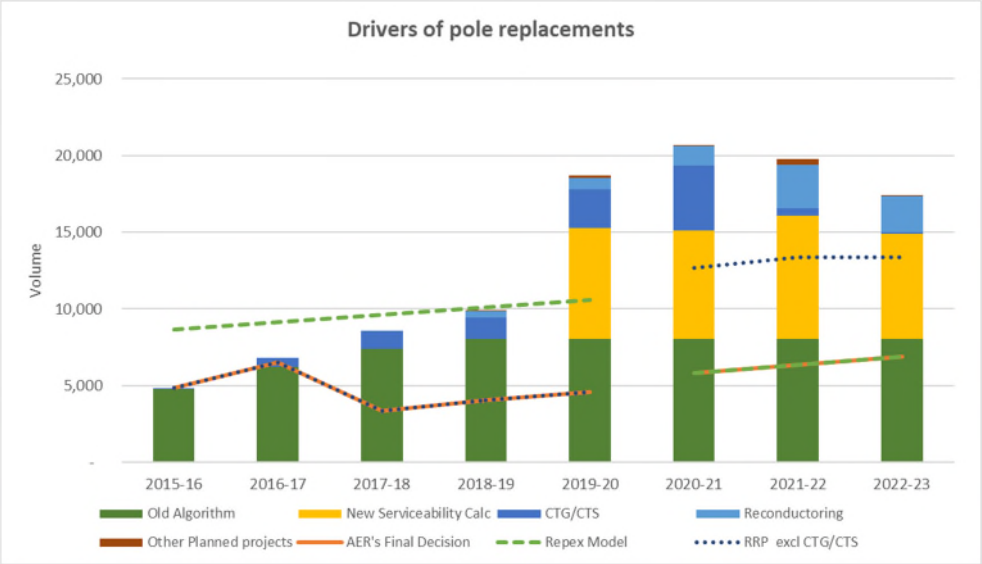
Figure 8: Number of Poles by Age



While the change in serviceability calculation resulted in an increase in pole replacements from 2019-20 onwards, there are other factors that have contributed to this increase. Our increase in our CTG/CTS program and reconductoring work indirectly increased the volume of pole replacements.

Figure 9 below shows the estimated breakdown of the key drivers that have resulted in an increase in our pole replacements.

Figure 9: Drivers of Pole Remediation



Key observations

- Our assessment of the former pole serviceability calculation shows that the level of defects we would have identified would have increased into the 2020-2025 regulatory period, as compared to our previous level of replacements.
- The step increase in the number of pole replacements in 2019-20 was predominantly due to the new serviceability calculation and consequential replacements from the clearance program.
- Over the review period, the repex model predicted 39,767 pole replacements compared to the adjusted/deemed “actual” of 40,220 replacements (or 8044 per year) based on the old serviceability calculator.
- In the first 3 years of the 2020-25 regulatory control period, the actual number of pole replacements due to defects (excluding consequential replacements) was 46,074 compared to 39,403 forecasted in the revised regulatory proposal.

10 POST IMPLEMENTATION REVIEW

We have undertaken a post implementation review (PIR) of our pole replacement expenditure to evaluate the benefits of it pole replacements over the review period and compare with alternative options. The PIR on pole replacements is set out supporting document *5.3.12 – PIR – Pole replacements*.

The basis and assumptions used in the PIR are:

- A cost benefit analysis over a twenty-year time horizon as a period
- The options analysis is based on differing volume of replacements.

- The actual delivery or selected option expenditure and unit cost over the 5-year review period is used as the starting point.
- The base case or counterfactual is based on the implied volume using the AER pole repex forecast and the actual delivery unit cost.
- The actual unit cost is applied across all other options.
- Costs associated with replacements of pole top structures, services, pole transformers and switches undertaken concurrently with pole replacements are included in the cost benefit analysis.
- Costs associated with pole replacements because of other projects or programs (e.g reconductoring, CTG/CTS) are excluded from this cost benefit analysis. They are included in the PIR of the respective asset class.

Based on the assumptions above, the cost benefit analysis in the PIR considered a replacement of 68,050 poles over the review period.

Table 7 sets out the basis of the PIR for poles and reconciliation to the annual CA RIN 2.2

Table 7: PIR / RIN Reconciliation

Poles ($ millions nominal)	2018-19	2019-20	2020-21	2021-22	2022-23	Total
RIN total ($million)	$ 56.6	$ 94.6	$ 102.0	$ 94.9	$ 104.6	$ 452.7
Defects	$ 40.7	$ 64.2	$ 65.0	$ 68.1	$ 82.5	$ 320.5
Non Defect						
Re-conductor	$ 2.8	$ 4.9	$ 8.5	$ 19.1	$ 18.8	$ 54.1
Clearance	$ 13.15	$ 25.47	$ 28.48	$ 7.68	$ 3.30	$ 78.08
RIN Reconciliation	**$ 56.65**	**$ 94.57**	**$ 101.98**	**$ 94.88**	**$ 104.60**	**$ 452.68**
Added to PIR for Poles						
Pole top	$ 14.40	$ 19.90	$ 21.30	$ 24.00	$ 28.10	$ 107.70
Services	$ 1.90	$ 5.60	$ 4.40	$ 5.00	$ 6.40	$ 23.30
Pole transformers	$ 7.80	$ 17.50	$ 10.40	$ 14.10	$ 11.00	$ 60.80
Fuses	$ 2.10	$ 6.10	$ 5.10	$ 5.20	$ 3.70	$ 22.20
Switches	$ 3.70	$ 3.20	$ 3.00	$ 2.70	$ 1.80	$ 14.40
Total PIR for Poles	**$ 70.60**	**$ 116.50**	**$ 109.20**	**$ 119.10**	**$ 133.50**	**$ 548.90**

The cost benefits analysis from the post implementation review confirms that the pole replacements undertaken over the review period delivered a net benefit of $576 million compared to the AER forecast option. It represents a balanced approach and provides an optimum and sustainable path to achieve the ESCOP target.

11 REVIEW PERIOD PERFORMANCE (2018-19 TO 2022-23)

The *review period*[23] for the ex-post review spans across two regulatory control periods and two separate Distribution Determinations.

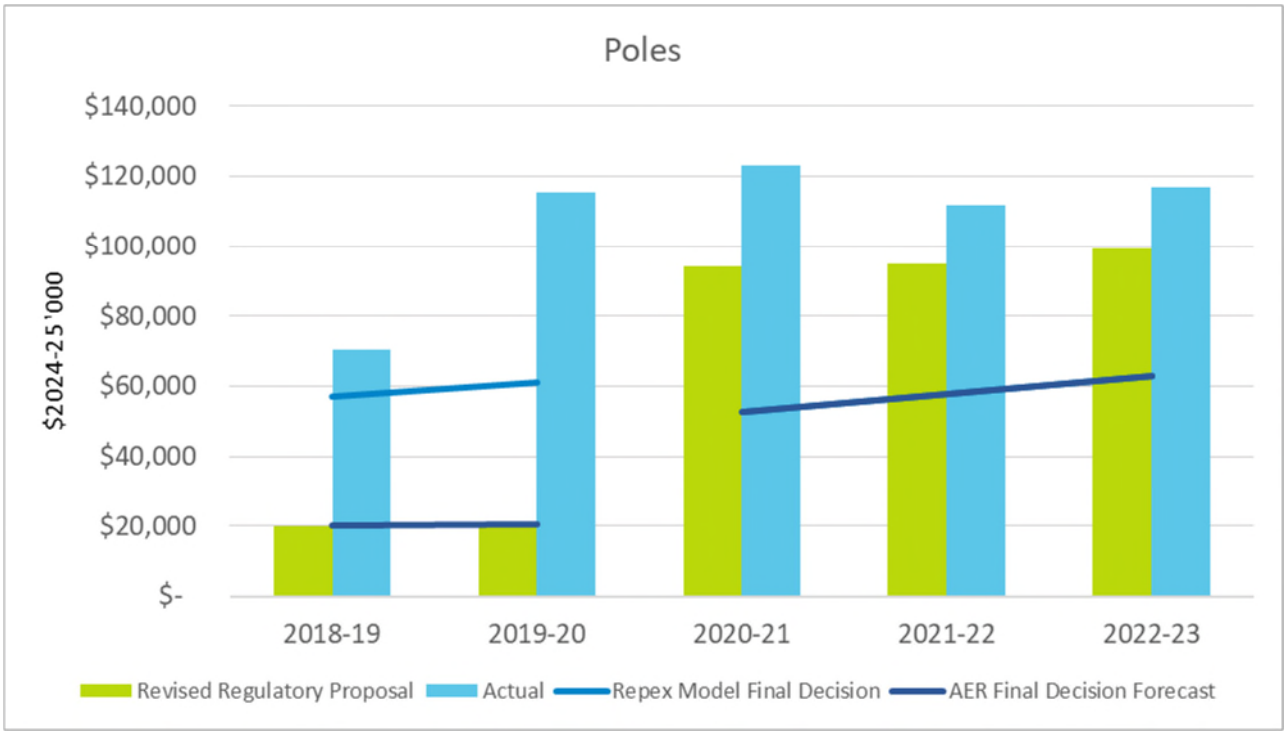
Actual and estimated performance against the forecasts set by the AER over the *review period* is provided in Table 8 below. Unless otherwise stated, all values have been converted to $2024-25 for comparison purposes and to align with the basis of the capex forecast for the 2025-30 regulatory control period.

23 NER S6.2.2A (a1)

Table 8: Review Period Performance - Pole Replacement[24]

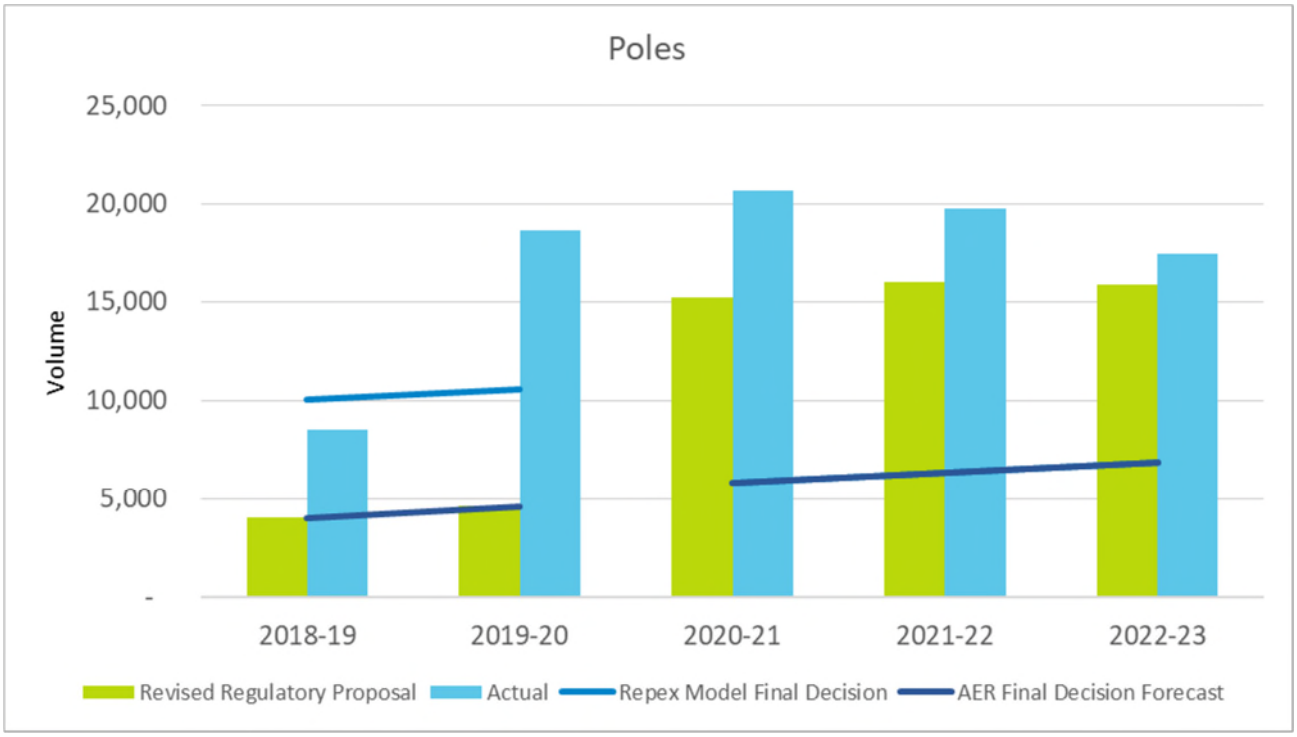
	POLES					
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
Revised Regulatory Proposal	$ 20,141	$ 20,640	$ 94,151	$ 94,858	$ 99,251	$ 329,040
Repex Model Final Decision	$ 56,943	$ 61,289	$ 52,829	$ 57,772	$ 62,830	$ 291,663
AER Final Decision Forecast	$ 20,141	$ 20,640	$ 52,829	$ 57,772	$ 62,830	$ 214,211
Actual	$ 70,451	$ 115,526	$ 122,918	$ 111,922	$ 116,808	$ 537,624
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
Revised Regulatory Proposal	4,050	4,605	15,254	16,019	15,878	55,806
Repex Model Final Decision	10,082	10,580	5,839	6,366	6,901	39,767
AER Final Decision Forecast	4,050	4,605	5,839	6,366	6,901	27,761
Actual	8,546	18,700	20,680	19,754	17,417	85,097
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Average
Revised Regulatory Proposal	$ 4,973	$ 4,482	$ 6,172	$ 5,922	$ 6,251	$ 5,560
Repex Model Final Decision	$ 5,648	$ 5,793	$ 9,047	$ 9,075	$ 9,105	$ 7,734
AER Final Decision Forecast	$ 4,973	$ 4,482	$ 9,047	$ 9,075	$ 9,105	$ 7,337
Actual	$ 8,244	$ 6,178	$ 5,944	$ 5,666	$ 6,707	$ 6,548

Figure 10: Pole Repex - Review Period



[24] The repex for RRP included allocation from CTG/CTS program to enable a like for like comparison with the AER allowance and Actual. No adjustments made to RRP volume as CTG/CTS was proposed as a program in Other category as per clearance job

Figure 11: Pole Replacement Volume - Review Period



Reasons and drivers of the expenditure on pole replacements over the review period are:

- As discussed in Section 6 above, we provided an incorrect forecast in its 2015-20 Regulatory Proposal and Revised Regulatory Proposal.
- Ergon Energy's forecast volume of pole replacements was 56% of that predicted by AER's repex model.
- In combination with a forecast unit cost that was below historical costs as noted by the AER25, the proposed repex for pole replacements, which was accepted and determined by the AER as the forecast in its final decision, was well below the expenditure we required to undertake pole replacements on a sustainable basis.
- In 2018-19,
    - repex for pole remediation was 287% above the AER's forecast, while only 24% above the expenditure as predicted by the repex model.
    - In volume terms, the actual number of poles remediated was 8,546 poles compared to the AER's and our RRP forecasts of 4,050 poles and repex model output of 10,082 poles respectively.
- The same issue was experienced in 2019-20 but was further compounded by the additional remediation required due to the change in serviceability calculation and the step-up in clearance program:
    - Actual pole repex was 560% above the AER's forecast compared to 188% above the repex model output.

[25] Page 6-89 AER Final Decision, Attachment 6 – Capital Expenditure Ergon Energy Determination 2015-20

- In volume terms, the actual number of poles remediated was 18,700 poles compared to the AER's and our Revised Regulatory Proposal forecast of 4,605 poles and the repex model output of 10,580 poles respectively.

- In our 2020-25 Revised Regulatory Proposal, we forecast an increase of our pole remediation requirements26.
- In the three years from 2020-21 to 2022-23
  - We exceeded the AER forecast by $178.5 million (103%) and our RRP forecast by $63.5 million (21%).
  - As shown in Table 8, the actual poles remediated was 57,851 poles compared to the RRP forecast of 47,151 poles.
  - Excluding CTG/CTS and pole remediation arising from reconductoring, the number of poles remediated was 46,07427 which closely aligns to our RRP forecast of 47,151

11.1 Adjustments for CTG/CTS

As discussed in Section 5 of Attachment B, the clearance program was reclassified from a repex program to an augex program to better align with the driver of this type of expenditure.

present a summary of the AER's forecast with and without the CTG/CTS where:

- The AER Final Decision Forecast is the forecast with a notional amount of CTG/CTS included.
- Actual as reported in our RIN with CTG/CTS in repex in 2018-19, 2019-20 and 2020-21.
- Adjusted AER forecast is the forecast without the notional amount of CTG/CTS.
- Adjusted actual shows repex with expenditure for CTG/CTS in 2018-19, 2019-20 and 2020-21 removed from the pole replacement category.

Table 9 present a summary of the AER's forecast with and without the CTG/CTS where:

- The AER Final Decision Forecast is the forecast with a notional amount of CTG/CTS included.
- Actual as reported in our RIN with CTG/CTS in repex in 2018-19, 2019-20 and 2020-21.
- Adjusted AER forecast is the forecast without the notional amount of CTG/CTS.

[26] RRP Supporting Document 6.027
[27] See PIR report Table 14

- Adjusted actual shows repex with expenditure for CTG/CTS in 2018-19, 2019-20 and 2020-21 removed from the pole replacement category.

Table 9: Review Period Performance – excluding CTG/CTS

$ 2024-2025 ($,000)	POLES					
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total
AER Final Decision Forecast	$ 20,141	$ 20,640	$ 52,829	$ 57,772	$ 62,830	$ 214,211
Actual (as reported in RIN)	$ 70,451	$ 115,526	$ 122,918	$ 111,922	$ 116,808	$ 537,624
Adjusted AER Forecast (without CTG/CTS)	$ 20,141	$ 20,640	$ 44,622	$ 57,772	$ 62,830	$ 206,005
Adjusted Actual (CTG/CTS removed in 18-19,19-20 and 20-21)	$ 54,306	$ 85,890	$ 89,107	$ 111,922	$ 116,808	$ 458,033

12 CONCLUDING SUMMARY

In conclusion, we submit that the overspend in pole replacement expenditure over the review period is prudent and efficient due to the following:

- Our erroneous forecast of volume and unit cost in the 2015-20 regulatory period has resulted in the lower than required forecast over this 5-year period; including 2018-19 and 2019-20 which falls in the ex-post review period.
- In 2018-19 Ergon Energy deployed a change in pole serviceability calculation to address the increasing number of pole failures which breached the ESCOP limits in 2019-20.
- Our pole assessment methodology has been independently assessed by EA Technology to be best practice and an operationally prudent approach to pole replacement.
- This change in algorithm resulted in a step change in number of pole replacements.
- The review period which commences in 2018-19 coincides with the change in the pole assessment algorithm.
- Our rate of pole failure for the 2019-20 to 2022-23 period was above the ESCOP limits of 1 in 10,000 poles.
- Our historically low volumes of pole replacements of between 5,000 – 8,000 poles per year on a population of over 850,000 wood poles (under 1% per year) was not sustainable.
- It is noted that while the increase in expenditure is commensurate with the volume increase, the unit cost has remained relatively stable.

- The AER in its 2020-25 Final Determination relied predominantly on its predictive modelling and trend analysis to determine its forecast pole replacement volumes and expenditure. We believe that in the 2020-25 determination, this approach was not appropriate due to the change in methodology (driven by regulatory obligations) as historical data did not capture the need to increase the number of pole replacements. Historic replacement rates also did not reflect our pole population, with a significant number of poles established in the 1970s and 1980s, rather than being established in a linearly across time.
- The step increase in pole remediations were a result of the implementation of a new serviceability calculation, increase of our clearance program to comply with safety obligations and increase pole replacements from other works such as reconductoring.
- The cost benefit analysis from the PIR identified there is NPV benefit of $445 million over the option based on the AER's forecast.

13 JUSTIFICATION STATEMENTS AND CONCLUSION

We submit that the expenditure for replacement of just over 85,000 poles over the *review period* is prudent and efficient as demonstrated by:

- The PIR which shows that the remediation of 68,050 defective poles and related costs of replacements of equipment attached to the poles we prudent and delivered a net benefit of $576 million.
- The remaining poles were replaced as part of re-conductoring projects or in clearance programs.
- Poles replaced during re-conductoring are included in the PIR for conductors and demonstrated to be justified.
- Poles replaced as part of the clearance program were replaced due to our legislative obligations on the clearance of our overhead lines to the ground and structures.
- *Attachment - Cost Comparison of Ergon Energy RIN Unit Costs to the NEM* report shows that the historical "basket of goods" unit cost is efficient. This is consistent with the basis of cost benefits undertaken in the PIR for poles.

We therefore submit that all the repex on poles incurred over the review period are required and should be rolled into our RAB.

APPENDIX A-1 - EA Technology Report Pole Assessment and Classification

Conclusions

C1. The Pole Assessment Algorithm used by Ergon Energy is consistent with worldwide overhead line design methods.

C2. The flattening off of unassisted pole failures coupled with an increase in pole replacements would be consistent with recent measures taken to improve the accuracy of data gathered and enhance its pole inspection algorithm.

- C2.1 Ergon Energy's awareness training for its pole asset inspectors, undertaken in 2017, was carried out in response to a number of unassisted pole failures occurring after the poles had been inspected and classified as serviceable.
- C2.2 The training informed the asset inspectors why they were collecting the data and how the data affected the classification.
- C2.3 Since this training a step change in pole data quality has been observed.
- C2.4 Case studies used as part of the awareness training demonstrated that poles wrongly defined as serviceable had failed. These poles would now be classified as unserviceable and would be replaced before they failed. i.e. reduction in unassisted pole failures and increase in pole replacements.

C3. The Electrical Safety Act 2002 (Qld) s29 imposes a specific duty of care on a prescribed Electrical Entity to ensure that its works are electrically safe; and are operated in a way that is electrically safe.

- C3.1 The pole assessment Field Mobile Computing system fulfils Ergon Energy's duty to inspect, test and maintain its assets.
- C3.2 Ergon is actively targeting an unassisted pole failure rate of less than one pole per ten thousand for its wood pole population.

C4. The principle of comparing a pole's calculated capacity against its design loadings is consistent with overhead line design practices used across Europe, the UK and America.

C5. The use of Area Moment of Inertia and Section Modulus equations (as used in Ergon Energy's Pole Assessment Algorithm) is consistent with overhead line design practices used across Europe, the UK and America.

C6. The reduction of the pole's Effective Diameter is an effective method of assessing the impact of external decay/damage/cracks/splits, as this reduction in the measurement to the outer layer of the pole has a much larger effect on the Area Moment of Inertia than simply determining the area of any decay.

C7. Ergon Energy restrict the sourcing of poles to arid locations, which therefore restricts the growth rate of the trees used in pole manufacture; however, some concern was expressed over the locations of sourced wood used to supply poles to Ergon Energy and it was indicated that there is no guarantee that all of the poles are supplied from these identified arid areas.

C8. Ergon Energy have trialled devices to determine a pole's fibre strength value in the field; however, these have so far been found to be inaccurate.

C9. Ergon Energy do not reduce the fibre strength of a pole dependent upon age.

- C9.1 It is understood that an Australian distribution utility does reduce a pole's fibre strength according to the pole's age when carrying out pole assessments.
- C9.2 This practice has been researched in the UK; however, it is not currently carried out during the inspection process.