energy market consulting associates

Ergon Energy 2025/26 to 2029/30 Regulatory Proposal

REVIEW OF ASPECTS OF PROPOSED EXPENDITURE

Public Version

Report prepared for:

AUSTRALIAN ENERGY REGULATOR

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Preface

This report has been prepared to assist the Australian Energy Regulator (AER) with its determination of the appropriate revenues to be allowed for the prescribed distribution services of Ergon Energy from 1st July 2025 to 30th June 2030. The AER's determination is conducted in accordance with its responsibilities under the National Electricity Rules (NER).

This report covers a particular and limited scope as defined by the AER and should not be read as a comprehensive assessment of proposed expenditure that has been conducted making use of all available assessment methods nor all available inputs to the regulatory determination process. This report relies on information provided to EMCa by Ergon Energy. EMCa disclaims liability for any errors or omissions, for the validity of information provided to EMCa by other parties, for the use of any information in this report by any party other than the AER and for the use of this report for any purpose other than the intended purpose. In particular, this report is not intended to be used to support business cases or business investment decisions nor is this report intended to be read as an interpretation of the application of the NER or other legal instruments.

EMCa's opinions in this report include considerations of materiality to the requirements of the AER and opinions stated or inferred in this report should be read in relation to this over-arching purpose.

Except where specifically noted, this report was prepared based on information provided to us prior to 21 June 2024 and any information provided subsequent to this time may not have been taken into account. Some numbers in this report may differ from those shown in Ergon Energy's regulatory submission or other documents due to rounding.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

Term	Definition
ADMS	Advanced Distribution Management System
AHI	Asset Health Index
ALARP	As Low As Reasonably Practicable
AMP	Asset Management Plan
BAU	Business As Usual
CB	Circuit Breaker
CBA	Cost Benefit Analysis
CBRM	Condition Based Risk Management
CEIG	Capital Expenditure Incentive Guideline
CNAIM	Common Network Asset Indices Method
CTG	Conductors to Ground
CTS	Conductors to Structure
current RCP	2020-25 Regulatory Control Period
DA	Distribution Authority
DG	Distributed Generation
EQ	Energy Queensland
EQL	Energy Queensland Limited
Ergon	Ergon Energy
ESO	Electrical Safety Office
ex post period	The Period FY19 to FY23
FMC	Field Mobile Computing
FMEA	Failure Modes Effect Analysis
GIS	Geospatial Information System
GSL	Guaranteed Service Level
HI	Health Index
IP	Internet Protocol
LV	Low Voltage
MPLS	Multiprotocol Label Switching
MSS	Minimum Service Standards
NECF	National Energy Customer Framework
NEM	National Electricity Market
NER	National Electricity Rules

Term	Definition
next RCP	2025-30 Regulatory Control Period
NOST	North St Substation
NSP	Network Service Provider
OT	Operational Technology
OTE	Operational Technology Environment
PIR	Post Implementation Review
PoF	Probability of Failure
RAB	Regulatory Asset Base
RAS	Risk Appetite Statements
RCP	Regulatory Control Period
RP	Regulatory Proposal
RRG	Reset Reference Group
RRP	Revised Regulatory Proposal
RTS	Return to Service
SDWAN	Software Defined Wide Area Networks
SFAIRP	So Far As Is Reasonably Practicable
SOTO	South Toowoomba Substation
SWER	Single Wire Earth Return
UGIS	Unified GIS
VCR	Value of Customer Reliability
VSL	Value of a Statistical Life

EXECUTIVE SUMMARY

Introduction and context

1. The AER has engaged EMCa to undertake a technical review of aspects of the replacement expenditure (repex) and augmentation expenditure (augex) that Ergon has proposed in its regulatory proposal (RP) for the 2025-30 Regulatory Control Period (next RCP), and the repex that Ergon has incurred during the FY19 to FY23 period (ex post period). The scope of our review also covers the governance, management and forecast methods applied by Ergon over these two periods that impact on the aspects of expenditure we have been asked to review.
2. The assessment contained in this report is intended to assist the AER in its own analysis of the proposed capex allowance as an input to its draft determination on Ergon's revenue requirements for the next RCP.

Expenditure under assessment

Incurred repex for ex post review period

3. Ergon reports to have incurred repex of $2,180.6 million during the period FY19 to FY23 (ex post period). Ergon has exceeded the repex included in the AER's final decision in every year of the ex post period, resulting in an overspend of $1,169 million once corrected.[1]
4. The allowance set by the AER reflects a total capex allowance, and whilst the AER also provides an allocation for each capex category, including repex, it does not allocate this further to asset category levels. The allocations that we refer to in our assessment have been determined by Ergon based on its interpretation of the AER determinations, and we have used these values as a guide in our analysis. We have removed the actuals included in FY19 and FY20 for public lighting that we consider is not SCS expenditure.
5. The primary drivers of the increased spend, above the capex allowance are:
   - Higher treatment of poles, primarily high levels of pole replacements.
   - Consequential replacement of assets installed on poles that require replacement, including transformers, cross-arms, overhead switches, and service cables through the bundling of works.
   - Higher volumes of reconductoring and conductor clearance programs.
6. We present our assessment of the conductor clearance program as a part of our assessment of augex, as Ergon has reclassified the program from repex to augex commencing in FY21.

Proposed repex for next RCP

7. Ergon has proposed $2,579 million repex for the next RCP.
8. On review of the repex trend, we observe the increase in repex commencing in FY19 to approximately $300 million, then again in FY20 to $410 million, and continuing at above this level in each year for the 2020-25 Regulatory Control Period (current RCP).
9. For the next RCP, Ergon's proposed repex results in a trend increasing year on year to a final value of $560 million by FY30, driven by year on year increases for the transformer, SCADA and other repex categories primarily associated with increased substation related repex.

[1] This compares with Ergon's stated overspend of $1190.9 million.

10. We also observe continued higher treatment of poles, primarily pole replacements and consequential replacement of assets installed on poles that Ergon plans to replace through the bundling of works.

Incurred conductor clearance for ex post period and aspects of forecast augex for next RCP

11. For the ex post period, Ergon incurred $196.8 million for the conductor clearance program. However, the data provided by Ergon results in a lower expenditure than included in its ex post review documentation of $224 million for conductor clearance. Ergon did not offer a reason for this difference.

12. Ergon has forecast capex of $181.1 million to remediate 12,270 defects to continue its conductor clearance program, being a slight decrease from $200.2 million that Ergon expects to incur in the current RCP. Ergon proposes to remediate outstanding and forecast level 1-5 defects within its remediation timeframes while monitoring and opportunistically rectifying the lowest priority level 5 defects. Ergon proposes to phase the program in the context of deliverability of the overall program of work for delivery, which leads to small differences in each year.

13. For its grid communications, protection and control category Ergon has forecast capex of $128.9 million, being an increase from $64.0 million that Ergon expects to incur in the current RCP. To assist our review, we have assigned individual projects with a similar project title in Ergon's capex model into project groupings, and which we understood from our discussions with Ergon at our onsite meeting were as Ergon had organised its capex proposal.

Our assessment and findings

Assessment of governance, management and forecasting methods

We considered the information that should be available to Ergon at the time it made its investment decisions, particularly for the ex post review

14. We typically place a substantial amount of weight on the application of good governance, management and forecasting methods to determine the extent to which a DNSP's forecast expenditure requirements are likely to be prudent and efficient. To that end, we considered the information available at the time Ergon made investment decisions that set in place programs of work that have resulted in it exceeding its capex allowance during the ex post period (and its estimated capex during the current RCP). Further, we considered whether the information available to Ergon at the time of its investment decisions was reflective of effective governance arrangements, and the suitability of those governance arrangements in ensuring that the capex incurred and estimated was prudent and efficient.

15. We also considered the condition of the network assets that was known at the time of the investment decisions, the expected outcome of any performance trends based on observed performance, and how this information was used to support any changes to the priority, composition and extent of replacement volumes and associated repex.

The network condition and performance indicated a need for greater investment by Ergon

16. We find that the performance information available to Ergon around the time of its preparation of its Revised Regulatory Proposal (RRP) for the 2020-25 period highlighted the need to increase the level of asset replacement above that subsequently included in the AER's capex allowance. We discuss trends in these indicators and how they contributed to a higher level of capex in Section 4. For reasons that remain unclear to us, this information does not appear to have featured in the commentary provided by stakeholders, or by the

AER, in respective reviews of Ergon's RRP which suggests to us that the information was not made available to those parties at that time.

Lack of quality and compelling information provided by Ergon to justify both the historical expenditure and the forecast

17. Our review processes were significantly hindered by the lack of quality and compelling information relating to the historical and forecast expenditure that resulted from these same improved forecasting processes, and which the AER had identified required improvement in its previous determinations. We were required to request information on multiple occasions, before we were able to reconcile the expenditure data for our review. In some cases, we have had to make judgement calls as to the basis for the expenditure in the absence of clear information.

Some improvements are evident in Ergon's forecasting methods, however adoption of standardised methods by Energy Queensland (EQ) has contributed to higher expenditure

18. We observe that Ergon has made some improvements to the methods it has applied to forecasting its capex requirements, since preparing its forecast for the current RCP, and these improvements appear to reflect a more general focus on the integration of processes associated with the establishment of EQ. However, overall, the integration and 'standardisation' of methods adopted by EQ, including adoption of methods in place at Energex, has also resulted in changes to the practices evident in the historical expenditure for Ergon. We identified some of these to confirm that they do contribute to higher forecast expenditure levels.

Ergon does not appear to have addressed some critical feedback provided in the last AER decision

19. Ergon has included risk-cost modelling in its assessment of its proposed capex forecast. The forecast has typically reviewed the outcome of the AER repex model, Condition Based Risk Management (CBRM) and alternate volume forecasts for its repex forecast. However, lack of options analysis, lack of supporting information, and concerns with the modelling assumptions, were raised by the AER in its previous determination, and are similarly evident in Ergon's RP for the next RCP.

Forecasting methods are not as Ergon has claimed, and place significant reliance on recent historical practices which may overstate future requirements

20. The expenditure models provided in response to our information requests allowed us to reconcile the program and understand the composition of Ergon's forecast, which was not possible from the initial information provided with Ergon's RP. With this understanding, we find that the proposed repex for the distribution line activities is the result of an extrapolation of a build-up of historical average defects and planned work, and is not based on risk-cost modelling outcomes as Ergon had claimed.

21. As a result, Ergon has placed significant reliance on its most recent historical replacement volumes and expenditure to determine its future requirements.

The level of expenditure that Ergon incurred is not supported by Ergon's claimed compliance risk or compliance obligations

22. We have observed a greater focus on increased expenditure directed towards compliance activities. Whilst we consider that Ergon was required to incur a higher level of capex than was included in the capex allowance, we did not find sufficient analysis to support the level of expenditure that it incurred, as reasonable and prudent. Nor did we find sufficient analysis of the claimed compliance risk to support that expenditure as reasonable and prudent, nor the emergence of a new compliance obligation that was driving the increase in expenditure.

CBA methods applied for the proposed repex include some fundamental flaws

23. By specifying the counterfactual as a continuation of Ergon's current practice for the ex ante forecast, the Cost Benefit Analysis (CBA) that Ergon has utilised provides no assessment of the net benefits of its proposal. Instead, the CBA effectively assumes (without demonstrating this) that the current replacement level and associated replacement policy has a net benefit and then measures only the variance in NPV of standardised alternative options relative to this.

24. The preferred option is presented as providing a more positive NPV result when compared with the options that Ergon has assessed. However, this is predicated on what we consider to be an invalid assumption that the counterfactual is a continuation of the investment option that Ergon is currently undertaking and which is higher than the long-term average.

25. Our concerns with Ergon's analysis and modelling assumptions cast doubt on Ergon's ability to draw meaningful conclusions from its analysis.

Portfolio not optimised, and not able to be assessed by change in risk level

26. Ergon has, in places, claimed that its risk modelling has assisted with the prioritisation of its projects and programs. However, due to the way Ergon has undertaken its risk cost modelling for the ex ante forecast, including its definition of its counterfactual, an assessment of whether the proposed capex is seeking to manage the existing risk and performance levels or improve upon them cannot be ascertained.

27. In many instances the basis for consideration of the project is clear, however Ergon has not adequately demonstrated that the capex forecast for the next RCP (for the aspects we were asked to review) would form part of a total capex forecast that reasonably reflects the capex criteria.

Assessment of ex post repex

Ergon has demonstrated a need for investment to a level that exceeded that included in the capex allowance

28. We have reviewed the major drivers of the increase in repex incurred by Ergon. We find that the information available at the time of the investment decision indicates a need to incur a level that exceeded that included in the capex allowance, and also exceeded the level that Ergon had included in its investment plans that informed its RP and RRP for the current RCP.

29. Two programs primarily contribute to the overspend in the ex post review period, being pole replacement and conductor clearance. These programs are in response to Ergon's assessment of safety and compliance risk.

The extent of expenditure that Ergon has incurred has not been demonstrated as reasonable and prudent

30. We found material errors and weaknesses in the modelling of the ex post repex presented in the Post Implementation Review analysis that Ergon has relied upon, and as a result we were not able to assign any weight to it in our review of the incurred repex.

31. We therefore considered the information available to Ergon at the time of its decisions to incur the expenditure and by reference to reasonable comparisons across the National Electricity Market (NEM). However, there was a general absence of compelling justification from Ergon for its expenditure. Artefacts that we expected should exist as part of the governance arrangements that Ergon had described, were either absent or incomplete in justifying the level of expenditure. We consider that Ergon has established a reasonable basis for higher expenditure on these programs, however the extent of expenditure that Ergon has incurred on these programs has not been reasonably demonstrated.

32. In other parts of Ergon's repex program, we saw examples of expenditure that was not undertaken efficiently, or that the volume of expenditure did not sufficiently account for the

interaction with other programs targeting a similar benefit. To that end, we do not see sufficient evidence of the benefit of Ergon's consequential replacement approach, that supports the extent of the expenditure that it incurred.

Evidence suggests some level of investment may have been effectively brought forward from its optimal timing

33. From the analysis provided, Ergon has not demonstrated that the repex that it incurred reflects an optimum level or optimum timing. There may be an argument that Ergon has in effect brought forward investment by advancing replacement. However, this introduces a higher cost than would be incurred by a DNSP acting prudently and would need to be offset by increased benefits. Ergon has not demonstrated that this is the case.

Assessment of proposed ex ante repex

Ergon's reliance on revealed expenditure as the basis of its forecast replacement requirements is flawed

34. Whilst revealed expenditure may be used as an indicator of future requirements, in this instance the revealed expenditure represents a material uplift from historical levels and as discussed above, we consider that the level of such expenditure was not justified. Ergon's proposed expenditure continues replacement levels established during the current RCP and which we consider are higher than a prudent and efficient level.

35. We consider that Ergon has not adequately demonstrated the need for the full extent of the expenditure that it has proposed, including by reference to its risk-cost modelling. Ergon has selected options for its proposed expenditure programs by reference to its counterfactual being the continuation of current elevated replacement levels, which overstate the prudent and efficient expenditure requirements.

Key elements of a good investment governance process appear lacking

36. We consider that Ergon's proposed expenditure lacks compliance with key elements of an investment governance process that reflects good industry practice. Ergon did not provide sufficient information and/or information with sufficient evidence of rigour to support the expenditure that it proposes. We make this observation based on the information that we would typically expect to find based on our expenditure reviews of other DNSPs.

Modelling assumptions relied upon by Ergon contribute to a higher level of replacement activity than is justified

37. We also find evidence of overstated input assumptions that we consider have led Ergon to an over-estimate of the benefits of its options, and which contribute to Ergon proposing a higher level of asset replacement activity than is justified.

Optimal risk/cost position to achieve a prudent and efficient level of expenditure is not adequately demonstrated

38. Whilst Ergon considers that the capex program it has proposed represents its response to an elevated level of risk, it has not demonstrated that the iterative process that it has undertaken in response to its Reset Reference Group (RRG) feedback has reflected an optimal risk/cost position to achieve a prudent and efficient level of expenditure. In the absence of a robust management framework and review process to calibrate and/or downgrade the project and program risk assessments, it is likely that this has contributed to an elevated level of proposed expenditure activity, which is comparable with the elevated program undertaken in the current RCP.

Assessment of ex post capex for conductor clearance and aspects of proposed augex

Need to address non-compliance with clearance to ground and clearance to structure has been demonstrated

39. For the capex it has incurred (as repex and augex) during the ex post period, we consider that Ergon needs to address clearance issues at sites that present an immediate safety risk of inadequate clearance to ground or structure, following verification that the defect exists. Ergon relies on the outcome of flights of its network using LiDAR for the identification of defects. This formed the basis of the program that commenced during the ex post review period.

Incurred expenditure for the ex post period may be higher than a prudent level

40. Our analysis of Ergon's data does indicate that a higher number of defects were identified for action than is prudent, however Ergon did not adequately justify its prioritisation of rectification of these defects and the level of rectification work that it undertook in the ex post period. Whilst Ergon claims that least cost solutions were applied, the high unit rates tend to indicate that Ergon may be replacing more of its network in response to an identified defect than we would expect. We found similar issues in our review of the balance of the repex program in Section 4 and it appears that similar issues applied to this program.

Further increases to the clearance program have not been adequately justified

41. For the last two years of the current RCP, Ergon assumes a further increase in defects. Ergon has not adequately explained the rationale for such an increase and has not provided information that suggests that it sufficiently understands the root cause for this.

Basis for the forecast of new defects is not formed on a reasonable basis, nor adequately considers the impact of other programs to mitigate conductor clearance defects

42. For the forecast period, the number of defects is based on two assumptions that we do not consider have a reasonable basis, being (i) that despite the identification and rectification of clearance issues currently being addressed, future flights will continue to identify a material number of new defects, and (ii) Ergon has not sufficiently taken account of the interaction with other programs that will assist resolve issues with conductor clearance. We consider that the extent of conductor clearance rectification will be materially less than Ergon has proposed, and the unit rates for the treatment of defects lower than Ergon has assumed.

Investment need, and relationship between, some of the elements of the grid communications, protection and control expenditure is not sufficiently demonstrated

43. For the grid communications, protection and control category we do not observe an overarching strategy that would provide a framework for determining the purpose and justification for the proposed work. Absent this contextual framework, Ergon has not demonstrated the need for some of the elements of the proposed expenditure.

Insufficient analysis of available options that renders the extent of the program, and increase in capex as not reasonable and prudent

44. We consider that some of the proposed projects are reasonably justifiable and note that they are part of ongoing programs. However, there is insufficient analysis undertaken to demonstrate that other projects are required to be undertaken or that lower cost alternatives are not preferable, such that a lower forecast expenditure would be prudent.

Implications for expenditure allowances

Ergon has not demonstrated that the repex incurred during the ex post period meets NER criteria

45. For reasons that became apparent after its determinations, we consider that the level of repex included in the AER's capex allowances over the ex post review period was not sufficient to meet the requirements of the business, in the long term interests of customers. This was most relevant for the years that fall into the current RCP. Accordingly, we consider that it was prudent that Ergon incurred a level of repex that exceeded the repex included in the capex allowance in aggregate.

46. Whilst we are aware of statements by Ergon that it has considered the capex allowance in aggregate, such that decisions impacting repex and augex were taken together for example through deferral of augex projects, we have not considered this in our review. Our reference for the purposes of the review is the AER allowance for repex, and more specifically whether Ergon has satisfied the capex criteria for the repex that it has subsequently incurred.

47. Based on the projects and programs we reviewed, we find that Ergon's repex of $2,180.6 million incurred during the ex post period does not meet the NER expenditure criteria because it has not demonstrated that it was efficient, prudent and reasonable. We consider that a conforming repex allowance that meets NER criteria would be materially less than Ergon has proposed.

Ergon's proposed repex allowance is higher than a prudent and efficient level

48. We consider that Ergon's proposed repex of $2,579.0 million for the next RCP is not a reasonable forecast of its requirements.

49. Based on the projects and programs we reviewed, we find that Ergon's repex forecast in its RP does not meet the NER expenditure criteria because it has not demonstrated that it is efficient, prudent and reasonable. We consider that a repex allowance that meets NER expenditure criteria would be materially less than Ergon has proposed.

Ergon's proposed augex allowance is higher than a prudent and efficient level

50. We consider that Ergon's proposed augex of $310 million for the two augex categories of 'conductor clearance' and 'grid communications, protection and control' is not a reasonable forecast of its requirements for the next RCP.

51. We consider that the need for some elements of its proposed expenditure has not been adequately demonstrated and that Ergon's proposed expenditure for conductor clearance and grid communications, protection and control categories are considerably overstated.

1 INTRODUCTION

The AER has asked us to review and provide advice on aspects of Ergon Energy's (Ergon) proposed capital allowance over the 2025-30 Regulatory Control Period (next RCP) relating to ex post repex, ex ante repex, and aspects of augex. Our review is based on information that Ergon provided and on aspects of the NER relevant to assessment of expenditure allowances.

1.1 Purpose of this report

52. The purpose of this report is to provide the AER with a technical review of aspects of the expenditure that Ergon has proposed in its regulatory proposal (RP) for next RCP, and of the repex that it has incurred during the ex post review period.

53. The assessment contained in this report is intended to assist the AER in its own analysis of the proposed capex allowance as an input to its Draft Determination on Ergon's revenue requirements for the next RCP.

1.2 Scope of requested work

54. Our scope of work, covered by this report, is as defined by the AER. Relevant aspects of this are as summarised in Figure 1.1.

Figure 1.1: Scope of work covered by this report

Scope of work covered by this report.

The scope of this review, as requested by the AER, covers the following.

Capex (ex post)

- Repex (all aspects)

Capex (ex ante)

- Repex (aspects affected by ex post review)
- Augex (specific aspects)

The scope includes the following specific requirements.

1. Have regard to how advice relating to the prudency and efficiency of the ex ante repex forecast is affected by the ex post review of repex.
2. Assess whether the repex overspend in the current RCP is justifiable; that is, whether the decision to overspend was a prudent and efficient one. We expect the consultant to test a number of factors in assessing the overspend including unit costs, volumes, asset management and project management practices.

1.3 Our review approach

1.3.1 Approach overview

55. In conducting this review, we first reviewed the RP documents that Ergon has submitted to the AER. This includes a range of appendices and attachments to Ergon's RP and certain Excel models which are relevant to our scope.

56. We next collated several information requests. The AER combined these with information request topics from its own review and sent these to Ergon.

57. In conjunction with AER staff, our review team met with Ergon at its offices on 13-15 May 2024. Ergon presented to our team on the scoped topics, and we had the opportunity to engage with Ergon to consolidate our understanding of its proposal.

58. Ergon provided the AER with responses to information requests and, where they added relevant information, these responses are referenced within this review.

59. We have subjected the findings presented in this report to our peer review and Quality Assurance processes and we presented summaries of our findings to the AER prior to finalising this report.

60. The limited nature of our review does not extend to advising on all options and alternatives that may be reasonably considered by Ergon, or on all parts of the proposed capex forecast. We have included additional observations in some areas that we trust may assist the AER with its own assessment.

1.3.2 Conformance with NER requirements

61. In undertaking our review, we have been cognisant of the relevant aspects of the NER under which the AER is required to make its determination.

Capex Objectives and Criteria

62. The most relevant aspects of the NER in this regard are the 'capital expenditure criteria' and the 'capital expenditure objectives.' Specifically, the AER must accept the Network Service Provider's (NSP) capex proposal if it is satisfied that the capex proposal reasonably reflects the capital expenditure criteria, and these in turn reference the capital expenditure objectives.

63. The NER's capital expenditure criteria and capital expenditure objectives are reproduced in Figure 1.2 and Figure 1.3.

Figure 1.2: NER capital expenditure criteria

NER capital expenditure criteria

The *AER* must:

(1) *subject to subparagraph (c)(2), accept the forecast of required capital expenditure of a Distribution Network Service Provider that is included in a building block proposal if the AER is satisfied that the total of the forecast capital expenditure for the regulatory control period reasonably reflects each of the following (**the capital expenditure criteria**):*

(i) *the efficient costs of achieving the capital expenditure objectives;*

(ii) the costs that a prudent operator would require to achieve the capital expenditure objectives; and

(iii) a realistic expectation of the demand forecast, cost inputs and other relevant inputs required to achieve the capital expenditure objectives.

Source: NER 6.5.7(c) Forecast capital expenditure, v211

Figure 1.3: NER capital expenditure objectives

NER capital expenditure objectives

*A building block proposal must include the total forecast capital expenditure for the relevant regulatory control period which the Distribution Network Service Provider considers is required in order to do each of the following (**the capital expenditure objectives**):*

(1) meet or manage the expected demand for standard control services over that period;

(2) comply with all applicable regulatory obligations or requirements associated with the provision of standard control services;

(3) to the extent that there is no applicable regulatory obligation or requirement in relation to:

(i) the quality, reliability or security of supply of standard control services; or

(ii) the reliability or security of the distribution system through the supply of standard control services,

to the relevant extent:

(iii) maintain the quality, reliability and security of supply of standard control services; and

(iv) maintain the reliability and security of the distribution system through the supply of standard control services;

(4) maintain the safety of the distribution system through the supply of standard control services; and

(5) contribute to achieving emissions reduction targets through the supply of standard control services.

Source: NER 6.5.7(a) Forecast capital expenditure, v211

How we have interpreted the capex criteria and objectives in our assessment

64. We have taken particular note of the following aspects of the capex criteria and objectives:

- Drawing on the wording of the first and second criteria, our findings refer to efficient and prudent expenditure. We interpret this as encompassing the extent to which the need for a project or program or opex item has been prudently established and the extent to which the proposed solution can be considered to be an appropriately justified and efficient means for meeting that need.
- The criteria require that the forecast '*reasonably reflects'* (emphasis added) the expenditure criteria and in the third criterion, we note the wording of a '*realistic expectation'*. In our review we have sought to allow for a margin as to what is considered reasonable and realistic, and we have formulated negative findings where we consider that a particular aspect is outside of those bounds.
- We note the wording '*meet or manage'* in the first objective (emphasis added), encompassing the need for the NSP to show that it has properly considered demand management and non-network options.
- We tend towards a strict interpretation of compliance (under the second objective), with the onus on the NSP to evidence specific compliance requirements rather than to infer them.
- We note the word '*maintain'* in objectives 3 and 4 and, accordingly, we have sought evidence that the NSP has demonstrated that it has properly assessed the proposed expenditure as being required to reasonably maintain, as opposed to enhancing or diminishing, the aspects referred to in those objectives.

Ex post review

65. In certain circumstances the NER allows the AER to reduce the amount by which an NSP's Regulatory Asset Base (RAB) is to be increased as part of the RAB roll forward, including expenditure by the NSP above its capex allowance where that expenditure does not reasonably reflect the capital expenditure criteria.

66. The NER capital expenditure incentive objective states that:

> *The capital expenditure incentive objective is to ensure that, where the value of a regulatory asset base is subject to adjustment in accordance with the Rules, then the only capital expenditure that is included in an adjustment that increases the value of that regulatory asset base is capital expenditure that reasonably reflects the capital expenditure criteria.*[2]

67. NER clause S6.2.2A allows the AER to reduce the amount of capex to be rolled into the RAB:

> *Prior to making a decision on the regulatory asset base for a distribution system as required by clause 6.12.1(6), the AER may determine under this clause S6.2.2A that the amount of capital expenditure as a result of which the previous value of the regulatory asset base would otherwise be increased in accordance with clause S6.2.1(e) should be reduced.*[3]

68. The process for ex post review of capex is outlined in the AER's Capital Expenditure Incentive Guideline[4].

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[2] NER clause 6.4A.

[3] NER clause S6.2.2A.

[4] Capital Expenditure Incentive Guideline, AER. April 2023. https://www.aer.gov.au/system/files/AER%20capital%20expenditure%20incentive%20guideline%20-%20April%202023.pdf

1.3.3 Technical review

69. Our assessments comprise a technical review. While we are aware of stakeholder inputs on aspects of what Ergon has proposed, our technical assessment framework is based on engineering considerations and economics.

70. We have sought to assess Ergon's expenditure proposal based on Ergon's analysis and Ergon's own assessment of technical requirements and economics and the analysis that it has provided to support its proposal. Our findings are therefore based on this supporting information and, to the extent that Ergon may subsequently provide additional information or a varied proposal, our assessment may differ from the findings presented in the current report.

71. We have been provided with a range of reports, internal documents, responses to information requests and modelling in support of what Ergon has proposed and our assessment takes account of this range of information provided. To the extent that we found discrepancies in this information, our default position is to revert to Ergon's RP documents as provided on its submission date, as the 'source of record' in respect of what we have assessed.

1.4 This report

1.4.1 Report structure

72. This report covers our ex post review of repex incurred in FY19 to FY23, together with our ex ante review of aspects of proposed repex and augex for the next RCP.

73. In each Section, we have presented:

- an overview of the proposed expenditure (or incurred expenditure for ex post repex), and a summary of Ergon's justification for that expenditure;
- our observations on Ergon's application of its governance framework and forecasting methodology to the expenditure category, along with the derived forecasting inputs;
- our assessment of individual expenditure categories and/or projects; and
- our findings for each expenditure category and the implications of these findings for the expenditure allowances determined by the AER in its Draft Determination.

74. We have taken as read the considerable volume of material and analysis that Ergon provided, and we have not sought to replicate this in our report except where we consider it to be directly relevant to our findings.

1.4.2 Information sources

75. We have examined relevant documents that Ergon has published and/or provided to the AER in support of the areas of focus and projects that the AER has designated for review. This included further information at onsite meetings and further documents in response to our information requests. These documents are referenced directly where they are relevant to our findings.

76. Except where specifically noted, this report was prepared based on information provided by AER staff prior to 21 June 2024 and any information provided subsequent to this time may not have been taken into account.

77. Unless otherwise stated, documents that we reference in this report are Ergon documents comprising its RP and including the various appendices and annexures to that proposal.

78. We also reference responses to information requests, using the format IRXX being the reference numbering applied by the AER. Noting the wider scope of the AER's determination, the AER has provided us with IR documents that it considered to be relevant to our review.

1.4.3 Presentation of expenditure amounts

79. Expenditure is presented in this report in $FY25 real terms, unless stated otherwise. In some cases, we have converted to this basis from information provided by the business in other terms.

80. While we have endeavoured to reconcile expenditure amounts presented in this report to source information, in some cases there may be discrepancies in source information provided to us and minor differences due to rounding. Any such discrepancies do not affect our findings.

2 BACKGROUND

Consistent with the NER, we have reviewed the drivers of the capex we have been asked to review, including a review of a sample of the programs and projects that make up that expenditure to inform our view of the prudent and efficient level of capex at a category level.

We understand that the AER considers our advice in setting an overall capex allowance, using other inputs and methods, and not to determine which programs or projects that a NSP should undertake.

Importantly, the framework allows for an NSP, acting prudently and efficiently, to consider changes to its operating environment and to make decisions within a regulatory period that align with the NER, and which may extend to spending an amount which differs from the capex allowance included in a regulatory determination.

2.1 Introduction

81. Under the NER, the AER determines an overall capex allowance. While the scope of our review covers ex post and ex ante repex and ex ante augex, for context we present in this section information on repex and augex together with overall capex.

82. We first provide an overview of the capital allowance for the 2015-20 regulatory control period (RCP) and current RCP, as the ex post review period FY19 to FY23 spans regulatory determinations for both periods. We then provide an overview of the capex that Ergon has incurred over the ex post review period, including drivers of that expenditure that we take into account in our review of repex and augex in subsequent Sections of this report.

83. We also provide an overview of the capex that Ergon has proposed for the next RCP, including observations in relation to presentation of expenditure amounts that we have taken into account.

84. Ergon has presented expenditures in its RP in $2025 terms. Where we compare this with expenditure over prior periods, we have escalated this to real 2025 dollars using escalation factors provided by Ergon where provided, otherwise we have used escalation factors from the ABS.

85. Any comments made in relation to categories of expenditure are provided for reference only.

2.2 Capital allowance for 2015-20 period

2.2.1 Summary of regulatory determination

86. Ergon submitted its RP for the 2015-20 RCP in October 2014. In April 2015, the AER published its preliminary decision, which took effect on 1 July 2015. Ergon submitted a RRP in July 2015.

87. The AER did not accept Ergon's RRP of $3,282.4 million ($FY15) and included a substitute estimate of $2,858.1 million ($FY15), being $424.3 million ($FY15) lower than its RRP in its final decision in October 2015, as shown in Table 2.1.

Table 2.1: AER final decision for 2015-20 RCP

	2015–16	2016–17	2017–18	2018–19	2019–20	Total
Ergon Energy's initial proposal	739.8	723.2	659.4	644.5	630	3,397.0
AER preliminary decision	540.1	495.3	428.1	381.0	337.5	2,182.0
Ergon Energy's revised proposal	749.4	685.6	634.3	610.6	602.6	3,282.4
AER final decision	667.0	601.4	553.6	522.6	513.5	2,858.1
Difference (final decision and revised proposal)	–82.4	–84.2	–80.7	–88.0	–89.1	–424.3
Percentage difference (%) (final decision and revised proposal)	–11.0	–12.3	–12.7	–14.4	–14.8	–12.9

Source: Ergon - 5.3.01 - Capex ex post justification - Overview - January 2024 – public Table 3, and Table 6.1 AER final decision 2010-15

2.2.2 Summary of reasons for AER's final decision

88. AER did not accept Ergon's revised capex, with the primary adjustments to network capex relating to:

- Augex: AER included a substitute estimate for its proposed capex to address voltage problems on its network and its system-enabling capex projects in augex
- Repex: AER included a substitute estimate based on its assessment of a business-as-usual (BAU) estimate of repex being lower than Ergon's forecast.[5]

2.3 Capital allowance for the current RCP

2.3.1 Summary of regulatory determination

89. Ergon submitted its RP for the current RCP in January 2019. In October 2019, the AER published its draft decision. Ergon submitted an RRP in December 2019.

90. The AER did not accept Ergon's RRP of $2,804.3 million ($FY20), having updated the proposed net capex due to a capex modelling error, and included a substitute estimate of $2,276.2 million ($FY20), being $528.1 million ($FY20) lower than Ergon's RRP in its final decision on 5 June 2020, as shown in Figure 2.2.

5 AER Attachment 5: Capital expenditure | Final decision – Ergon Energy 2015-20.

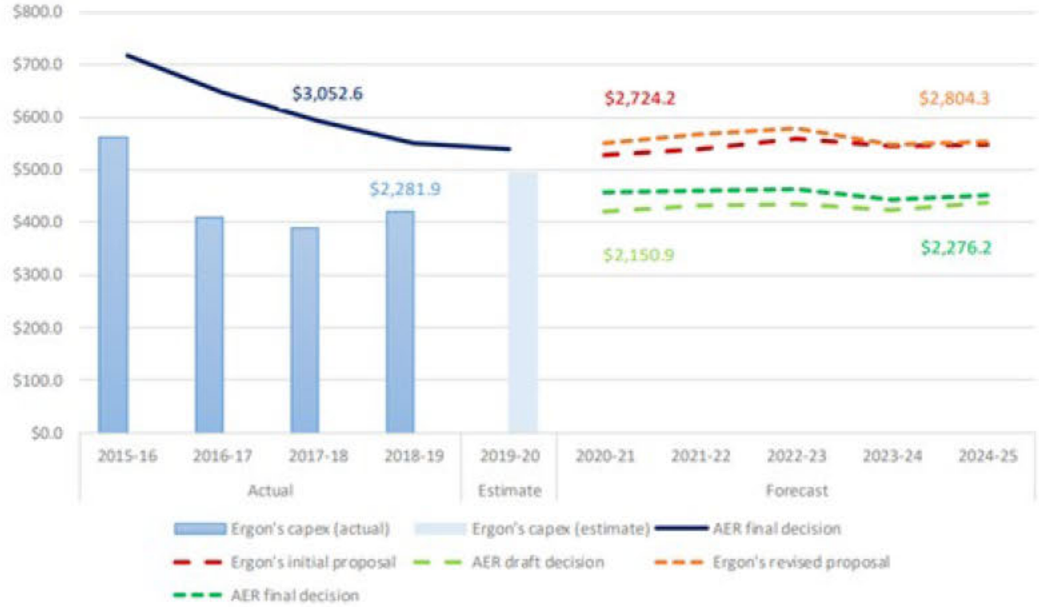
Figure 2.1: AER final decision for the current RCP ($m, FY25)

Description	FY21	FY22	FY23	FY24	FY25	Total
Ergon Energy's revised proposal	551.6	568.8	580.7	549.5	553.7	**2804.3**
AER final decision	457.5	461.6	462.7	442.7	451.8	**2276.2**
Difference ($)	-94.1	-107.2	-118.0	-106.8	-101.9	**-528.1**
Percentage difference (%)	**-17%**	**-19%**	**-20%**	**-19%**	**-18%**	**-19%**

Source: AER Attachment 5: Capital expenditure | Final decision – Ergon Energy 2020–25, Table 5.1

91. In Figure 2.3 we provide a comparison of the RP, RRP and AER decisions, compared with the historical expenditure.

Figure 2.2: Historical versus forecast capex ($m, FY20)



Source: Ergon Energy's revised proposal and AER analysis.
Note: Ergon Energy's actual and estimated capex is based on its recast category analysis RIN data, which reflects Ergon Energy's new CAM that will apply for the 2020–25 regulatory control period. The 2015–20 AER final decision forecast therefore is not directly comparable with the historical and forecast capex amounts shown.

Source: AER Attachment 5: Capital expenditure | Final decision – Ergon Energy 2020-25, Figure 5.2

92. We observe that the draft and final decision are more closely aligned with historical expenditure than with Ergon's RP and RRP, with Ergon having materially underspent the capex allowance in the 2015-20 period.

2.3.2 Summary of reasons for AER's final decision

93. In our review of Ergon's RP for the current RCP for the AER, we formed a view that Ergon did not consistently apply the structural elements of its investment governance and management framework and forecasting processes to a standard that would achieve a capex forecast that is prudent, efficient and reasonable in accordance with the NER capital expenditure criteria. We considered that its forecasting processes had led to a systemic bias to over-estimation in the forecast that it has proposed.[6] We raised specific concerns in regard to emphasis on its top-down challenge process for determination of the proposed

6 EMCa, Review of aspects of Ergon Energy and Energex's forecast capital expenditure. August 2019.

capex program, and insufficient information and insufficient evidence of rigour to justify the proposed expenditure.

94. In its draft decision, the AER concluded that:

> *Ergon Energy's governance and management framework led to a significantly overstated total capex forecast. Ergon Energy has applied its forecasting methodology inconsistently and many programs and projects lack sufficient risk-based cost-benefit analysis*
>
> *Overall, we observed a lack of necessary supporting material throughout Ergon Energy's capex proposal. There were also significant delays in receiving responses to information requests throughout the review process. However, we acknowledge that Ergon Energy engaged with us extensively ahead of our draft decision to discuss these information gaps. It provided additional supporting material, although this material still lacked the quantitative assessment we typically expect to support a capex forecast. In forming its revised proposal, we encourage Ergon Energy to have regard to our observations throughout this draft decision, particularly where we have noted a lack of supporting material to justify the prudency and efficiency of its capex forecasts.*[7]

95. In its final decision, the AER included a substitute estimate of $2,276.2 million ($FY20), based in part on issues that it had identified with Ergon's risk modelling:

> *Our draft decision and ongoing engagement with Ergon Energy indicated that we typically expect distributors to support their proposals with quantified risk assessments where appropriate. Ergon Energy acknowledged this and its revised proposal included more quantitative support for its forecasts. However, we identified several critical modelling errors in this analysis, including inaccurate base case assessment and overstated risk calculations, most notably in its repex and property forecasts.*[8]

96. The AER also referred to stakeholder submissions that did not support the proposed expenditure included in the RRP.

97. In Table 2.2 we provide the reasons included in the final decision that relate to the areas of scope included in our review.

Table 2.2: AER findings in its final decision 2020-25 relevant to EMCa's ex post review scope

Issue	Findings and reasons
Total capex consideration	Ergon Energy has not supported or justified its significant increase in forecast capex. Its governance and management framework led to a significantly overstated total capex forecast. Ergon Energy has applied its forecasting methodology inconsistently and many programs and projects lack adequate risk-based cost-benefit analysis.
Augex	We have included Ergon Energy's proposed subtransmission growth and power quality augex in our substitute estimate. However, Ergon Energy has not fully supported its revised network communications augex.
Repex	Ergon Energy's revised repex forecast is significantly higher than its historical expenditure and higher than its initial proposal. Its revised repex forecast also significantly exceeds our revised repex model results. Our bottom-up assessment highlighted that Ergon Energy's underlying network risks are heavily overstated, leading to an overstated repex forecast required to address these risks.

Source: extract from Table 5.3 – Summary of our findings and reasons, AER Attachment 5: Capital expenditure | Final decision – Ergon Energy 2020–25

7 AER Attachment 5: Capital expenditure | Draft decision – Ergon Energy 2020–25. Pages 5-9.

8 AER Attachment 5: Capital expenditure | Final decision – Ergon Energy 2020–25. Pages 5-8.

98. Specifically in regard to augex, the AER found ‘evidence gaps’ in Ergon’s proposed programs for its network communications augex, including not addressing concerns raised by the AER in its draft decision. As discussed in our assessment of the proposed network communications augex in Section 6, we have found similar issues with Ergon’s justification for its proposed augex to that described by the AER.

99. For its revised repex program, the AER identified several critical issues in the modelling of costs and benefits for its repex programs provided with the RRP, that it considered led to an overstatement of its expenditure requirements, and which was supported by stakeholder submissions. In general, our reading of the final decision is that Ergon had not adequately responded to the feedback provided in the draft decision.

100. In relation to the increased repex program driven by pole treatment expenditure, the AER stated at the time:

> *Ergon Energy subsequently increased its poles forecast by $117.0 million (42 per cent) in its revised proposal. It did not explain why its poles forecast changed so significantly from its initial proposal. Several stakeholder submissions including CCP14 and ECA raised concerns with Ergon Energy increasing its forecasts without explanation. CCP14 noted that the proposed repex increase “presents a real dent in Energy Queensland's credibility that it has its long-term asset management under control.*[9]

101. In terms of the Conductor Clearance program, included as repex, the AER stated:

> *Overall, Ergon Energy has not provided sufficient information to support shifting from its business-as-usual replacement practices to a significantly larger program in dollar terms, and to incur nearly twice as much expenditure to remediate broadly the same number of clearance breaches. Below we outline the repex forecast we have included in our substitute estimate of total capex.*[10]

> *Therefore, our substitute estimate outlined in table 3, which is derived using the repex model and trend analysis, includes the historical repex of $69.2 million that Ergon Energy has spent remediating clearance breaches during the current period (2015– 20). As noted above, this amount was spent to rectify 21601 defects during this period. Therefore, we consider $69.2 million, which is included in our substitute estimate, would provide a prudent and efficient operator with sufficient resources to respond to the clearance to ground and structure breaches Ergon Energy has identified. Based on the information we have received, it would be able to respond to broadly the same number of clearance breaches as it remediated in the current period.*[11]

102. Similar concerns were also raised in Ergon’s proposed augex included in the RRP, including for the grid communications, protection and control category of augex, which we introduced in Section 2. We find that some of the concerns first raised by the AER persist in our review of the proposed augex for the next RCP in Section 6.

103. As discussed in our assessment of the ex post repex and forecast capex that we have been asked to review, we also find issues with the application of Ergon’s modelling, and which extends to where the risk cost modelling has been undertaken. We discuss our findings further in Sections 4, 5 and 6.

2.3.3 Changes between Ergon’s RP and RRP relevant to our review of ex post repex

104. In its RRP, Ergon states that it:

9 AER Attachment 5: Capital expenditure | Final decision – Ergon Energy 2020–25. Page 5-19.

10 AER Attachment 5: Capital expenditure | Final decision – Ergon Energy 2020–25. Page 5-25.

11 AER Attachment 5: Capital expenditure | Final decision – Ergon Energy 2020–25. Page 5-28.

considered several factors that influence all aspects of our capital expenditure program which have changed since the time of our Regulatory Proposal submission.[12]

105. The factors listed in the RRP included (i) safety / condition changes assessment, (ii) qualified risk assessments, (iii) capex / opex trade-offs, and (iv) labour cost escalators and unit rates.

106. We provide Ergon's analysis of the movement in expenditure in Table 2.3.

Table 2.3: Comparisons of capex forecast ($m, FY25)

			Revised Regulatory Proposal				
				Difference from RP		Difference from DD	
$m Real $2020	Regulatory Proposal	AER draft decision	Forecast	$	%	$	%
Repex	1,094.4	834.5	1,289.6	195.2	*17.8%*	455.04	*54.5%*
Augex	248.5	169.3	239.5	-9.0	*-3.6%*	70.19	*41.5%*
Gross connections	375.9	373.2	376.7	0.8	*0.2%*	3.51	*0.9%*
ICT	210.1	158.4	164.4	-45.7	*-21.8%*	5.95	*3.8%*
Property	128.6	56.1	103.8	-24.7	*-19.2%*	47.75	*85.1%*
Fleet	135.8	114.6	128.3	-7.4	*-5.5%*	13.78	*12.0%*
Other non-network	24.9	22.2	22.1	-2.8	*-11.2%*	-0.12	*-0.6%*
Overheads	686.5	610.6	682.2	-4.4	*-0.6%*	71.51	*11.7%*
Gross capex	**2,904.7**	**2,339.0**	**3,006.6**	**101.93**	**3.5%**	**667.61**	**28.5%**
less capcons	169.9	169.0	169.0	-0.9	*-0.5%*	-	*0.0%*
less disposals	10.6	19.2	20.9	10.3	*97.1%*	1.72	*9.0%*
Net capex	**2,724.2**	**2,150.9**	**2,816.8**	**92.6**	***3.4%***	**665.9**	***31.0%***

Source: Ergon Revised Regulatory Proposal, Table 12. Note total may not add due to rounding

107. Our first observation is that the net capex proposed in the RRP is approximately 3% higher than the net capex included in the RP and is not a material increase in aggregate. However, in reviewing the individual components, there is a notable increase in repex, which is largely offset with reductions to other areas of capex.

108. We also observe that there are material reductions (in percentage terms) included in the AER's final decision for repex and property capex, compared with the capex proposed in the RRP for reasons as discussed earlier in our report.

2.4 Actual expenditure

2.4.1 Actual and estimated expenditure for the current RCP

109. Ergon has estimated that it will incur capex of $4,838 million for the current RCP. This is $2,057 million above the capex allowance for the current RCP.[13] The material components of overspend relate to repex. Ergon has indicated that it will absorb any capex over the capex allowance for ICT.

12 Ergon Energy Revised Regulatory Proposal 2020-25. Page 25.

13 Ergon 2025-30 Regulatory proposal - January 2024. Page 85.

2.4.2 Overview of Ergon's ex post capex

110. As discussed in Section 4, expenditure that exceeds the capex allowance is subject to ex post review. The period for review of the ex post expenditure is determined as the first three years of the current RCP and the last two years of the preceding RCP, being FY19 to FY23, in accordance with AER's Capital Expenditure Incentive Guideline (CEIG).

111. Ergon invested $4,362.7 million in capex over the review period.[14] Of this, Ergon incurred repex of $2,180.6 million during the period FY19 to FY23. Ergon states that this is $1,191.1 million (120%) higher than the repex forecast that the AER relied upon for setting Ergon's capex allowance.

112. In Figure 2.4 the actual repex incurred by Ergon is compared with the AER's repex forecast for each year of ex post review period.

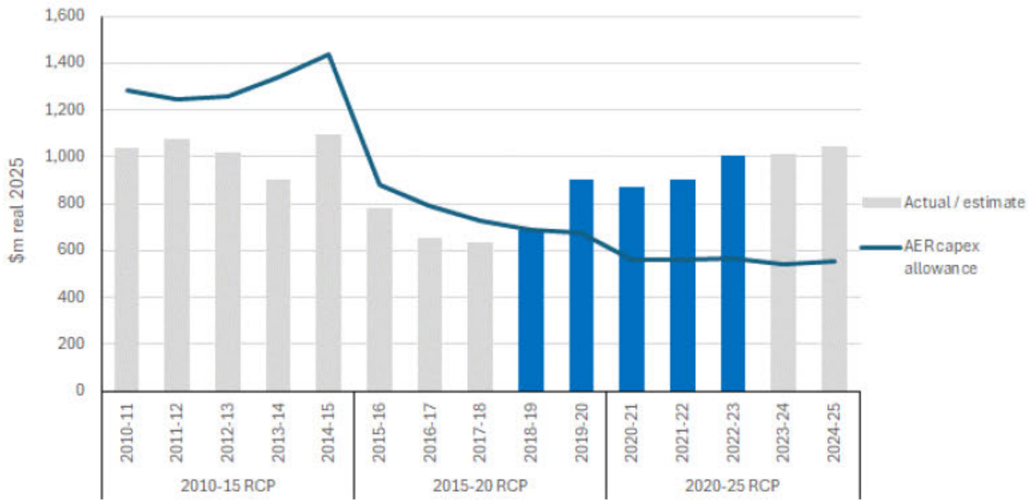
Figure 2.3: Actual capex versus AER allowance ($m, FY25)

Ex post Review Period Total	AER Forecast	Actual (as per RIN)	Variation $million	Variation per cent
Augmentation capex	400.2	269.2	130.9	-33%
Customer connections capex (gross)	485.7	642.9	157.2	32%
Asset replacement capex	989.6	2,180.6	1,191.1	120%
Non-network capex	451.7	561.5	109.7	24%
Capitalised overheads	942.1	1,036.5	94.4	10%
Total Gross Capex	**3,269.3**	**4,690.8**	**1,421.5**	**43%**
Capital Contributions included	215.0	328.2	113.1	53%
Total Net Capex (excl disposals)	**3,054.2**	**4,362.6**	**1,308.4**	**43%**

Source: Ergon 5.3.01 capex ex post justification overview – January 2024, Table 21

113. Figure 2.5 shows the expenditure trend of total capex, against the capex allowance included in the AER's final decision for the current and past RCPs. We have highlighted the capex incurred during the ex post period.

Figure 2.4: Ergon actual capex versus AER repex forecast ($m, FY25)



Source: EMCa analysis of historical and forecast RIN

14 Ergon 2025-30 Regulatory proposal - January 2024. Table 27.

114. With the exception of FY19, Ergon has exceeded the capex forecast included in the capex allowance in every year of the ex post period. In producing the data for the above figures, we have relied on data provided by Ergon.

115. In reproducing this data for our analysis, we have used the escalation series provided by Ergon in response to IR031 Question 3 to convert the materials provided in the original source documents to real $FY25. However, we are not able to reconcile this to the AER capex allowance included by Ergon in its documentation.[15] For simplicity we have referred to Ergon's documentation and have noted where we refer to differences to the AER final decision, and where we state the variances as provided by Ergon in our review.

2.4.3 Drivers of capex overspend in ex post period

116. Ergon describes the drivers of the ex post overspend as:

> *Our capex increased during the current regulatory control period, primarily driven by our investment across regional Queensland in refurbishment and replacement works to address the performance challenges of an ageing network and meet community safety and reliability expectations. These works included targeted pole and conductor replacements in older Sections of the network. In addition, we invested heavily in a major non-network ICT portfolio of works that involved transforming and consolidating core systems and business processes which has allowed us to work more efficiently and with a higher level of cyber security.*[16]

2.5 Proposed expenditure for the next RCP

2.5.1 Overview

117. Ergon proposes $5,890.2 million capex in its RP for the next RCP as shown in Table 2.4.

Table 2.4: Ergon forecast capex ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	Total
Augex	143.9	151.2	160.0	162.4	171.2	**788.6**
Repex	479.3	491.8	512.7	534.3	560.9	**2,579.0**
Customer connections	77.5	79.3	81.3	83.3	84.7	**406.1**
Non-network capex	177.5	155.6	132.6	131.9	140.1	**737.6**
Export services	13.0	13.9	11.7	12.4	11.7	**62.7**
Capitalised overheads	257.3	257.8	262.4	265.4	273.1	**1,316.1**
Total capex	**1,148.4**	**1,149.6**	**1,160.8**	**1,189.7**	**1,241.7**	**5,890.2**

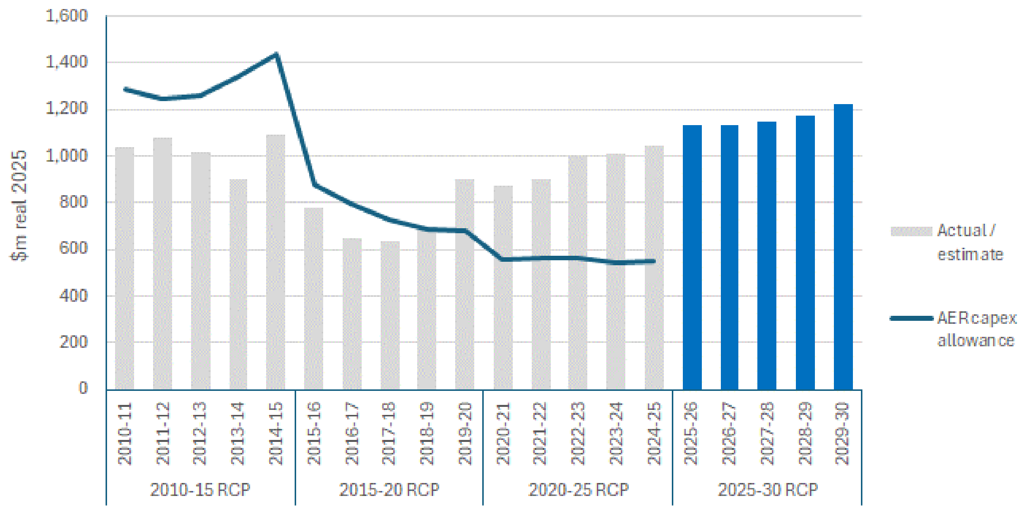
Source: RIN data

118. In Figure 2.6 we show the historical and forecast capex relative to the capex allowance, with the forecast period highlighted.

[15] We suspect that a different escalation series may have been used in Ergon supporting document (Ergon 5.3.01, Table 2, Page 13).

[16] Ergon's Regulatory Proposal 2025-30. Page 85.

Figure 2.5: Ergon actual capex versus AER capex forecast ($m, FY25)



Source: EMCa analysis of historical and forecast RIN

119. The level of capex in aggregate for the next RCP, is an increase on the total capex incurred during the current RCP, which is an overspend against the capex allowance, and an increasing trend from historical levels.

3 REVIEW OF GOVERNANCE, MANAGEMENT AND FORECASTING METHODS

We find that the performance information available to Ergon around the time of its preparation of its RRP for the current RCP highlighted the need to increase the level of asset replacement above that was subsequently included in the AER's capex allowance. For reasons that remain unclear to us, this information does not appear to have featured in the commentary provided by stakeholders, or by the AER, in respective reviews of Ergon's RRP which suggests to us that the information was not made available to those parties at that time.

The information that Ergon provided was of poor quality with numerous inconsistencies and logic flaws and did not provide compelling justification to support the expenditure that it incurred or to support its proposed expenditure. We were required to request information on multiple occasions before we were able to reconcile the expenditure data for our review. In some cases, we have had to make judgement calls as to the basis for the expenditure in some areas in the absence of clear information. We consider that Ergon did not provide evidence of its application of adequate governance and management processes for the expenditure that it incurred and that its methods for forecasting its requirements for the next period similarly reflect significant deficiencies.

We observe that Ergon has made some improvements to the methods it has applied to forecasting of its capex requirements, since preparing its forecast for the current RCP, and these improvements appear to reflect a more general focus on the integration of processes associated with the establishment of EQ. However, overall, the integration and 'standardisation' of methods adopted by EQ, including adoption of methods in place at Energex, has also resulted in changes from the practices evident in the historical expenditure for Ergon. We identified some of these to confirm that they do contribute to unnecessarily higher expenditure levels.

3.1 Introduction

120. In this Section, we provide an overview of Ergon's expenditure governance and management framework. We subsequently assess the extent to which expenditure forecasts developed under this framework, and that are within our scope of review, are likely to be prudent and efficient.

121. The extent to which Ergon's forecast requirements meet NER requirements is, in part, dependent on how the governance and management framework has been applied. Specifically:

- In Section 4 we consider how this framework was applied to repex for the ex post review period
- In Section 5 we consider how this framework was applied to forecast repex
- In Section 6 we consider how this framework was applied to forecast augex.

3.2 Assessment of governance arrangements for the current RCP

3.2.1 No material changes made to governance arrangements

122. During our discussion of the governance arrangements during our onsite meeting, we asked Ergon, what if any changes it had made to the governance framework that it had in place during the current RCP, which would be relevant to our review of the ex post capex and ex ante capex forecasts. Ergon characterised the changes as being focussed on 'one EQ' (i.e. a common set of processes) during the current RCP, and which included 'getting our house in order'. Whilst changes to Ergon's processes included the introduction of Copperleaf, use of Cost Benefit Analysis (CBA) and a consistent approach to expenditure assessment, Ergon shared that there was no material change to the governance of the program, to which we understood related to the governance structure.

No material changes to planning standards or external obligations are apparent

123. During our discussion, we asked Ergon if there had been any changes to planning requirements as a result of the integration of processes in forming EQ. We also asked Ergon if there had been any material changes to regulations that applied to Ergon since 2018, and which may explain the increase in expenditure incurred during that period. This was particularly important to understand whether a new obligation, or indeed direction had influenced the increase in poles, conductor and clearance programs above the level that Ergon had initially forecast it required to undertake.

124. Ergon stated that no material changes had been made.

Top-down adjustments are not sufficient to justify increase in capex

125. As discussed in Section 2, Ergon identifies the key contributor to the overspend in the ex post period as repex, due to a significant increase in the replacement of defective poles.

126. We have sought to understand how Ergon has made its decisions to overspend both the regulatory allowance and its own proposed requirements for the period, and the composition of the programs determined at that time, including the contribution of increased pole replacement.

127. Ergon states that in preparing its investment plan, it had undertaken some top-down adjustments:

> *In recognition of our need to increase spending on our replacement programs, we did a top-down challenge to reduce expenditure elsewhere such as in our network augmentation. Where feasible and within our risk appetite, we have deferred large substation augmentation and replacement projects as well as our distribution feeder works. We have also deferred some clearance works where the breaches are of a less critical nature. Due to the need to significantly increase our pole and other consequential replacements, we were unable to fully offset the large overspend in our replacement capex.*[17]

128. We have considered this from multiple perspectives. Firstly, we considered the information that was reasonably available to Ergon at the time of the investment decision, and how this information was used to determine a reasonable estimate of replacement requirements. Secondly, we considered the arrangements in place to 'govern' the investment decisions to ensure that the incurred and estimated capex was prudent and efficient. Lastly, we considered the information provided by Ergon to support demonstration that its incurred capex was prudent and efficient, to which it refers to its Post Implementation Reviews (PIR).

[17] Ergon - 5.3.01 - Capex ex post justification - Overview - January 2024 – public.

General lack of supporting documentation for investment decisions associated with Ergon's investment plan

129. We consider that a normal governance process would require business cases (or similar) to support proposed investments at a portfolio, and category level. These business cases would be supported by robust analysis of options, and interrogation of available condition and performance data. As we explore further in our review of the repex for the ex post period, we were not provided with the information that we would expect Ergon would have relied upon before incurring the repex that it has reported.

130. As outlined in our assessment of expenditure in Sections 4, 5 and 6, the information provided by Ergon has been problematic and generally lacked sufficient justification. We were not able to easily ascertain the information that was available to Ergon at the time of its investment decisions, to determine the basis on which Ergon considered that the incurred capex met the capex criteria at that time. After numerous requests for information, both prior to and following the onsite discussion we were able to form a view on the reasonableness of the ex post repex. However, we consider that Ergon's evident difficulty in providing this information to us is a strong indication that such information did not drive a structured decision process at the time.

PIR analysis included by Ergon for ex post repex is misleading

131. As a part of its RP, Ergon has included a description of the drivers of the expenditure incurred during the ex post period and included a PIR for each major repex category, to support its decision:

> *We also note the AER's concern on the lack of cost benefit analysis to support our capex forecast in their previous decisions. In support of our expenditure in this ex post review, we have conducted post implementation reviews on the relevant asset classes that demonstrates the prudency of our investments.*[18]

132. We found material errors and weaknesses in the modelling of the ex post repex presented in Ergon's PIR analyses. We provide our assessment of Ergon's PIR analysis in Section 4, where we conclude that we have not given any weight to the PIR analysis provided by Ergon as a result of the issues we have identified in the cost benefit analyses.

133. The primary focus for our review was on what was, or should have been, reasonably known by Ergon at the time of the decision to invest, and the extent to which those decisions reflected the requirements of the capex objectives.

3.3 Assessment of governance arrangements for the next RCP

3.3.1 Governance framework

Strategic focus areas broadly align with Ergon's proposed increases in capex

134. In its RP, Ergon outlines four investment priorities for 2025-30.[19] These priorities differ slightly from the focus areas included in its expenditure forecasting methodology, and which appear to have a closer alignment to the proposed expenditure:

> *Our focus over the forthcoming period is to deliver:*
>
> *-Sustainable investment to avoid the historical boom-bust cycle and manage aged assets, while seeking continued cost efficiencies;*

[18] Ergon - 5.3.01 - Capex ex post justification - Overview - January 2024 – public.

[19] Ergon 2025-30 Regulatory Proposal – January 2024. Page 57.

-Improved community and staff safety, by leveraging innovative solutions to transition to an intelligent grid and manage asset safety risks and severe weather events; and

-Investments that enable and leverage the availability of distributed energy solutions – including both grid scale and small solar generators, electric vehicles, and energy storage solutions. [20]

135. As discussed in Section 2, Ergon has decided upon a large step increase in capex during the current RCP and which it proposes to maintain in the next RCP. We understand this includes increased capex to achieve a more 'sustainable' level of replacement given the age of its network, and which Ergon also submits is required to continue to meet 'acceptable' safety and reliability levels from its aging network (investment priority two). We also observe large increases in its grid comms, protection and control augex (and repex) which appear linked to its desire to leverage technology. We review the justification for each of the included increases in subsequent sections of our report.

Governance arrangements continue to be aligned with a common EQ approach

136. Ergon describes a four-tier governance process, which includes:[21]

- Asset Management Strategy & Policy
- Grid Investment Plan
- Program/Portfolio of Work (PoW) performance reporting
- Project and program approvals.

137. As a part of the description of its governance process, we observe a focus on alignment of future network development and operational management with the EQ strategic direction and policy frameworks, risk and delivery. We infer that alignment with EQ may require changes to Ergon's historical practices that are included in the revealed historical expenditure.

In some instances, a common EQ approach has led to changes to historical methods formerly adopted by Ergon

138. We found some evidence of the methods historically applied by Ergon, and which were reflected in the historical expenditure, being updated to align with a common EQ approach and which more closely align with methods in place at Energex. Furthermore, we found evidence of targets established for EQ, which apply to both Ergon and Energex, and which may have contributed to increases in activity for Ergon relative to historical levels.

139. Given our focus on review of repex, the methods that we refer to primarily relate to the determination and application of asset management standards and practices, and which we detail in subsequent sections of this report. We review the implications of these changes to the proposed capex for the ex post period and ex ante period in Sections 4 to 6 inclusive.

140. We asked Ergon to describe any changes to standards that have been applied by EQ to Ergon that has resulted in changes to the way in which the network and network assets are managed within the Ergon service area compared with historical practice. Specifically, we were interested in the nature of the change and relationship to the proposed capex, referring directly to where an increase to the historical level of capex has been proposed.

141. Ergon's response included the following examples of changes to standards that it had made, and that have resulted in increases to the capex program:

- Removal of 6/8 year inspection cycles. Ergon reduced the inspection interval and resulted in an increase in forecast pole replacements.

20 Ergon 5.2.02 – Expenditure forecasting methodology – June 2023. Page 4.

21 EMCa_AER Presentation - 13 to 15 May 2024 (Day 2).

- Stopped nailing low strength poles. For Ergon this initially required replacement of any unserviceable (US) pole below 5kN, then revised to a lower limit of 4.5kN, which contributed to an increase in pole replacements overall.
- Expanded the use of composite crossarms from 2020, which incurred a higher initial cost however Ergon claims that this offers other benefits.
- Introduction of replacement of non-venting cable pit covers in response to an identified safety risk following an incident, with particular emphasis on high-risk frequented areas.
- Introduction of partial discharge (PD) testing of ring main units (RMUs) in 2022, which has led to higher RMU replacements and cable termination repairs.[22]

142. We consider that some of the above methods are generally consistent with reasonable management responses to emerging issues. However, as stated in sections 4 and 5, we find that the pole management methods employed by Ergon has generally led to a higher pole replacement rate, and therefore high level of expenditure than is prudent without adequate consideration of differences between the two networks and the customers they serve.

143. Ergon provided examples of its works program and asset safety performance reporting,[23] which we consider provides a robust framework to interrogate performance and take corrective actions where required.

Development of investment governance process remains ongoing

144. We had understood from information that Ergon presented to its RRG[24] that it had undertaken an investment governance review of EQ. We requested a copy of the review findings to understand what, if any, changes had been made by EQ. Ergon advised that there was no formal report generated, rather that the:

> *Investment Management Refresh Project, is a process EQ is undertaking across both its regulated and unregulated business. This initial focus has been on forming a new dedicated board sub-committee including the associated charters and workplans.*[25]

145. In its RP, Ergon also referred to the evolution of its decision-making framework and so we asked for details including the nature of the key changes and timing of those changes relative to the ex post review period and ex ante capex forecast included in the RP. In response, Ergon referred us to the business case documents and its cost-benefit framework material provided with its RP as evidence of improvements that it had made to its benefit models. Ergon also provided an overview of its portfolio maturity roadmap (see Figure 3.1), to expand the application of value models to compare and consider investments for portfolio scenarios.

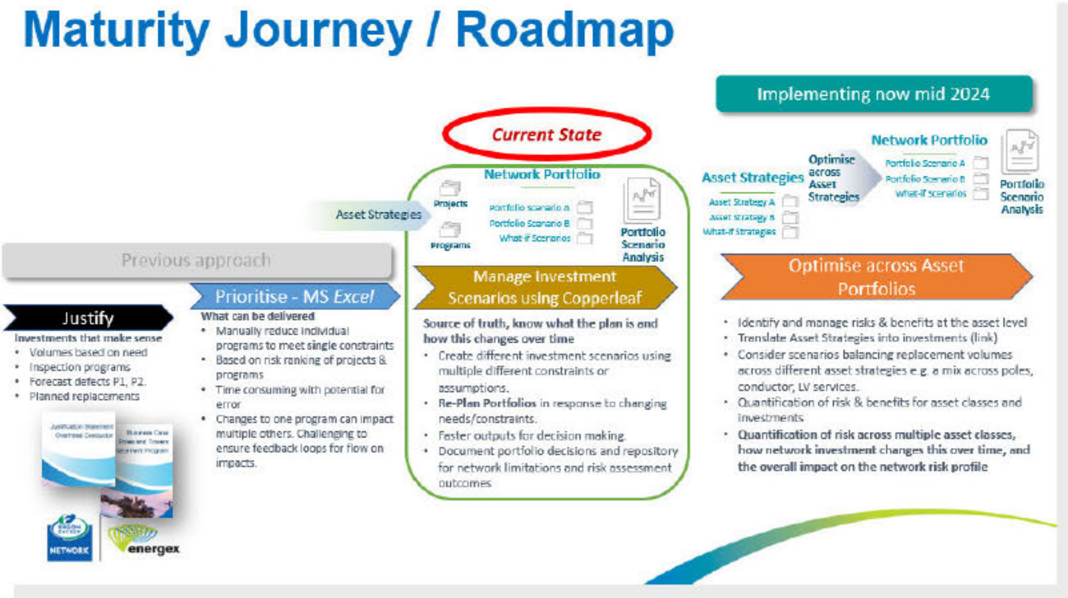
22 Ergon's response to IR038. Question 2.

23 Ergon's response to IR038. Question 11.

24 Reset Reference Group (RRG) deep dive. March 2024.

25 Ergon's response to IR022. Question 2.

Figure 3.1: Maturity journey



Source: Figure 2. RRG EQ AM Maturity Journey Slide – March 2024, provided in response to IR22, Question 3

146. Our interpretation of Ergon's maturity map suggests that it currently has the ability to develop investment scenarios in response to constraints or assumptions, and which we would expect, consistent with the application of Copperleaf we have seen in other NSPs, may extend to consideration of risk outcomes or other service outcomes of a portfolio. However, when asked to describe the current and forecast level of network risk that Ergon expects to be managing, Ergon states:

> *EQ applies this framework [Network Risk Framework] to identify specific risks and manage them appropriately. EQ manages the risks individually, as such does not have aggregate views of total network risk as requested.*[26]

147. To better understand how Ergon makes trade-offs for the level of risk that it may accept at a portfolio level, we also asked how ALARP/SFAIRP[27] has been assessed and achieved in practice, including by reference to any qualitative or quantitative assessment of ALARP/SFAIRP. We often see this undertaken at a project level, however there are implications also at a total network level. Ergon states that this is primarily managed at 'officer' level to determine options to mitigate risk and comply with its obligations:

> *Whilst monetised risk values (with a range of calibration factors) is [sic] used as a method to quantify risk analysis (as outlined in Question 5), a holistic approach is taken to assess ALARP/SFAIRP in practice. Under the Work Health & Safety Act (Qld) 2011, Electrical Safety Act (Qld) 2002, and associated Regulations, as a person in control of a business or undertaking, Energy Queensland has an obligation to ensure that safety risk is eliminated or otherwise minimised SFAIRP. This requires our officers to ensure they are complying with their due diligence obligations when comparing options with similar risk reduction outcomes. With respect to safety, the risk management methodology utilised by Energy Queensland per the Network Risk Framework, incorporates various factors to consider when determining whether an approach towards managing risk is appropriate in the circumstances. This is a key objective focusing on a no compromise approach to community and employee electrical safety, leveraging innovative solutions that enable continued improvements in the safe operation of our networks.*[28]

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26 Ergon's response to IR022. Question 5.

27 As Low As Reasonably Practicable or So Far As Is Reasonably Practicable.

28 Ergon's response to IR022. Question 7.

3.3.2 Risk management framework

148. EQ's Network Risk Framework includes Risk Appetite Statements (RAS) that describe the risk appetite of the EQ Board for each of the risk consequence areas. For example, Ergon states that it applies its Network Risk Framework and its embedded Network Risk Evaluation Matrices to conduct risk assessments of: [29]

- All new investment proposals (business cases and project approval reports)
- Investments detailed in the Program of Work
- Asset assessments within forecasting tools (e.g., Copperleaf, P6)
- New operational risks identified in the field that are likely to require investment.

The network risk framework has continued to evolve

149. During our assessment of the 2020-25 RP for the AER,[30] we observed that the Network Risk Framework provided a mechanism to evaluate the tolerability of outcomes and prioritisation of investments that will control or mitigate the identified risks. However, application of this framework in practice, including how ALARP has been assessed and achieved, was not evident in the justification statements or other supporting information provided in support of Ergon's forecast expenditure.

150. In its determination for the current period, the AER identified issues with the input assumptions in its decision, including the disproportionality factors that had been applied to Ergon's modelling and which it considered lead to an overstatement of requirements.

151. For the 2025-30 RP, Ergon has further developed the Network Risk Framework and introduced a new Risk Quantification Guideline, that we understand supports the risk quantification tools that it has employed and a CBA framework. The guideline provides guidance on the selection of consequence values and use of disproportionality factors for quantification of risk costs.

152. We looked for evidence of how this guidance has been applied in the development of the repex forecast, which we describe in Section 5.

Change in expression of risk position makes direct comparison problematic

153. EQ's risk appetite establishes the amount of risk EQ is willing to pursue or accept in order to achieve its objectives. We compared the positions of the RAS, included as a central tenet of the risk management framework, to understand whether we could discern a change in risk position, and whether that position may lead to an increase in expenditure. In Table 3.1 we note a change in expression of the risk appetite statements which renders direct comparison problematic, and introduction of other risks in the RAS.

29 Ergon 5.2.06 - Network Risk Framework – January 2024. Page 14.

30 EMCa review of aspects of Ergon's proposed capex 2020-25.

Table 3.1: Comparison of risk appetite statements

	2018 version	2023 version
Risk	Distribution	Network Asset Safety & Reliability
Risk appetite statement	EQ has a **medium appetite** for operating the network effectively and will invest prudently in the network, including systems and automation to balance network risk, cost, customer expectations and performance standards. EQ has a **low appetite** for any disruption to supply as a result of the network performance of our critical assets.	EQ will design, build, and maintain a safe and reliable electricity network. EQ will apply: • a **Conservative** appetite to the safe design and operation of its assets. This means EQ will focus and prioritise investment that improves safety outcomes. • a **Balanced** appetite to meeting customer and stakeholder supply expectations, ensuring network performance is in line with required standards while maintaining a competitive cost structure and acknowledging the commitment to safety as a priority. • a **Balanced** appetite to new technology initiatives that support asset safety and reliability

Source: EMCa analysis of risk appetite statements provided to the AER in support of 2020-25 RP and 2025-30 RP

154. A 'conservative' appetite is described by EQ as '*Will only take safe options that are very low risk with high degree of certainty, unwilling to accept even a limited amount of risk in most situations.*' 'Balanced' is described as '*Will consider all potential options and choose the one most likely to result in successful delivery through applying a manageable control program*'.

155. We recognise that risks and risk positions change over time and are not intended to remain static. We also recognise that it is the role of management to determine how the range of risks are balanced to achieve its objective. In that context, we looked for evidence of how the various risk positions were applied in the development of the proposed capex forecast and particularly the risk that the portfolio would address, including measure of ALARP.

156. Whilst less overt in the risk appetite statement, we observe a greater focus on compliance is evident in the increased expenditure directed towards pole failure and conductor clearance activities. Statements of compliance are peppered through many of the justification statements that Ergon has provided in support of its proposed expenditure, and which has had the effect of driving an increase in the expenditure that Ergon has and proposes to incur. In our assessment of the expenditure in sections 4 through 6 we consider further Ergon's claims as to what constitutes compliance.

Ergon's application of the risk cost modelling may overstate the benefits

157. In many instances, we have not seen evidence that the risk models have been peer reviewed, or that sensitivity analysis has sufficiently demonstrated that they result in robust outcomes. In absence of this evidence, we find that some values may overstate the PoF and/or the consequence of failure[31] and which may lead to an over-estimation of the benefit. For example:

- The basis for the selection of safety injury consequence is not provided. In Table 2 of its CBA framework, Ergon ascribes a value of 25% Value of a Statistical Life (VSL) to serious injury, which may overstate the consequence of an injury, being a minimum of $1.3 million per serious injury. However later, a value of 10% is cited.
- Disproportionality factors applied to oil spills are not consistent with the AER's guidance. However, Ergon states that following feedback from the AER during its pre-lodgement

[31] Consequence values are provided in Table 2 of Ergon's cost benefit analysis framework.

engagement, it did not apply disproportionality factors to environmental risks in its business cases.[32]

- We discuss the application of these and other factors further in our review of the category specific expenditure forecast, where they are a driver of the forecast replacement requirements. However, as discussed in Section 3.4, Ergon has not relied upon the risk cost modelling in the determination of its forecast replacement requirements for its distribution line repex, which makes up the majority of its forecast repex.

3.3.3 Portfolio management

Top-down review of forecast capex portfolio not compelling

158. During the onsite meeting discussion, we were made aware of at least four iterations of the proposed capex forecast that was undertaken prior to the submission of Ergon's RP. In the most recent response to IR021, we were provided with an example of the change between an iteration presented to the RRG and the RP.

159. Figure 3.2 shows the evolution of proposed capex shared with the RRG as well as the final RP capex submitted to the AER in January 2024.

Figure 3.2: Evolution of proposed capex ($m, FY25)

Ergon Energy Network Capital Expenditure	March 23 Forecast	May 23 Forecast	August 23 Forecast (Draft Plan)	November 23 Forecast	Reg Proposal Forecast (January 2024)
Augmentation	1,065	1,049	825	845	851
Connections (net)	393	365	319	290	321
Asset replacement	2,915	2,604	2,474	2,562	2,579
Non-network		0	0	0	0
ICT	266	265	251	287	288
Property	195	141	161	157	157
Fleet	179	203	231	243	243
Other non-network	26	23	28	32	32
Property leases	incl in opex	19	18	17	17
Capitalised overheads	1,329	1,329	1,216	1,294	1,316
Total Net Capex	**6,366**	**5,998**	**5,521**	**5,727**	**5,805**

Source: Ergon response to IR38, question 1

160. In broad terms, Ergon describes the iterations as:

- First iteration (March 2023) - preliminary forecast to commence engagement with RRG.
- Second iteration (May 2023) - output of an EQ executive steering committee challenge following concern expressed by the RRG, leading to a reduced capex forecast compared with the first iteration.
- Third iteration (August 2023) and Draft Plan (September 2023) - result of an EQ regulatory committee challenge, following further concern expressed by RRG. Further reductions were primarily targeted at Ergon's repex and augex. As advised in the response to IR021, this included deferral of augmentation projects to the 2030-35 RCP, spreading programs of work over longer periods where there is a lower risk profile.

32 Ergon response to IR007. Question 3a

- Fourth iteration (November 2023) - increase in capex due to modelling refinements. The increase was mostly due to correction of an error in its application of CPI escalations.
- Fifth iteration and RP (January 2024) - following internal approval of the fourth iteration, a further correction of a modelling error was made leading to an increase in capex to the $5,805 million included in the RP. [33]

161. Ergon's description of its review and challenge process, albeit in response to concerns raised by the RRG rather than self-initiated, is indicative of a level of top-down pressure that should reduce costs where possible and ensure that the program is efficient. However, Ergon did not provide us with evidence of a systematic criteria-based approach to portfolio optimisation, that would evidence progression towards a prudent and efficient forecast. We conclude that Ergon's forecast capex is largely derived from assumptions used in the bottom-up development of its proposed expenditure, with two of the iterations essentially being to correct identified errors.

3.4 Assessment of expenditure forecasting for next RCP

3.4.1 Expenditure forecasting

Ergon has introduced a rolling investment plan

162. Based on our discussions during the onsite meeting, we understand that all network capital projects and programs are forecast in the detailed annual Grid Investment Plans for Energex and Ergon, and in seven-year rolling Grid Investment Plans. This is supported by:

- Annual published DAPR which also contains a five-year forecast of all network investment including major project scope, timing, and cost.
- Annual process for developing and approving network portfolios of work (seven-year network capital and operating).
- Ergon introduced the project governance and workflows created for network projects and for network programs.

163. We consider adoption of a rolling investment plan is reflective of good practice. However, we were not provided with a copy of the seven-year rolling plan in response to our requests for evidence of its investment planning and governance processes, to confirm these claims by Ergon, or to understand how the rolling plan aligns with the capex proposed for the next RCP or that which Ergon has incurred in the ex post review period.

Ergon has introduced greater quantitative analysis of its capex forecast

164. Ergon has provided the results of its quantitative assessment for large parts of the proposed capex that we have been asked to review. For example, the inclusion of risk-cost modelling as discussed in Section 3.3 is a feature of good practice and is consistent with AER guidance materials. However, as discussed below and further in our assessment of the associated expenditure in Sections 5 and 6, we have found several issues with the modelling, such that Ergon has not, in many instances and for large parts of its proposed capex, relied on the outcome of its quantitative assessment to develop its forecast requirements.

3.4.2 Repex activity forecasting

Justification statements and business cases did not explain expenditure forecast

165. Ergon has provided a business case for each of its major RIN categories of repex, with each outlining the rationale for its proposed repex. Within these documents, Ergon has included

[33] Ergon response to IR038. Question 1.

comparisons of the proposed repex forecast with outcomes of Ergon's modelling using the repex model for each of the asset classes.

166. The amounts included in Ergon's business case documents do not align with the RIN categories or Ergon's capex model submitted with its RP. The discrepancies are material, to the extent that the composition of the proposed expenditure included in the business cases could not readily be understood. Following additional information provided by Ergon, we were able to reconcile the business case values with the RIN categories, however the disconnect between the business cases and the proposed expenditure raises doubt on the extent to which the proposed expenditure was derived from considerations in the business cases.

Application of forecasting methods varies from Ergon's description

167. A large part of the repex program is driven by forecasts of assumed future defects, arising from the assessed condition of the assets following future inspections. Ergon has developed a bottom-up forecast of its proposed repex, that it claims is determined through application of its risk cost modelling.

168. Ergon has implemented CBRM for the majority of its asset classes. The CBRM methodology is used to predict the asset condition, and is an option used by Ergon as a part of its options analysis. However, except for its proposed substation-related repex, Ergon does not appear to have relied on the results of CBRM or risk-cost modelling for large parts of its repex program, but rather it applies a continuation of the replacement levels that it has been undertaking in the current period.

169. Notwithstanding comments made by Ergon in its RP and supporting business cases for its proposed repex program, we were unable to ascertain how Ergon has determined or optimised the replacement activity that it has proposed for the next RCP. We asked for evidence of the application of its forecasting methods, to determined how Ergon had developed its forecast. We find that the counterfactual that Ergon included in its risk-cost modelling for the ex ante period, which we understand was the modelling that Ergon has also relied upon for development of its forecast repex for the next RCP, is based on continuation of its current level of asset replacement for each asset class. We did not find sufficient justification to support defining the counterfactual in this way.

170. In discussing our request to provide evidence of the application of the forecasting methods Ergon applied to develop its forecast repex, we were advised that this information was not provided with the RP. In its response to our information request, Ergon provided a series of spreadsheets:

> *This is the spreadsheet we have utilised to build the distribution asset forecast expenditure and volume for 2025-30 RCP. EE RIN RepEx Forecast 2025-30 v0.1m.xlsx was the reference Excel file that's shows the relationship between volume and expenditure represented in the RIN asset group and business cases (including consequential asset).*
>
> *Defect replacements were made up of P1, P2 and Return to Service (RTS) replacements. Defect replacement forecast was produced using historical replacement volume and unit cost rate. The replacement forecast expenditure and volume can be found in the following Excel tabs of the EE RIN RepEx Forecast 2025-30 v0.1m.xlsx spreadsheet: 'Defect P1', 'Defect P2' and 'RTS'*
>
> *Targeted replacements can be found in the following Excel tabs of the EE RIN RepEx Forecast 2025-30 v0.1m.xlsx spreadsheet: 'Planned' and 'Reconductor'*
>
> *All the tabs, 'Defect P1', 'Defect P2', 'RTS', 'Planned' and 'Reconductor', has the same named columns.*[34]

[34] Ergon response to IR038. Question 4.

171. We find that the spreadsheet '*utilised to build the distribution asset forecast expenditure and volume for 2025-30 RCP*' was based on average historical replacement volumes, and average unit costs and not, as Ergon had presented in its RP, based on its risk cost modelling.

172. A spreadsheet was also provided that was used to build the substation forecast expenditure and volume for the next RCP, and which provides the list of projects to which the associated expenditure has been 'apportioned' against the relevant RIN asset categories.

Ergon has apportioned repex to RIN categories

173. As described above, Ergon has developed a bottom-up forecast of its proposed repex, which we describe as:

- For distribution-related expenditure - forecasts of each of the proposed defect management programs (P1, P2, CTGCTS and Return to Service (RTS)), and planned replacement projects and programs, have been apportioned to each of the RIN asset categories
- For substation-related and SCADA expenditure - forecasts of each of the proposed projects and programs have been apportioned to each of the RIN asset categories.

174. This is consistent with our experience having assisted the AER with its review of Ergon's RP for the current RCP, whereby Ergon supplied 'apportionment models' for the above expenditure. A variation of the process appears to have been again applied to the forecast repex for the next RCP.

175. The models provided allowed us to understand the composition of each of the RIN asset categories, the relationship of the proposed projects and programs included in business cases, and importantly, how the expenditure forecast had been determined. Absent this information, we were not able to ascertain the composition of the forecast expenditure.

3.4.3 Augex activity forecasting

176. Augex is typically forecast using bottom-up methods, as Ergon has done, and responds to specific drivers which may vary from one regulatory period to another.

177. As discussed in Section 6, the 2010-15 RCP included a large investment in augex. Following subsequent revision of the jurisdictional planning standards, augex was significantly reduced in subsequent periods. The absence of growth (or the ability of the network to meet the growth without further augmentation) is observed in the 2015-20 RCP, and then increases are apparent in 2020-25 and 2025-30 RCPs.

178. Ergon describes the increases as being in response to demand growth coupled with exhausting the available capacity in the network. The most significant increases are in the distribution growth and sub-transmission growth categories. There are also other increases evident in the SCADA, protection and control, resilience, and clearance categories, following Ergon's decision to reclassify this expenditure from repex to augex.

No material changes to Ergon's planning framework

179. The AER has asked that we include observations in relation to changes to Ergon's planning and investment framework that we consider may have led to an increase in augex relative to historical expenditure.

180. We asked Ergon to nominate any changes to its planning framework that may result in an increase to its augex. Ergon refers to changes to its ratings methodology, which primarily impact Energex. To avoid creating new network constraints, and associated projects to address the constraints, Energex has maintained existing feeders and transformers ratings, and will apply the new ratings methodology on new work when feeders are modified/constructed or when transformers are replaced. Ergon confirmed by a response to IR38 Question 8 that there was no change for Ergon.

181. We have not identified any material differences in the planning framework that have contributed to a step increase in augex for Ergon.

Reclassification of conductor clearance from repex to augex

182. As discussed in Section 4, from FY22 onwards, the Conductors to Ground (CTG)/Conductors to Structures (CTS) program has been reported as augex instead of repex. Ergon describes the reason for this change as providing '*a better reflection of the drivers for our clearance program.*'[35] As a result, approximately $40.9 million for conductor clearance is not included in the reported repex, and a proportion of overhead conductors for the last two years of the review period has been reclassified as augex. We discuss this further in our assessment of the clearance program in Section 6.

3.4.4 Expenditure assessment and justification

Ergon has applied a cost benefit framework to its proposed expenditure

183. Ergon has undertaken an economic assessment of the expenditure included in its business cases for the ex ante period that it claims demonstrates that proposed projects are economically viable. Ergon consider that this assessment also justifies the selection of its preferred option where more than one option is considered. The analysis typically compares the incremental costs and incremental benefits of the proposed option with a stated BAU counterfactual.

184. Ergon has included a cost benefit framework with its RP that describes the methods that it has undertaken. For the reasons outlined below, we consider Ergon's application of its cost benefit framework is flawed.

Ergon's definition of counterfactuals biases Ergon's option selection

185. Ergon defines the counterfactual used in its PIR analysis for the ex post repex as the replacement activity indicated in the AER final decision. We provide our assessment of Ergon's PIR analysis in Section 4, where we conclude that we have not given any weight to the PIR analysis provided by Ergon as a result of the issues we have identified in the cost benefit analysis. We consider that with adjustment, Ergon may be able to model the options more accurately.

186. For the proposed repex in the ex ante period, the counterfactual is defined as a continuation of Ergon's current practice, being the replacement activity it has been incurring. The CBA based on Ergon's definition of its counterfactual in this way provides no assessment of the net benefits of its proposal.

187. Ergon has not demonstrated that the counterfactual that it has assumed is reflective of an efficient level of replacement activity to meet and maintain service levels. Instead, for the ex ante period the CBA effectively assumes (without demonstrating this) that the current policy has a net benefit and then measures only the variance in NPV of standardised alternative options relative to this.

188. The definition and treatment of 'Counterfactual' appears inconsistent with the AER guidance material. The AER defines the counterfactual as the current BAU costs that are likely to be incurred by the NSP, and which may have an increasing risk cost function attributed to it:

> *When analysing options for asset retirement or de-rating decision-making, the counterfactual (or base case) represents the 'business-as-usual' (BAU) cost of service. That is, the expected cost that would be incurred if the asset is not retired or de-rated, but remains in service, operated, and maintained on a BAU basis.*
>
> *The counterfactual represents the costs that consumers would incur if the asset continued to be operated under the standard operating and maintenance practices that the business would generally apply. This can be thought of as the costs that would arise*

[35] Ergon 5.3.03 capex ex post justification conductor repex – January 2024.

in the case of 'doing noting [sic] materially different' from the usual practices of the business under its usual asset management practices.[36]

189. Ergon describes its counterfactuals as:

The counterfactual is an estimate of what would have happened in the absence of the program, project, or intervention, and is the view of the future to compare the options under consideration against. While the counterfactual is sometimes referred to as the "Do-Nothing" option, it should be framed around a continuation of current practise [sic] that would happen without the proposed network intervention.[37]

190. We consider these definitions to be markedly different. Whereas the AER definition of the BAU base assumes that the asset(s) are not retired, Ergon has defined this as assuming that assets are retired and replaced at the same level as its 'current practice'. That is, the application by Ergon appears to differ whereby the counterfactual is defined as continuing investment in asset replacement. For example, Ergon cites an example of a counterfactual as 'Continued investment in a program at historic rates, such as continuing to replace 10,000 poles / year'.

191. Including a level of investment associated with interventions such as asset replacement, biases the options assessment such that the efficient level of investment cannot be reasonably determined with respect to the BAU methods.

Options analysis is biased to supporting the preferred option for some capex categories

192. In its final decision for the current RCP, the AER found a lack of consideration of options for the programs (or some portion of them) that Ergon had proposed.[38] Also, it found that Ergon's options analysis was likely to bias the analysis towards its preferred replacement option, such that the forecast was likely to overstate prudent and efficient costs.

193. We looked for evidence that Ergon has improved its options analysis in the expenditure areas that we were asked to review, specifically the extent to which Ergon has considered and made provision for efficient and prudent options in its assessment. For augex, this extends to consideration of non-network alternatives, support for evidentiary gaps and adequate quantitative analysis.

194. In assessing options, Ergon states that:

Where there is no clear and specific regulatory obligation, a positive NPV is essential for an intervention to be justified. A positive result in NPV terms is the determinant in maximising the value to customers. If all options assessed are negative, this is evidence that the counterfactual should be continued. Where several options are positive, the option with the highest value (to the extent it is deliverable) should be undertaken.[39]

195. As evident in our assessment of aspects of the proposed expenditure in Section 6, we consider that Ergon has not sufficiently addressed this feedback, which results in a bias to supporting the preferred option for some capex categories.

Estimated NPV is not relevant to confirming the need

196. In its assessments, Ergon presents its preferred option as providing a more positive NPV result when compared with the options that Ergon has assessed. However, this is predicated on what we consider to be an invalid assumption in which the counterfactual for the ex ante period is a continuation of the investment option that Ergon is currently undertaking which, as discussed in Section 2, is higher than the long-term average. While NPVs may, if appropriately determined, assist with choosing between options, the NPVs

36 AER - Industry practice application note Asset replacement planning - 25 January 2019. Page 27.

37 Ergon 5.2.05 – Cost benefit framework and principles – January 2024. Page 2.

38 AER. Final decision - Ergon Energy distribution determination 2020-25 - Attachment 5 - Capital expenditure - June 2020. Page 5-21.

39 Ergon 5.2.05 – Cost benefit framework and principles – January 2024. Page 2.

that Ergon has calculated are not valid in confirming need because of Ergon's inappropriate definition of counterfactuals.

197. On reviewing the CBA for service lines, we observe that the most significant claimed benefits are from the reduction in risk due to improved service line safety. However, the claimed benefits are essentially the same as those that Ergon has claimed in its network visibility business case. Specifically, in its network visibility business case, Ergon claims that this program will result in a 60% to 90% reduction in safety risk (depending on the option chosen) and that identification of service line issues through network visibility will allow a 2-year deferral (on average) of service line replacements. Ergon's service line replacement business case does not take this into account, and effectively claims the same benefits being achieved by proactive service line replacement program.

198. In our separate report on our assessment of a network visibility program, we accept that a network visibility program is beneficial in reducing service line safety risks and in facilitating a defect-based service line replacement strategy and that this will largely or fully obviate the need for a proactive age-based replacement program.

199. In its pole and pole top replacement program, Ergon also allows for the consequential replacement of service lines. This too is not accounted for in Ergon's service line replacement CBA.

200. To the extent that the CBA is relevant to Ergon's proposed program, we identify further concerns with its analysis, for example:

- No evidence is provided for assuming a 1% probability of serious injury from 'shocks and tingles'
- No evidence is provided for assigning a safety risk to defects that is 10% of the risk that applies to failures
- The 'Intervention capex NPV' does not appear to be an NPV, as the heading would suggest, but rather is the sum of the difference in capex between the option and the 'counterfactual' over a five-year period. (For reasons that are unclear, and appear to be a further error, the capex is summed from 2027 to 2031). As a result, figures quoted as 'Net NPV' are the sum of five years of undiscounted capex which has been deducted from the present value of 20 years of benefits. These figures have no economic meaning.

201. While we have concerns with Ergon's analysis, the conclusion drawn from it are also erroneous in our view. Ergon's analysis would suggest that the larger the program the higher the NPV. For example, it claims that a doubling of the program will produce an NPV that is $71 million higher than the (unknown) NPV of the proposed program. We consider that this is only the case in Ergon's analysis because it fails to account for the higher risk of older service lines and therefore implicitly assumes that every service line replacement will equally reduce safety risk. Without appearing to recognise this anomalous result, Ergon's business case simply makes the circular observation that '*this option* [i.e. doubling the replacement rate] *required additional resource and investment compared to the counterfactual'* and that *'our preferred option counterfactual is the most optimum (sic) solution…*".[40]

A positive NPV does not necessarily indicate optimum timing

202. We observed references during our onsite to an assumption that a positive NPV justifies undertaking a project. EQ's cost benefit framework document correctly identifies the need for analysis to determine optimal timing for a project and notes that this can determine the investment year that maximises the NPV.[41] However we saw no evidence of Ergon having

[40] Ergon 5.4.05 – Service Line Replacements business case. Page 22.

[41] Ergon 5.2.05 Cost Benefit Analysis Framework and Principles. Page 11. While this document correctly identifies the timing optimisation process, it erroneously refers to annuitizing the cost by multiplying by the WACC, rather than also taking account of the economic life of the relevant assets.

undertaken such analysis and therefore Ergon did not demonstrate whether there may be a net benefit from prudent deferral of its proposed projects.

3.4.5 Cost estimation approach

Cost estimation framework is reasonable

203. In response to our questions, Ergon provided a copy of the EQ Estimation Methodology and Framework 2020[42] that defines the underlying principles, as well as the business rules and associated estimation system linkages used for network project cost estimation in EQ.

204. EQ categorises estimates by degree of project scope definition, which typically aligns with the project phase in its lifecycle.

205. To maintain currency, compatible units and standard estimate reviews are initiated based on a range of triggers that include:

- Ad hoc reviews by request
- Periodic reviews such as annually or quarterly, including related to changes in trends associated with unit rate types of work
- Changes driven by work practices, contract or materials impacts.

206. During the onsite we asked if Ergon had undertaken any external reviews of its estimate accuracy, to which the response was that they had not.[43] We also asked for evidence of any PIRs undertaken at the completion of the works, particularly for the ex post review period, that show the actual versus forecast capex, volume and unit costs. In response, Ergon provided the models that it had used to build up its forecast based on an averaging method of historical unit rates by activity. Whilst these reported unit costs by asset category, they did not address our question.

207. Ergon also provided a presentation titled 'IWP program build Program Estimate overview 2024',[44] which provided a high-level summary of the milestones associated for review of unit rates and some improvement actions that have been undertaken.

Ergon's unit rate analysis is flawed

208. Based on our review of the historical averaging method that Ergon has applied, we have identified a number of issues:

- The averaging method applied by Ergon draws from what appears to be expenditure expressed in nominal terms, then determines an average which is used to develop a forecast expenditure. This forecast expenditure appears (incorrectly since it is in nominal terms) to reconcile with the input to the capex model which is expressed in real 2023 dollars.
- Whilst we see provision for escalation in the model, this does not appear to have been applied to determine the average unit rates, which appear to have been relied upon in developing the forecast.
- The escalation rates included in the model differ from those provided to us by Ergon as the basis of its assumptions, and would appear to come from the opex model, and not its capex modelling assumptions.
- Ergon does not account for outlier expenditure or volumes in its determination of unit rates, which results in a biased unit rate. There are clear examples of large movements in expenditure and/or volumes, which result in a unit rate that is an outlier to the trend or may be zero. Without explanation and correction, these outlier values result in a bias to the unit rates relied upon for determination of the forecast expenditure.

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42 Ergon response to IR038. Question 13.

43 Ergon response to IR038, Question 13, also states that no external reviews of cost estimates and/or the cost estimation methodology have been carried out.

44 Ergon's response to IR038. Question 13.

209. Ergon provided a comparative analysis of bundled costs, to demonstrate that its costs for key programs were efficient when compared with other DNSPs in the NEM. We could not reproduce the results included in this analysis based on Ergon's assumptions for poles. In fact, our analysis led us to higher 'bundled' unit rates than Ergon had claimed, as described in Section 4.5.

3.4.6 Capex portfolio deliverability

210. Ergon has provided an assessment of deliverability for its proposed capex and taken together with the discussions during the onsite, we consider that Ergon has put in place reasonable processes that should result in deliverability of its program. However, at the project and program level, we have identified the potential for constraints of key resources based on a step increase in activity for SCADA, protection and control category works, which we consider will impact the ability to deliver those programs. We discuss this further in Section 6.

3.5 Our findings and implications for our review of governance, management and forecasting methods

3.5.1 Summary of findings

Lack of compelling information for our review

211. The Better Resets Handbook published by the AER nominates four expectations of a network business' capital expenditure proposal. [45]

- Top-down testing of the total capital expenditure forecast and at the category level
- Evidence of prudent and efficient decision-making on key projects and programs
- Evidence of alignment with asset and risk management standards
- Genuine consumer engagement on capital expenditure proposals.

212. Except for consumer engagement, which is beyond our scope of review, we find that Ergon has not materially achieved the remaining three expectations.

213. In our interactions with EQ, we find the responses to our queries were generally high-level and, in many cases, did not meaningfully respond to the questions. For instance, we find that SMEs struggled to respond to questions as to how the forecast capex included in the RP has been built up in many cases, and which should be easily explained and evidenced. We found that we needed to ask multiple rounds of questions in attempting to ascertain the basis of Ergon's proposal.

214. Data provided by Ergon does not appear to have been adequately reviewed prior to submission. We had difficulty reconciling project and program expenditure to the RIN and to the sub-categories included in Ergon's documentation. We found instances of incorrect modelling techniques and escalation assumptions which are not indicative of a quality submission, such as with the models used to determine the unit rates and forecast expenditure for its distribution lines. In several instances, Ergon also submitted information and analyses, which differed considerably from information, analyses and business case information originally provided with its regulatory proposal.

Ergon does not appear to have addressed some critical feedback provided in the last AER decision

215. Ergon provided risk-cost modelling in support of its proposed repex, however at times we found this difficult to interrogate. We were not provided with the basis of the inputs and

45 AER. Better Reset Handbook - December 2021.

assumptions that Ergon has applied in forming its projects and programs, nor were we provided NPV models in some instances to interrogate.

216. Taken together with our concerns over lack of options, lack of supporting information, and counterfactual and modelling assumptions, we consider that similar concerns expressed in the AER's previous determination were not sufficiently addressed.

Repex forecasting methods are not based on risk cost modelling as Ergon has claimed

217. The expenditure models provided in response to our information requests allowed us to reconcile the program and understand the composition of Ergon's forecast. With this understanding, the repex for the distribution line activities is the result of a build-up of an extrapolation of historical average defects and planned work, and is not based on risk-cost modelling outcomes as Ergon has claimed.

218. As a result, Ergon has placed significant reliance on its most recent historical replacement volumes and expenditure to determine its future requirements, which we consider in Sections 4 and 5.

Augex forecasting methods based on a bottom-up build of requirements

219. Ergon's forecast for the aspects of augex we have been asked to review is based on a bottom-up forecast, which is reasonable for this type of work. Ergon describes general increases in augex as being driven by now exhausting available capacity in the network. This is most relevant to the distribution growth and sub-transmission growth categories.

220. We have not identified any material differences in the planning framework that Ergon has applied to developing its forecast capex requirement, that has contributed to the step increase in augex that Ergon has proposed.

221. Ergon has reclassified its CTG/CTS program from repex to augex, which is included as a new defect driven forecast, to which Ergon describes the driver as compliance. We typically see this classified by NSPs as repex and we discuss our assessment of this program further in Section 6.

Adoption of common EQ standards has contributed to higher levels of expenditure

222. We observe that Ergon has made improvements to the methods it has applied to forecasting of its capex requirements, and these improvements appear to reflect a more general focus on the integration of processes associated with the establishment of EQ. However, the integration and 'standardisation' of methods adopted by EQ has also resulted in changes to the practices evident in the historical expenditure for Ergon. We identified some of these, to confirm that they do contribute to higher forecast expenditure levels.

A greater focus on compliance is evident in Ergon's proposal

223. We have observed a greater focus on increased expenditure directed towards claimed compliance activities. Statements of compliance are peppered through many of the justification statements that Ergon has provided in support of its proposed expenditure, and which has had the effect of driving an increase in the expenditure that Ergon has and proposes to incur. Accordingly, we looked for demonstrable evidence of the risk and breach of its compliance requirements, or whether new compliance requirements may be resulting in an increase in the required expenditure.

224. As presented in our assessment of the proposed expenditure in Section 4 and 5, whilst we consider that Ergon was required to incur a higher level of capex than was included in the capex allowance, we did not find sufficient analysis to support the level of expenditure that it incurred as reasonable and prudent. Nor did we find sufficient analysis of the compliance risk to support the proposed expenditure as reasonable and prudent, nor the emergence of a new compliance obligation that was driving the increase in expenditure.

CBA methods applied include some fundamental flaws

225. By specifying the counterfactual as a continuation of Ergon's current investment practice, the CBA that Ergon has utilised provides no meaningful assessment of the net benefits of its proposal. Instead, the CBA effectively assumes (without demonstrating this) that the current policy has a net benefit and then measures only the variance in NPV of standardised alternative options relative to this.

226. The preferred option is presented as providing a more positive NPV result when compared with the options that Ergon has assessed. However, this is predicated on what we consider to be an invalid assumption that the counterfactual is a continuation of the investment option that Ergon is currently undertaking which, as discussed in Section 2, is higher than the long-term average.

227. Our concerns with Ergon's analysis and modelling assumptions cast doubt on Ergon's ability to draw meaningful conclusions from its analysis.

Portfolio not optimised, and not able to be assessed by change in risk level

228. To assess the change in portfolio risk as a result of its proposed program, Ergon could assess the pre- and post-investment risk, which it has not done.

229. Ergon has provided PIRs of its repex program, which it claims delivered over $1 billion of additional benefit in NPV terms compared to a program constrained to the AER capex allowance.

230. Applying the models relied upon by Ergon to its forecast capex, without moderation, would result in a similar scale of benefit and which appears improbable and may in fact suggest that its risk-cost modelling at a portfolio level may overstate the benefits that Ergon has claimed. For example, it appears that in comparing its proposed program with the 'AER capex allowance' scenario Ergon has assumed that under the AER scenario repex would have ceased entirely after the end of the current period. This is an improbable assumption and leads to Ergon to a distorted view of the efficacy of its current and proposed high levels of repex.

231. Ergon has, in places, claimed that its risk modelling has assisted with its prioritisation of its project and programs. However, due to the manner in which Ergon has undertaken its risk modelling, including its definition of its counterfactual, an assessment of whether the proposed capex is seeking to manage to existing risk and performance levels of improve upon them cannot be ascertained.

232. In many instances the basis for consideration of the project is clear, however Ergon has not adequately demonstrated that the capex forecast that it has proposed for the next RCP (for the aspects we were asked to review) reflects a justified level of expenditure with justified timing such that it represents a reasonable forecast of prudent and efficient expenditure, as required under the NER.

4 REVIEW OF EX POST REPEX

We consider that Ergon's incurred repex of $2,181.6 million for the ex post period is higher than a prudent and efficient level.

We consider that it was prudent that Ergon incurred a level of repex that exceeded the repex included in the capex allowance in aggregate.

However, based on the projects and programs we reviewed, we find that Ergon's repex incurred during the ex post period does not meet the NER expenditure criteria because it has not demonstrated that it is efficient, prudent and reasonable. We consider that a repex allowance that meets NER criteria would be materially less than Ergon has proposed.

4.1 Introduction

233. In this section, we provide an overview of the repex that Ergon has incurred in the ex post review period. We subsequently assess the extent to which this expenditure is likely to be prudent and efficient.

4.2 Overview of Ergon's proposed conforming ex post repex

4.2.1 Overview of Ergon's ex post repex

What Ergon has incurred

234. Ergon reports to have incurred repex of $2,180.6 million during the period 2018-19 to 2022-23, as shown in Table 4.1. Ergon presents this as being$1,191 million (or 120%) higher than the repex forecast that the AER relied upon for setting Ergon's capex allowance, when converted to $FY25.

Table 4.1: Ergon actual repex versus AER final decision - as proposed by Ergon ($m, FY25)

	FY19	FY20	FY21	FY22	FY23	Total
AER Final decision	187.0	182.6	198.5	206.4	215.2	**989.8**
Actual	310.5	430.6	455.9	481.9	501.8	**2,180.6**
Variance	*-123.4*	*-248.0*	*-257.4*	*-275.5*	*-286.6*	***-1,190.9***

Source: EMCa analysis of RIN forecast data, Regulatory Proposal tables and response to IR031

235. As stated in Section 2, we were not able to precisely reproduce the values that Ergon has presented, noting that the variance lies essentially with escalation of the AER's decision amounts. After applying the escalation series provided by Ergon, we calculate the values as outlined in Table 4.2.

Table 4.2: Ergon actual repex versus AER final decision - as calculated by EMCa ($m, FY25)

	FY19	FY20	FY21	FY22	FY23	Total
AER Final decision	199.6	196.2	197.3	205.1	213.6	**1,011.8**
Actual	310.5	430.8	455.8	482.0	502.0	**2,181.0**
Variance	*-110.9*	*-234.6*	*-258.5*	*-277.0*	*-288.3*	***-1,169.3***

Source: EMCa analysis of RIN forecast data, Regulatory Proposal tables and response to IR031

236. Ergon has exceeded the repex included in the AER final decision in every year of the ex post period, resulting in an overspend which we calculate as $1,169 million.[46]

237. The allowance set by the AER reflects a total capex allowance, and whilst the AER also provides an allocation for each capex category including repex, it does not allocate this further to asset category levels. These allocations have been determined by Ergon based on its interpretation of the AER determinations, and we have used these values as a guide in our analysis.

238. Actuals for FY19 and FY20 included $13.6 million of public lighting spend undertaken and reported in the RIN as SCS in FY19 ($5.4 million) and FY20 ($8.2 million). We do not consider that this is SCS expenditure, noting that it was removed by the AER from the capex allowance for SCS in its final decision. We have not removed this expenditure from Table 4.2, however we have made an adjustment for public lighting expenditure in our assessment below.

239. The category totals are provided in Table 4.3.

46 This compares with Ergon's stated overspend of $1190.9 million.

Table 4.3: Ergon actual repex by category ($m, FY25)

	FY19	FY20	FY21	FY22	FY23	Total
Poles	70.5	115.6	122.9	112.0	116.8	**537.7**
Pole top	47.9	70.0	75.2	68.0	73.9	**335.0**
Overhead conductors	20.8	23.9	31.5	58.8	59.8	**194.8**
Underground cables	2.8	5.8	12.2	8.4	7.2	**36.4**
Service lines	12.8	20.6	28.7	28.1	32.4	**122.7**
Transformers	68.8	86.5	69.7	75.9	77.5	**378.4**
Switchgear	57.0	71.6	73.5	74.2	84.1	**360.5**
SCADA	9.4	10.3	23.0	34.0	32.0	**108.7**
Other	15.2	18.2	19.1	22.7	18.2	**93.3**
Total	**305.1**	**422.6**	**455.8**	**482.0**	**502.0**	**2,167.4**
Public lighting	5.4	8.2	0.0	0.0	0.0	**13.6**
Total (as reported)	**310.5**	**430.8**	**455.8**	**482.0**	**502.0**	**2,181.0**

Source: EMCa analysis of Ergon RIN

4.3 Assessment of drivers of Ergon's ex post repex

4.3.1 Drivers of increased repex

Increased replacement needs drive overspend at a total capex level

240. In its RP for the next RCP, Ergon claims that the capex overspend for the current RCP was primarily due to increased replacement needs:

> *Our capex increased during the current regulatory control period, primarily driven by our investment across regional Queensland in refurbishment and replacement works to address the performance challenges of an ageing network and meet community safety and reliability expectations.*[47]

241. Replacement capex accounts for over 90 percent of the overspend, with poles representing almost one third of all replacement capex.[48] For repex, Ergon states that the

> *need for asset replacement has risen due to an increasing asset failure rate, most critically our pole failure rates. As a responsible distribution entity, we have an obligation to increase our investment in asset replacement to maintain a safe and reliable network.*[49]

242. Ergon describes the main drivers for the increased spend over the current RCP as:

> *- the identification of a larger than expected number of defective poles requiring replacement due to a change to our pole serviceability calculation (as required by Queensland's Electrical Safety Code of Practice 2020 – Works) in response to an increasing number of in-service pole failures;*
>
> *- a consequential increase in the need to replace transformers, cross-arms, overhead switches, and service cables associated with pole replacements, resulting in most of our distribution line asset categories being above the AER's forecast (although bundling of*

47 Ergon 2020-25 Regulatory proposal – January 2024. Page 85.

48 Ergon 5.3.01 Capex ex post justification – overview – January 2024. Page 3.

49 Ergon 2020-25 Regulatory proposal – January 2024. Page 86

these works ensures our program is delivered efficiently and avoids the need to return to the same site to replace assets that fail subsequently); and

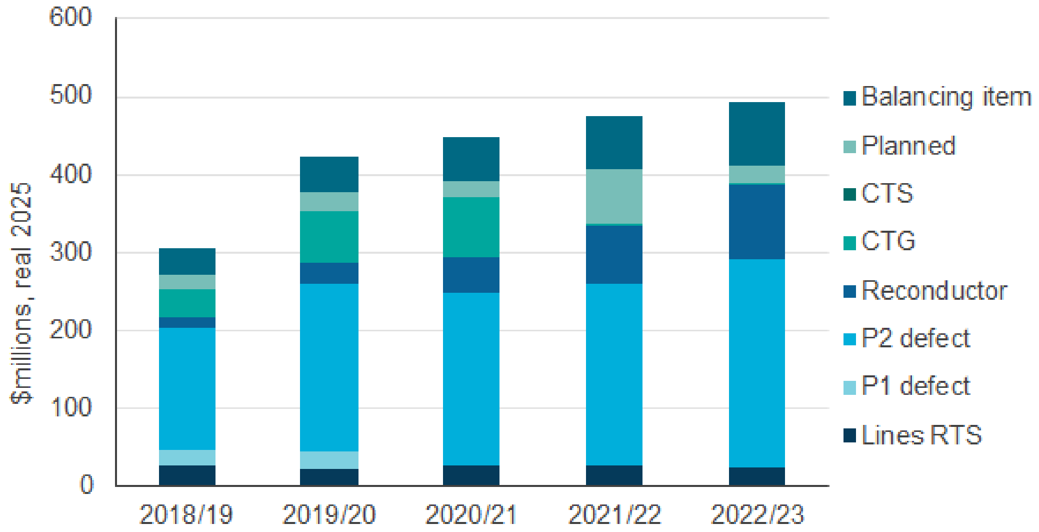
- an increase in our reconductoring program to address the safety and reliability risks of an increase in unassisted conductor failure, in particular copper conductor.[50]

Breakdown of ex post repex was not able to be reconciled to the RIN

243. We asked Ergon to provide a spreadsheet that clearly shows the relationship (and allocation) between each of the individual replacement projects and the expenditure provided by Ergon and the repex included in the RIN asset categories for the review period. Ergon provided an explanatory note and spreadsheet in its response.[51]

244. We were unable to reconcile the information provided to the RIN. In fact, our analysis highlights a balancing item of $247 million required to be added to the information that Ergon has provided to align with the RIN total of $2,181 million for the review period. We show the breakdown including the balancing item in Figure 4.1, ordered by emergency works, defects, then planned programs.

Figure 4.1: Summary of ex post review period repex by driver ($m, FY25)[52]



Source: EMCa analysis of Ergon's response to AER IR39, question 2

245. We make the following observations:

- Firstly, the conductor clearance programs are shown for the first three years only. This is due to reclassification of these programs as augex in FY22 and which we review in Section 6.
- Secondly, the reconductoring program increases over the five years, with large increases in the final two years. We understand this is primarily driven by a single line rebuild project, M028 Childers to Gayndah.
- Lastly, we can see that the combination of Line RTS, P1 and P2 defects account for 59% of the repex over the review period and which is similar to the 65% claimed by Ergon. However, the combination of the planned work and balancing item accounts for 20% of the repex, but which is not included at a level of information to assist with our review. We also note the presence of planned work at a category level in our assessment below.

50 Ergon 2025-30 Regulatory Proposal – January 2024. Page 34

51 Response to AER IR39. Question 2.

52 Converted using Ergon's escalation rates, excluding labour cost escalation.

4.3.2 Review of past performance

246. The review period for the ex post review spans two RCPs and two separate distribution determinations.

Recent distribution determinations allowed a lower level of capex

247. As a part of its supporting information, Ergon included a review of the determination for the 2015-20 RCP and 2020-25 RCP. From our reading of this material, there appear to be two key issues.

248. Firstly, estimates used for comparison with historical levels for review of the 2015-20 pole replacement and again for 2020-25 pole replacement were under-stated, in that actuals were higher. For the 2015-20 period, Ergon concluded that:

> *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 [sic] 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.*[53]

249. Secondly, for the 2020-25 period Ergon included a combination of pole replacements associated with the pole replacement program and the CTS/CTG program, which was further complicated by changes to the underlying forecasting method adopted by Ergon for its RRP.

250. Ergon considers that this combination of issues contributed to determination by the AER of capex allowances that Ergon subsequently considered were lower than required to meet the safety and reliability outcomes required, including compliance with the Electrical Safety Code of Practice (ESCOP).[54]

Actual and estimated performance driven primarily by increases in repex

251. Ergon also included a review of past performance. In addition to the higher actuals than estimates at that time, as discussed above, the statements by Ergon of most relevance to the ex post review include:

> *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.*[55]

252. We consider the changes introduced to the management of its pole fleet in the following Section.

An elevated program had already begun prior to commencement of the review period

253. The ex post review period commenced in FY19, two years prior to the 2020-25 RCP to which the AER final decision relates. At the time the 2020-25 RP was submitted to the AER, January 2019, the final two years of the RCP were estimates.

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53 Ergon 5.3.02 capex ex post justification – pole repex – January 2024. Page 12.

54 Queensland's Electrical Safety Code of Practice 2020 – Works.

55 Ergon 5.3.02 capex ex post justification – pole repex – January 2024. Page 16.

254. Key points provided in Ergon's RP include:

- Ergon was forecasting an underspend of $523 million ($FY20) for network capex in the 2015-20 RCP
- A key contributor to the underspend was improvements in delivery
- It was providing high reliability and customer service performance outcomes to customers
- Reliability performance was (with a few exceptions) stable, or progressively improving and had been at or exceeded the Minimum Service Standards (MSS) in its Distribution Authority (DA). [56]

255. There was a strong message that the network was performing well, and customers were benefiting from savings realised, in part, by the merger of Ergon and Energex. Ergon goes further, stating that further savings were planned:

> *Notwithstanding the reductions already targeted for the two businesses in their 2015-20 Regulatory Proposals and the AER's associated Distribution Determinations, in order to improve further on the baseline an additional totex target of $562 million net of implementation costs in nominal terms over four years (2016-17 to 2019-20) was formalised for the two business. These further targeted savings were against the forward estimates at that time, which approximated the regulatory expenditure allowance over the period to 2019-20.*
>
> *For ourselves and Energex, Energy Queensland expects to achieve cumulative post-merger net savings of $579 million by the end of 2019-20, which exceeds the initial estimate of $562 million.*[57]

256. In its RP for the current RCP, Ergon was projecting a total capex underspend against the capex allowance of -$666.8 million ($FY20) for the preceding RCP.[58] We observe some inconsistency of information provided in the RP regarding the annual expenditure. The AER draft decision shows the annual expenditure, which indicates expenditure in each year of the 2015-20 RCP, totalling $2,385.3 million ($FY20) against the capex allowance of $3,052.6 million ($FY20).[59]

257. As we present in Section 2, the actual capex resulted in an underspend of $118 million compared with the capex allowance, somewhat lower than Ergon had projected and largely accrued in the beginning of the period. The final year capex, FY20, was $223 million higher than the capex allowance.

258. The reasons for the increase in expenditure in the final two years, and specifically the overspend in FY20 are not able to be determined from the regulatory documents submitted at that time, but only by investigation of the decisions taken by Ergon at that time. What is clear, is that decisions taken prior to FY20 resulted in a step increase in capex, and specifically repex in that year. These decisions are now evident in the timeline provided by Ergon, replicated in Table 4.4, in response to our questions.

Indicators highlight deterioration in performance

259. The AER in its final decision for the current RCP stated that:

> *At a total network level, Ergon Energy's network reliability has improved since the beginning of the 2010–15 regulatory control period. The frequency of unplanned outages has declined over this period, indicating that Ergon Energy's unserved energy risk, at a total network level, is declining over time. This highlights that Ergon Energy has been able to improve the reliability of its network over the last nine years with its*

56 ERG 1.004 2020-25 Regulatory Proposal JAN19 PUBLIC. Page 20.

57 ERG 1.004 2020-25 Regulatory Proposal JAN19 PUBLIC. Page 21.

58 Being the sum of the network capex underspend of 552.5m ($2020) and a non-network capex underspend of -$114.3m ($2020).

59 ER - Ergon Energy 2020-25 - Draft decision - Attachment 5 - Capital expenditure - October 2019. Figure 5.2.

revealed capex (and by extension repex) spend. We therefore consider capex and repex forecasts that are broadly in line with this historical expenditure are likely to provide Ergon Energy with sufficient resources to at least maintain its network reliability.[60]

260. Since the AER's final decision, we noted a general improvement to the reliability indicators reported by Ergon:

- In the 2022 DAPR, Ergon describes increases unfavourable to STPIS targets for FY22 due primarily to increases in emergency maintenance for urban SAIDI and SAIFI and high voltage asset failures for short and long rural SAIDI. Ergon notes that these increases were coincident with an increase in outages during wet and storm conditions.[61]
- In the 2023 DAPR, five of the six reliability measures were favourable to the unplanned performance targets under the AER's STPIS framework. The unfavourable measure was due to the duration of emergency maintenance.[62]

261. Whilst an increase to SAIDI was observed against MSS targets, and a more moderate increase to STPIS in the early years of the ex post period, more recent reliability performance has improved. For SAIFI, evidence of an increase was less certain. Whilst we would expect a relationship between reliability performance and asset failure (particularly SAIFI), we placed higher weightage in our assessment on the recorded asset failure data and defect data, rather than where a failure may have resulted in an outage as defects are an indicator of a decline in asset condition which precedes an impact to reliability.

Asset failure and resulting safety of the network highlight increasing risk

262. Another important indicator is the underlying asset condition, where deterioration of the network and its components may lead to premature failure and increased risk of safety incidences, bushfire and unserved energy to consumers. This may be evident in the reliability outcomes at the time, as reliability tends to be a lag indicator, and lag asset performance for some time because of the use of rolling averages.

263. We observe that Ergon has claimed that its asset age profile indicates the need for a large volume of asset replacement required over the next two RCPs.[63] This is also evident in the messaging included in its 2025-30 RP.

264. Ergon refers to deteriorating performance of its network across key asset classes, including the need to meet its legal obligations to mitigate safety risks to SFAIRP.[64] However, we do not find evidence in the RP to support this claim, nor how this information has been used to support the proposed expenditure.

265. Reported unassisted pole failures were very low through to FY18 and well below the level included in the Code of Practice. Ergon advised that it has since back cast volumes for FY16, FY17 and FY18 based on revised criteria (i.e. inclusion of storm-related failures where significant wind speeds or direct lightning strikes did not occur). These back cast figures show an increase over this period, however an absolute level that did not exceed the ESCOP.

266. Based on the reporting in place at the time, the unassisted pole failure annual volumes increased above the threshold in FY19, and on a 3-year rolling basis in FY20.

267. It is probable that a combination of factors including the low replacement levels, inspection and work delivery issues, recording and reporting of failures have each contributed to the increase in risk not being observed earlier. Each of these issues have been identified by Ergon and are evident in the milestone decisions provided in Table 4.4.

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60 AER Attachment 5: Capital expenditure | Final decision – Ergon Energy 2020–25.

61 Ergon Distribution Annual Planning Report 2022. Page 90.

62 Ergon Distribution Annual Planning Report 2023 Page 98.

63 EQL Board submission. December 2020. Page 2.

64 EQL Board submission. December 2020. Page 2 and Attachment 3.

268. We consider that presented with an increase in the pole failure rate, and with work not being completed to address unserviceable poles in a timely manner[65], it was reasonable to commence a review of pole management process and to take corrective action.

Increasing unassisted Pole failure rates were evident prior to AER final decision

269. Ergon states that it observed a trend of increasing unassisted pole failures, prior to submission of its 2020-25 RP to the AER.[66] This trend continues to increase until exceeding the threshold limit as defined in the Code of Practice of 1 in 10,000 poles on a rolling three year basis.

270. We reviewed the 2020-25 RP and RRP and did not find explicit reference to unassisted pole failure. The Asset Management Plan for poles included with the RP states that '*EQs three year moving average pole reliability is currently and consistently exceeding the compliance requirement required under Clause 5.1 of the Electrical Safety Code of Practice Works 2010.*'[67]

271. We also reviewed the business case for pole replacement[68] provided with the RRP, which we considered to be the most recent reference to the requirements for managing its pole assets provided to the AER at the time, albeit it also refers to the same Asset Management Plan included with the RP. In its discussion of applicable service levels, Ergon refers to the requirements of the Code of Practice, where it states that '*[t]his provision is particularly relevant at present due to Ergon's rising pole failure rate, which exceeded 100 pole failures in 2018/19*'[69]

272. Ergon makes further references to pole failure throughout its business case document. However, Ergon has also referred to pole failure and inspection defect increases, which appear to use reference to failure and defects interchangeably, including failure following inspection (in reference to changes to pole serviceability assessment) and unassisted failure – both of which result in requirements to increase remediation rates, as proposed by Ergon.

273. Nonetheless a three-year trend of unassisted pole failure is presented in Figure 3 of the business case, reproduced below in Figure 4.2.

65 Under the Electrical Safety Code of Practice 2020 Works, Poles identified as defective require rectification with standard timeframes as set out in Section 5.3.4 of the ESCOP.

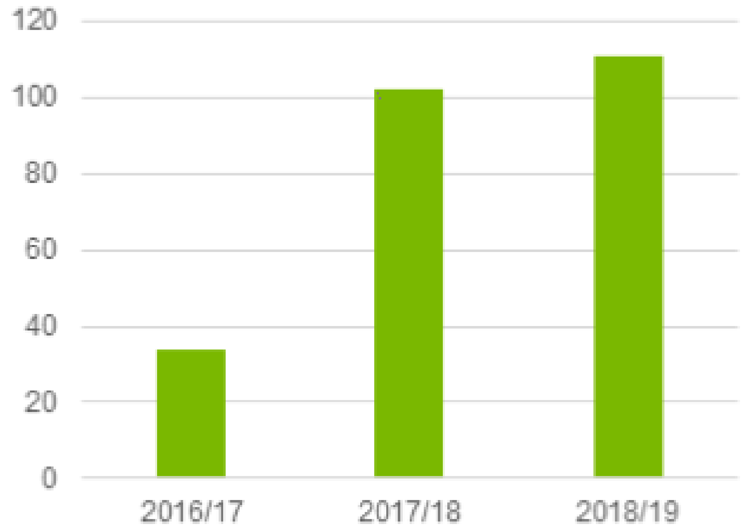
66 Ergon 5.3.01 capex ex post justification overview – January 2024. Page 3.

67 Ergon Energy 7.037 Asset Management Plan – Poles and Lattice Towers – January 2019. Page 15.

68 ERG 6.027 Business Case Poles and Towers DEC19 PUBLIC.

69 ERG 6.027 Business Case Poles and Towers DEC19 PUBLIC. Page 3 and Appendix H.

Figure 4.2: Ergon Energy Pole Failure Trends



Source: ERG 6.027 Business Case Poles and Towers DEC19 PUBLIC, Figure 3

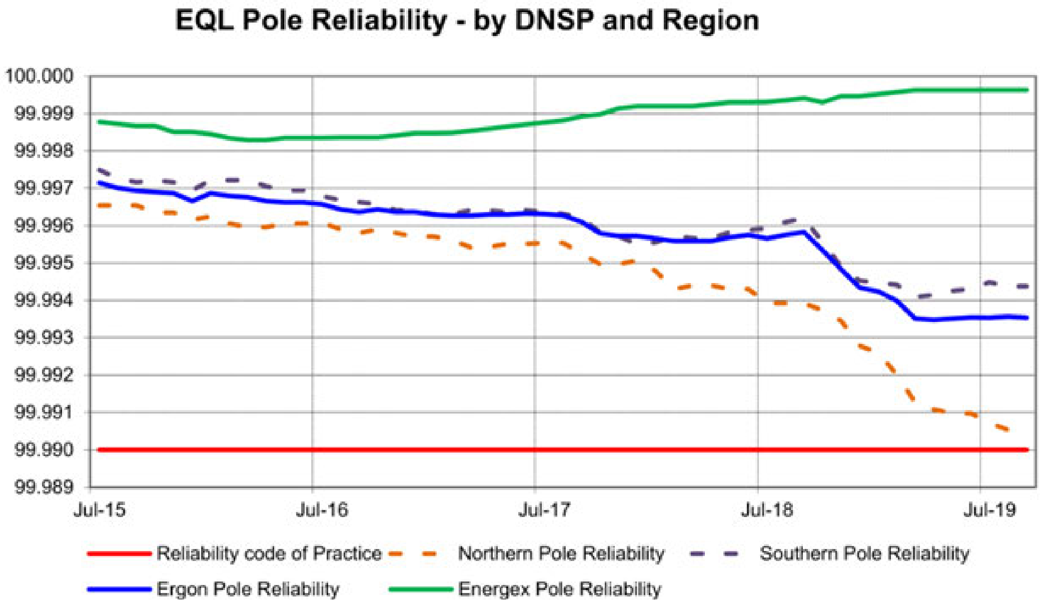
274. Ergon presented the rolling three-year average failure data for Ergon and from that data concluded that:

> *pole failures are increasing in Ergon and will consistently breach the Code of Practice standard in future years, and hence increasing remediation programs are required.*[70]

275. The data in the figure provided by Ergon (reproduced as Figure 4.3) does not show a current breach, however as the data from FY17 rolls off, and assuming a similar level of failures as experienced in FY18 and FY19, the breach would reasonably be expected to occur at some time in the near future (as was subsequently the case).

70 ERG 6.027 Business Case Poles and Towers DEC19 PUBLIC. Page 5.

Figure 4.3: Energy Queensland Regions 3 Year Rolling Pole Reliability



Source: ERG 6.027 Business Case Poles and Towers DEC19 PUBLIC, Figure 4

276. At the same time, Ergon was reporting an increase in the reported pole inspection defects, in part due to the change in the pole strength algorithm in 2019 which Ergon describes to align with the methodology used by Energex and which is in accordance with Australian Standards.[71] We review the reasonableness of this change in the next section as it is used to determine the level of defects and therefore the replacement quantities.

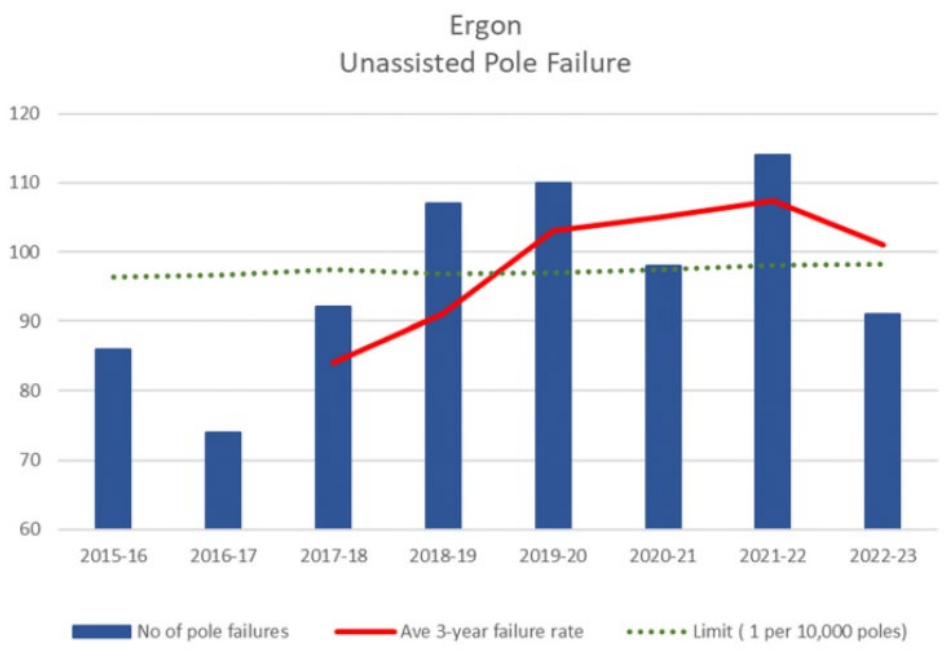
277. It would also be reasonable to conclude that the pole replacement levels forecast at the time by Ergon (with reference to poles replaced under all of its programs) were derived with the objectives of at least arresting the increase in unassisted failures and to return the network to acceptable safety performance. However, Ergon has since replaced a higher volume of poles than it proposed. We consider this casts a level of doubt on the methods that Ergon employed at the time to determine its forecast pole replacement requirements.

278. According to the updated unassisted pole failure data provided in the 2025-30 RP shown in Figure 4.4, Ergon's performance has breached the ESCOP target since FY20. But more recently the number of pole failures shows signs of reducing to within target in the next few years.[72]

[71] ERG 6.027 Business Case Poles and Towers DEC19 PUBLIC. Page 5.

[72] We note some differences in reported historical unassisted failure numbers between the charts shown in this report. These differences are not explained by Ergon.

Figure 4.4: Unassisted pole failure FY16 to FY23



Source: Ergon 5.3.02 Capex ex post justification – January 2024, figure 3

279. Importantly, in determining the capex allowance for any RCP the AER considers a range of factors and uses different methods of assessment. The capex allowance is determined to allow the NSP to manage its network to maintain safety and reliability consistent with the capex criteria. The onus remains on the NSP to justify the proposed expenditure required under the NER. The determination however does not provide a budget or cap of expenditure on any one category, and therefore allows flexibility to the NSP to manage emergent issues or conditions, consistent with the incentive provisions included in the regulatory framework.

4.3.3 Ergon's response to the AER final decision for the current period

Timeline of key decisions

Ergon acknowledges errors in preparing information for its RPs considered by the AER

280. Whilst the review period spans two regulatory determinations, the decisions surrounding the most recent determination for the current RCP provide the greatest insights. This is because Ergon's RP was being prepared during 2018 for submission in 2019 and provides a record of what information was known by Ergon at the commencement of the ex post review period in FY19.

281. Ergon provided an assessment of the regulatory determinations in its supporting documentation:

> *Ergon Energy submits that the capex expenditure over the review period is prudent and efficient to enable it to maintain and operate its extensive and ageing network in compliance with its regulatory obligations as a distribution network service provider.*
>
> *Ergon Energy accepts that the AER forecasts for the 2015-20 and 2025-25 Regulatory Determinations based on the information in Ergon Energy's regulatory proposals were reasonable.*
>
> *However as shown in the detailed analysis in attachments provided, the forecasts are below what is required for Ergon Energy as a prudent operator to meet its regulatory obligations associated with the provision of standard control services. In particular, the*

forecasts [sic] pole replacements is below a reasonable amount required for Ergon Energy to operate and maintain the network safely and in compliance with its regulatory obligation.[73]

282. Under the NER, the onus is placed on the NSP to provide sufficient information to justify its proposed capex allowance to meet the requirements of the capex objectives. The AER publishes guidelines to outline how it approaches an assessment of the proposed capex allowance, and the information that it would expect to be provided with a proposal.

283. From statements by Ergon and our own review of the AER determinations, the information provided by Ergon was not sufficient to conclude that the capex allowances, as proposed by Ergon at the relevant times, met the requirements of the capex objectives.

Ergon has summary justification statements to support the ex post expenditure

284. The attachments referred to by Ergon are the ex post justification statements for each asset category and a PIR. These documents outline the repex incurred by Ergon and compare this to the repex component of the capex allowance included in the AER's determinations and also RRP repex relevant to each year of the review period. The PIR provides the results of Ergon's NPV analysis comparing the actual delivered repex compared with options including the AER final decision repex for each category. We first consider the information that would have been available to Ergon at the time of the decision to invest, before presenting our review of these documents.

Increase in pole replacement is a key driver

285. We understand from Ergon that a key driver for the increased repex incurred in the review period was driven by the increase in pole replacement. Ergon provided a high-level timeline of key decisions that informed the increase in pole replacement expenditure to its RRG in March 2024.

286. We asked Ergon to provide details of the information it had available, and the decisions taken in the lead up to the AER final decision. We provide a summary of these milestones in Table 4.4.

Table 4.4: Key decisions and milestones in determining an increased level of repex

Key date	Milestone	Description and implication to pole treatment volumes
2013/14	Implementation of Variable Inspection Cycles	Implementation of 6-year and 8-year inspection cycles for specific subsets of the pole population. This included rural wood poles in low risk locations for the commencement of FY15. These changes effectively moved approximately 110,000 poles to a 6 or 8-year inspection cycle and resulted in an average inspection cycle of 4.5 years.
Sep 17	Commencement of Ergon Energy Pole Inspection Contracts	New pole inspection contracts were established. This was the first time in almost 15 years that a new contracting company was brought in to complete these inspections. Whilst there were no material changes to the inspection method, new training and new pole inspectors resulted in an increase in quality of inspections. **As a result, unserviceable pole volumes had a slight uplift.**
May 18	Pole nailing criteria change	Minimum strength criteria were adopted for nailing (including replacement of unserviceable poles rated at less than 5kN). **Potential to result in an increase to pole replacement rates.**
Aug 18	Low strength pole working group recommendations	Range of improvements implemented to systems and processes. Minimum strength criteria adopted for nailing retained.

73 Ergon 5.3.01 capex ex post justification - overview - January 2024. Page 41.

Key date	Milestone	Description and implication to pole treatment volumes
Dec 2018	2020-25 RP	At this point in time, **the volumes of replacements had only slightly increased due to improved training and identification of defective unserviceable poles by inspectors.** The full impacts of future pole serviceability calculation changes had not been analysed.
Dec 2018	Failed Pole Initiates System and Process Review	Unassisted pole failure resulted in system and process review.
Apr 19	Field Mobile Computing (FMC) Upgrade	Upgrade to out-of-support system required changes to pole serviceability assessment, including change to limit state strength calculation to maintain consistency with overhead design calculations, change to characteristic bending strengths in line with AS/NZS 7000:2010 and adoption of minimum strength criteria. **Subsequently the volume of unserviceable poles that were replaced or nailed increased in FY20.**
Sep 19	Unserviceable Pole Audit	Identified large number of sites where action had not been taken previously.
Oct 19	AER 2020-25 draft determination	Determination based on December 2018 RP. Substitute capex substantially lower than proposed by Ergon for repex in RP.
Dec 19	2020-25 RRP	Included increased pole treatment volumes based primarily on the increased volume of observed unserviceable pole defects that had been generated due to the implementation of the upgraded FMC system and associated pole serviceability calculation changes and increasing unassisted pole failure rate.
Dec 19	Unserviceable Poles Update Board Paper	Board updated on results of independent expert opinion review into EQs management of Unserviceable Poles conducted by Aurecon, including a significant number of recommendations and the proposed response to these recommendations
Dec 19	Removal of 6 and 8-Year Pole Inspection Cycles	Align the inspection cycles across the Energex and Ergon Energy networks to be a nominal 5-year cycle commencing in FY21. Key drivers were opex and capex savings though efficiency.
Jun 20	AER 2020-25 final determination	Substitute capex substantially lower than proposed by Ergon for repex in RRP.
Jul 20	EQ Pole Inspection Contracts Commenced	Commence new contracts that leverages common contract requirements and technical specifications for the inspection that enabled some efficiencies and process alignment. Planning commenced in March 19.
Dec 20	Capex Investment Forecast 2020-25	Approval of the revised Network Investment Forecast 2020 to 2025 for Ergon Energy, including substantial increase above final determination capex allowance. Following updated Aug-Oct 2020. **The volume of unserviceable poles replaced or nailed increased further during 2020-25 period.**
Jul 21	Independent Review of Pole Assessment and Classification (EA Technology)	Independent review concluded that effectiveness of the response that Ergon has made to its current situation over the past few years

Source: Timeline of decisions – Pole Asset Management provided with IR039

287. On review of this information, Ergon referred to a submission to the EQ Board in December 2020 '*to seek support for a risk-based approach to Ergon Repex that was above the AER*

determination, including a description of the risk-based approach that has subsequently been applied by Ergon.'[74]

288. We requested a copy of this submission to understand how Ergon had responded to the AER final decision, and to shed further light on the information that Ergon had relied on its decision making process. This is discussed below.

Board approval of increased repex program in 2020

Board submission lacked detail justifying the proposed level of replacement

289. In its December 2020 submission to its Board, Ergon presented a revised capex forecast for the current RCP of $2,494.6 million[75] for the combination of repex, augex and connex and which we understand was approved by the EQ Board at that time. The submission states that the forecast is $484 million above Ergon's RRP and $948 million above the AER FD.

290. The submission also states that:

> *The five-year forecast has been produced at an asset category level consistent with the approach adopted by the AER in its final determination. The revised analysis has been built up from three views:*
>
> • *Business as usual bottom up build.*
>
> • *Revised business cases accounting for AER feedback regarding risk quantification.*
>
> • *Asset volumes for replacement assessed using the AER Repex model.*
>
> *Further higher levels of risk have been accepted for non-safety related asset replacements (Substation transformers, distribution transformers, distribution switchgear and SCADA equipment).*[76]

291. Whilst the submission provided high level details of the build-up of the forecast, it was not sufficient to determine how Ergon had developed the forecast expenditure, and where information underpinning the forecast had materially changed from that relied upon for the RRP and which was reviewed in determining the capex allowance for the period.

292. A detailed variance analysis against the AER final decision (or the RRP) has not been provided that adequately explains the rationale for changes made by Ergon in FY20.

293. The compliance-based programs referred to relate to pole replacement and conductor clearance. Ergon states that these programs directly respond to its compliance requirements to ensure the safety of its network.

Pole replacement program increased significantly

294. In its RRP, Ergon proposed a pole remediation program of $375.8 million ($FY19) to remediate (replace and reinforce) a total of 64,797 poles. This represented a relatively small increase from its RP that included $315.2 million ($FY19) for the same program.

295. The revised program predominantly applies a defect remediation approach based on the quantities calculated using the revised condition assessment algorithm. The proposed remediation program is described by Ergon as being the *'absolute minimum program required for the forward period, with further increases likely to be required in future periods. The modelled result shows that pole failure rates are likely to continue to breach the Code of Practice standard in future years, and hence increasing remediation programs will be required.'*[77]

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74 EQL Board submission. December 2020.

75 For which the basis of the expenditure is not defined, and we assume is most likely nominal.

76 EQL Board submission. December 2020.

77 6.027 Justification – Poles and Towers Replacement Program. Page 9.

296. In its Board submission, Ergon included a program of 18,000 poles per annum at a total cost of $566.2 million (nominal) over the current RCP, or $352.1 (nominal) over the first three years. A lower reinforcement to replacement ratio was evident in FY21 which Ergon has claimed was forecast to increase in the subsequent years.

Conductor clearance program increased significantly

297. The issue of classification of the clearance program as repex or augex is a regulatory matter for the AER, however from our experience these programs are typically classified as repex. We also note that Energex has proposed a similar program for line clearance rectification.

298. In its RRP, Ergon proposed a conductor clearance program of $115.8 million to rectify overhead conductor clearance to ground and structure compliance breaches, representing a total of 22,486 defects. This represented a material increase from its RP that included only $14 million ($FY20) for the same program.

299. Differences in representation of the clearance program between Ergon and the AER are problematic. We note that Ergon sought to make adjustments to the relevant asset categories in its repex programs to reflect the change in clearance programs as augex. We have reflected these adjustments in our assessment of repex and assessed the corresponding clearance program in Section 6.

300. In its 2020 Board submission, Ergon included an annual spend of $52 million (nominal) which for the review period totals $156 million (nominal). However, for the ex post review period Ergon states that it has incurred $223 million, and which we consider in our assessment in Section 6.

Introduction of additional risk-based programs

301. In its December 2020 Board submission, Ergon included new programs to address emerging risks that were not identified at the time of the RRP. These include repex programs for (i) substation fencing, (ii) transformer bunding, and (iii) protection system upgrades.

302. According to the submission, Ergon claims that approximately 65 per cent of the repex program is defect driven in that the work is identified through planned inspections or that assets are replaced on failure. Ergon appears to have prioritised the increase in this work and identified several substation replacement projects for deferral into the next RCP totalling approximately $55 million.[78] As a consequence, a program to replace problematic circuit breakers was included to mitigate safety risks arising from the proposed substation project deferrals.

303. For augex, an additional program for bushfire mitigation was included and the CTS/CTG program was reclassified as augex (from repex) commencing in FY22, as discussed earlier.

304. In response to our request for further information to justify inclusion of these additional projects, Ergon provided further information which we have reviewed. We consider that inclusion of the additional projects is reasonable. For example, the substation fencing and transformer bunding projects were identified following an incident and subsequent review of priority risk areas.

305. The information provided by Ergon in support of its protection relay replacement suggests that the additional program was an '*ongoing program of work towards the replacement of high-risk protection relays*'[79] and not an additional risk-based program as the Board submission would suggest. Nonetheless, a program to address the highest risk relays was likely to be prudent.

[78] For which the basis of the expenditure is not defined, and we assume is most likely nominal.

[79] Ergon Energy 7.103 Strategy Scope – Protection relays January 2019 provided in response to IR39. Question 3.

Ergon was not able to produce artefacts that can be relied upon to determine a prudent and efficient investment program

306. We asked Ergon to provide copies of the revised business cases relied upon for the approval in December 2020 for an increased repex program, and those that would have existed for approval of the works program for each approval period (e.g., annual) and for each asset category of the repex program. We expected that consistent with the management of its investment program, there would have been evidence based justification for the investment including how that expenditure had been derived as a standard artefact of EQs work program governance.

307. In response,[80] we were provided copies of the business cases and models submitted to the AER for its RP and RRP. Given that the Board approved in December 2020 a significantly higher level of expenditure than was proposed in the RP or RRP, we fail to understand the relevance of the information provided to the AER when this is clearly not what the December 2020 approval was based upon.

308. Ergon also provided business cases that were referred to as 'post AER 2020-25 Business cases' for distribution transformers, conductor and switches only.[81] However, the chronology of approval and relationship to the December 2020 Board approved investment program remains unclear.

309. On review of the business cases for these asset classes, the analysis supports adoption of, or close to, the repex included in the capex allowance of the AER's 2020-25 final decision. As we present in subsequent sections, Ergon has overspent its own estimate established at the time it appears that these business cases were developed.

310. Ergon also provided an example of:

> *Approval for the specific capex in demonstration of EQ's portfolio governance is attached in the form of the approval memo for 2021/22 (refer* Ergon 21_22 CAPEX NAMP Line Approval Memo*.pdf), noting that expenditure and volumes of work are represented per hub region across the state, and expenditure is in total dollars per Delegation of Authority requirements.*[82]

311. This was a high-level memorandum provided for approval of its one-year works program, in accordance with Ergon's delegated financial authority.

312. We conclude that Ergon did not prepare and did not undertake detailed business case justification for its proposed program as it suggested, nor did it provide such to its Board to support its approval in December 2020. We would expect that the Board would require revised business case justification to be prepared, and specifically to address the justification for, and implications of, the proposed increase compared with the AER final decision capex allowance.

313. Absent this information, we are unable to determine how Ergon and its Board concluded that the program approved in December 2020 was prudent and efficient, noting that Ergon has subsequently incurred a level of repex that further exceeded the capex included in this approval.

Comparison of repex levels at key milestones

Actual repex exceeded Ergon's own estimates

314. In Figure 4.5 we show the relationship of the December Board approval, compared with the RP, RRP, AER final decision, and the repex that Ergon ultimately incurred. We have included the augex component of the conductor clearance program to be able to compare on a like for like basis.

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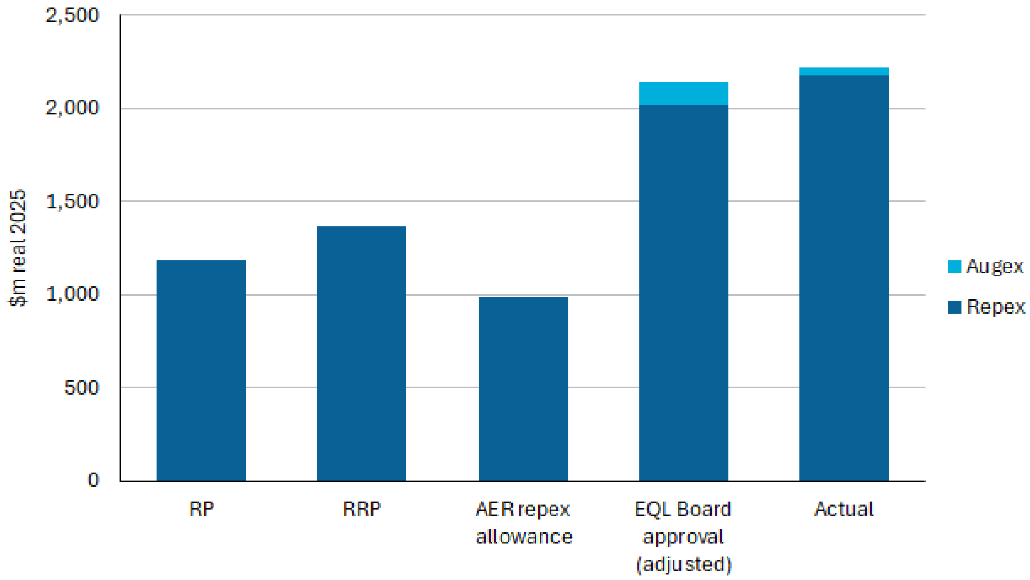
80 Ergon response to IR39. Question 3.

81 Ergon response to IR39. Question 3.

82 Ergon 21_22 CAPEX NAMP Line Approval Memo provided in response to IR39. Question 3.

Figure 4.5: Comparison of estimated repex requirements for review period ($m, FY25)[83]



Source: EMCa analysis

315. Ergon's expenditure estimate not only exceeds the capex allowance included in the AER's final decision, but also the forecast prepared and approved by the EQ Board in December 2020. We asked Ergon to provide evidence of the application of its governance processes, including the approvals for its program that occurred and which led to the estimated level of expenditure, to assist our assessment against the requirements of the NER.

316. In absence of detailed information on the approvals that Ergon gained for each part of its program, we have relied on the Board submission approved in December 2020 as the basis for the investment plan that Ergon has ultimately delivered against.

Review of claims made by Ergon

Ergon does not have the oldest fleet of timber poles

317. Ergon states that a substantial number of its assets are reaching the end of their serviceable lives in the current and next RCPs.[84] Moreover, whilst Ergon has been able to maintain low levels of asset replacement due to the construction of assets in the 1970s and 1980s, it considers that these same assets are approaching 60 years of age and replacement rates need to increase.

318. We undertook some analysis of asset age profiles across the NEM in Table 4.5, and on average, consider that Ergon does not have the oldest network of wood pole amongst its peers, nor is its population more highly skewed to older poles than its peers.

83 RP figures derived from RIN in real $2020 and we converted to real $2025 using escalation index provided by Ergon IR031.

84 Ergon 2020-25 Regulatory proposal – January 2024. Page 90.

Table 4.5: Comparison of timber pole ages

	Timber Pole Population 2023 CA RIN	Weighted Average Age	% Poles over 60 Years Old	% Poles over 50 Years Old
Essential	1,125,009	40	17.5%	36.5%
Ausgrid	435,053	40	14.7%	40.8%
Endeavour	292,929	31	1.4%	19.6%
Ergon	**871,347**	**34**	**7.2%**	**19.3%**
Energex	405,578	28	2.1%	10.8%

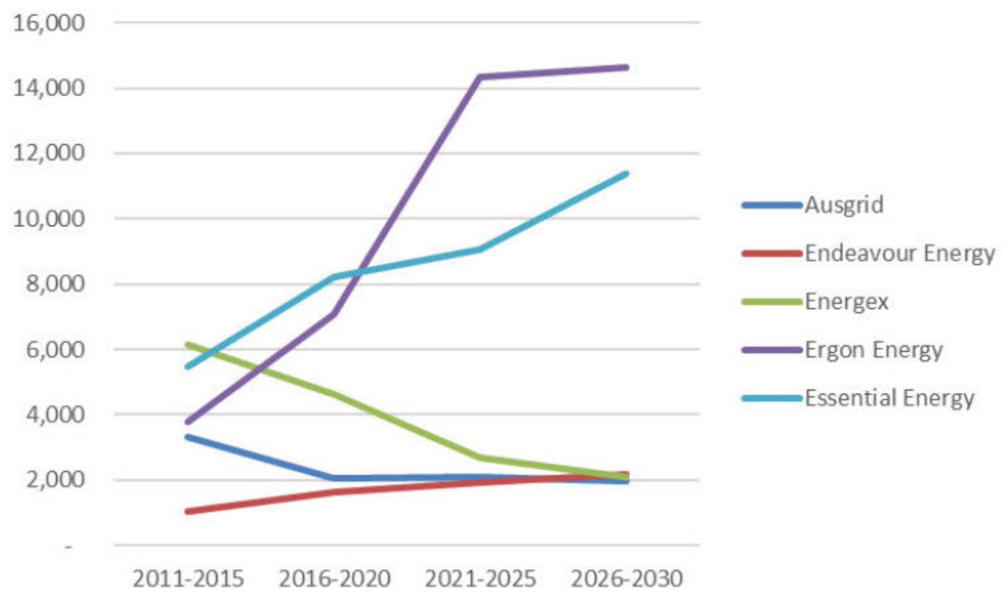
Source: EMCa analysis of CA RIN data

Ergon has a higher pole replacement rate relative to other DNSPs

319. We also considered asset replacement rates, which we consider a better indicator than using age alone, as this is more likely to reflect condition based replacement rates and which makes several assumptions in relation to asset installation, operating conditions and replacement philosophies. As a consequence, none of these indicators can be used without adjusting for these factors.

320. We present the replacement rates for poles for Ergon's peers in Figure 4.6. Prior to the current RCP, Ergon again does not appear to have been an outlier in replacement levels.[85]

Figure 4.6: Comparison of average pole replacement volumes per 5-year period[86]



Source: EMCa analysis of RIN data

321. A better indicator would have been treatment rates, whereby the number of pole replacements and reinforcements (nailing) are added, however we were limited by the data that was available. We would expect that with reinforcement rates added to the replacement rates, the increase in pole treatments may be further accelerated for some businesses. For Ergon, our analysis suggests this is the case.

85 The increasing rate of expenditure for pole replacements for Essential Energy is also a factor of a transition to composite poles (which have a higher initial capital cost) and inclusion of an at risk poles program as a part of its resilience program.

86 The 5-year periods were chosen to align with the regulatory period for Qld DNSPs, however the regulatory periods for NSW DNSPs differ.

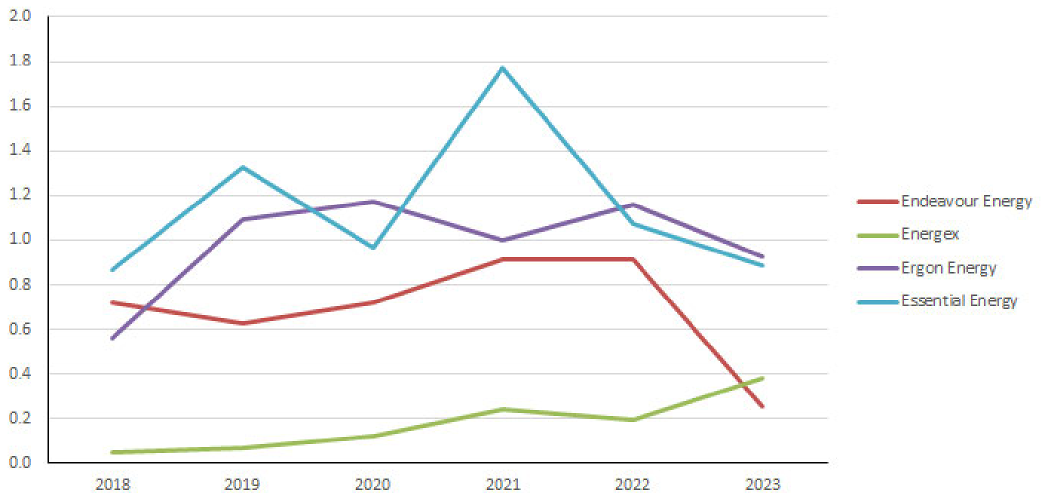
322. We consider that a program based on the actual deterioration and condition of its assets is required to meet the requirements of the NER, and we looked for evidence that Ergon had undertaken its program based on its asset information rather than on the age of its network as these statements might suggest.

Ergon's pole failure rate is not an outlier compared to similar DNSPs

323. We also reviewed the failure trends, using the ESCOP target of 1 failure in every 10,000 poles as a reference. We have based the analysis on the total pole population recorded in the FY23 RIN. We excluded Ausgrid, as the failure data included in the RIN placed Ausgrid as an outlier, and the extent of the difference indicated to us that there was more likely an error with the data.

324. As shown in Figure 4.7, the performance level of Endeavour and Essential are similar to Ergon on a 1 per 10,000 poles level, whereas the replacement rates in order to achieve this level of performance vary significantly as shown in Figure 4.6.

Figure 4.7: Comparison of annual pole failure rates, expressed as per 10,000 poles[87]



Source: EMCa analysis of RIN data[88]

4.3.4 Assessment of PIRs

325. Ergon has included a CBA for each of its major asset categories in seeking to demonstrate that the actual volume of replacement is prudent. The basis and assumptions used in each of the PIRs were assessed over a 20-year period by Ergon.

326. The base case or counterfactual as presented by Ergon is based on the volume of replacements using the repex included in the AER final decision capex allowance (at a category level), and the actual delivered unit cost. The counterfactual excluded the consequential replacement volume and associated expenditure.

327. Ergon determined that the counterfactual would result in higher failures, as the replacement volume was typically lower than the number of defects than Ergon has historically identified. Therefore, Ergon assumed a percentage of the defects that were not addressed would result in unassisted failure. These assumptions drive some of the difference in risk costs between the options that Ergon has assessed.

328. Four alternative replacement/ reinforcement options were evaluated and compared to the counterfactual (the AER final determination):

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87 The volatility of failure information provided up to and including 2018 does not align with other information provided by Ergon and likely to be in error.

88 The data is based on annual RIN and may differ from data reported to jurisdictional regulators (e.g. Development of 3-year average).

1. Historical volume (continuation with previous practice)
2. Health Index Based Replacement (HI >=7.5)
3. AER Repex Live Scenario
4. Actual Delivery (Defect based).

329. Costs associated with replacements of pole top structures, services, pole transformers and switches undertaken concurrently with pole replacements are included in the CBA for poles, and similarly for the conductor replacement program under conductors.

330. Where the implementation of an Asset Health Index (AHI) was limited by the availability of condition data, a Weibull model was used instead. The Weibull characteristics are estimated using the actual failure information from a single year.

331. The process described by Ergon to first establish a PoF to predict the number of failures and assign a consequence to each failure is likely to provide a reasonable reference counterfactual to assess alternate options. This is also broadly consistent with AER guidance. However, we find issues with the application of this in practice, reinforcing some of the issues described in Section 3.

Definition of the counterfactual is not correct

332. Further to the discussion in earlier sections of this report, the counterfactual is not defined in a way to usefully compare options.

333. In some instances, the NPV analysis has considered a component of the incurred expenditure for the category, being a value of repex less than the category total, as its counterfactual and therefore introduces further bias.

Assessment period of benefits does not align with the costs

334. Ergon has included an assessment period of 20 years for the benefits, which are the difference in avoided risk costs, but only 5 years for the costs. We find several issues with this modelling approach:

- Only considering 5 years for costs does not accurately represent the actual investment that will be incurred by Ergon over the assessment period, and further undermines the definition of the counterfactual. At a minimum, failed assets would need to be replaced for every asset class, and therefore the investment would not be zero, and this investment would impact the calculation of benefits.
- By considering benefits over 20 years, the risks (and therefore assumed benefits) exponentially increase over that period which creates a significant difference between the options at 20 years. This in effect drives the major difference in the benefits between options and bestows high NPV values on Ergon's high-replacement option.

335. We consider that these are critical modelling issues, and which could be highlighted through sensitivity analysis. For example, when we applied a shorter assessment period to Ergon's modelling for poles, and keeping other factors unchanged, the ranking of options changed such that Ergon's preferred option would also have changed. As we have only applied this to one asset, we do not consider that this is definitive. However, we do consider this casts doubt on the robustness of the modelling and that Ergon has not sufficiently tested the sensitivity of its modelling.

In aggregate, assumed benefits of delivered program are not credible

336. Based on Ergon's own analysis, the total NPV generated from Ergon's actual delivered repex program over the review period exceeded the benefits delivered by the lower repex program included in the capex allowance by $1.1 billion. We do not find this value of additional claimed net benefits credible, noting that it largely results from the inappropriately modelled exponential increase in the differential relative to Ergon's definition of an 'AER counterfactual', as referred to above.

337. For these reasons, we consider that the modelling approach is not fit for purpose. Along with the issues presented by the assessment period above, we consider that the benefits are individually and collectively overstated for reasons described in Section 3.

Little weight can be attributed to the provided analysis

338. As a result of the issues we have identified, we have not given any weight to the PIR analysis provided by Ergon as we consider that it currently does not provide valid output.

339. Based on deterioration of the condition of network assets and increasing defects as described earlier in this report, there appears to be a strong case for a material increase in the repex required over the review period relative to the final decision capex allowance. In addition, Ergon was presented with a compliance requirement to resolve identified low clearance defects. However, from the provided analysis, Ergon has not demonstrated that the incurred repex was prudent and efficient.

340. The analysis that Ergon has provided does not demonstrate that either the level of the program or the timing of replacements, is 'optimal'.

4.4 Assessment of repex by category

341. In the following sections we provide a summary assessment of the repex incurred during the review period by RIN category.

4.4.1 Pole category

Ergon's incurred repex for poles

342. Over the review period, Ergon incurred $537.7 million on its pole management program. We show how this relates to Ergon's forecast included in the RP, RRP and finally the provision included in the capex allowance in Table 4.6.

Table 4.6: Review period performance for poles ($FY25)[89]

	POLES					
($,000)	FY19	FY20	FY21	FY22	FY23	Total
RRP	20,141	20,640	94,151	94,858	99,251	**329,040**
Repex Model final decision	56,943	61,289	52,829	57,772	62,830	**291,663**
AER final decision	20,141	20,640	52,829	57,772	62,830	**214,211**
Actual	70,451	115,526	122,918	111,922	116,808	**537,624**
Volumes	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**Total**
RRP	4,050	4,605	15,254	16,019	15,878	**55,806**
Repex Model final decision	10,082	10,580	5,839	6,366	6,901	**39,767**
AER final decision	4,050	4,605	5,839	6,366	6,901	**27,761**
Actual	8,546	18,700	20,680	19,754	17,417	**85,097**
Unit rates ($)	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**Average**
RRP	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	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**

Source: Ergon 5.3.02 capex ex post justification pole repex – January 2024, Table 8

343. The increase in pole replacement volumes commenced in FY19, to a total of 85,097 pole treatments over the period. Whilst there was an increased forecast volume included from FY21 in the AER final decision, it was much lower than Ergon had estimated in its RRP or that Ergon would go on to replace.

Assessment

An increase in pole replacement rate compared with historical levels was required

344. As established earlier in our review, Ergon was reporting an increase in the reported pole inspection defects and failure rates. Based on the evidence we have reviewed, including that described in Section 4.3, we consider that the increase in unassisted pole failures required Ergon to review its pole assessment and management processes and given the presence of other factors such as increasing defect rates, would have resulted in an increase to the historical pole replacement levels. We therefore focus on how Ergon determined the level of increase, and whether this has met the requirements of the NER, having been satisfied that an increase above historical levels was required.

Definition of unassisted failure is acceptable

345. We asked Ergon if there is a definition of unassisted pole failure agreed with the Queensland Electrical Safety Office (ESO), as jurisdictional safety regulatory, and whether this was aligned with industry. Ergon's description to us during the onsite meeting indicated that there was general alignment of the definition of unassisted pole failure with industry, with the exception of a 120km/h limit to design wind loads, whereby poles that failed due to winds exceeding this limit would be considered as unassisted. In other supporting information, we saw evidence that a 140km/h limit was used, consistent with the pole design criteria and is as we would expect.

89 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.

346. We asked Ergon for copies of its reporting to ESO on asset safety including unassisted asset failure including poles.

347. We also asked Ergon whether the ESO had raised any notices against Ergon in response to its unassisted pole failures. We were advised that an improvement notice was issued in March 2024, some four years after the unassisted pole failure rate had exceeded the threshold in FY20. On review of the improvement notice, the ESO was seeking information pertaining to the pole population of failure history. Ergon was not able to confirm whether its definition of an unassisted failure was approved by the ESO.

Changes to pole serviceability assessment and inspection methods are likely to be reasonable, however should be tested to customer value

348. We have not undertaken a detailed review of the serviceability assessment undertaken by Ergon and have relied on statements by Ergon that the changes reflect the serviceability assessment in place at Energex and are consistent with the recommendations of its independent review which we have reviewed.

349. We have not identified any material issues from this independent review that would result in a departure for pole serviceability compared with our experience of methods employed in other DNSPs in the NEM. However, we note that the adoption of standards intended for a predominantly urban customer group, may need to be moderated for application to Ergon's network such that the service and reliability outcome are matched with the value placed on those outcomes by the customers in that service area. We did not see evidence that Ergon or EQ had considered the differences or indeed the potential for adopting a set of standards that may result in higher service and reliability outcomes than are valued by customers.

350. We found some examples of conflicting information pertaining to the timing and purpose of the changes that Ergon has made to its pole management practices. In our review, we have placed higher emphasis on the timing and milestones provided in response to our most recent information request,[90] which we consider to be a more complete chronology of events.

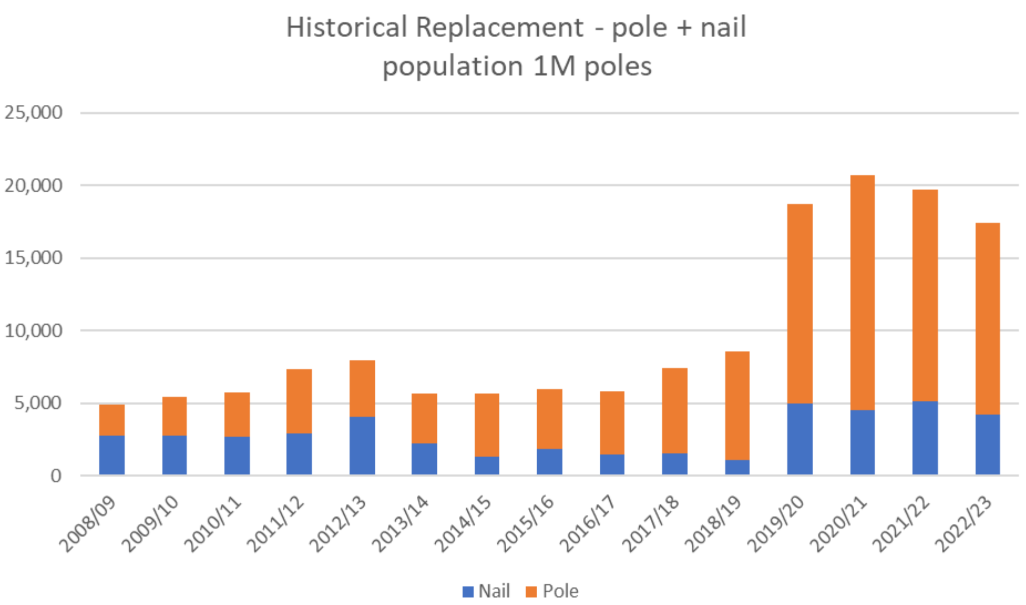
Impact of minimum pole strength for nailing has led to higher replacement rates

351. We asked Ergon to provide the data of its historical reinforcement rates. Based on our work in other jurisdictions we consider that pole reinforcement (or nailing) is an effective risk mitigation strategy, that allows for rapid risk reduction of pole populations. We have seen evidence of reinforcement rates in the order of 40-50% used for this purpose.

352. Ergon provided the information provided in Figure 4.8.

90 Ergon, Timeline of Decisions - Pole Asset Management provided in response to IR039. Question 5.

Figure 4.8: Historical reinforcement rates



Source: Ergon, AER_Presentation_Pole Timeline_Chronology_Day 5 provided with response to IR039, Question 3

353. The reinforcement rates indicated in this analysis appear low by other standards and increase to approximately 25% in the review period. Ergon advised that the reinforcement rate is around 40% when pole replacements from other programs are excluded. We comment on this in our review of the forecast repex, where we observe the reinforcement rate increases to 38% for defect poles only but is much lower across all pole treatments (including conductor related pole replacement). We consider that this is on the low side of benchmarks we are aware of and has resulted in a higher cost program.

354. We consider that the changes to pole serviceability implemented by Ergon, including adoption of minimum strength analysis for reinforcement, resulted in an increase to the number of pole replacements relative to reinforcements. We observe in other DNSPs the adoption of strategies to cost-effectively achieve rapid risk mitigation supported by robust business cases, including analysis of the potential to increase reinforcement rates. We have not seen similar analysis undertaken by Ergon.

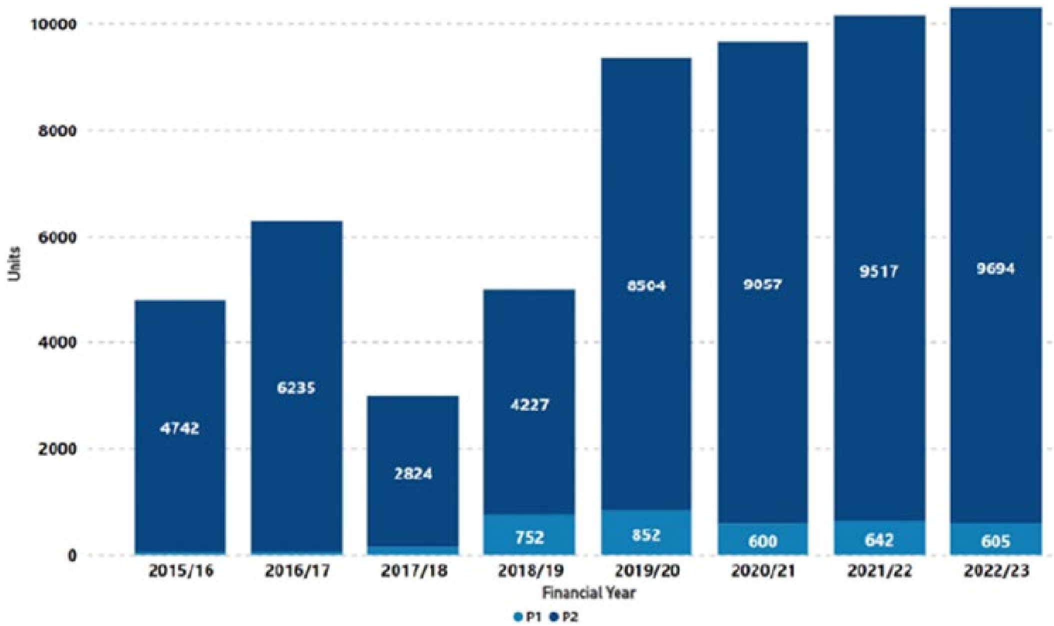
355. During our onsite discussion, we asked Ergon for details of its defect analysis and specifically whether it had identified any sub-population of poles that were drivers of increasing defects. Whilst Ergon provided some information during that discussion identifying some species of poles, we were not convinced that Ergon's forecasting methods for defects have adequately considered the influence of sub-populations of poles which could inform the selection of prudent and efficient treatment strategies.

Basis of replacement volumes has not been adequately demonstrated

356. We understand that a large part of the pole replacement program results from identified defects from pole inspection and application of the serviceability assessment. We asked for but were not provided with evidence of the defect volumes arising from Ergon's pole condition assessment, to determine how the serviceability assessment had been applied to its inspection records. Furthermore, we sought to confirm that the incurred expenditure was a direct outcome of the application of its pole condition assessment and not another assessment method.

357. We were provided the information included in Figure 4.9. Assuming that the P1 and P2 defects indicate an unserviceable pole, the number of defects does not reconcile with the replacement volumes during the review period. We expect part of the reason is that these numbers do not include the consequential pole replacements from other programs, and once included, may reconcile to the pole numbers that Ergon has replaced.

Figure 4.9: Historical pole defects



Source: Ergon 5.3.02 Capex ex post justification – Pole Repex – January 2024, Figure 1

358. The increase in defect numbers is clearly evident in Figure 4.9 from FY20, due to the changes that Ergon had made to its serviceability assessment.

Consequential replacement not sufficiently supported

359. Ergon states that there are also other factors that contributed to the increase in pole replacements from FY20, being the CTG/CTS program and reconductoring program. The inclusion of these additional replacements has the effect of masking the condition of the pole population, as it results in a higher pole replacement volume (and pole repex) than would otherwise be the case for defects alone.

360. Based on Ergon's analysis, the value of these additional programs included in the pole replacement repex is approximately $155 million, for reconductoring and clearance associated with poles, thereby reducing the defect related program to approximately $372 million.[91]

361. Whilst we consider there are likely delivery efficiencies associated with work bundling, and consequential asset replacement, as Ergon has purported to do, it has not demonstrated that this has been optimised across the portfolio. We have reviewed the modelling that Ergon has undertaken for its ex post period, which it claims demonstrates a benefit, however we find issues that cast doubt on the extent of benefits claimed.

4.4.2 Conductor replacement category

Ergon's incurred repex for conductor replacement

362. Over the review period, Ergon incurred $194.8 million on its conductor replacement program. We show how this relates to Ergon's forecast included in the RP, RRP and finally the provision included in the capex allowance in Table 4.7.

91 These values have been derived from information provided by Ergon in its PIRs and escalated to $2025.

Table 4.7: Review period performance for conductors ($FY25)[92]

			OVERHEAD CONDUCTORS			
($,000)	FY19	FY20	FY21	FY22	FY23	**Total**
RRP	66,849	70,116	27,676	27,816	28,716	**221,173**
Repex Model final decision	136,966	152,321	22,254	24,945	27,771	**364,258**
AER final decision	66,691	69,958	22,254	24,945	27,771	**211,620**
Actual	20,817	23,916	31,510	58,774	59,768	**194,785**
Volume (units)	FY19	FY20	FY21	FY22	FY23	**Total**
RRP	514	410	577	629	626	**2,756**
Repex Model final decision	824	913	376	428	483	**3,024**
AER final decision	514	410	376	428	483	**2,211**
Actual	381	356	551	659	577	**2,524**
Unit Cost ($)	FY19	FY20	FY21	FY22	FY23	**Average**
RRP	130,047	170,993	47,942	44,234	45,888	**87,821**
Repex Model final decision	166,170	166,860	59,144	58,323	57,544	**101,608**
AER final decision	129,739	170,607	59,144	58,323	57,544	**95,071**
Actual	54,637	67,180	57,188	89,186	103,511	**74,340**

Source: Ergon 5.3.03 capex ex post justification conductor repex – January 2024, Table 7

363. The actual repex over the review period is lower than that included in the capex allowance of the final decision by $16.8 million. This is largely due to underspends in the first two years.

Assessment

Replacement volume is primarily defect-driven

364. Ergon describes conductor replacement as being driven by a combination of conductor condition, type, construction, operating environment, and in-service performance history.[93] Ergon also included targeted replacement programs for problematic conductor types.

365. In its asset safety reporting, increasing failure rates for conductors are evident.

366. Whilst the details of the program that Ergon has undertaken was not provided, we observe in the 2022 DAPR that Ergon identified 'at risk' conductors and which is then double checked with a field inspection. 3/12 galvanised steel (SC/GZ) and small diameter Hard Drawn Bare Copper (HDBC) conductors have both been identified and confirmed as prone to failure due to corrosion and mechanical fatigue caused by reduced stranding and cross-sectional area. Targeted programs are aimed at known problematic conductor types and initially focused on those installed in populated, coastal regions where the likelihood of in-service asset failure is considered greater. This is consistent with at risk conductor replacement programs we have seen in other jurisdictions.

92 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.

93 Ergon 5.3.03 capex ex post justification conductor repex – January 2024. Page 4.

367. The 2022 DAPR goes on to list the priority scope areas for reconductoring, including all remaining hard drawn bare copper 7/0.064" imperial and smaller, to be completed within the current RCP.[94] The higher priority conductor is coastal hard drawn copper conductors 70+ years old, coastal galvanised steel conductor 55+ years old and other 70+ year old coastal conductor types.

Reclassification of conductor clearance program has reduced the repex being assessed

368. From FY22 onwards, the CTG/CTS program has been reported as augex instead of repex. Ergon describes the reason for this change is it provides '*a better reflection of the drivers for our clearance program*.'[95] As a result, there is approximately $40.9 million for conductor clearance not included in the total repex, and a proportion in overhead conductors for the last two years of the review period. We discuss this further in Section 6.

369. After removal of conductor clearance from the overhead conductor repex category, both for the capex allowance and the actuals, Ergon claims it has incurred a lower level of capex than the final decision.

Increase in replacement volume compared with historical levels is reasonable

370. Ergon has observed an increase in the unassisted failures of overhead conductors, which introduce safety and network reliability risks. In response to the increasing failure rate, Ergon concluded the historical level of overhead conductor was too low. We observe a replacement volume that has been progressively increasing, and which is higher in the current RCP and which Ergon has stated forms the basis of its ongoing replacement program. This increase is also, in part, due to the replacement of approximately 100km of line for the Childers to Gayndah 66kV feeder.

371. Ergon has not provided information to explain the basis of the lower replacement volume that was incurred prior to this time.

Increase driven by Childers to Gayndah 66kV feeder line rebuild

372. Replacement of the 66kV feeder from Childers to Gayndah involves replacement of approximately 100km of conductor in the review period. According to the business case submitted with the RRP,[96] Ergon increased the cost of this project to $52.4 million ($FY20) for its proposed option which is higher than the $38.1 million ($FY20) submitted as part of its RP. Ergon explains that this is due to a complete re-estimation of the project.

373. The AER did not include this project in the capex allowance in its draft determination.

> *Consistent with the repex model's top-down application, that a large replacement project that falls outside business-as-usual practice, such as the Childers to Gayndah 66kV feeder replacement project, could be justified as prudent and efficient through risk-based cost-benefit analysis that considers all viable options, including a base-case or counterfactual option. As highlighted in Section A.4, Ergon Energy did not provide this analysis in its proposal or subsequent information request responses.*[97]

374. The AER also states:

> *As Ergon Energy did not sufficiently support its proposal through cost-benefit analysis or other rigorous risk assessments, we were unable to derive a substitute estimate from our bottom-up analysis.*[98]

375. We did not find reference to this project in the final determination, and as such consider that the AER did not include this project explicitly in its substitute estimate. However, we

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[94] Ergon. Distribution Annual Planning Report 2022-23 to 2026-27. Page 81.

[95] Ergon 5.3.03 capex ex post justification conductor repex – January 2024.

[96] Business Case M028 Childers to Gayndah Aged Line Rebuild – Dec 2019.

[97] Attachment 5: Capital expenditure | Draft decision – Ergon Energy 2020–25. Page 39.

[98] Attachment 5: Capital expenditure | Draft decision – Ergon Energy 2020–25. Page 42.

consider that Ergon has effectively managed the delivery of this work within the top-down repex allowance for this category for the reasons set out in the AER determination.

4.4.3 Pole top structure category

Ergon's incurred repex for pole top structures

376. Over the review period, Ergon incurred $334.9 million on pole top structure replacement. We show how this relates to Ergon's forecast included in the RP, RRP and finally the provision included in the capex allowance in Table 4.8.

Table 4.8: Review period performance for pole top structures ($,000, FY25)[99]

	POLE TOP STRUCTURES					
	FY19	FY20	FY21	FY22	FY23	Total
RRP	27,756	29,993	34,331	34,511	35,665	**162,257**
AER final decision	10,385	9,712	29,656	29,656	29,656	**109,066**
Actual	47,902	69,976	75,200	67,965	73,902	**334,944**

Source: Ergon 5.3.04 capex ex post justification pole top structures repex – January 2024, Table 6

377. Ergon has incurred a much higher level of repex for pole top structures than included in the AER final decision or its own RRP forecast.

Assessment

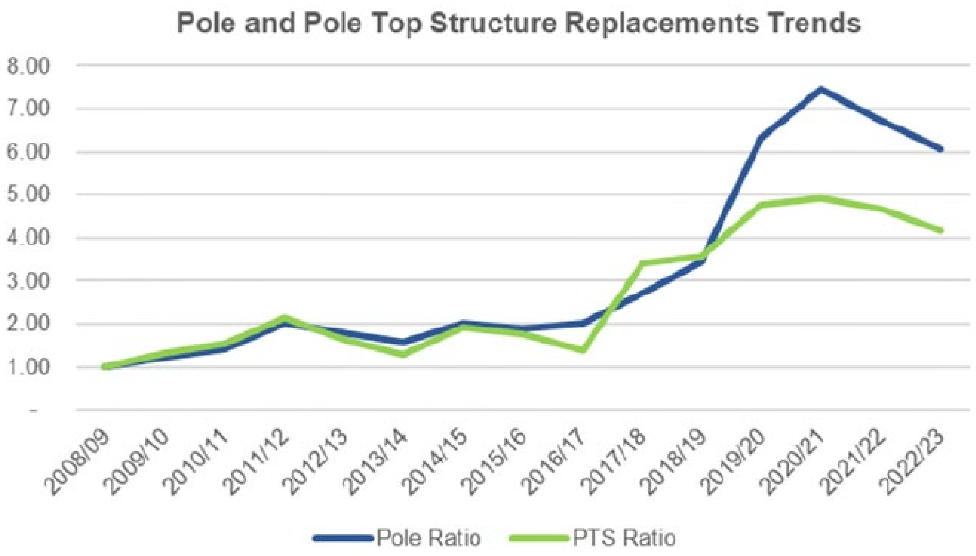
Replacement volume is primarily defect-driven

378. The majority of pole top structure (i.e. crossarms) replacements are bundled with other works such as pole replacements or overhead reconductoring. A large proportion of the increase in repex for pole top structures is driven by consequential replacements in poles, CTG/CTS and reconductoring programs, which if these programs have been scoped and delivered efficiently, will require replacement of pole top structures.

379. Ergon has provided a useful relationship between the pole top structure replacement and pole replacement in Figure 4.10.

99 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 4.10: Pole and pole top replacement trends



Source: Ergon 5.3.04 capex ex post justification pole top structure repex – January 2024, Figure 3

380. We understand that this chart shows the increase in pole and pole-top structure replacement relative to the FY09 volume, to determine whether the increase from that point is well correlated – that is, has a direct relationship. Figure 4.10 shows a well correlated relationship between the replacement of poles with pole-top structures. We expect the higher pole replacement trend from FY20 was likely the result of a higher proportion of rural Single Wire Earth Return (SWER) poles, where a crossarm is not included, and therefore not required to be replaced.

Increase in repex is as a result of other programs

381. Ergon estimates that the defect related program is approximately $123.2 million.[100] Based on Ergon's analysis, the value of these additional programs included in the pole replacement repex and for reconductoring and clearance is the balance of $205.6 million or 63% of the repex.

382. On the basis of the defect replacement program alone, the expenditure is within 15% of the capex allowance included in the AER final decision.

4.4.4 Underground cable category

Ergon's incurred repex for underground cables

383. Over the review period, Ergon incurred $36.4 million on cable replacement. We show how this relates to Ergon's forecast included in the RP, RRP and finally the provision included in the capex allowance in Table 4.9.

100 These values have been derived from information provided by Ergon in its PIRs and escalated to $2025.

Table 4.9: Review period performance for underground cables ($FY25)[101]

			UNDERGROUND CABLE			
($,000)	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**Total**
RRP	3,729	3,263	1,000	1,001	1,010	**1,003**
Repex Model final decision	1,507	1,739	1,739	1,935	2,151	**9,072**
AER final decision	1,507	1,739	1,739	1,935	2,151	**9,072**
Actual	2,749	5,837	12,199	8,427	7,186	**36,399**
Volume (units)	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**Total**
RRP	27	24	5	5	5	**66**
Repex Model final decision	12	15	1	1	1	**30**
AER final decision	12	15	1	1	1	**30**
Actual	8	10	21	21	18	**78**
Unit Cost ($)	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**Average**
RRP	136,144	136,514	200,012	200,200	201,157	**174,966**
Repex Model final decision	125,853	116,535	1,911,983	1,906,612	1,891,300	**1,190,456**
AER final decision	125,853	116,535	1,911,983	1,906,612	1,891,300	**1,190,456**
Actual	343,671	583,738	580,907	403,546	394,519	**461,276**

Source: Ergon 5.3.07 capex ex post justification underground cable repex – January 2024, Table 5

384. Ergon has incurred a much higher level of repex for cables than included in the AER final decision or its own RRP forecast.

Adjustments for clearance program

385. Ergon has identified approximately $2.4 million (7%) in the cable category for the clearance program. Ergon has not described what this is for, and we do not consider this is material to our review.

Assessment

Replacement volume is primarily driven by other programs

386. Ergon states that '*around three-quarters of our expenditure on underground cable replacement has been driven by consequential replacements with other projects and programs.*'[102] However, Ergon has not provided details to support this claim.

387. Ergon describes its asset management approach towards replacement of underground cables greater than or equal to 33kV is based on its CBRM framework, and for distribution and low voltage cables, the standard approach is to replace upon the identification of a defect or in-service failure. Compared with other asset categories, Ergon has a relatively young cable population.

101 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.

102 Ergon 5.3.07 capex ex post justification underground cable repex – January 2024. Page 14.

388. For the review period Ergon states that distribution underground cable replacement expenditure accounts for 99% of the total repex, and there has not been a major project[103] associated with underground cable expenditure.

389. In its supporting document,[104] Ergon also states that 75% of cable replacement is from consequential replacement, and of the remaining 25%, failure-related replacement accounts for 10%, and proactive replacements for the balance of 15%.

Incurred capex for underground cable failures likely to be reasonable

390. Ergon has not sufficiently explained the basis of the selected replacement volume for underground cable. However, on balance, the level of replacement on failure and planned programs is relatively low, and when compared with historical levels is reasonable.

4.4.5 Service lines category

Ergon's incurred repex for service lines

391. Over the review period, Ergon incurred $122.6 million on service line replacement. We show how this relates to Ergon's forecast included in the RP, RRP and finally the provision included in the capex allowance in Figure 4.11.

Figure 4.11: Review period performance for service lines ($FY25)[105]

			SERVICE LINE			
($,000)	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**Total**
RRP	16,205	16,917	12,510	12,520	12,620	**70,772**
Repex Model final decision	12,160	12,367	7,834	7,822	7,826	**48,010**
AER final decision	12,160	12,367	12,589	12,589	12,589	**62,294**
Actual	12,798	20,587	28,702	28,129	32,416	**122,631**
Volume (units)	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**Total**
RRP	7,544	8,375	15,288	15,287	15,274	**61,768**
Repex Model final decision	5,907	6,007	5,966	5,979	6,002	**29,862**
AER final decision	5,907	6,007	9,571	9,591	9,629	**40,705**
Actual	13,299	14,549	15,833	15,163	19,750	**78,594**
Unit Cost ($)	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**Average**
RRP	2,148	2,020	818	819	826	**1,326**
Repex Model final decision	2,059	2,059	1,313	1,308	1,304	**1,609**
AER final decision	2,059	2,059	1,315	1,313	1,307	**1,611**
Actual	962	1,415	1,813	1,855	1,641	**1,537**

Source: Ergon 5.3.08 capex ex post justification underground services repex – January 2024, Table 7

103 Single project with expenditure exceeding $1 million.

104 Ergon 5.3.07 capex ex post justification underground cable repex – January 2024. Page 11.

105 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.

392. As shown in Figure 4.11, Ergon has incurred a significantly higher level of repex for service lines than included in the AER final decision and its own RRP forecast.

Adjustments for clearance program

393. Ergon has identified approximately $9.8 million (8%) included in the service lines category for the clearance program. Ergon has not described what this is for, and we do not consider this is material to our review.

Assessment

Ergon introduced a targeted replacement program

394. We observed that Ergon increased its replacement volumes during the 2015-20 RCP which appears to be because of the introduction of a targeted replacement program. We asked Ergon to provide justification for the increase in replacement volumes and expenditure for service lines since part way through the 2015-20 RCP and which has continued in the 2020-25 RCP evident in the RIN. Ergon stated that prior to the merger of Ergon and Energex in 2016, Ergon's replacement program was driven by moderate/serious defects only, and that the replacement volume:

> *was not adequate and lead [sic] to increased numbers of unassisted failures, defects, and public shocks in Ergon Energy. A proactive replacement program was implemented in 2018/2019 to address the elevated unassisted failures, defects, and public shocks in Ergon Energy regions. There are approximately 110,000 defects that was recommended to be replaced due to emerging issue e.g., insulation deterioration (based on the defects in attached 2017 excel spreadsheet), it was expected the program to be completed in 2030 by increasing service replacement volume.*[106]

395. Ergon estimates that the targeted replacement program accounts for $61.6 million (51%), pole and conductor replacement programs $41 million (34%) and defects $ 17.4 million (15%).

Basis for introduction of a targeted program is reasonable

396. Ergon has included a combination of proactive replacements through a targeted program and reactive replacement, either on failure or the result of inspection. Overhead service lines represent around 50% of all reported asset-related shocks.

397. Underscoring the need for a change in approach, Ergon states that it received ten improvement notices related to service line assets from ESO and a notice regarding the management of Entity Neutrals. Public shocks are required to be reported to the ESO and are monitored against corporate performance targets.

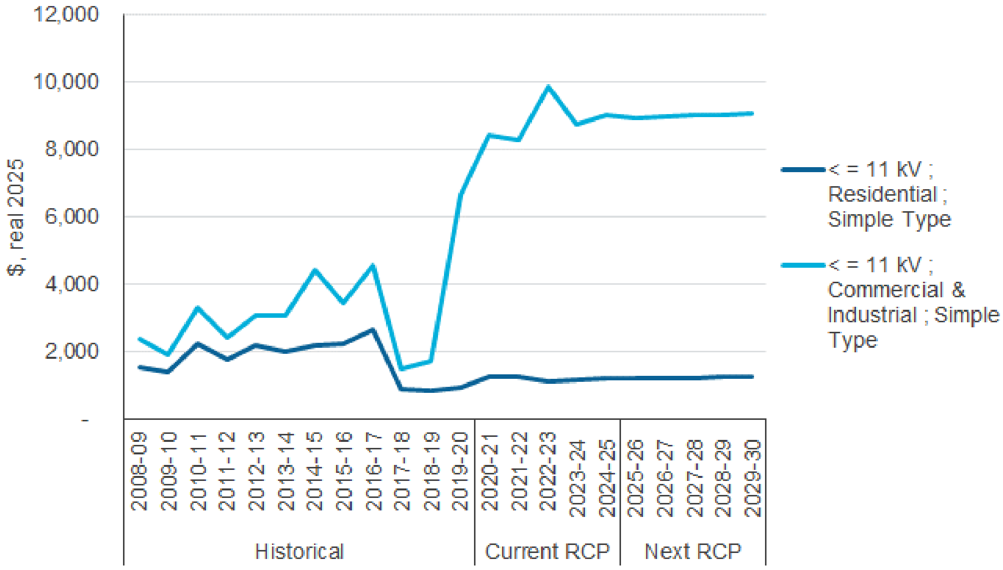
398. Ergon has not substantiated the basis of its selected replacement volume of 8,500. We consider that it is likely determined by the replacement volume to address 110,000 defects by 2030 assuming commencement in 2018, following identification in 2017. The replacement volume however should account for service lines replaced under other programs including defects and consequential replacement, and this estimate does not do this.

Increases for commercial service line unit rates is not explained

399. The basis of the change in unit rate relative to the RRP is not explained by Ergon. Our review of the RIN information reveals that the calculated unit rate for commercial service lines varies significantly from the historical rate, commencing FY20, as shown in Figure 4.12. It has the effect of increasing the average unit rate for all service lines.

[106] Ergon response to IR39. Question 21.

Figure 4.12: Historical and forecast unit rate for service lines, $FY25



Source: EMCa analysis of RIN information

400. As commercial service lines are a smaller population of the replacement program, we expect this should not have impacted the 2020-25 program materially, however it influences the forecast repex as discussed in Section 5.

4.4.6 Transformer category

Ergon's incurred repex for transformer replacement

401. Over the review period, Ergon incurred $378.3 million on transformer replacement. We show in Table 4.10 how this relates to Ergon's forecast included in the RP, RRP and finally the provision included in the capex allowance.

Table 4.10: Review period performance for transformers ($FY25)

	TRANSFORMERS					
($,000)	FY19	FY20	FY21	FY22	FY23	Total
RRP	56,349	58,910	44,832	45,817	52,168	**258,076**
Repex Model final decision	39,395	39,671	31,745	32,374	33,344	**176,529**
AER final decision	39,395	39,671	31,745	32,374	33,344	**176,529**
Actual	68,766	86,481	69,691	75,870	77,494	**378,302**
Volume (units)	FY19	FY20	FY21	FY22	FY23	**Total**
RRP	1,176	1,195	1,499	1,490	1,473	**6,834**
Repex Model final decision	1,401	1,418	848	884	923	**5,473**
AER final decision	1,401	1,418	848	884	923	**5,473**
Actual	1,802	2,153	2,148	2,023	1,469	**9,595**
Unit Cost ($)	FY19	FY20	FY21	FY22	FY23	**Average**
RRP	47,916	49,297	29901	30752	35407	**38,655**
Repex Model final decision	28,118	27,986	37,453	36,604	36,134	**33,259**
AER final decision	28,118	27,986	37,453	36,604	36,134	**33,259**
Actual	38161	40,168	32,444	37,503	52,753	**40,206**

Source: Ergon 5.3.06 capex ex post justification transformer repex – January 2024), Table 11

402. Ergon has incurred a significantly higher level of repex for transformers than included in the AER final decision or its own RRP forecast.

Adjustments for clearance program[107]

403. Ergon has identified approximately $19.2 million (5%) included in the transformer category for the clearance program. Ergon has not described what this is for, but we do not consider this is material to our review.

Assessment

Expenditure primarily distribution related

404. Ergon states that approximately 95% of Ergon's transformer replacement expenditure is associated with distribution transformers. Ergon has included 19 sub-transmission transformer replacements within the remaining 5% of transformer expenditure over the review period, the majority of which are the result of CBRM assessments.

405. Approximately 58% of the total transformer repex is the result of distribution transformer in-service failure. Table 4.11 shows the expenditure by driver.

107 In Table 12 Ergon identifies $24.8 million, and which differs from other references.

Table 4.11: Transformer repex by driver, ($m, nominal)

Driver	FY19	FY20	FY21	FY22	FY23	Total
Substation	4.9	9.1	6.2	4.3	8.5	**33.0**
Distribution defect	37.9	35.1	29.5	39.8	41.8	**184.1**
Distribution programs						
poles	7.8	17.5	10.4	14.1	11.0	**60.8**
conductors	1.1	3.4	5.3	6.0	8.1	**23.9**
clearance	3.6	5.7	6.4	0.1	0.0	**15.8**
Total	**55.3**	**70.8**	**57.8**	**64.3**	**69.4**	**317.6**

Source: EMCa analysis of Ergon - 5.3.16 - PIR - Distribution transformer replacements - January 2024 - public

Additional transformer replacement due to other distribution programs

406. An additional $100.5 million (nominal) of the transformer repex is due to the pole management and conductor replacement programs, with pole replacement being the primary driver. The change in pole serviceability criteria led to a higher number of poles being replaced, and in turn triggered replacement of the pole mounted distribution transformer and associated equipment.

Higher rate of distribution transformer replacement is not adequately supported

407. We considered the reasons that the AER determined a lower capex than Ergon had proposed, and whether this could indicate why Ergon had subsequently incurred a much higher level of capex. The AER used trend analysis, the repex model and bottom-up assessment techniques, to assess the forecast repex. In this case it used the repex model result, highlighting that it was not satisfied that Ergon's forecasting methodology led to a prudent level.

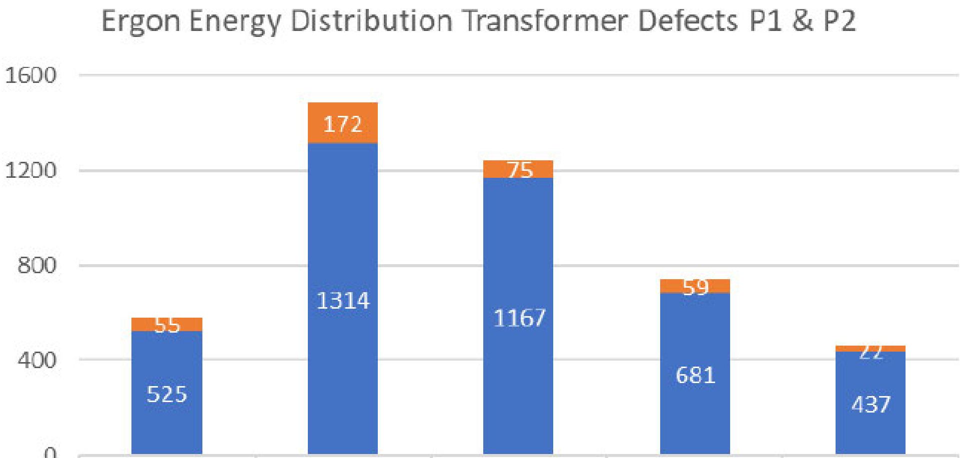
408. Notwithstanding the lower capex allowance, Ergon has incurred a much higher level of capex for distribution transformers than it had estimated itself, as evidenced in Table 4.11. The Board submission in December 2020 indicated a rate of replacement lower than that included in the RRP. The basis for exceeding this level has not been justified.

409. We looked for evidence of an emerging risk or issue that Ergon may be mitigating that would help explain the increase. Ergon describes the asset management strategy for distribution transformers as run-to-defect or run-to-failure.[108] Ergon states that the defects reported result in transformer replacement with the primary reasons for replacement being corrosion (56%) and oil leakage (25%). We consider this is not a run to fail strategy, whereby replacements are made following failure of the transformer, but rather replace on defect. Subject to the classification method, this may result in transformers being prematurely replaced when a repair could have been undertaken to address the defect.

410. In Figure 4.13, we show the historical trend of defect-driven replacement and refurbishment works that have been conducted on distribution transformers. The profile of defects does not align well with the incurred expenditure, assuming the P1/P2 defects are resolved in the year they are identified.

108 Ergon 5.4.26 Asset Management plan distribution transformers – January 2024. Page 30.

Figure 4.13: Distribution transformer defects P1 and P2



	2018/19	2019/20	2020/21	2021/22	2022/23
P1	55	172	75	59	22
P2	525	1314	1167	681	437

Source: Ergon 5.4.26 Asset Management plan distribution transformers – January 2024, Figure 15

411. We conclude that there are replacements in addition to the defect based replacements being undertaken.

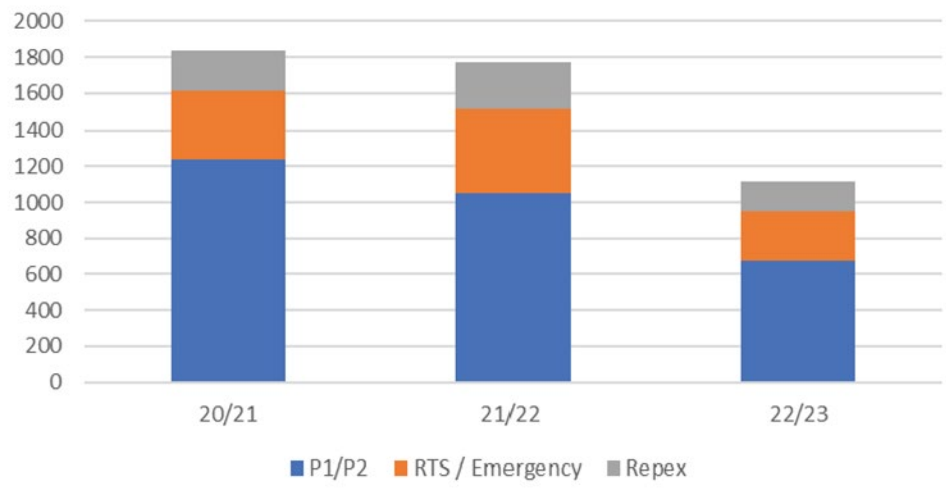
412. In its supporting documentation, Ergon states that:

> *It was identified that some assets were being replaced prematurely for opportunistic reasons. This cultural issue is being addressed through open data-driven communication, as evidenced in the 2022/23 data. Figure 4.14 shows replacement data in terms of defects (P1/P2), return to service (RTS) and emergency projects, and planned replacement (REPEX) projects (e.g. line rebuild).*[109]

413. We have reproduced Figure 4.19 referred to by Ergon as Figure 4.14 below, which shows a replacement level of 1000 units p.a. included in the 2020 Board submission, towards the end of the 3-year period shown. We consider that 'opportunistic' replacement may have contributed to a higher replacement level and associated repex than a prudent and efficient level in previous years.

[109] Ergon 5.4.26 Asset Management plan distribution transformers – January 2024.

Figure 4.14: Distribution Transformer Replacement Data



Source: Ergon 5.4.26 Asset Management plan distribution transformers – January 2024, Figure 19

414. In response to this analysis, Ergon has introduced several new initiatives that include:

- Approved use of products to repair defects: Power Patch, Penetrol
- Monthly report with Data and Defect Review
- Distribution Transformers replaced as part of a project (e.g. upgrade or US Pole Replacement) and not defective should be tested and returned to EQ Stores for reuse
- Lines Defect Classification Manual Updates.

415. Introduction of the new initiatives listed by Ergon is likely to result in lower cost solutions to address distribution transformer defects, more efficient classification of defects and reduction of early or 'opportunistic' replacement. These changes appear to have already resulted in a decline in defects commencing in FY22 and a further decrease in FY23, and which should flow into a reduced repex requirement.

Accounting for re-issue of equipment

416. We asked Ergon what measures are in place to recover the remaining operating life of assets removed prematurely, as a result of the consequential replacement strategy or opportunistic replacement, such as return and re-issue from EQ stores. Specifically, how the costs of assets are accounted for in the capex forecast and RAB so that customers are not paying twice.[110] We did not receive a response.

417. Absent a response, we consider that Ergon has not effectively taken into account the remaining life of assets removed given that utilisation of these assets will reduce the average unit rate of future replacement activities. Given the size of the consequential replacement program, and the likely opportunistic replacement of distribution transformers (and associated fuse switchgear) we consider that this could be material.

4.4.7 Switchgear category

Ergon's incurred repex for switchgear replacement

418. Over the review period, Ergon incurred $360.4 million on switchgear replacement. We show in Table 4.12 how this relates to Ergon's forecast included in the RP, RRP and finally the provision included in the capex allowance.

110 IR39. Question 9.

Table 4.12: Review period performance for switchgear ($FY25)

			SWICHGEAR			
($,000)	FY19	FY20	FY21	FY22	FY23	**Total**
RRP	19954	18,350	27,746	22,778	38,865	**127,693**
Repex Model final decision	11,390	11,659	24,314	23,797	23,490	**94,650**
AER final decision	11,390	11,659	24,314	23,797	23,490	**94,650**
Actual	57,034	71,597	73,540	74,196	84,038	**360,404**
Volume (units)	FY19	FY20	FY21	FY22	FY23	**Total**
RRP	13,593	7,407	2,656	2,731	2,618	**29,004**
Repex Model final decision	1,526	1,476	1,744	1,628	1,537	**7,911**
AER final decision	1,526	1,476	1,744	1,628	1,537	**7,911**
Actual	4,280	4,792	5,036	4,901	4,541	**23,550**
Unit Cost ($)	FY19	FY20	FY21	FY22	FY23	**Average**
RRP	1,468	2,477	10448	8342	14845	**7,516**
Repex Model final decision	7,463	7,899	13,940	14,618	15,285	**11,841**
AER final decision	7,463	7,899	13,940	14,618	15,285	**11,841**
Actual	13326	14,941	14,603	15,139	18,506	**15,303**

Source: Ergon 5.3.05 capex ex post justification switchgear repex – January 2024, Table 11

419. Ergon exceeded the allowance provided by the AER over 2018-23 by 281% for switchgear. Ergon Energy has overspent its switchgear repex allowance in every year of the review period.

Adjustments for clearance program[111]

420. Ergon has identified approximately $8.0 million (2%) included in the transformer category for the clearance program. Ergon has not described what this is for, but we do not consider this is material to our review.

Assessment

Expenditure primarily distribution related

421. Ergon states that approximately 90% of Ergon's switchgear replacement expenditure is associated with distribution switchgear. Table 4.13 shows the switchgear repex by driver.

111 In Table 12 Ergon identify 24.8 million, and which differs from other references.

Table 4.13: Switchgear repex by driver ($m, nominal)

	FY19	FY20	FY21	FY22	FY23	Total
Substation	13.8	16.2	10.2	15.5	18.3	**74.0**
Distribution switch defect	8.6	7.9	8.4	7.1	12.1	**44.1**
Distribution fuse defect	5.4	7.8	10.6	10.2	18.2	**52.2**
Distribution program						
poles	5.8	9.3	8.1	7.9	5.5	**36.6**
conductors	0.8	3.3	5.8	7.9	7.3	**25.1**
clearance	0.8	1.8	3.7	0.3	0.0	**6.6**
Distribution transformer fuses	10.6	12.3	14.2	13.9	13.9	**64.9**
Total	**45.9**	**58.6**	**61.0**	**62.9**	**75.3**	**303.7**

Source: EMCa analysis of Ergon - 5.3.15 - PIR - Switches replacements - January 2024 - public

422. Ergon has included 771 sub-transmission switchgear replacements at an average of 154 p.a. This is an increase over historical levels.

> *Our substation switches replacement strategy involves a mixture of proactive replacement based on condition, typically identified utilising Condition Based Risk Management (CBRM), with a small portion of expenditure involved in replacing switches upon failure or defect. Around 10% of the total replacement of switches is associated with substation switches replacement, conducted following CBRM assessments.*[112]

423. However, according to Table 4.13 the substation related switchgear is much higher than 10% of the total switchgear replacements. The driver for higher switchgear replacement in substations is not explained.

There is no corresponding increase in defects or failures that assist with explaining the increase in repex

424. The replacement strategy for Ergon distribution switches is to replace on failure or identified defect. The main cause of defects is the corrosion of metallic enclosures, operational issues, insulation ageing and degradations of associated components, which if left unaddressed, eventually cause an unassisted failure of the switch.

425. The number of unassisted and defect failures shown in the PIR for switchgear provided by Ergon[113] shows a reduced level of defects or failures, compared with historical levels, and a relatively flat trend. We do not consider that an increase in defects or failures explains the increase in switchgear replacement. Absent a clear explanation, Ergon has not sufficiently supported the increase for this purpose.

Additional switchgear replacement due to pole replacement

426. As a result of the much higher volume pole replacement program, additional distribution switches have and are being replaced at the same time as the pole. Ergon considers that bundled replacement, where efficient to do so, is in line with good industry practice.

427. As indicated in Table 4.13, an additional $133.2 million (nominal) of the switchgear repex is due to consequential replacement. Included in this figure is $64.9 million (nominal) associated with fuses attributable to distribution transformers, all of which will not be the result of pole replacement, however separation of this figure by sub-driver was not provided by Ergon.

112 Ergon 5.3.15 PIR switch replacements – January 2024.

113 Ergon 5.3.15 PIR switch replacements – January 2024. Figure 2 and Figure 3 respectively.

428. Further to our discussion of the transformer repex, the change in pole serviceability has led to a higher number of poles being replaced, which in turn triggers replacement of the pole-mounted switchgear assets. We asked, and Ergon has not explained, how it treats the value of reclaimed and re-issued assets including switchgear (and transformers) that may be prematurely replaced and suitable for re-use.

High distribution transformer replacement drivers higher fuse replacement

429. Ergon has stated that '*Whenever a distribution transformer is replaced, HV and LV fuses are replaced as part of the replacement process.*'[114] Whilst fuse expenditure is included in the switchgear category, and not transformers, we expect this is contributing to a further uplift.

430. We show the components of the fuse expenditure in Table 4.14, based on the breakdown shown in Table 4.13.

Table 4.14: Fuse expenditure ($m, nominal)

	FY19	FY20	FY21	FY22	FY23	Total
Defective Switch Fuse and Cartridges	5.4	7.8	10.6	10.2	18.2	**52.2**
Distribution Transformer Related Fuses	13.8	21.5	25.4	22.1	20.7	**103.5**
Total	**19.2**	**29.3**	**36**	**32.3**	**38.9**	**155.7**

Source: Ergon 5.3.15 PIR Switches replacements - January 2024, Table 10

431. Ergon incurred a large proportion of its fuse expenditure on defects including expendable cartridges. Fuses are mainly an expendable protection asset that operate under a fault event and would be replaced once they have operated. We understand from Ergon's documentation that only switch fuses are counted in the RIN volume and the expendable cartridges are excluded. This is likely to increase the calculated unit rate.

432. In Table 4.15 we show the estimated cost of fuse replacement based on replacing a fuse/fuse unit with each transformer replacement, as $116.8 million and approximates the value $103.5 million (nominal) in Table 4.14 after conversion to the same dollar terms.

Table 4.15: Estimated fuse replacement expenditure ($m, FY25)

	FY19	FY20	FY21	FY22	FY23	Total
Transformer replacement volume	1801	2153	2141	2016	1465	**9576**
Fuses unit rate from RIN ($ FY25)	8,730	10,463	12,967	12,552	17,411	**n/a**
Estimated cost ($m FY25)	15.7	22.5	27.8	25.3	25.5	116.8

Source: EMCa analysis of Ergon 5.3.16 PIR Distribution transformer replacements - January 2024 and RIN

433. We understand that the replacement includes fuse holder, housings and other fuse related equipment. However, a value of over $12,000 per unit appears high for a distribution pole-mounted transformer, and which Ergon estimate increases to an average unit cost over $14,000 for the next RCP.

434. Fuse cartridges are excluded from the CBA as the cartridges are an expendable item and have to be replaced after each operation. We would consider that an expendable item is more typically expensed rather than capitalised.

[114] Ergon 5.3.15 PIR switch replacements – January 2024.

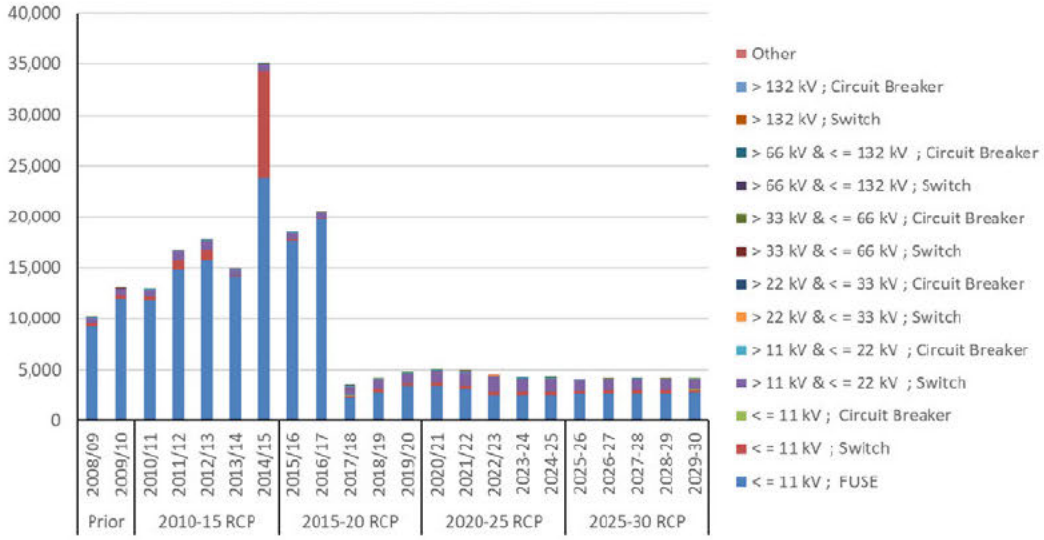
Elevated levels of switchgear replacement is not adequately explained

435. Similar to transformers, we have seen elevated levels of switchgear replacement that do not appear to be supported by the defect information that has been provided. Similar to the case with transformers, the estimated defect driven program was approximately in-line with the volumes included in the RRP, despite the approval by the Board in December 2020 that reduced the estimated replacement volume.

Shift in asset management strategy not explained

436. We observe a distinct change in volume (lower) and unit rate (higher) of distribution switch replacement. On review of the RIN data in Figure 4.15, this appears to relate to a significant reduction in the volume of <=11kV fuse units, but an increase in expenditure and which is not explained in Ergon's documentation. We would expect, given the materiality of the change, that Ergon would have included a description outlining the change in treatment, or how this may be reflective of a change in asset management strategy or accounting treatment for this item.

Figure 4.15: Switchgear replacement volumes



Source: EMCa analysis of RIN

4.4.8 SCADA, network protection and control category

Ergon's incurred repex for SCADA, network protection and control

437. Over the review period, Ergon incurred $108.7 million on SCADA, network protection and control replacement. We show how this relates to Ergon's forecast included AER final decision and Ergon actual expenditures in Table 4.16.

Table 4.16: Review period performance for SCADA, network protection and control ($,000, FY25)

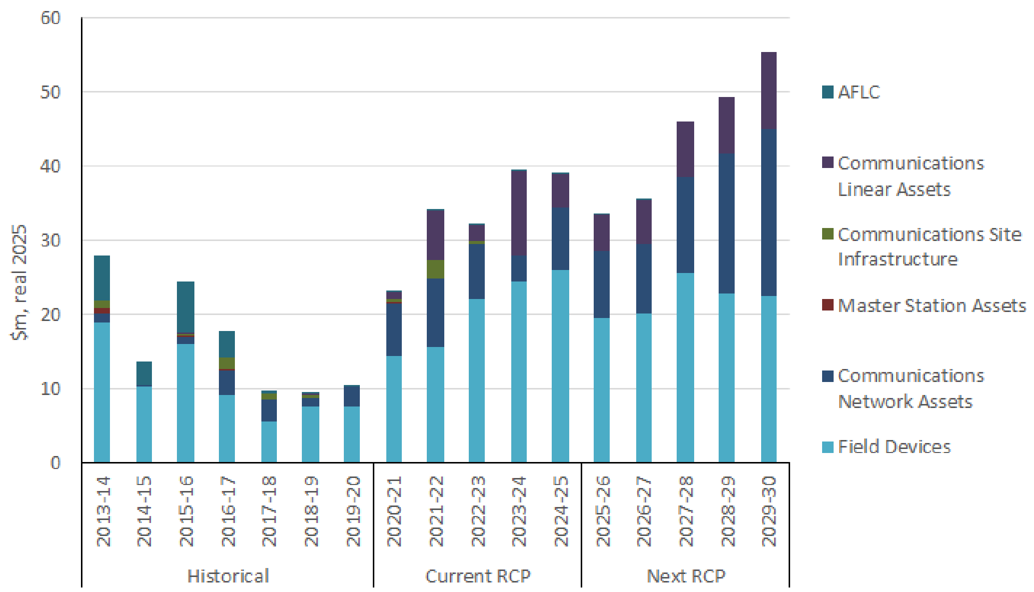
	SCADA, NETWORK CONTROL AND PROTECTION					
	FY19	FY20	FY21	FY22	FY23	Total
AER final decision forecast	16,582	12,091	12,710	12,710	12,710	**66,802**
Actual	9,389	10,319	22,996	33,947	31,998	**108,649**

Source: Ergon 5.3.09 capex ex post justification SCADA, network control and protection repex – January 2024, Table 6

438. The most significant portion of expenditure in this category is attributable to three categories: Field Devices (including protection relays), Communications Network Assets (networking equipment) and Communications Linear Assets (pilot and fibre optic cables).

Collectively the three categories contribute 96% of the total expenditure in this asset category, as evident in Figure 4.16.

Figure 4.16: SCADA, network protection and control repex category ($m, FY25)



Source: EMCa analysis of RIN

Increasing in service failures not apparent in the supporting documentation

439. We do not see evidence of increasing in-service failures in the supporting documentation provided. The figure provided in the ex post justification appears to be based on RIN information and, with the exception of the communication network assets, does not provide sufficient information to indicate an increasing trend in asset failures for the eight years provided. Nor do we see evidence of replacement strategies based on technical obsolescence risk or other indicators, which may indicate an increase in required replacement levels.

440. In the 2022 DAPR, Ergon recognised the age profile of field devices, particularly protection relays and the need to move to a proactive replacement program to manage the failure risks.

441. On the basis that failures have occurred, Ergon is required to undertake replacements. In FY21, Ergon experienced an increase in failures for field devices, which reflects an increasing trend from FY18. The reasons for the trend are not explained, nor why Ergon has brought forward investment in this area two years earlier than originally forecast:

> *Our Revised Regulatory Proposal underestimated our requirements for Field Devices in the first three years of the 2020-2025 regulatory period. However, we did forecast an increase from 2023-24 in expenditure requirements, with the final year of this period forecasting an expenditure of around $11m (2020 $). Because of our increased failures rates in the 2019-20 and 2020-21 period, we began to undertake a more proactive replacement program for Field Devices (need to check this).*[115]

442. Similarly, there is an increase in communication network asset failures towards the end of the review period. Ergon describes this as demonstrating that the fleet of first generation Communications Network Assets have reached the end of their serviceable lives and require the commencement of proactive replacement programs. These include Ethernet replacement, Operational Technology Proxy Appliances, Microwave Radio, Lower Class Equipment and circuit Emulation.

115 Ergon 5.3.09 capex ex post justification SCADA, network control and protection repex – January 2024. Page 14.

Components of other repex linked to substation related repex

443. Ergon states that 25% of the proposed expenditure is related to consequential replacement as part of other programs. Substation refurbishment projects typically replace protection relays and communications equipment and there is little choice over this expenditure.

Increase in communications Linear Assets driven by a single project

444. A further 10% is associated with a single lines project, Childers to Gayndah 66kV line rebuild, which included Optical Ground Wire in its design.

445. As discussed in our assessment of the overhead conductor repex, we consider that Ergon has effectively managed within the top-down repex allowance for this category as included in the capex allowance, and for the reasons set out in the AER final determination.

4.4.9 'Other' category

Ergon's incurred repex for 'other' repex category

446. Over the review period, Ergon incurred $106.9 million in its 'Other' repex category. We show how this relates to Ergon's forecast included Ergon actual expenditure and the AER final decision in Table 4.17.

Table 4.17: Other repex category ($,000, FY25) [116]

	Other					
	FY19	FY20	FY21	FY22	FY23	Total
AER final decision Forecast	8,783	4,766	10,652	10,652	10,652	**45,505**
Actual	20,562	26,355	19,111	22,661	18,214	**106,903**

Source: Ergon 5.3.10 capex ex post justification other repex – January 2024, Table 6

447. After adjustment to remove the public lighting repex (non-SCS), the total Other repex is reduced from $106.9 million to $93.5 million for the review period. The breakdown is shown in Table 4.18. The major component is the sub-category of 'other' which primarily comprises substation fencing, DC systems, batteries, and miscellaneous civil works.

Table 4.18: Breakdown of Other repex category ($,000, FY25)

Asset Category	FY19	FY20	FY21	FY22	FY23	Total
CTs	3,186	3,440	4,633	4,497	4,858	**20,615**
VTs	4,886	3,840	3,965	3,523	3,063	**19,279**
Cap Banks	183	79	42	-	-	**305**
SVCs	796	83	-	-	-	**163**
Other sub-category	6,843	10,757	10,497	14,671	10,319	**53,088**
Total	**15,177**	**18,199**	**19,137**	**22,691**	**18,240**	**93,450**

Source: Ergon 5.3.10 capex ex post justification other repex – January 2024, Table 1. Totals may not add due to rounding

Assessment

Ergon includes its emergency replacement programs in this category

448. From our knowledge of Ergon's works program, and also reflected in its forecast repex as discussed in Section 5, a large component of its expenditure for the 'other repex' category is

116 The actual repex for FY19 and FY20 included $13.6 million of public lighting spend undertaken and reported in the RIN as SCS in FY19 ($5.4 million) and FY20 ($8.2 million).

associated with its RTS or emergency replacement of failure programs. We have not identified any concerns with the scale of this program for the ex post review period, based on trending.

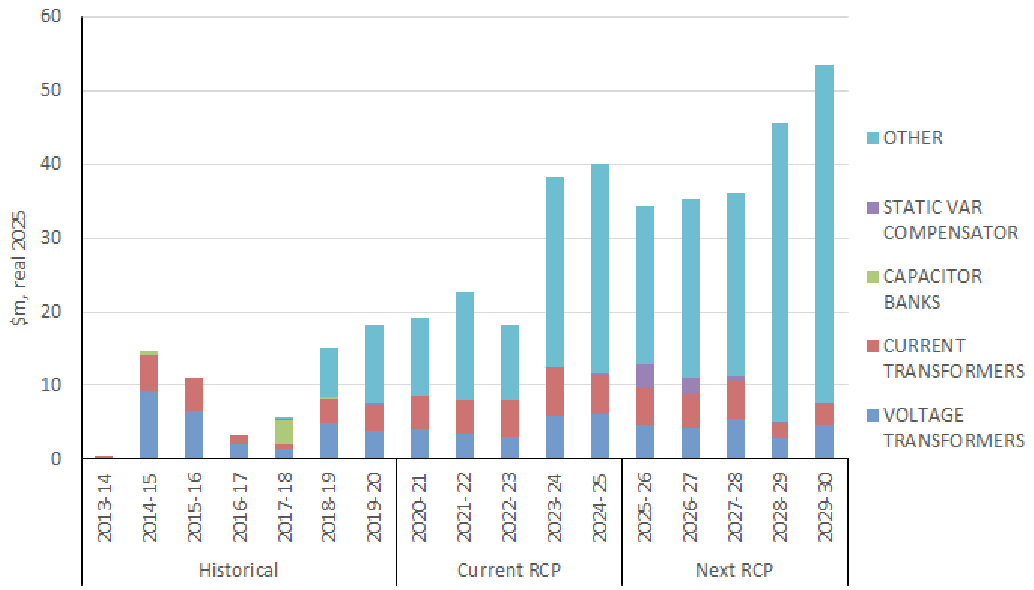
Expenditure on instrument transformers linked to substation replacement projects

449. From our knowledge of Ergon's works program, and also reflected in its forecast repex as discussed in Section 5, expenditure on current transformers (CT) and voltage transformers (VT) is included in this category. This expenditure closely follows other replacement activities in substations, whereby asset replacements are bundled. We have not identified any concerns with the scale of this program for the ex post review period, based on trending.

Introduction of new programs largely explain the variance and increase for this category, and which are reasonable

450. Ergon has included several new replacement programs including for (i) substation fencing, (ii) transformer bunding, and (iii) protection system upgrades as discussed in Section 4.3. Figure 4.17 shows an increase in expenditure in FY19 and has continued into the 2020-25 RCP, coinciding with the introduction of these new programs.

Figure 4.17: Other repex category ($m, FY25)



Source: EMCa analysis of RIN

451. Based on our review of the Ergon Board submission in 2020, and as discussed in Section 4.3, we consider the inclusion of these additional risk-based programs to be reasonable, and the incurred expenditure also reasonable.

452. The further increase in FY24 has not been explained by Ergon. This is not included in the ex post period, and as such we did not request Ergon to explain this increase.

4.5 Assessment of efficient unit rates

4.5.1 Comparison with the NEM

453. Ergon has provided an attachment to its RP comparing Ergon's unit costs to the NEM,[117] to show that the historical "basket of goods" unit cost is efficient. Ergon states that:

[117] Ergon 5.2.08 Cost Comparison of Ergon Energy RIN Unit Costs to the NEM – December 2023.

Generally, our asset replacement programs involve the replacement of multiple assets as a bundled work package. For example, where we have identified a defective pole that requires replacement based on its condition, we are likely to replace other assets that are attached to the pole at the same time such as the cross-arms attached to that pole. This allows the (sic) for the prudent replacement of assets that may also be likely to fail in the short to medium term which would have required us to return to the same site to replace these in the future. It also allows a more efficient delivery of the pole replacement where it may be difficult and more time consuming to re-establish the existing asset rather than a new one, as well as reducing planned outage on our network for future replacements, and unplanned outages for in-service failure of assets in poor condition.[118]

454. As discussed earlier in our report, we expect that there are efficiencies of work bundling and efficient delivery of pole replacement due to consequential replacement, however Ergon has not sufficiently demonstrated that the scale of replacement undertaken in the ex post review period is efficient.

455. Ergon also states that its RIN unit rates cannot be directly compared with its peers:

Given our delivery of programs in a more bundled way, our method of reporting our RIN by asset categories is to apportion our replacement expenditure in a program on a pro-rated basis with the material cost of the assets being replaced. This is a consistent and repeatable process for us to report on expenditure in individual categories. Hence, in assessing the efficiency of our program delivery it is important that we consider the way our program is constructed.[119]

456. We sought to reproduce the analysis that Ergon has relied upon for poles to conclude that its delivery of the works program is efficient compared with its assessment of its peers and could not. Our analysis of the poles case, using the methods and factors described in Ergon's report, results in a higher unit rate than Ergon has stated.

4.5.2 Movement of unit rates

457. Direct comparison of unit costs can be problematic due to possible variances to the accounting methods applied to capture costs to align with the RIN asset categories by each DNSP. Given that these methods have been in place for some time, and used by the AER in its determination, we expect the reporting methods have matured such that comparison provides a reasonable indicator of efficiency. We also considered the trend over time, and which may be a further indicator of a change in practice.

458. For Ergon we observe significant volatility in the unit rates prior to FY19 and which is not explained by Ergon. Given the volatility, coupled with the data issues identified by the AER in its final decision for the current RCP, we have not placed weight on these trends.

459. More particularly there are year on year changes, including examples where unit rates have increased significantly that are not explained by Ergon and may indicate a change in governing standard, relative to the past, and/or input cost change or potential inefficiency.

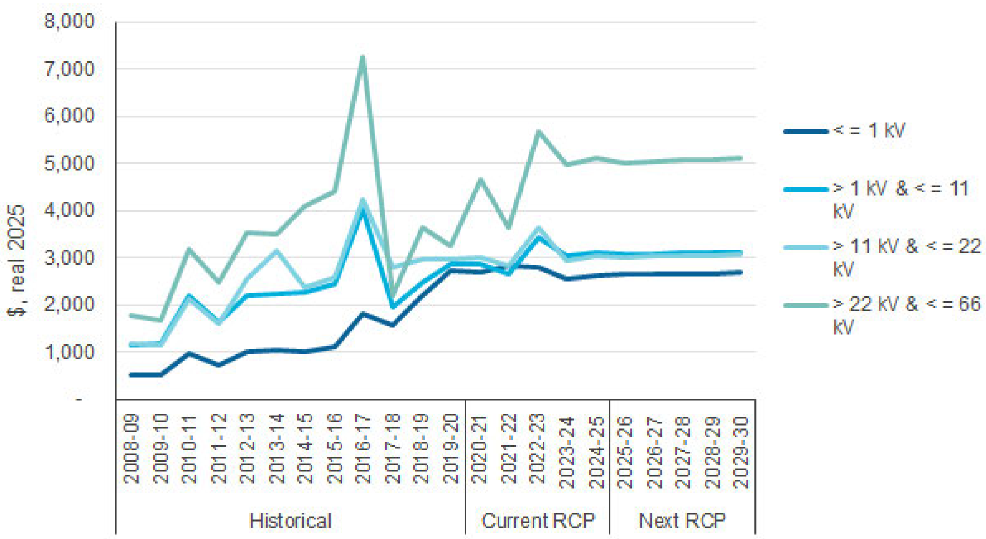
460. We found some anomalies in the movement of average unit rates in the information provided by Ergon, as evidenced by high volume replacement including pole top structures, services lines and fuses. For other assets, the unit rates that were being realised by around FY20 appear to remain relatively stable from that point on.

461. Figure 4.18 shows that the rates for pole top structures has been increasing, with the largest increases evident for low voltage (LV) structures which are not explained. Accepting the possible data errors prior to FY18, whilst the unit costs for high voltage (HV) remain relatively stable, the unit cost for LV crossarms is increasing. We would expect this to remain relatively stable, and perhaps reduce over time due to increased volumes associated with the large pole replacement program.

118 Ergon 5.2.08 Cost Comparison of Ergon Energy RIN Unit Costs to the NEM – December 2023. Page 3.

119 Ergon 5.2.08 Cost Comparison of Ergon Energy RIN Unit Costs to the NEM – December 2023. Page 3.

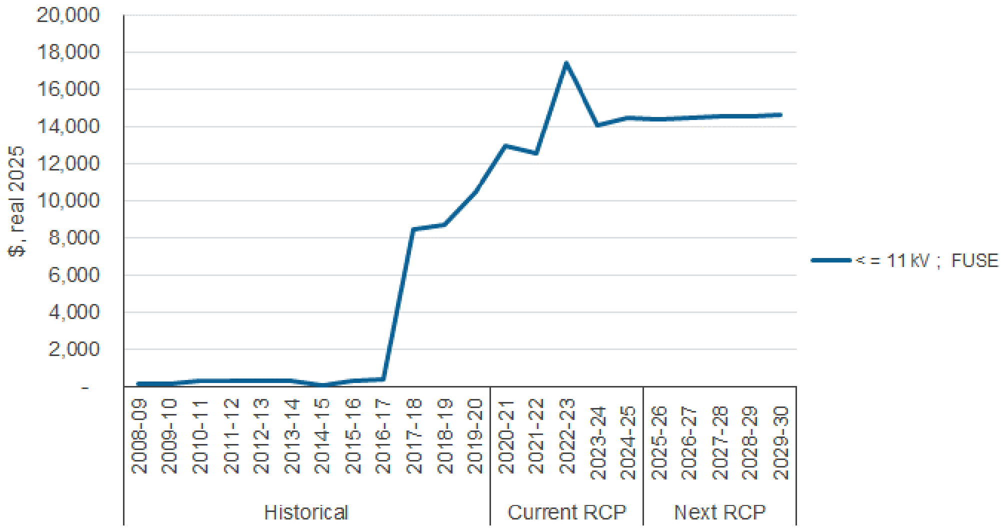
Figure 4.18: Pole top structure unit rates ($FY25)



Source: EMCa analysis of RIN

462. Figure 4.19 shows fuse unit rates, and which we discuss in our review of the switchgear asset category. The average unit cost is the result of changes in expenditure and volume at the same time, and which suggest to us that there has been a change in reporting for switchgear that may assist to explain the large increase. Fuses comprise expendable cartridges and fuse units and which vary significantly in cost, and collectively represent a large expenditure item that is not explained.

Figure 4.19: Switchgear – fuses unit rates ($ FY25)



Source: EMCa analysis of RIN

4.6 Our findings and implications for ex post repex

4.6.1 Summary of findings

Ergon has established a need to incur a higher level of capex that exceeded that included in the AER's capex allowances for the ex post period

463. The capex allowance allows NSPs to make prioritisation decisions, however the degree of aggregate overspend highlights the need to consider whether and to what extent there may have been a more fundamental change to the requirements for asset replacement which was not considered at the time of the AER's final decision for the current RCP.

464. We have reviewed the major drivers of the increase in repex incurred by Ergon and find that the information available at the time of the investment decision indicates a need to incur a level that exceeded that included in the capex allowance, and the level that Ergon had included in its investment plans that informed its RP and RRP for the current RCP.

The replacement of poles and conductor assets are primary drivers of the incurred repex

465. Two programs primarily contribute to the overspend in the ex post review period, being pole replacement and conductor clearance. These programs are in response to Ergon's assessment of safety and compliance risk.

Lack of coherent supporting information to support the claim of a prudent and efficient level of repex

466. The information provided by Ergon has been problematic and absent sufficient justification for the high level of incurred repex. We were not able to easily ascertain the information that was available to Ergon at the time of its investment decisions, to determine whether the incurred capex met the capex criteria.

467. We have considered the information available to Ergon at the time of its decisions to incur the expenditure and by reference to reasonable comparisons across the NEM. Artefacts that we expected should exist as part of the governance arrangements that Ergon had described, were either absent or incomplete in justifying the level of expenditure. We consider that Ergon has established a reasonable basis for higher expenditure on these programs, however the extent of expenditure that Ergon has incurred on these programs has not been reasonably demonstrated.

468. We found material errors and weaknesses in the modelling of the ex post repex presented in the PIR analysis, and as a result we were not able to assign any weight in our review of the incurred repex.

Primary and enduring focus on pole program has led to higher replacement levels than Ergon has justified

469. The primary driver of repex is the pole management program. We consider that Ergon has responded to a need to reverse an increasing trend of pole failure risk, and which resulted in system wide changes to the management of its wood pole population as discussed in Section 3. These changes have also been the primary driver for the increase in repex above that included in the capex allowance (and initially estimated by Ergon).

470. We consider the changes to its pole assessment and treatment methods that Ergon has made has led directly to the increase in repex that it has incurred. The primary, and what appears to be an enduring focus, appears to be to reduce the unassisted pole failure rate below the levels in the ESCOP. More recent results suggests that the increasing unassisted failure rate may have been arrested. There is insufficient information to determine the future trajectory or result of the unassisted pole failure rate.

471. Our analysis indicates that Ergon's rate of investment to address the pole failure risk, as measured by its performance against the ESCOP, exceeds that of its peers. We consider that the peers we have compared against have similar challenges with the age, condition and failure rates of its poles that Ergon is experiencing and, we also consider would be similarly seeking to align with good practice for their unassisted pole failure rates. We also consider that Ergon's pole reinforcement rates (nailing) are lower than we would expect to support rapid risk reduction at lowest cost. These factors, taken together suggest that that Ergon likely incurred a higher level of pole replacement than was required to meet its obligations, at a higher cost than was otherwise necessary.

Efficiency of consequential replacements not sufficiently demonstrated

472. For other areas of repex the increases largely reflect the consequential replacements associated with its pole management program, and continuation of re-conductoring and conductor clearance programs. We consider the conductor clearance programs separately in Section 6.

473. Whilst we consider that there are likely delivery efficiencies associated with work bundling, and consequential asset replacement, as Ergon has purported to do, it has not demonstrated that this has been optimised across the portfolio. We have reviewed the modelling that Ergon has undertaken for its ex post period, which it claims demonstrates a benefit, however we find issues that cast doubt on the extent of benefits claimed.

Other drivers of repex include inefficient planned works

474. For other asset categories the repex is, in general, reflective of reasonable drivers and has been based on a reasonable unit rate. However, we remain unconvinced by the extent of distribution transformer and distribution switchgear repex that Ergon has undertaken. Elements of this are higher than Ergon had estimated and are without sufficient justification to demonstrate the volume of replacement that Ergon has incurred.

475. Moreover, we have found evidence that Ergon is undertaking a number of planned programs, and that these appear to include replacements that could be unnecessarily bringing forward the timing relative to its peers. Further, this elevated level of repex is being used as the basis for forecasting repex for future years as discussed in Section 5.

Some unit costs appear to be higher than an efficient level

476. For Ergon we observe significant volatility in the unit rates prior to FY19 and which is not explained by Ergon. Given the volatility, coupled with the data issues identified by the AER in its final decision for the current period, we have not placed weight on these trends.

477. More particularly there are year on year changes, including cases where unit rates have increased significantly, that are not explained by Ergon and which may indicate a change in governing standard, relative to the past, and/or input cost change or potential inefficiency.

478. Similarly, Ergon has not pointed us to other exogenous factors that may help explain trends in unit rates, and if this were the case, where such factors may have led to an increase or decrease in unit rates, and whether this was a sustained change or something that may only be temporary.

4.6.2 Implications

A higher level of repex than the AER's allowances over the ex post period, was justified

479. For reasons that became apparent after its determinations, we consider that the level of repex included in the AER's capex allowances over the ex post review period was not sufficient to meet the requirements of the business, in the long term interests of customers. This was most relevant for the years that fall into the current RCP. Accordingly, we consider that it was prudent that Ergon incurred a level of repex that exceeded the repex included in the capex allowance in aggregate.

Ergon incurred a higher level of repex than was justified

480. Based on the projects and programs we reviewed, we find that Ergon's repex incurred during the ex post period does not meet the NER expenditure criteria because it has not demonstrated that it is efficient, prudent and reasonable. We consider that a conforming repex allowance that meets NER criteria would be materially less than Ergon has proposed.

5 REVIEW OF FORECAST REPEX

We consider that Ergon's proposed repex of $2,579.0 million for the next RCP is not a reasonable forecast of its requirements.

Ergon's proposed expenditure continues replacement levels established during the current RCP and which we consider are higher than a prudent and efficient level. Ergon did not provide sufficient information and or information with sufficient evidence of rigour to support the expenditure that it proposes. We make this observation based on the information that we would typically expect to find based on our expenditure reviews of other DNSPs.

5.1 Introduction

481. We reviewed the information provided by Ergon to support its proposed repex forecast, including a sample of projects and programs. Our focus was to ascertain the extent to which the issues identified in the preceding sections are evident at the activity level, and to assess the extent to which the forecast expenditure reflects the NER criteria.

482. We sought to establish the strategic basis for, and the reasonableness of, Ergon's proposed repex for each of the identified categories of expenditure. Forecast expenditure in the next RCP is reflective of a step increase from the historical expenditure that Ergon has incurred and is expected to incur in the remainder of the current RCP.

483. Ergon has provided its bottom-up forecast and how this forecast has been apportioned to each of the RIN groups. We have referred to this in our assessment.

484. We first summarise and compare Ergon 's proposed expenditure for the next RCP with its historical actual and estimated expenditure in the prior and current RCP's. We subsequently provide our review of Ergon's forecast for each repex RIN group.

5.2 Overview of Ergon's proposed repex forecast

5.2.1 Overview

485. Ergon has proposed $2,579 million repex for the next RCP, being $1,507.8 million above the final decision for the current RCP and $227.3 million above the estimated repex that Ergon expects to incur in the current RCP. Table 5.1 shows the forecast repex by category.

Table 5.1: Proposed repex for next RCP by category ($m, FY25)

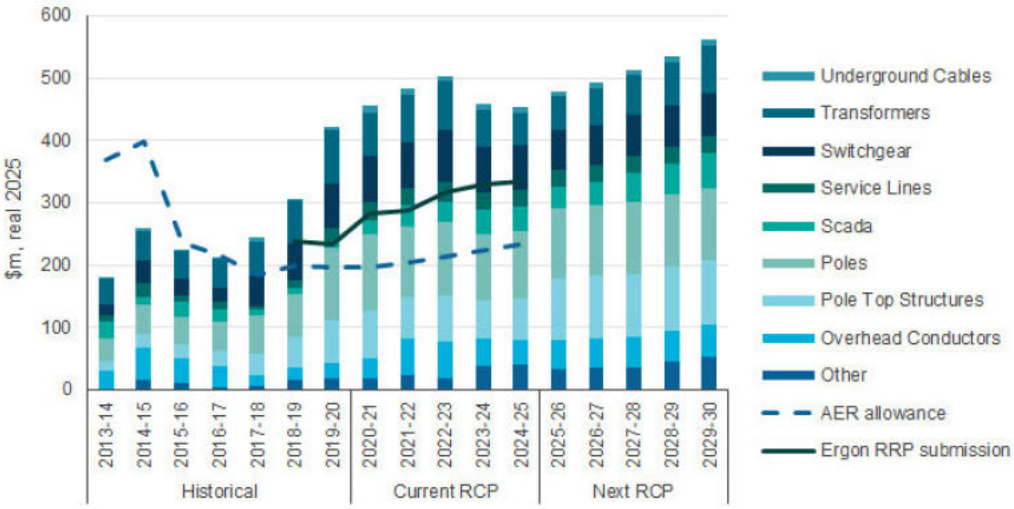
RIN category	FY26	FY27	FY28	FY29	FY30	Total
Poles	112.3	113.7	114.9	115.6	116.8	**573.3**
Pole top	98.8	99.8	100.7	101.1	102.1	**502.5**
Overhead conductors	46.0	47.7	49.0	50.1	51.0	**243.8**
Underground cables	8.2	8.3	8.5	9.1	9.8	**44.0**
Service lines	27.5	27.8	28.1	28.3	28.6	**140.3**
Transformers	54.2	58.8	62.0	69.0	74.2	**318.2**
Switchgear	64.7	64.8	67.3	66.0	69.3	**332.3**
SCADA protection and control	33.4	35.4	46.0	49.4	55.5	**219.8**
Other	34.3	35.4	36.1	45.6	53.6	**204.9**
Total	**479.3**	**491.8**	**512.7**	**534.3**	**560.9**	**2,579.0**

Source: EMCa analysis of forecast RIN

5.2.2 Repex trend

486. We have generated repex trends over time, by RIN Group, from Ergon's forecast RIN and Historical Recast RIN. All expenditure has been inflated to real FY25 dollars, and for the purposes of allowing comparison to the historical RIN also includes Ergon's proposed real cost escalation assumptions.

Figure 5.1: Historical and forecast repex ($m, FY25)



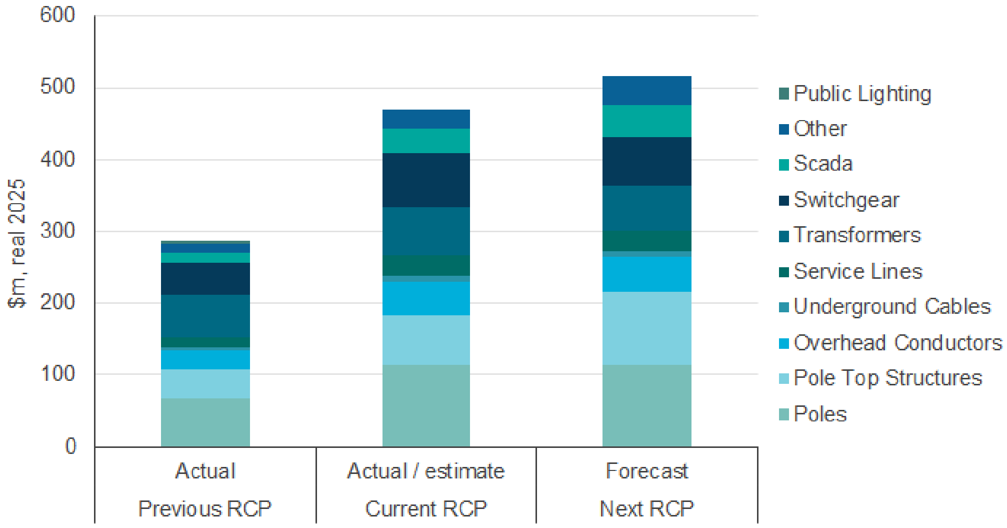
Source: EMCa analysis of RIN and Ergon response to IR007

487. In Figure 5.1 we observe the increase in repex commencing in FY19 to approximately $300 million, then again in FY20 to $410 million, and continuing at above this level in each year for the current RCP.

488. For the next RCP, Ergon's proposed repex results in a trend increasing year on year to a final value of $560 million by FY30, driven by year on year increases for the transformer, SCADA and other repex categories.

489. Figure 5.2 compares Ergon's annualised average repex for each expenditure category between the next RCP and the previous and current RCPs. This figure highlights the significant step increase in annualised repex that Ergon is incurring in the current RCP, and the further increase that it proposes for the next RCP.

Figure 5.2: Annual average repex for the previous, current and next RCPs ($m, FY25)



Source: EMCa analysis of Ergon RIN.

490. We discuss the relationship between the capex allowance, RRP and actual/estimated repex for the current period as it relates to the ex post review period in Section 2 and Section 4 respectively. The above provides context to the review of the forecast.

5.3 General assessment observations

5.3.1 Data errors and challenges

491. Ergon has not provided documentation that is consistent with its own governance process and capex forecasting methodology that requires, among other things, robust justification and supporting analysis for the repex that it has proposed for the next RCP.

492. For example, we would have expected to see evidence to support the proposed condition-based expenditure forecasts. This would include condition assessment and corresponding risk assessment of the asset class and information regarding contributions of failures and defects that have led to declining network performance or other service measures.

493. We issued requests for information prior to our onsite discussions, to understand how Ergon had developed its expenditure forecasts. We asked further questions at the onsite discussions. We formed a view at the onsite discussion that Ergon appeared to have supporting information that exists within the business and which describes the decisions it made and the assumptions it applied in developing its expenditure forecast on a reasonable economic basis. However, Ergon did not provide such information.

494. In discussion with the AER, we asked a further extensive set of questions with the objective of understanding the artefacts that Ergon had relied upon in developing the expenditure forecasts, including the models it had prepared. We were provided this information on 10 June, nearly six months after lodgement of the RP to the AER, and we have sought to take this into account in this report. In the process of obtaining this information, and for reasons that are unclear to us, we learned that Ergon had earlier made a decision to withhold this information from its submission to the AER.

5.3.2 Large reliance placed on recent increase in historical repex

495. Ergon states that its forecast repex is '*in line with our long-term historic average for replacement and represents a continuation of our existing asset management practices*'[120]

[120] Ergon 2025-30 Regulatory proposal – January 2024. Page 89.

with reference to a repex trend from 2010 to 2030. This trend includes the increased repex that Ergon has incurred above the capex allowance for the current RCP, which we discussed in Section 4.

496. In Section 3 and Section 4, we identified systemic issues that we consider likely to have led to an unjustified level of capex, and by extension are not a reasonable indicator of future requirements. In reviewing Ergon's proposed requirements for the next RCP, we have sought to assess the extent to which these issues are evident and affect the reasonableness of Ergon's proposed expenditure allowance.

5.3.3 Consequential asset replacement

497. During the current RCP, Ergon has undertaken an increase in pole and conductor replacement as discussed in Section 4. In doing so, Ergon has replaced other distribution assets as a part of these programs, referred to as consequential replacement. For example, when a pole is required to be replaced, the pole attachments and hardware are also replaced at the same time, such as cross-arms, services, distribution switches and pole-top distribution transformers.

498. Ergon considers that replacement where efficient to do so, is in line with good industry practice of bundling works for efficiency. Whilst it may be efficient to undertake the replacement of this equipment at the same time as the structure (e.g. poles) where it is economic to do so, we have not seen demonstration that the volume of replacement undertaken by Ergon reflects an efficient level. Specifically, Ergon has not demonstrated that that the alternative to allow the asset to continue in service, assuming this was technically possible, was an inferior option.

499. Ergon describes a process of returning assets with residual life into stores for re-issue. However, it has not provided a response to our request to allow us to understand how it has taken account of the potential utilisation of such assets in its forecasts.

500. In other businesses, the 'consequential' replacement of a pole would more typically be reflected in the historical unit rate, rather than a specific allocation within the pole replacement program. We reviewed the implications of this in our assessment of the specific repex asset category.

5.3.4 Attribution to RIN categories

501. We have based our assessment of Ergon's proposed repex on what has been included in its RIN.

502. Ergon has provided business cases for each RIN category. However, these do not reconcile to the RIN without adjustment. We have taken these into account in our assessment and made adjustments in line with the attribution of repex to RIN categories as provided by Ergon as discussed in Section 3.

503. In general, we have relied on the historical RIN that has been supplied by Ergon in producing trends and which includes conductor clearance undertaken as repex prior to FY22.

5.3.5 Sub-transmission substation replacement projects

504. Ergon has included several substation replacement projects in its capex model, and which have been attributed to each of the relevant RIN asset categories of cable, transformer, switchgear, SCADA and other. The attribution is based on the assets that are being replaced at each site.

505. As discussed in Section 3, Ergon claims to uses a CBRM methodology to identify individual sub-transmission assets nearing the end of their lifecycle, and which includes a site-specific assessment of asset condition, consideration of the load supplied by the site, and safety and environmental risk.[121]

[121] Ergon – 2025-30 Regulatory Proposal 0 January 2024 – public.

506. Ergon describes the highest proportion of expenditure as being driven by major substation asset replacement, with the majority of this being 33/11kV transformers and 33kV circuit breakers.[122]

Application of CBRM

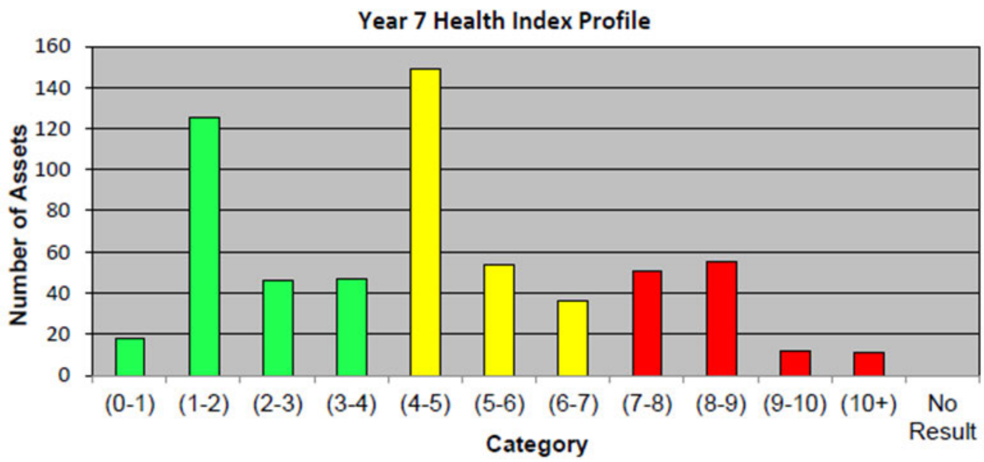
507. We had understood from Ergon that the proposed sub-transmission substation transformer repex had been determined using CBRM methods. We requested Ergon to provide the CBRM model and Health Index (HI) calculations (current and future) to determine the assets it needed to replace. We received a response on 10 June 2024 with its CBRM Model Documentation for Substation Assets, and similar information for instrument transformers.

508. We understand that Ergon has a mature CBRM process in place for its sub-transmission assets, developed in cooperation with EA Technology.

Substation asset replacement

509. The Substation Transformer Replacement business case identifies the replacement of 55 transformers at a cost of $91.9 million ($Dec 2022) which aligns with the value we derive from Ergon's attribution model. The year 7 (2030) summary of HIs for substation transformers is shown in Figure 5.3.

Figure 5.3: Health index profile for substation transformers, 2030



Source: Ergon 5.4.12 – Business case Substation Transformer replacements – January 2024, Figure 8

510. Ergon's CBRM modelling identified 111 transformers, which after conducting its risk evaluation was reduced to 55 replacements. For circuit breakers, Ergon's CBRM modelling identified 235 circuit breakers / reclosers for replacement. However, after risk evaluation and timing analysis of dependent projects this was amended to 263, with a different profile across the next RCP to align with the bundling of substation works.

Individual asset replacement projects

511. The AER requested copies of business cases (or similar), models used to arrive at the forecast and asset condition reports for a number of the major projects included in Ergon's SCS capex model and provided this information to us for our review.[123] We provide our views of a sample of these projects below.

South Toowoomba substation (SOTO) transformer and switchgear replacement

512. Ergon has provided a business case totalling $16.3 million ($Dec 2022) to replace 2 x 33/11kV transformers and 2 x 110/33kV transformers like for like; and 16 x 33kV outdoor

[122] Ergon – 2025-30 Regulatory Proposal 0 January 2024 – public.

[123] Ergon response to IR007. Question 2.

circuit breakers (CB) to be replaced with indoor 33kV CBs. Ergon states that based on its CBRM analysis, the transformer and CB identified for replacement will reach their retirement age by 2027.[124]

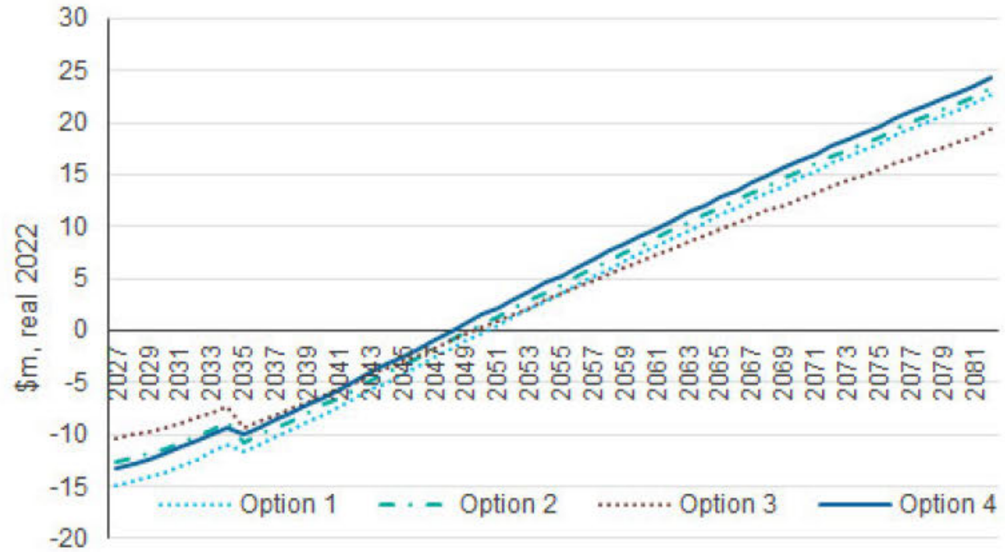
513. We were also provided with the NPV model and risk model that aggregates the risks/benefits for input to the NPV model. The risk models were hard-coded which prevented us reviewing how the source information was used to calculate the results that Ergon has relied upon. We make the following observations:

- The NPV model does not define the counterfactual and does not produce an NPV for a counterfactual that can be compared with other options. Rather, Ergon calculates the risks/benefits relative to the counterfactual in its assessment.
  - Ergon has selected a commissioning year of 2030, and therefore we would expect the counterfactual and the options to have the same risk/benefits prior to this time, as representative of the untreated cost. However, the modelling by Ergon assumes the project is undertaken in 2027, with benefits commencing in the same year that the capex is incurred.
  - Whilst the individual assets appear to be modelled with costs that reflect that the asset is replaced in the year 2030, this is not accurately modelled when aggregated in the transformer and CB risk models. Such that, compared to the counterfactual, a benefit is present at the start of the assessment period, being 2027.
- The NPV model uses an assessment period of 60 years, being the assumed technical life of the assets. As we found with other models that Ergon has applied and undertaken over 20 years, the risks (and therefore benefit) exponentially increase over that period which creates a significant difference between the options at the extremes of the assessment period. We illustrate this in Figure 5.4. Furthermore, there is significant uncertainty beyond 15 to 20 years, which makes modelling beyond these timeframes less helpful. Assessment periods much shorter are more typically applied to replacement analysis.
- The major sources of benefits are reliability, measured as Value of Customer Reliability (VCR) and emergency replacement cost, both of which increase with the probability of failure.
  - In addition to the above modelling deficiencies, we have not been provided the basis of the input assumptions. For example, the VCR in the business case refers to an average weighted VCR of $48/kWh, however the modelling appears to be based on a higher value of $52/kWh.
  - Whilst the parameters for the PoF, expressed beta and gamma individually look reasonable for the population of assets that Ergon has described,[125] we were not provided with the derivation of these values to determine that the model reflects the asset class.

124 Ergon, South Toowoomba Transformer and Switchgear replacement business case, provided with IR007. Question 2.

125 Refer to DATA worksheet, ERG IR007 SOTO RqBT_v4_24TR1TR3 risk model.

Figure 5.4: SOTO: Cumulative NPV of options



Source: EMCa analysis from Ergon IR007 NPV model for SOTO

514. The major driver identified by Ergon is the condition score of the transformer and circuit breaker units at this substation, however in the documentation provided by Ergon in support of this project, Ergon did not include the condition assessment of the assets to be replaced, or the determination of replacement timing as 2027.

515. We identified the AHI and year at which the transformers were deemed to be at end of life in Table 5.2 from the Transformer CBRM model. We find that selection of these transformers for replacement in the next RCP, based on a HI value >7.5 is marginal.

Table 5.2: Asset health – South Toowoomba substation transformers

Asset description	HI @ Year 7	Estimated EOL Year
SW SOTO T7 - TR93169150 1969 33/11 kV 11.5MVA ENGLISH ELECTRIC (A31W8754/2)	7.82	2029
SW SOTO T6 - TR93170775 1969 33/11 kV 11.5MVA ENGLISH ELECTRIC (A31W8754/3)	7.47	2030
SW SOTO T1 - TR92220474 1969 100/33 kV 60MVA TYREE (65501)	7.42	2030
SW SOTO T3 - TR93123750 1972 100/33 kV 60MVA HAWKER SIDDELEY (711004101)	6.46	2034
SW SOTO T5 - TR92758732 1972 33/11 kV 11.5MVA GEC (A32K3063/5)	6.17	2035

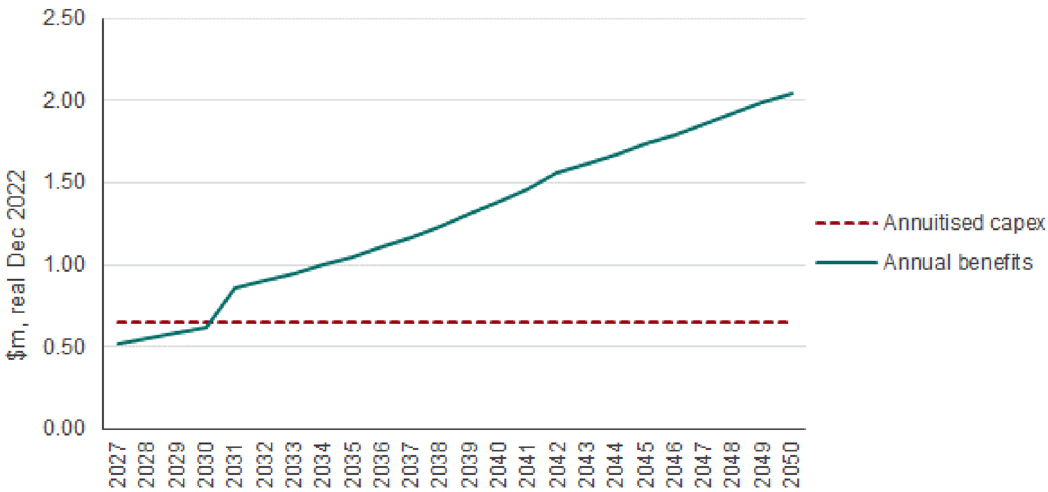
Source: EMCa analysis of Ergon CBRM Substation Transformers_AER2530v1

516. We looked for evidence that the switchgear asset health may have been the key drivers, however the 33kV switchgear had AHI of between 5.5 and 7.5 at Year 7, and which would not have been candidates for replacement. Accordingly, we consider that the asset condition for transformers and switchgear, based on review of Ergon's AHI scores, does not present a compelling driver for completion of this project in the next RCP.

517. Further to this, we undertook an assessment using the costs and benefits in Ergon's NPV model, to establish the optimum timing from an economic viewpoint. The result of our assessment is shown in Figure 5.5, which suggests that the optimum timing for this project is 2031, which is close to the commissioning date of 2030 that Ergon has proposed, but well

beyond the assumed date of 2027 that its NPV modelling was based on. We found this same result for each of the four options that Ergon had considered.

Figure 5.5: South Toowoomba – Optimum timing based on comparison of annual benefits against annuitised cost ($m Dec22)



Source: EMCa analysis from ERG IR 007 NPV model for South Toowoomba

518. We also found that we were able to replicate the NPVs for each option that Ergon states in its business case. However, we were able to replicate this based on timing of 2027, as per Ergon's NPV modelling, whereas the business case shows timing of 2030. In other words, the NPVs shown in the business case appear to be based on different project timing from what the business case proposes. This may not affect conclusions but is indicative of poor quality control in the supporting analysis.

Neil Smith substation Transformer and Circuit Breaker Replacement

519. Ergon has provided a business case totalling $9.6 million ($Dec 2022) to replace the aged 66/11kV transformers and replace the aged 11kV switchboard in a new control building. Ergon states that it has undertaken a substation condition assessment (with report provided) and identified a

> *significant number of assets recommended for replacement between 2022 and 2029. These assets, as well as others identified to be replaced in the Asset Limitation Model are summarised below:*
>
> – *The English Electric 66/11kV 15/20/25MVA Transformers (estimated retirement year 2022)*
>
> – *The South Wales 11kV Switchboard consisting of 15 x 11kV CBs (estimated retirement year 2022)*
>
> – *A number of the substation protection relays.*[126]

520. The condition assessment report presents several issues present at the substation, and assets operating beyond their technical design life.

521. We were not provided the output of the CBRM model for this site. On review of the CBRM model for transformers, both 66/11kV transformers have an AHI >10 indicating poor asset health and would be candidates for replacement.

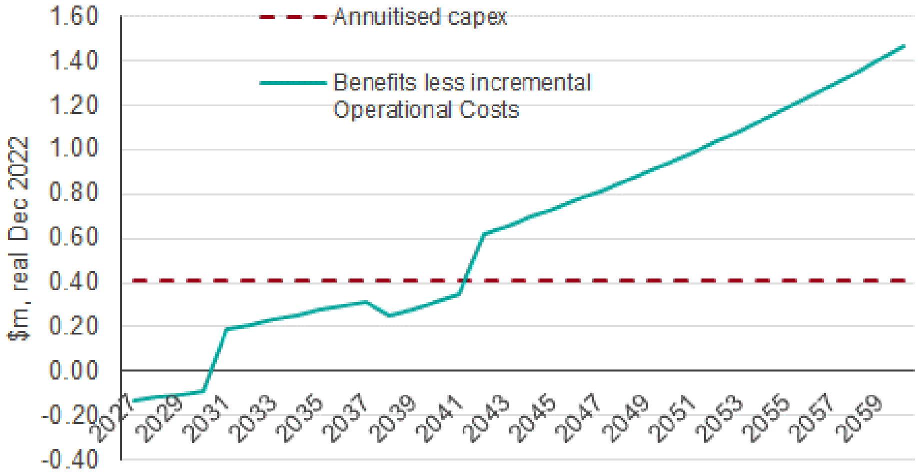
522. However, we find similar instances of the issues we identified for South Toowoomba in the economic analysis that has been provided. Furthermore, Ergon has adopted a different and flat outage rate prior to replacement of the assets, in which '*to capture the increased risk of*

[126] Ergon, Neil Smith business case, provided with IR007. Question 2.

failure in the first years of a transformer or circuit breakers life.'[127] Such an approach is likely to bias the determination of the economic timing for replacement of assets at this substation.

523. As with SOTO, we undertook an assessment of the economically optimal timing for this project, using the costs and benefits that Ergon provided in its cost benefit model. The results of this assessment are illustrated in Figure 5.6, and show that from an economic viewpoint, the option that Ergon has proposed would not be justified until 2042.

Figure 5.6: Neil Smith substation, Option 1 (preferred): Optimal timing based on comparison of annual benefits against annuitised cost ($m Dec22)

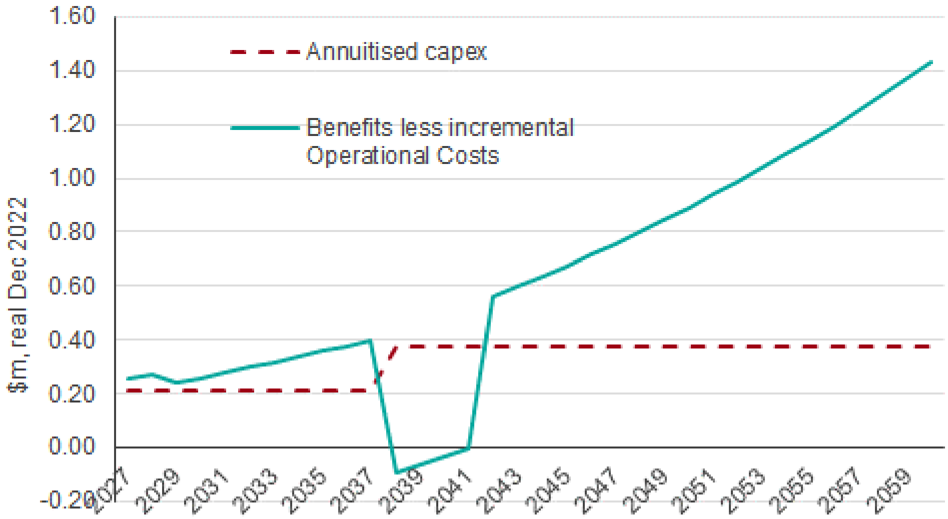


Source: EMCa analysis from ERG IR 007 NPV model for Neil Smith substation upgrade

524. We undertook a similar analysis of Ergon's 'Option 3', which has a much lower cost of $5.25 million ($Dec22) in the next RCP, compared with $10.2 million ($Dec22) for Option 1 which Ergon has proposed. The analysis shows that Option 3 would be viable within the next period, as shown in Figure 5.7. Under option 3, there is a 'stage 2' requirement for further expenditure of $9.4 million ($Dec22) in 2038, which shows as a negative deviation from 2037 in Figure 5.7 under Ergon's specification of this option, however as shown our economic timing assessment suggests that this should optimally be deferred to 2042. Regardless of the need and timing for Option 3 Stage 2, the NPV of this is $12.2 million, compared with $12.85 million for Option 1 and, on the basis of timing assessment, Option 3 presents as preferred to Option 1.

127 Ergon, Neil Smith business case, provided with IR007. Question 2.

Figure 5.7: Neil Smith substation, Option 3: Optimal timing based on comparison of annual benefits against annuitised cost ($m Dec22)



Source: EMCa analysis from ERG IR 007 NPV model for Neil Smith substation upgrade

Ergon has included two projects subject to RIT-D

North Toowoomba 66kV Switchgear Replacement

525. Ergon advised in its response to IR007, that this project title was misleading and should have been more correctly titled "New North Toowoomba 33/11kV Zone Substation". Ergon describes the driver of this project as being the condition of the assets at North St Substation (NOST), which is located adjacent to the proposed substation site, as well as load growth in the North Toowoomba area, including a new hospital.[128]

526. The preferred option is to rebuild NOST as a 2 x 25/32MVA 33/11kV North Toowoomba substation (NOTO) on the land adjacent to the existing NOST site at a cost of $10.9 million ($Dec 2022) in the next RCP, with completion by FY28. The current RCP expenditure included $5.9 million ($Dec 2022) for this project.

527. Ergon refers to its RIT-D final Project Assessment Report which includes an estimated capital cost (inclusive of interest, risk, contingencies and overheads) of $17.04 million. The estimated project delivery timeframe at that time was March 2026.[129] Accordingly, we have not reviewed this in-flight project.

North Toowoomba 33kV Switchgear Replacement

528. This project title was misleading, and Ergon advised that it should have been more correctly titled "New Kleinton Zone Substation". Ergon describes the driver as the condition of the assets at Meringandan Substation and Highfields Zone Substation, as well as load growth in the area.[130]

529. The preferred option is to establish a new Kleinton zone substation to allow for load transfers from Meringandan Substation and Highfields Zone Substation following a contingency at either site. Ergon has included $10.9 million ($Dec 2022) in the forecast, with the project commencing in FY26.

530. This project relates to the Final Project Assessment Report published as "Reliability and Capacity Reinforcement for the North Toowoomba Network" in 2019. In this report Ergon states that:

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128 Ergon response to IR007. Question 2.

129 https://www.ergon.com.au/__data/assets/pdf_file/0004/1079023/Toowoomba-Final-Project-Assessment-Report.pdf.

130 Ergon response to IR007. Question 2.

the establishment of Kleinton zone substation, that we conducted a RIT-D for in 2019 under a previous investment framework maximises the benefits to customers under our current Cost Benefit Framework, with an NPV outcome of $1.7m. As such, we have included this investment in the 2025-2030 period.[131]

Economic Modelling

531. The concerns with Ergon's analysis that we have highlighted undermine the conclusions that Ergon draws from it in forming its program of substation projects. To the extent that Ergon has relied on its NPV analysis to determine the composition and timing of the projects, and not other factors, we find that the analysis is likely to result in advancing some projects ahead of their optimal replacement date. Modelling errors are indicated in the business case for the South Toowoomba substation, where Ergon states that '*The benefits begin at around $520k / annum in 2027, growing to around $2m by 2050'*[132] however the replacement project does not complete until 2030, and benefits would not reasonably be expected to be realised until 2031.

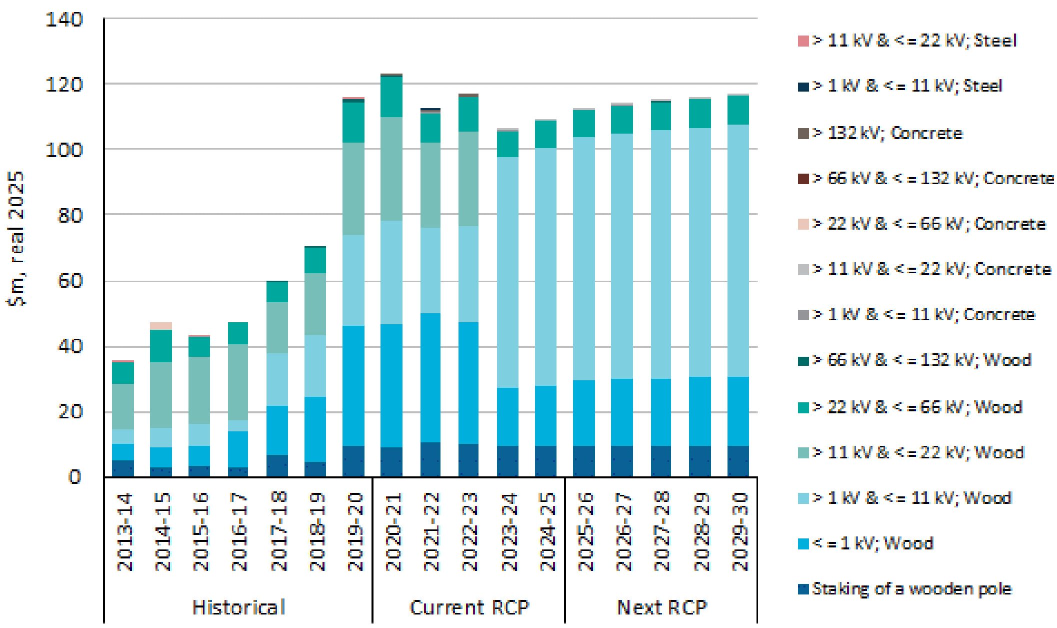
532. The timing for the substations we reviewed were programmed to be later than the timing that Ergon had nominated from its condition assessment, however it is not clear whether the proposed timing represents the economic timing.

5.4 Assessment of poles category repex

5.4.1 Ergon's forecast repex for poles category

533. Ergon has forecast capex of $573.3 million for the poles category for the next RCP based on the RIN. In Figure 5.8 we show the historical and forecast repex trend by year and by asset category.

Figure 5.8: Poles repex category ($m, FY25)



Source: EMCa analysis of Ergons historical and forecast RIN data

534. At a total level the expenditure established in FY20 is continuing on average over the subsequent years and throughout the forecast period.

131 Ergon, new Kleinton Zone Substation RIT-D memorandum provided with IR007. Question 2.

132 Ergon, South Toowoomba Transformer and Switchgear replacement business case, provided with IR007. Question 2.

535. At an asset category level, we observe that an increase in staking of wood poles commenced in FY20 and has continued at similar levels. The increase in LV and 22kV wood pole replacement evident in FY20 was reduced in FY24 for LV poles to approximately half, and to zero for 22kV poles. This trend is planned to continue at these levels in the forecast. The balance of the forecast is made up of increasing 11kV wood pole replacement.

536. The trend in replacement volume mirrors the expenditure due to the use of standard unit rates, as we would expect.

5.4.2 Our assessment of capex forecast for Poles asset category

Pole Replacements business case includes large consequential replacement component

537. Ergon has provided a pole replacement business case totalling $815.1 million and which differs from the RIN value of $573.3 million.

538. The basis of the pole replacement business case includes the defect program plus the consequential replacement of other pole mounted assets as shown in Table 5.3 totalling $706.5 million ($Dec 2022). Once escalated to $FY25 including labour escalation as assumed by Ergon, this appears to align with the business case value of $815.1 million.

Table 5.3: Poles repex category by activity reconciled with business case ($m, Dec 2022)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total
Defect (Pole Repl + Nail)	**83.0**	**83.0**	**83.0**	**83.0**	**83.0**	**415.0**
Pole-top (consequential)	27.0	27.0	27.0	27.0	27.0	**135.0**
Services (consequential)	5.4	5.4	5.4	5.4	5.4	**27.0**
Distribution TXs (consequential)	13.2	13.2	13.2	13.2	13.2	**66.0**
Fuse (Consequential)	9.1	9.1	9.1	9.1	9.1	**45.5**
Distribution SWs (consequential)	3.6	3.6	3.6	3.6	3.6	**18.0**
Sub-total Pole consequential	**58.3**	**58.3**	**58.3**	**58.3**	**58.3**	**291.5**
Pole Replacement program	**141.3**	**141.3**	**141.3**	**141.3**	**141.3**	**706.5**

Source: Analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

539. Whilst the business case claims a positive NPV for this program, Ergon has adequately demonstrated that its selected option, being aligned with the historical expenditure, is optimal or reflects optimal timing. From the business case alone, we were not able to determine the level of defect and planned replacement that Ergon has planned to undertake, and whether this is reflective of a reasonable level.

Reconciliation of RIN asset category relied on inclusion of poles repex from conductor programs

540. Based on information provided in response to our questions we were able to reconcile the forecast repex used to populate the RIN as shown in Table 5.4, which when escalated to $FY25 including labour escalation as assumed by Ergon, aligns with the RIN value of $573.3 million.

Table 5.4: Poles repex category reconciled to RIN category ($m, Dec 2022)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total RCP
Defect (Pole Repl + Nail)	83.0	83.0	83.0	83.0	83.0	**415.0**
Conductor program (consequential)	15.8	16.5	17.0	17.4	17.6	**84.3**
Total	**98.8**	**99.5**	**100.0**	**100.4**	**100.6**	**499.3**

Source: Ergon 5.4.01 Pole replacement business case, also analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

541. We review the basis of the conductor programs as a part of conductor repex.

Level of defect replacement aligned with recent elevated levels of replacement

542. Based on this same information, we can determine that the pole replacement activity is made up of the components listed in Table 5.5.

Table 5.5: Build-up of poles repex forecast incl consequential replacement in RIN

Item	Basis of forecast	Forecast reinforcement volume	Forecast replacement volume
Defects P1	5-year average	0	1,111
Defects P2	3-year average	23,290	59,972
Return to service	3-year average	0	432
Planned	n/a	0	0
Re-conductor program	Reconductor ratio		11,827
Total		**23,290**	**73,342**

Source: Analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

Reinforcement rate would typically be higher to achieve rapid risk reduction

543. The total treatment volume proposed by Ergon is 96,632 poles, and which reflects a reinforcement rate of 24% in aggregate. For the defect-based program only, Ergon has forecast a reinforcement rate of 38% over the RCP.[133] For rapid risk reduction, we consider that the reinforcement rate is likely at the low end of reinforcement rates achieved in other jurisdictions facing similar challenges, and with similar pole populations. Similarly, we would expect that a higher degree of poles may be reinforced to support re-tensioning for the clearance program or reconductoring program, which would result in a higher reinforcement rate in aggregate, however this does not appear to be the case in Ergon's forecast.

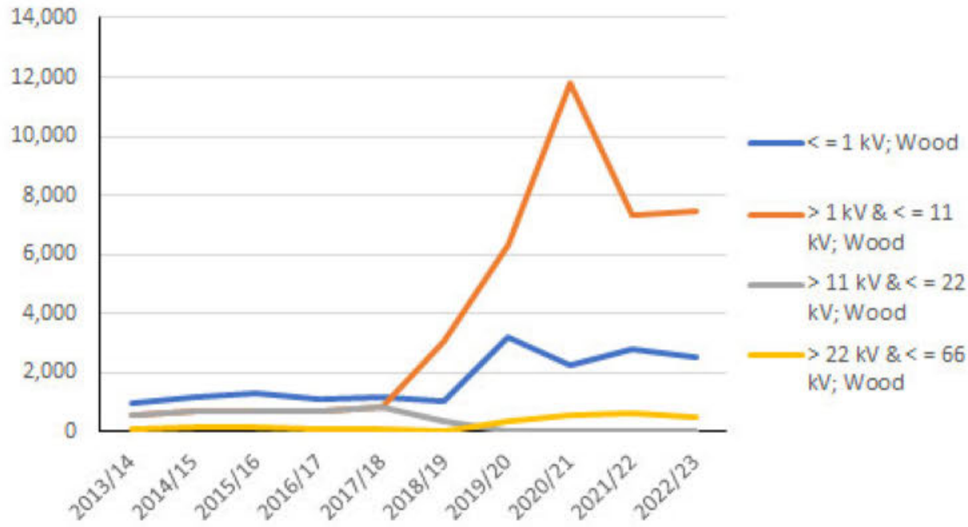
544. Overall, we consider that Ergon is likely able to make greater use of pole reinforcement than it has assumed, and which would result in a lower capex requirement.

Large variation in historical defects is observed

545. For the defect-based replacements, there is insufficient detail for the historical aggregate records alone to determine whether this is a reasonable indicator of the forecast defect-based replacements that Ergon is likely to identify across the next RCP. We show the large variation in historical P2 defect-based replacements in Figure 5.9, including the peak in FY21 for 11kV wood poles, and which biases upward the three-year historical average. For P1 defect-based replacements, there were negligible replacements in the last three years, so a five-year average was used.

133 Including P1 and P2 defects only.

Figure 5.9: Historical volume of P2 pole defect replacements



Source: EMCa analysis of RIN data

546. For the reasons outlined in Section 3 and given the large step increase since FY19 a historical average should be supported by additional information as to the estimated condition of poles. Other relevant factors include the location of poles being replaced, pole condemnation rate and the relationship to the inspection cycle and inspection zone.

Reconductoring ratio based on recent experience

547. For the reconductor program, Ergon's model appears to work from a calculated average of historical poles replaced in the reconductor program. For the forecast, there are 11,827 poles included for a reconductoring program in aggregate of 3,262 km. This averages to requiring 3.6 poles for every km of reconductoring. Using historical records is appropriate, as reconductoring would typically involve replacing a pole at each end of the replaced conductor section, and the bay lengths would vary by site. We were not provided with the underlying data in the model to confirm the ratios.

Rates of consequential replacement are reasonably based on revealed rates

548. The consequential replacement component is based on the historical rate of asset replacement from the historical replacement as shown in Table 5.6.

Table 5.6: Consequential replacement ($m, Dec 2022)

Project/program title	Total volume	Total repex	Consequential replacement ratio
Pole top	47,970	135.0	0.78
Services	20,230	27.0	0.33
Distribution transformers	2,261	66.0	0.04
Switchgear (fuses)	1,891	45.6	0.03
Switchgear (other)	Not identified	18	Not identified
Total		**291.6**	

Source: Ergon 5.4.01 Pole replacement business case, Table 2 and Table 3

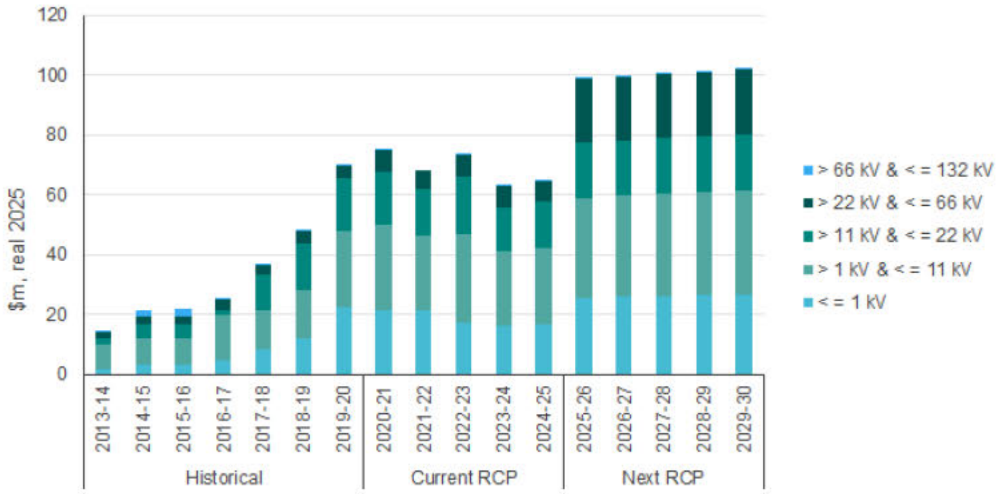
549. We consider this is a reasonable indicator, absent better information. We note however, that if the volume of pole replacements is altered, the consequential replacement activity is similarly altered in line with these factors.

5.5 Assessment of pole top structure category repex

5.5.1 Ergon's forecast repex for pole top structure asset category

550. Ergon has forecast capex of $502.5 million for the pole top structure category for the next RCP based on the RIN. In Figure 5.10 we show the historical and forecast repex trend by year and by asset category.

Figure 5.10: Pole top structure category repex by RCP ($m, FY25)



Source: EMCa analysis of Ergons historical and forecast RIN data

551. The total level of expenditure established in FY20 is continuing on average over the subsequent years to the end of the current RCP, but Ergon proposes a step increase at the commencement of the next RCP. The increase applies across all asset categories.

5.5.2 Our assessment of capex forecast for pole top structures

Pole top structure business case includes large consequential replacement component

552. Ergon has provided a pole top structure replacement business case totalling $262.3 million and which differs from the RIN value of $502.5 million.

553. The basis of the pole top structure replacement business case includes the defect program plus the consequential replacement of other pole mounted assets as shown in Table 5.7 totalling $226.5 million ($Dec 2022). Once escalated to $FY25 and including labour escalation as assumed by Ergon, this aligns with the business case value of $262.3 million.

Table 5.7: Pole top structure category repex by activity reconciled with business case ($m, Dec 2022)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total RCP
Defect	25.6	25.6	25.6	25.6	25.6	**128.0**
Targeted replacement	19.7	19.7	19.7	19.7	19.7	**98.5**
Consequential	41.3	41.9	42.3	42.7	42.9	**211.1**
Pole Top Replacement program	**45.3**	**45.3**	**45.3**	**45.3**	**45.3**	**226.5**

Source: Analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

554. We identified a number of inconsistencies between the volumes expressed in the business case document and the NPV model.[134] Whilst the business case claims a positive NPV for

[134] Ergon IR007 Risk Monetisation Model 2025-30 Crossarm.

this program, Ergon has not undertaken the analysis we consider is required to confirm its selected option is prudent, as discussed in section 3. We were not able, from the business case alone, to determine the level of defect and planned replacement that Ergon has planned to undertake, and whether this is a reasonable level.

Reconciliation of RIN asset category relied on inclusion of repex from pole and conductor programs

555. Based on information provided in response to our questions we were able to reconcile the forecast repex used to populate the RIN as shown in Table 5.8, and which when escalated to $FY25 and including labour escalation as assumed by Ergon, aligns with the RIN value of $502.5 million.

Table 5.8: Pole top structure category repex reconciled to RIN category ($m, Dec 2022)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total RCP
Pole top replacement program	45.3	45.3	45.3	45.3	45.3	**226.5**
Pole program (consequential)	27.0	27.0	27.0	27.0	27.0	**134.8**
Conductor program (consequential)	14.3	14.9	15.4	15.8	16.0	**76.3**
Total	**86.6**	**87.2**	**87.6**	**88.0**	**88.2**	**437.7**

Source: Business case, also analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

556. We review the basis of the pole program as part of pole repex, and the conductor program as a part of conductor repex.

Level of defect replacement aligned with historical levels

557. Based on the forecast model provided with IR38, we can determine that the pole top structure replacement activity is made up of the components listed in Table 5.9.

Table 5.9: Build-up of pole top structure category repex forecast incl consequential replacement in RIN

Item	Basis of forecast	Forecast replacement volume
Defects P1	5 year average	5,600
Defects P2	3 year average	90,993
Return to service	3 year average	1,829
Planned	Manual entry	35,000
Re-conductor program	Reconductor ratio	23,757
Total		**157,179**

Source: Analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

558. As noted in our assessment of the pole forecast, the historical averaging method is not sensitive to the replacement patterns that have occurred in the past. We observe that the replacement of sub-transmission cross arms in response to P2 defects is cyclical, and more than likely linked to specific replacement programs. For the averaging period, the use of an average in each year of the forecast period may overstate the volume of crossarms required to be replaced. Furthermore, the incremental volume adjustment of 113% to the historical average replacement volume applied at the commencement of the next RCP is not explained. A similar incremental volume adjustment is present for RTS volume also. Absent justification for these increases, the proposed replacement volume exceeds a prudent level.

Addition of 7,000 planned pole top structure replacements p.a. not justified

559. Ergon has added a total of 7,000 pole top structure replacements per annum into the forecast, referred to as targeted replacement, without sufficient analysis of a prudent volume

of replacement. We asked Ergon to explain the basis for the additional targeted cross arm replacements included for the next RCP.

560. Ergon's response[135] indicates that the determination of 7,000 pole top replacements is the difference between the crossarms exceeding 42 years, as determined from its Weibull analysis, and the number of crossarms that would be replaced by defects and 90% of the consequential replacements, being at or above the age threshold over a ten-year period.

561. We consider the rationale provided by Ergon to be reasonable, however the analysis of replacement volumes which we understand has been used in the forecast model is different to Ergon's analysis, based on Table 5.9. When the same calculation method is applied as Ergon has done, a lower targeted replacement volume of 6,000 per annum is derived.

Pole top structure replacement attributed to reconductoring ratio based on recent experience

562. For the reconductor program, Ergon's model appears to work on a calculated average of historical poles replaced in the reconductor program. For the forecast, there are 23,757 cross arms included for a reconductoring program in aggregate of 3,262 km. This averages to requiring 7.3 crossarms for every km of reconductoring, or twice as many crossarms as poles. Using historical records is appropriate, as reconductoring would typically involve replacing one or both (HV and LV) cross arms at each pole replaced at each end of the replaced conductor section.

563. However, this doesn't allow for replacement of SWER line or HV only line, where the number of crossarms will be lower. We were not provided with the underlying data in the model to confirm the ratios, to ascertain whether the recent experience is likely to be a reasonable indicator of the future requirements.

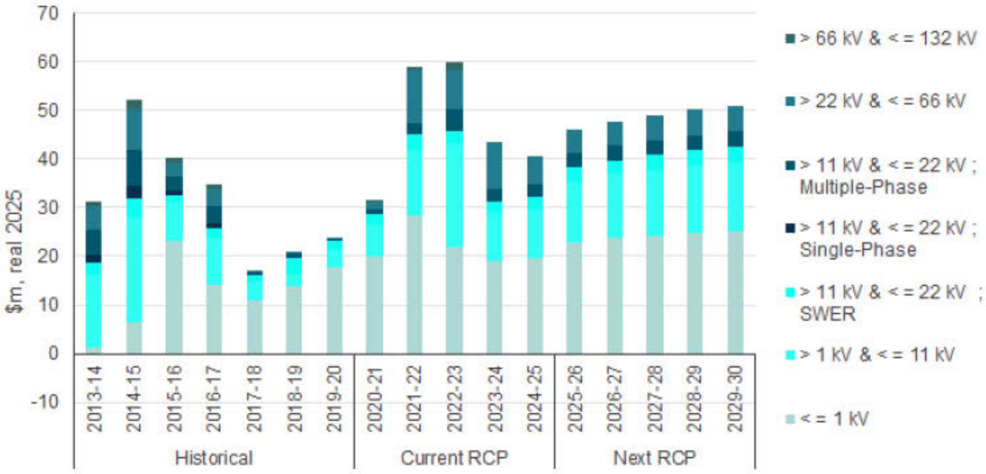
5.6 Assessment of overhead conductor category repex

5.6.1 Ergon's forecast repex for overhead conductor category

564. Ergon has forecast capex of $244 million for the overhead conductor category for the next RCP. In Figure 5.11 we show the historical and forecast repex trend by year and by asset category.

135 Ergons response to IR39. Question 13.

Figure 5.11: Overhead conductor category repex by RCP ($m, FY25)



Source: EMCa analysis of Ergons historical and forecast RIN data

565. At a total level we observe a general increasing trend since the start of the previous RCP, with the repex incurred in FY21 and FY22 presenting as outliers to that general trend. Based on our assessment in Section 4, the drivers for higher repex include the conductor clearance program, the reconductoring program and inclusion of a single 66kV line rebuild project.

566. The increases relative to the current RCP and after removing the impact of the 66kV line rebuild project, appear to be driven by increasing HV conductor replacement.

5.6.2 Our assessment of capex forecast for conductors

Conductor business case includes a large consequential replacement component

567. Ergon has provided a conductor replacement business case totalling $537.8 million and which differs from the RIN value of $244 million.

568. The basis of the pole top structure replacement business case includes the defect program plus the consequential replacement of other pole mounted assets as shown in Table 5.10 totalling $474.4 million $2023 and aligns with the inputs to Ergon's SCS capex model.

Table 5.10: Overhead conductor repex by activity reconciled with business case ($m, Dec 2022)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total RCP
Defect	**5.3**	**5.3**	**5.3**	**5.3**	**5.3**	**26.6**
Targeted replacement	**34.5**	**36.2**	**37.4**	**38.5**	**39.1**	**185.7**
Pole (consequential)	*15.8*	*16.5*	*17.0*	*17.4*	*17.6*	***84.3***
Pole-top (consequential)	*14.3*	*14.9*	*15.4*	*15.8*	*16.0*	***76.3***
Services (consequential)	*3.7*	*3.8*	*3.9*	*4.0*	*4.1*	***19.6***
Distribution TXs (consequential)	*7.7*	*8.1*	*8.3*	*8.5*	*8.6*	***41.1***
Fuses (consequential)	*4.2*	*5.3*	*5.5*	*5.7*	*5.8*	***26.6***
Distribution SWs (consequential)	*2.6*	*2.8*	*2.8*	*2.9*	*2.9*	***14.1***
Sub-total consequential	**48.4**	**51.4**	**52.9**	**54.3**	**55.1**	**262.1**
Conductor Replacement program	**88.3**	**92.9**	**95.6**	**98.1**	**99.5**	**474.4**

Source: Analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

569. Based on information provided in response to our questions we were able to reconcile the forecast repex used to populate the RIN using the defect and targeted expenditure only, totalling $212.3 million ($Dec 2022).

Level of defect replacement aligned with historical levels

570. Based on this same information, we can determine that the pole replacement activity is made up of the components listed in Table 5.11.

Table 5.11: Build-up of overhead conductor category repex forecast incl consequential replacement in RIN

Item	Basis of forecast	Forecast replacement volume
Defects P1	5 year average	6
Defects P2	3 year average	417
Return to service	3 year average	45
Re-conductor program	Manual entry	3,263
Total		**3,731**

Source: Analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

571. Total treatment volume is 3,731 kms of conductor, with the majority from the reconductoring program. We are generally satisfied that Ergon has identified at-risk conductors and is targeting removal of at-risk conductors as a priority in response to increased failure volumes. However as discussed in Section 4, Ergon has not sufficiently explained the basis of the selected replacement volume for overhead conductor.

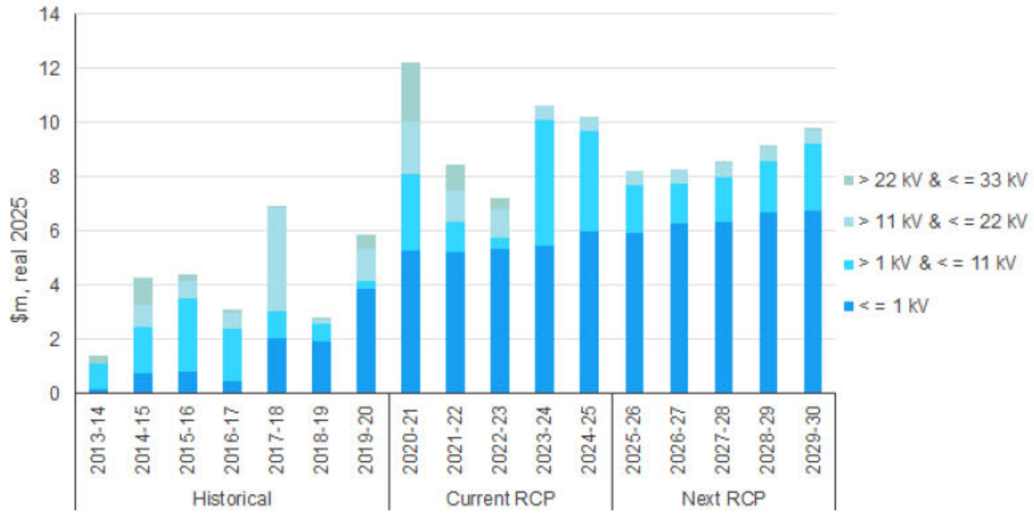
572. Whilst the defect-based volumes are low, there are incremental volume adjustments of 256% included that are not explained for P1 defects.

5.7 Assessment of underground cable category repex

5.7.1 Ergon's forecast repex for underground cable category

573. Ergon has forecast capex of $44 million for the underground cable category for the next RCP. In Figure 5.12 we show the historical and forecast repex trend by year and by asset category.

Figure 5.12: Underground cables category repex by RCP ($m, FY25)



Source: EMCa analysis of Ergons historical and forecast RIN data

574. At a total level the expenditure proposed in next RCP is similar to the current RCP, a much higher LV cable replacement than in previous periods. Annual capex by program is shown in Table 5.12.

Table 5.12: Underground cable category repex ($m, FY25)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total
Underground Cable Replacements Business Case	7.3	7.7	7.7	8.0	8.1	**38.8**
Magnetic Island Distribution Cable Replacement	0.4	0.0	0.0	0.0	0.1	**0.5**
RIN attribution from substation projects	0.5	0.6	0.8	1.1	1.6	**4.6**
Total	**8.2**	**8.3**	**8.5**	**9.1**	**9.8**	**44.0**

Source: EMCa analysis of Ergon SCS capex model and EE Substation Project Analysis 2025-30 v0.3c provided with IR38

5.7.2 Our assessment of capex forecast for underground cables

Majority of expenditure is based on distribution defects

575. We asked Ergon to clarify statements made in Section 9 of document 5.3.07 relating to '*Around three-quarters of our expenditure on underground cable replacement has been driven by consequential replacements with other projects and programs*'. We did not understand how the drivers of consequential replacement could result in such a high proportion of cable replacement, and formed an initial hypothesis that the proposed cable replacement was more likely the result of other drivers. In its response,[136] Ergon clarified that at the time of preparing the document, the exact composition was not known. The data now available indicates that most of the expenditure was based on identification of defects and not consequential works, and which we consider further below..

Proposed replacement volume is not adequately supported

576. Whilst Ergon states that for HV cables with an operating voltage ≥ 22kV, a planning assessment is conducted for the limitations associated with each underground feeder and individual projects are developed, the forecast appears based on an assessment of average replacement volumes.

577. Furthermore, the forecasting model used for the next RCP, includes provision for an additional replacement volume above the historical average for LV cables, such that LV cable replacement dominates the repex program with 95km of the approximate 106km distribution cable replacement program. This is a direct conflict with the business case, which comprises 100km of the proposed 175km program as HV cable replacement.

578. Justification of the additional replacement of LV cables is not adequately supported, nor is the conflict between the business case and the forecasting model.

RIN attribution from substation projects makes up the remainder

579. We note that Ergon is proposing to increase the number of substation projects, and projects that include underground cable in their scope are included here. This makes up a small proportion of the proposed repex.

580. As discussed in Section 3, Ergon has attributed repex to the cable category for the cable related works in substation replacement projects. We identified six projects involving the replacement of 11kV and 33kV cable, all of which are relatively low in value.

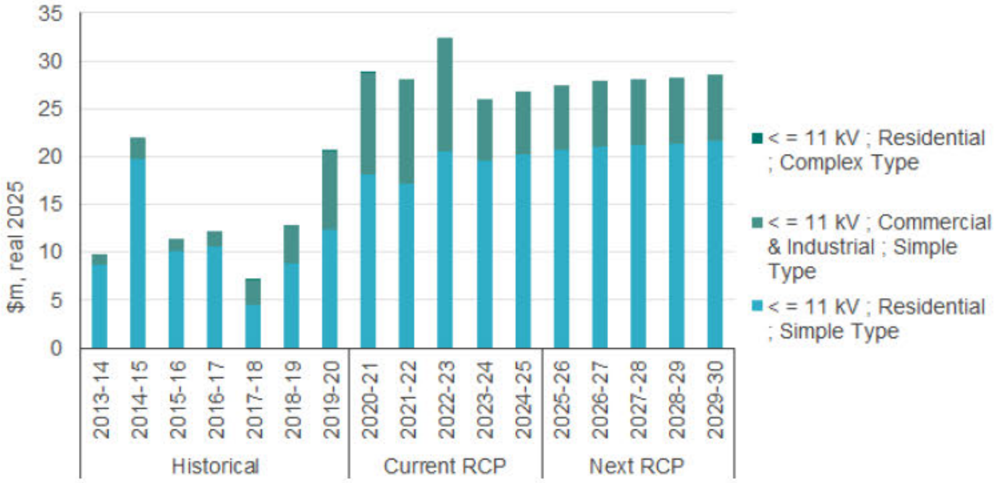
136 IR039. Question 18.

5.8 Assessment of service lines category repex

5.8.1 Ergon's forecast repex for service lines asset category

581. Ergon has forecast capex of $140.3 million for the service lines category for the next RCP. In Figure 5.13 we show the historical and forecast repex trend by year and by asset category from the RIN.

Figure 5.13: Service lines category repex by RCP ($m, FY25)



Source: EMCa analysis of Ergons historical and forecast RIN data

582. At a total level, the expenditure proposed in the next RCP is similar to the current RCP.

5.8.2 Our assessment of capex forecast for service lines

Reconciliation of RIN asset category relied on inclusion of repex from pole and conductor programs

583. Based on information provided in response to our questions we were able to reconcile the forecast repex used to populate the RIN as shown in Table 5.13.

Table 5.13: Service line category repex by project ($m, FY25)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total RCP
Service Lines Replacements Business Case	17.3	17.4	17.5	17.6	17.7	**87.6**
Consequential replacement	10.2	10.4	10.6	10.7	10.8	**52.7**
Total	**27.5**	**27.8**	**28.1**	**28.3**	**28.6**	**140.3**

Source: Ergon SCS capex model and business case, includes real cost escalation

Service line business case includes defects and targeted replacement

584. The service line replacement program includes targeted replacement and defect-based replacement as shown in Table 5.14 totalling $75.5 million ($Dec 2022) and aligns with the input to Ergon's SCS capex model, denoted as the Service Lines Replacements Business Case.

Table 5.14: Service line category repex by activity reconciled with business case ($m, Dec 2022)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total RCP
Defect	3.7	3.7	3.7	3.7	3.7	**18.5**
Targeted replacement	11.4	11.4	11.4	11.4	11.4	**57.0**
Total service line business case	**15.1**	**15.1**	**15.1**	**15.1**	**15.1**	**75.5**

Source: Analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

Level of defect replacement aligned with historical levels

585. Based on this same information, we can determine that the service line replacement activity is made up of the components listed in Table 5.15.

Table 5.15: Build-up of service line category repex forecast incl consequential replacement in RIN

Item	Basis of forecast	Forecast replacement volume
Defects P1	5 year average	974
Defects P2	3 year average	34,619
Return to service	3 year average	438
Planned	Manual entry	42,500
Re-conductor program	Reconductor ratio	12,811
Total		**91,342**

Source: Analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

586. Based on the data provided by Ergon, we observe that:

- The average used for the P2 defects reflects an elevated level of replacement, using two years of history only.
- Consequential service lines replacement is based on a treatment volume of 3,731 kms of conductor, with the majority from the reconductoring program. We are generally satisfied that Ergon has identified its at-risk conductors and is targeting removal of its at-risk conductors as a priority in response to increased failure volumes. However as discussed in Section 4, Ergon has not sufficiently explained the basis of the selected replacement volume for overhead conductor, nor therefore the consequential replacement of service lines.
- Whilst the defect-based volumes are low, there are incremental volume adjustments of 256% included for P1 defects that are not explained.

587. As we presented in Section 3.4.4, we have highlighted issues with the risk-cost modelling, and with the unit rates in our review of the ex post period (Section 4) and which we consider are not suitably explained in Ergon's analysis. We have concerns with Ergon's analysis and the conclusions drawn from it are also erroneous in our view.

Inclusion of an ongoing proactive program is not sufficiently justified

588. In our assessment of Ergon's service line replacement for the current RCP, which at that time Ergon was proposing increasing to 14,000 replacements p.a., we stated:

> *Based on the reported performance of this asset category, and in the absence of better information on the composition and risk of the service line population, we consider that an increased level of replacement for Ergon is reasonable.*[137]

[137] EMCa review of aspects of Ergon's proposed capex 2020-25.

589. During the current RCP, Ergon estimated that it will replace 17,153 service lines p.a. on average. The volume is now increasing to an average of 18,254 p.a. We expect that even after five years, many of the risks have not been addressed and which may require continuation of further risk mitigation including consideration of a targeted replacement program.

590. However, we don't see sufficient consideration of the consequential replacement of service lines in the forecast which are likely to replace the older problematic service lines. Nor do we see consideration of the network visibility project which Ergon proposes as allowing for a significant reduction in service line replacements in the next RCP through more effective targeting of replacement requirements. As discussed in Section 3.4.4, Ergon's service line replacement business case does not take this into account, and effectively claims the same benefits being achieved by the proactive service line replacement program in its risk-cost analysis (as Ergon has presented as being the basis of its proposed replacement volumes) as is being claimed for the network visibility project.

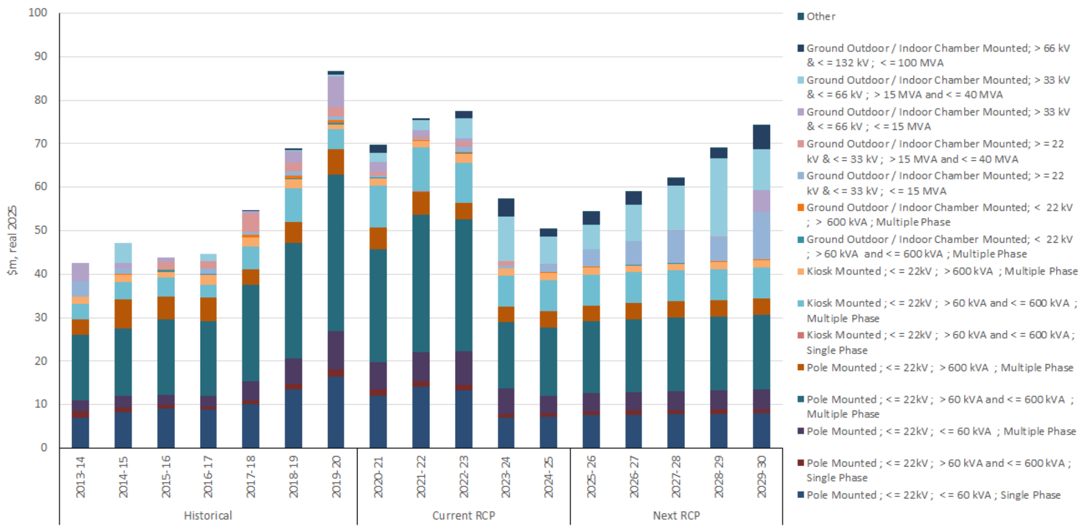
591. Whilst introduction of a targeted program may have been reasonable in the current RCP, introduction of the network visibility program, which is beneficial in reducing service line safety risks and in facilitating a defect-based service line replacement strategy, may also largely obviate the need for a proactive age-based replacement program. We form this view on the basis that Ergon continues its defect-based program and is also undertaking a volume of consequential replacements as a result of its other programs.

5.9 Assessment of transformers category repex

5.9.1 Ergon's forecast repex for transformers category

592. Ergon has forecast capex of $318 million for the transformers category for the next RCP. In Figure 5.14 we show the historical and forecast repex trend by year and by asset category.

Figure 5.14: Transformers category repex by RCP ($m, FY25)



Source: EMCa analysis of Ergons historical and forecast RIN data

593. At a total level the expenditure proposed in the next RCP is similar to the current RCP, with a clear increasing trend evident over next RCP.

5.9.2 Our assessment of capex forecast for transformers

Reconciliation of RIN asset category relied on inclusion of other projects

594. Based on information provided in response to our questions we were able to reconcile the forecast repex used to populate the RIN as shown in Table 5.16 totalling $276.7 million ($Dec 2022) which aligns with the inputs to Ergon's SCS capex model.

Table 5.16: Transformer category repex ($m, Dec 2022)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total RCP
Defect	15.6	15.6	15.6	15.6	15.6	**78.0**
Consequential (poles and conductors)	20.9	21.3	21.5	21.7	21.8	**107.2**
Apportionment from substation projects	11.0	14.5	16.8	22.6	26.6	**91.5**
Total	**47.5**	**51.4**	**53.9**	**59.9**	**64.0**	**276.7**

Source: EMCa analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m and EE Substation Project Analysis 2025-30 v0.3c with IR38

Distribution transformer replacement is supported by a business case

595. Ergon has provided a business case for its distribution transformer replacement program totalling $132 million ($Dec 2022) being for the replacement of defective distribution transformers and associated fuses. The fuse replacements due to defective transformers repex included in the business case is allocated to the switchgear RIN category.

596. The business case identifies consequential transformer replacement of $107.2 million (as shown in Table 5.16) and consequential fuse replacement of $72.0 million, however it also states that this expenditure is included in other program business cases, along with their associated benefits.

597. The identified need in the business case describes the observed uplift in switchgear replacement, which is then explained by the consequential replacement in the pole and conductor programs. The business case recommends that Ergon continues with the counterfactual '*after a thorough evaluation of available options.*'[138]

Replacement volume assumed in the distribution transformer business case is similar to the volume assumed in the forecast capex model

598. In the business case, the replacement volume is identified as 2,675 for the counterfactual based on defects, and a further 3,616 (2,210 + 1,406) for consequential replacement as shown in Table 5.17.

Table 5.17: Transformer replacement volume assumed in counterfactual

Item	Business case reference	Forecast replacement volume
Counterfactual (base scenario)	Table 6	2,675
Consequential (pole replacements)	Table 3	2,210
Consequential (reconductoring)	Table 3	1,406
Fuse replacement (only switch fuses)	Table 4	Not identified
Total		**6,291**

Source: Ergon 5.4.04 Business case distribution transformer replacement - January 2024

599. As shown above we reviewed the forecast model provided by Ergon and identified a different volume of replacements than was provided in the business case. The replacement

138 Ergon 5.4.06 Business case distribution switch replacement - January 2024. Page 6.

data in Table 5.18 is for all voltage types as it is not possible to separately identify switch types from this analysis.

Table 5.18: Build-up of transformer category repex forecast incl consequential replacement in RIN

Item	Basis of forecast	Forecast replacement volume
Defects P1	5 year average	199
Defects P2	3 year average	2,768
Return to service	3 year average	2,145
Re-conductor program	Reconductor ratio	1,231
Total		**6,343**

Source: EMCa analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

Defect rate is not reducing at the rate indicated by Ergon

600. Ergon states that:

> *As the consequential replacement are forecasted to be increased in the next 5 years with the increment in reconductor volume, based on the "REPEX guideline" the older transformers will be targeted consequentially as part of the efficiency bundling. That will result in reduction in transformer defect. Therefore, the expected defect rate will be 75% of the historical defect and has been consider in our investment forecast. The current forecast shows the failure is increasing but in conjunction with consequential replacement from pole and conductor programs the failures will be maintained within current service levels.*[139]

601. We agree that the rate of defects is likely to decline. As defect-based pole and conductor replacement proceeds, the consequential replacement of transformers is likely to reduce the defect levels below historical levels, as the older transformer fleet is removed from the population. Also, as discussed in Section 4, Ergon has introduced new initiatives that have effectively reduced the number of transformer replacements required under P1, P2 and RTS.

602. On review of the modelling, we can see that a -50% incremental adjustment was made to the historical P2 defects only, and not 75% as the business case has stated. The difference is not explained.

603. No adjustment was made to P1 defects or RTS volumes and given distribution transformers are primarily run to failure asses, this is reasonable.

Improvements made during calibration years are not reflected in the distribution transformer forecast

604. As discussed in Section 4, Ergon has introduced several improvements to the efficiency of transformer treatment, including introduction of repair strategies and reclassification of defects that have resulted in lower opportunistic and defect-based replacement. Given the recency of these interventions, they will not be present in the historical volume analysis. Ergon does not appear to have taken account of the benefits of these measures in the forecast. This also extends to the capture and potential for re-issue of assets removed prematurely during the consequential replacement.

Substation projects based on a mature CBRM framework

605. As discussed in Section 5.3.5, Ergon has a mature CBRM process, and this has been applied to identify potential candidate replacement projects. Projects are then evaluated using its risk models and NPV analysis, and also timing dependency with other projects.

139 Ergon 5.4.06 Business case distribution switch replacement - January 2024. Page 17.

606. We find that the identification of projects is generally sound, although we found an example project where the transformers (and switchgear) were at the margins of being candidate projects, and if not for other reasons could be candidates for deferral.

607. Economic analysis for substation projects is not compelling. Replacement projects are undertaken for a variety of reasons, and there are often efficiencies in bundling work into broader substation projects. Quantification of the risks and benefits provides a means to assess options against the counterfactual and determine the optimal timing of the intervention. However, based on our review of a sample of projects, we have concerns with Ergon's economic analysis, which in our opinion undermines the conclusions that Ergon draws from it in forming its program of substation projects. To the extent that Ergon has relied on its NPV analysis to determine the composition and timing of the projects, and not other factors, we find that the analysis is likely to result in advancing some projects ahead of their optimal replacement dates.

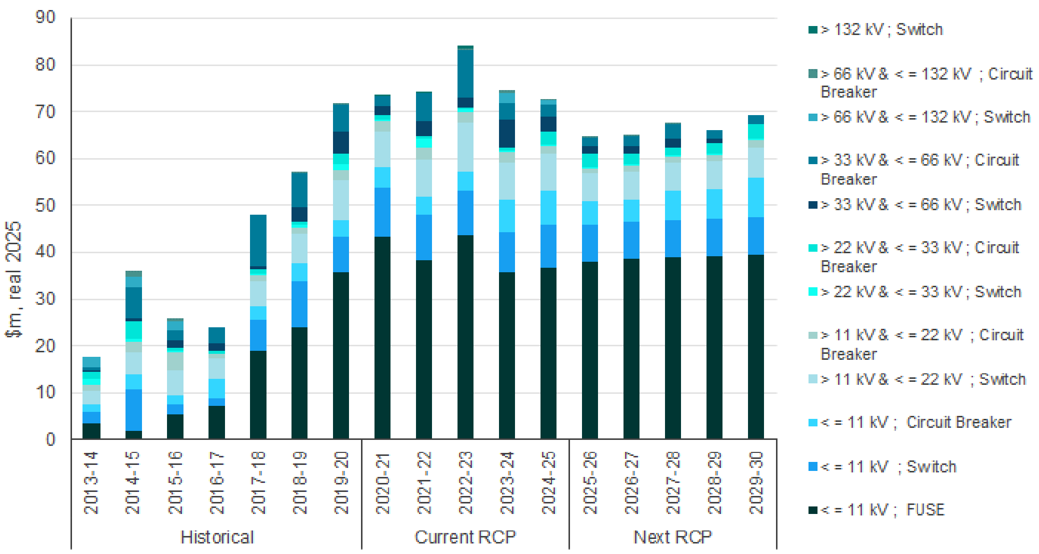
608. The timing for the substation replacement projects that we reviewed, incorporating transformer replacement, were programmed to be later than the timing that Ergon had nominated from its condition assessment, however it is not clear whether the timing represented the economic timing.

5.10 Assessment of switchgear category repex

5.10.1 Ergon's forecast repex for switchgear category

609. Ergon has forecast capex of $332 million for the switchgear category for the next RCP. In Figure 5.15 we show the historical and forecast repex trend by year and by asset category.

Figure 5.15: Switchgear category repex by RCP ($m, FY25)



Source: EMCa analysis of Ergons historical and forecast RIN data

610. The largest component from Figure 5.15 is the fuses asset category.

611. At a total level, the forecast expenditure for switchgear repex is similar to that incurred during the current RCP. However, this is a step increase from historical expenditure. As discussed in Section 4, Ergon explains this is due primarily to consequential replacements, being the bundling of replacement of switchgear assets as a part of increased volume of pole and conductor replacement programs.

5.10.2 Our assessment of capex forecast for switchgear

Reconciliation of RIN asset category relied on inclusion of other projects

612. Based on information provided in response to our questions, we were able to reconcile the forecast repex used to populate the RIN as shown in Table 5.19 totalling $289.4 million ($Dec 2022) which aligns with the inputs to Ergon's SCS capex model.

Table 5.19: Switchgear category repex by project ($m, Dec 2022)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total RCP
Switch defects	6.7	6.7	6.7	6.7	6.7	**33.5**
Switches consequential	6.2	6.3	6.4	6.5	6.5	**31.9**
Fuse consequential	33.4	33.7	33.9	34	34.1	**169.1**
Sub-total consequential	**46.3**	**46.7**	**47.0**	**47.2**	**47.3**	**234.5**
Apportionment from Substation projects	10.6	10.0	11.7	10.2	12.5	**54.9**
Total	**56.9**	**56.7**	**58.7**	**57.4**	**59.8**	**289.4**

Source: EMCa analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m and EE Substation Project Analysis 2025-30 v0.3c provided with IR38

Distribution switches replacement is supported by a business case

613. Ergon has provided a business case for its distribution switches replacement program totalling $65.4 million ($Dec 2022) being for defective switch replacement[140] excluding fuses related to distribution transformers. Once the fuse consequential replacement is included, the total increases to $234.5 million ($Dec 2022).

614. Whilst Ergon states that it replaces distribution switches to ensure safety, reliability, environmental, and financial risks are managed in the best interest of consumers, the premise of the business case is to maintain the higher replacement volumes that Ergon has incurred in the current RCP. The business case recommends that Ergon continues with its counterfactual (base case scenario), being to replace the same defect volume of switches replaced in Dec 2022.

615. The business case also states:

> *A significant reduction in failures and defects can be observed after 2019/20. This could be mainly due to the consequential replacements.*[141]

616. We therefore considered the basis for Ergon's defects forecast, and whether the analysis adequately accounted for (i) the reducing defects trend, and (ii) the ongoing impact of consequential replacements.

Replacement volume assumed in the distribution switch business case is not what the forecast capex is based upon

617. In the business case, the replacement volume is identified as 3,555 for the counterfactual based on defects, and a further 3,382 (1,890 + 1,492) for consequential replacements, as shown in Table 5.20.

140 including Air Break Switch (ABS), Gas Break Switch (GBS), and Ring Main Units (RMUs).

141 Ergon 5.4.06 Business case distribution switch replacement - January 2024. Page 9.

Table 5.20: Switchgear replacement volume assumed in counterfactual

Item	Business case reference	Forecast replacement volume
Counterfactual (base scenario)	Table 6	3,555
Consequential (pole replacements)	Table 3	1,890
Consequential (reconductoring)	Table 3	1,492
Fuse replacement (only switch fuses)	Table 4	Not identified
Total		**6,937**

Source: Ergon 5.4.06 Business case distribution switch replacement - January 2024

618. We reviewed the forecast model provided by Ergon and identified a different volume of replacements than was provided in the business case. The replacement data is for all voltage types as it is not possible to separately identify switch types from this analysis. This is summarised in Table 5.21.

Table 5.21: Build-up of switchgear category repex forecast incl consequential replacement in RIN

Item	Basis of forecast	Forecast replacement volume
Defects P1	5 year average[142]	419
Defects P2	3 year average[143]	12,603
Return to service	3 year average	3,560
Re-conductor program	Reconductor ratio	3,759
Total		**20,341**

Source: Analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m with IR38

619. In its business case Ergon states:

> *As the consequential replacement are forecasted to be increased in the next 5 yrs with the increment in reconductor volume, based on the "REPEX guideline" the older switches will be targeted consequentially as part of the efficiency bundling. That will result in reduction in switch defect. Therefore, the expected defect rate will be 50% of the historical defect and has been consider in our investment forecast.*[144]

620. Assuming the RIN asset categories referred to as 'switch' relate to the same distribution switches in this business case, we do see evidence of a 50% reduction applied to the defect-based volumes referred to above. The total defect driven volume included in the forecasting model is 5,403[145] over the next RCP, and despite being 50% lower than the 3-year historical defects, it exceeds the 3,555 referred to in the business case.

Insufficient justification of defect volumes or failure outcomes of proposed distribution switches replacement program

621. As observed in our assessment of the ex post repex for switchgear, we observed a decreasing trend of defects or failures, compared with historical levels. We would expect, as Ergon has proposed, to see reduced replacement volumes included in the forecast commensurate with these reductions in defects. However, we do not see sufficient account of the benefits arising from the consequential replacement of switchgear in determining a risk optimised program.

142 With the exception of fuse units, where a lower 3 yar average is used.

143 Includes negative increment adjustments for some line items.

144 Ergon 5.4.06 Business case distribution switch replacement - January 2024. Page 17.

145 A further 10,948 for fuses and 231 for circuit breakers.

622. The failure forecasts provided with the business case indicate around 150 failures p.a., which exceeds the stated failure volumes in the RIN for these assets. We have not seen sufficient evidence of how the PoF distributions included in the business case assisted Ergon to identify the assets at risk of failure. These distributions do not indicate a population in advanced stages of wear-out.

623. The differences between the forecasting model used as the basis for the forecast replacement volume and expenditure, and the business case are not explained and also do not sufficiently address the concerns noted above.

Circularity evident in CBA

624. Ergon concludes from its NPV modelling that:

> *any volume lower than counterfactual option provided the negative NPV based on the cost benefit analysis, reveals that counterfactual Option achieves the comparable gains among options and reaches towards most optimum solution.*[146]

625. This suggests to us a circularity in logic, whereby the analysis is designed to maintain a level of replacement that Ergon has been undertaking and not to determine a risk optimised replacement program consistent with the NER, and AER guidance. As evidenced above, the replacement volume assumed in Ergon's forecast capex is higher than is included in the business case, and therefore the NPV modelling is not valid.

Issues arising from treatment of distribution fuses in the ex post period similarly apply

626. As noted in our assessment of the ex post repex, the treatment of fuse related repex is not suitably explained. Specifically, we have not seen an explanation for why expendable cartridges are treated as capex (and not opex), the reasonableness and benefits associated with complete fuse assembly replacement with a change of distribution transformer, and rate of fuse switch replacement that Ergon has incurred.

627. This continues to be a large component of the switchgear repex which has not been reasonably explained.

Remaining asset replacements form part of substation replacement projects

628. Ergon has included a business case for replacement of its CB assets totalling $48.3 million ($Dec 2022) for replacement of 263 assets. The business case outlines the forecast limitations pertaining to CB and recloser assets based on CBRM modelling.

629. We were not able to reconcile the replacement volume in the models we were provided. For example, we observed a total of 231 CBs included in the distribution modelling, and a further 469 CBs and isolators included in its substation modelling.

630. Based on CBRM modelling, Ergon estimates that 235 assets will exceed an HI of 7.5 by 2030, and which it believes underscores the need for replacement over the current and next RCPs. Ergon then goes on to include 235 assets in its forecast for the next RCP, despite suggesting some of these assets may be replaced earlier in the current RCP.

631. Ergon indicates the specific timing is subject to optimisation of other factors. We have not seen demonstration of the optimal timing of replacement of these assets. Ergon states that its optimisation has increased the volume of replacements from 235 to 263, of which half are included in 10 substation projects, with costs apportioned to the switchgear category.

632. We considered a sample of these projects as part of the transformer category.

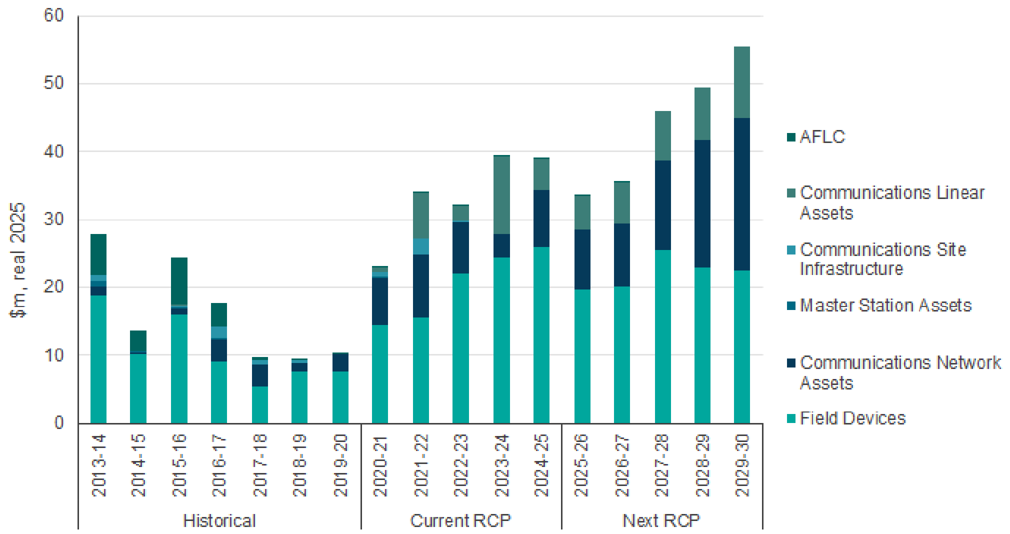
146 Ergon 5.4.06 Business case distribution switch replacement - January 2024. Page 22.

5.11 Assessment of SCADA protection and control category repex

5.11.1 Ergon's forecast repex for SCADA protection and control category

633. Ergon has forecast capex of $220 million for the SCADA protection and control category for the next RCP. In Figure 5.16 we show the historical and forecast repex trend by year and by asset category.

Figure 5.16: SCADA, protection and control category repex by RCP ($m, FY25)



Source: EMCa analysis of Ergons historical and forecast RIN data

634. We observe a steeply increasing trend in the next RCP, at an average spend higher than what will be incurred in the current RCP. The expenditure is weighted towards the last three years of the next RCP. This is largely driven by stepped increases in proposed grid communications projects.

5.11.2 Our assessment of capex forecast for SCADA protection and control category

Basis for assessment

We applied project groupings from Ergon's capex model to assist our review

635. To assist our review, we assigned individual projects with a similar project title in Ergon's capex model into program groupings for repex, which we understood from our discussions with Ergon at our onsite meeting were as Ergon had organised its capex proposal. We found that the major groupings were secondary systems and communications.

636. The groupings also highlighted Operational Technology Environment (OTE) as a further grouping that included $13.8 million for OTE Security Replacement - part of Ergon's Cyber Security business case. In addition, a number of the proposed OTE projects include cyber security requirements as a driver of the proposed capex. We consider Ergon's proposed capex to meet its cyber security requirements in a separate report to the AER. The balance of OTE totals approximately $20 million.

637. As discussed in Section 5.12, a component of the OTE program is also categorised as 'other repex.' In response to our request for information to understand the composition of

the 'other' repex category, Ergon states that it included $23.8 million for OTE.[147] We were not provided sufficient information to understand the OTE program, nor how Ergon had determined the attribution between the SCADA protection and control category and its 'other repex' category.

638. Ergon has provided business cases for a proportion of the expenditure in this category, and we review these below. However, where business cases were provided, it was not clear how the value reconciled with the project totals included in Ergon's capex model or RIN information.

639. In Table 5.22 we show the project grouping we developed based on Ergon's capex model. In order to achieve reconciliation, a balancing item is required and which we consider is likely an attribution from substation projects. However, given the size of this balancing item, this project grouping was not sufficient to assist our review.

Table 5.22: SCADA protection and control category repex reconciled to RIN category ($m, FY25)

Asset Category	FY26	FY27	FY28	FY29	FY30	Total RCP
Secondary systems (incl relays)	3.9	4.2	4.5	5.6	5.9	**24.0**
Grid comms	12.8	14.2	18.1	22.1	25.5	**92.7**
Tele communications	1.0	1.2	1.2	1.2	1.4	**5.9**
OTE	3.3	3.4	3.7	11.9	12.0	**34.2**
Balancing item (likely part of attribution from substation projects)	12.4	12.5	18.6	8.6	10.7	**62.9**
Total	**33.4**	**35.4**	**46.0**	**49.4**	**55.5**	**219.8**

Source: EMCa analysis of SCS capex model

Attribution from individual substation replacement projects

640. As noted above, we found that the SCADA protection and control repex category also includes expenditure attributed from 78 substation replacement projects. We did not find any further sub-categorisation of projects by Ergon to assist our review.

641. Based on information provided in response to our questions, we were then able to reconcile the forecast repex used to populate the RIN as shown in Table 5.23, when escalated to $FY25 and including labour escalation as assumed by Ergon. The reconciliation was based on the sum of identified substation projects where the costs were attributed to the SCADA category, and asset categories as listed in Table 5.23.

Table 5.23: SCADA protection and control category repex reconciled to RIN category ($m, Dec 2022)

Asset Category	FY26	FY27	FY28	FY29	FY30	Total RCP
Secondary systems	17.2	17.5	22.2	19.8	19.3	**96.1**
Communications network	7.9	8.2	11.4	16.4	19.5	**63.4**
Communications linear asset	4.2	5.2	6.4	6.8	9.1	**31.7**
AFLC	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**29.4**	**31.0**	**40.0**	**42.9**	**47.9**	**191.2**

Source: EMCa analysis of data provided in EE Substation Project Analysis 2025-30 v0.3c with IR38

642. The table indicates that the largest component, by value is the secondary systems specifically associated with protection relay replacement.

[147] Ergon's response to IR039. Question 35.

Secondary systems replacement

643. The secondary system replacement projects total $96.1 million ($Dec 2022) for the next RCP and primarily relate to protection relay replacement.[148]

644. Ergon has included a Protection Relay Replacements business case which details the replacement of 1,222 protection relays at an estimated cost of $96 million ($Dec 2022), and which we assume is the same value as provided in Table 5.23, being the sum of the field devices RIN asset category. In its capex model, Ergon has included substation-based replacement projects which include protection relay replacement, in addition to dedicated relay replacement projects, as indicated in Table 5.22

Protection relay program is likely to be reasonable

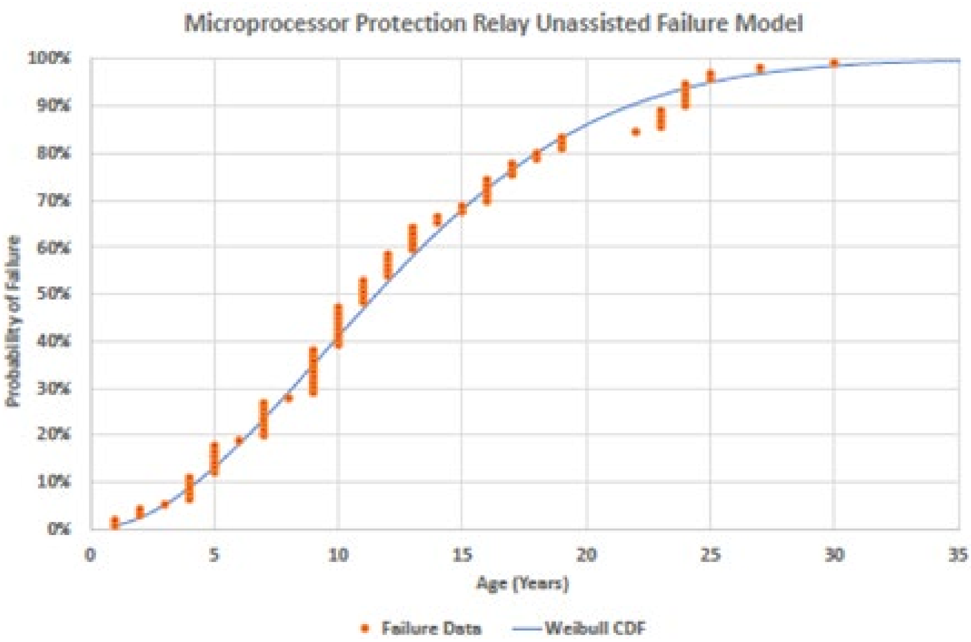
645. The condition of protection relay assets is typically monitored through periodic inspections and reviews of performance data. Any relays that fail in-service or during maintenance are managed using Ergon's corrective maintenance process. Relays are replaced either with a like-for-like model or by a current contract relay.

646. An additional consideration is to determine whether there is an existing project at the target substation site to bundle the relays into the project scope to achieve cost efficiencies.

647. Ergon has approximately 8,000 relays including electromechanical, static and microprocessor relays with assessed design and service lives of between 20 to 45 years. Based on its proposed replacement volume of 1,222 relays, we estimate that Ergon is forecasting to replace around 15% of its relays during the next RCP.

648. Ergon estimates the PoF of its relays by applying its actual failure rate data to generate a Weibull Distribution. This is demonstrated in the example for microprocessor relays provided in Figure 5.17. Ergon then applies its assessment of the consequence and likelihood of failures, which we understand it uses to prioritise the replacement program.

Figure 5.17: Ergon's analysis of its unassisted failure rates for microprocessor relays



Source: Ergon - 5.4.11 - Business Case Protection Relay Replacements - January 2024 – public, Page 14

649. Using its NPV analysis Ergon determines its forecast replacement volume of 1,200 relays during the next RCP. This contrasts with an age-based replacement forecast of 5,000 relays. We consider that the method used by Ergon to determine the replacement volumes for its protection relay replacement is sound and will likely assist provide a risk-cost

148 Corresponds to $110.4 million ($FY25).

optimised program. When considering the optimal timing for relay replacements Ergon evaluates opportunities to combine the work with other projects. The result of this is evidenced by approximately half of the replacements being undertaken coincidentally with other replacement projects at twelve substations.[149]

Communications related projects

650. Communications projects are included in the RIN asset categories of communications network and linear assets.

651. Based on our review of Ergon's capex model, projects with a prefix of GRID COMMS totalled $92.7 million and TELCO a further $5.9 million (see Table 5.22) for the next RCP. However, for its grid communications projects, Ergon states that it has included $77.8 million ($Dec 2022) repex.[150] We were not able to reconcile these amounts.

652. Ergon's Grid Comms investment program identifies five technology types (TDM, Network Control systems, P25 Network, Internet Protocol (IP) Network, Site Supporting Infrastructure, Linear Media). Each of the technology types are populated with projects (e.g. Microwave Radio Core replacements, P25 Replacement Edge South, DC Systems replacements etc.).

653. Ergon provided business case documents for the project categories which contained basic information on the asset's population, the identified need for replacement, options identified, and the outputs from Ergon's risk/cost calculation for its preferred selected option.

Ergon has an effective strategy for grid communications

654. Ergon's approach to its grid communications portfolio is to proactively manage the risks and costs associated with its telecommunications services by replacing equipment '*ahead of likely in-service failure and to improve the reliability, performance and capacity of the network.*'[151]

655. The grid communications assets support the efficient and safe operations of the electricity network and critical business systems through the telecommunications services they provide. Ergon claims that its approach will improve the reliability, performance and capacity of the network.

656. The replacement strategies set out in the Asset Management Plan (AMP)[152] are reasonable for these asset classes given their importance and emerging issues with age and condition. It would be expected that volumes of replacements based on these strategies would increase when there are higher volumes of assets at expected end of life.

657. The strategies also support the use of risk-cost based forecasts of repex where the probability of and consequences from failure can be predicted. Monetisation of the risk-cost will provide an optimised approach to the predicted failures. The individual justification documents indicated that Ergon had applied this approach.

Ergon has not provided adequate analysis to support its proposed grid communications repex

658. In response to EMCa's request for information, Ergon supplied individual justification/business case documents for the individual projects. These documents confirmed our view that the Ergon had not sufficiently optimised its program.

659. The combined repex and augex proposed for the next RCP for grid communications is provided in Table 5.24. We provide our assessment of the augex component in Section 6,

149 Ergon – 5.4.11 - Business case Protection Relay Replacements – January 2024, Page 17.

150 ERG IR020 - GRID COMMS Investment Program, Table 1.

151 ERG IR007 – GRID COMMS Investment Program, Page 3.

152 For example, Ergon's 05/06/2024 update of its 2018 telecoms AMP for microwave radio and operational support systems assets.

where we find that the development of the augex program appears to be in the early stages of development.

Table 5.24: Capex forecast for grid communications projects ($m, Dec 2022)

Type	Previous RCP	FY26	FY27	FY28	FY29	FY30	Total
Repex	55.5	9.45	11.34	15.77	19.25	21.97	**77.77**
Augex	13.24	4.25	4.26	4.26	4.27	4.27	**21.31**
Total	**68.74**	**13.7**	**15.6**	**20.03**	**23.52**	**26.24**	**99.07**

Source: ERG IR020 - GRID COMMS Investment Program

660. A major capital investment in Ergon's communication assets occurred between 2009 and 2013, which Ergon estimate to be approximately $140 million. The expected lives of the communications assets are between 7-12 years with many of these assets reaching end-of-life (either through technical obsolescence or because of end of support from vendors).

661. Ergon's Grid Comms Investment Program[153] sets out its approach to determining the efficient and prudent repex forecast. To ensure that the proposed program is optimal we would expect to see that Ergon had considered and analysed a range of credible options. From the information provided by Ergon we cannot conclude that it has undertaken sufficient analysis of its available options to support its selected option which is essentially a bottom-up derived program. In addition, we are unable to determine if the proposed repex is based on the outputs from Ergon's risk-cost analysis.

662. We reviewed two programs in greater detail, given the similar structure, presentation and supporting analysis that Ergon applied to its project categories, the discussion below applies for most grid comms project categories:

- AC Systems Replacement project - Ergon proposes $4.9 million capex ($Dec 2022) for its AC Systems Replacement project. The project includes the replacement of generators and solar regulators that provide backup electricity supply to telecommunications assets. Ergon does not provide a description of its proposed risk-based option, nor how it was applied when determining its proposed repex. Whilst we recognise the need to maintain these assets in good operating condition, we consider that the information provided by Ergon is insufficient to support its proposed expenditure for the next RCP.
- IP / Multiprotocol Label Switching (MPLS), Microwave Radio and Operational Support Systems - The replacement strategies set out in the AMP are reasonable for these asset classes given their importance and emerging issues with age and condition. It would be expected that volumes of replacements based on these strategies would increase when there are higher volumes of assets at expected end of life. The strategies also support the use of risk-cost based forecasts of repex where the probability of and consequences from failure can be predicted, with the results used to determine an optimised approach to the predicted failures.

OTE program is not sufficiently supported

663. Ergon provided four business cases to support its OTE replacement program. We were unable to reconcile the sum of the repex stated in these documents to the repex proposed for this category, or the individual projects that Ergon had included in its SCS capex model.

664. The business documents indicated that Ergon's development of the OTE program was at an early stage. This was particularly the case for the OTE AER infrastructure replacement justification statement which Ergon provided in response to our request for information following the onsite meeting. Because of the above issue we consider that the proposed level of OTE expenditure is insufficiently supported. We base this on:

[153] ERG IR007 – GRID COMMS Investment Program.

- OTE Infrastructure Replacement - In response to our information request, Ergon advised that the project value had been revised down from $9.4 million to $4.1 million ($Dec 2022) and added additional monitor and storage back-up projects.[154] However, Ergon did not provide details of the changes to allow us to reconcile to the provided information. Ergon has not provided details of its cost build-up. Based on the expenditure profile, and claimed previous RCP expenditure, this appears to be an in-flight project that is to be completed in 2026-27. Whilst we accept the need for this program, Ergon has provided insufficient evidence to support a conclusion that the proposed level of expenditure is reasonable and prudent.
- Monitor replacement project - In response to our request for additional supporting information to explain the step increase in expenditure,[155] Ergon provided its OTE monitor replacement justification document. Whilst we accept the need for the efficient and prudent replacement of OTE monitoring assets, we are unconvinced that the proposed repex is reasonable and that the proposed replacement timing during FY29 and FY30 is prudent.
- [redacted] project - Ergon describes [redacted] as the core communications platform used by its control room and requires a major upgrade and/or replacement in the next RCP.[156] Ergon has proposed two expenditure components for its [redacted] platform in the next RCP: (i) replacement of the existing platform (repex), and (ii) a continuous improvement program (augex). We consider the repex component only.

  Ergon explains that if the proposed replacement is not made, the current version of the [redacted] platform (initially installed in 2021) will not be fit-for-purpose and may become incompatible with new and emerging communications technologies used by Ergon and third parties. Moreover, that it will be at the end of vendor support for the [redacted] technology stack. However, whilst Ergon states that some components are at end of life, others are on extended support from FY27. The costs included in the counterfactual for further extended support, and increased risks of component failure suggest this is a reasonable option to pursue. Whilst we consider Ergon should have provided greater explanation for why the replacement date could not be extended beyond FY30, accrual of technology debt in an operational critical system is not considered prudent. A replacement date towards the end of the period, as Ergon has proposed and which allows for an effective market-based procurement process, is reasonable.

5.12 Assessment of 'other' category repex

5.12.1 Ergon's forecast repex for 'other' category

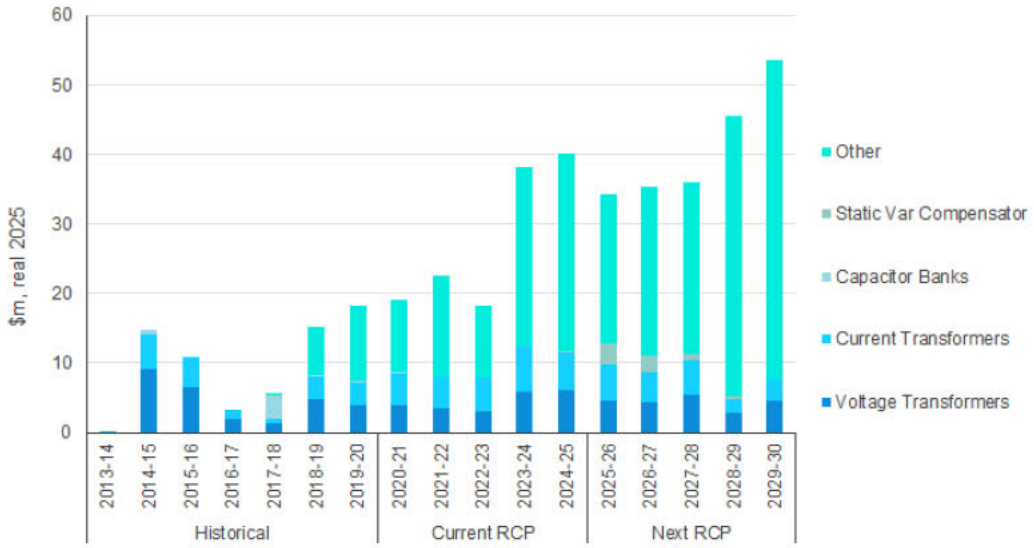
665. Ergon has forecast capex of $205 million for the 'other' category for the next RCP. In Figure 5.18 we show the historical and forecast repex trend by year and by asset category.

[154] Ergon's response to IR039 attachment. Question 35.

[155] Ergon's response to IR039. Question 35.

[156] Business case Ergon [redacted] provided with IR036 Question 12. Page 5.

Figure 5.18: Other repex category by RCP ($m, FY25)



Source: EMCa analysis of Ergons historical and forecast RIN data

666. As shown in the RIN data, the largest component of the proposed repex for the next RCP is a sub-category referred to as 'other', followed by voltage transformers. Neither of these categories have projects associated with them in the SCS capex model that we could identify. We observe that the 'other' category was first introduced in FY19 and the associated repex has increased over time, with a further step increase in FY24 prior to the commencement of the next RCP.

5.12.2 Our assessment of capex forecast for other category

Reconciliation of RIN asset category relied on inclusion of varying substation projects

667. Based on information provided in response to our questions we were able to reconcile the forecast repex used to populate the RIN as shown in Table 5.25, and which when escalated to $FY25 and including labour escalation as assumed by Ergon, aligns with the RIN value of $205 million.

Table 5.25: Other repex reconciled to RIN category ($m, Dec 2022)

Project/program title	FY26	FY27	FY28	FY29	FY30	Total
Attribution from substation projects	30.1	30.2	30	33.3	33.9	**157.5**
Attribution from lines projects	0.0	0.8	1.4	6.3	12.4	**20.9**
Total	**30.1**	**31.0**	**31.4**	**39.6**	**46.3**	**178.4**

Source: EMCa analysis of data provided in EE RIN Repex forecast 2025-30 v0.1m and EE Substation Project Analysis 2025-30 v0.3c with IR38EMCa analysis

668. The 'other' repex category comprises expenditure attributed to it from 84 substation projects and a single lines project,[157] the transmission tower refurbishment and replacement project. We did not find any further sub-categorisation of projects by Ergon to assist our review.

669. Ergon has provided business cases for a proportion of the expenditure in this category, and we review these below.

157 Additional lines defect-driven expenditure was included in the build-up model for lines, and then zeroed out before totalling the required forecast expenditure.

Proposed RTS capex is higher than the historical average

670. Ergon has provided a business case for its RTS program at a total cost of $80.7 million, which comprises 39% of the category. The projects included in the RTS program are shown in Table 5.26.

Table 5.26: Return to service program repex ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	Total
Return to Service - Substation Plant	14.0	14.1	14.1	14.2	14.3	**70.8**
Return to Service - Substation Relays	1.2	1.2	1.2	1.2	1.2	**6.1**
Return to Service - Substation Batteries	0.5	0.6	0.6	0.6	0.8	**3.1**
Return to Service - Power Quality Metering Equipment	0.1	0.1	0.1	0.1	0.1	**0.7**
Total	**15.8**	**16.0**	**16.1**	**16.2**	**16.5**	**80.7**

Source: Ergon SCS capex model

671. Ergon has included its RTS program to respond to in-service failure of substation assets. The forecast is based on analysis of historical data. Ergon states that:

> *due to the risk associated with distribution assets are increasing and top down pressure optimisation impact to the delivery program, Ergon Energy is expected not to have adequate step change in substation proactive projects. Therefore, we envisage the RTS expenditure to maintain the historical level of $13 million for the regulatory period 2025-30.*[158]

672. Ergon provided the historical spend for the last five years as shown in Table 5.27 and which we assume is expressed in nominal dollars as the basis is not defined by Ergon. We are not able to generate an average from these values that approximates that which Ergon has proposed unless we only use the highest three years data, from FY20 to FY22. We consider this would be a selective use of an average, resulting in the highest forecast, when only one year of the past five years has exceeded this value.

Table 5.27: Historical spend of RTS program ($ nominal)

	FY19	FY20	FY21	FY22	FY23
SRTS – Substation Return to Service	1,939,186	8,483,262	13,454,582	9,480,819	5,135,585
BRTS – Battery Return to Service	46,878	603,917	394,715	92,300	1,268
RRTS – Relay Return to Service	3,446	684,606	716,008	609,170	54,212
Total	**1,988,510**	**9,771,785**	**14,565,305**	**10,182,289**	**5,191,065**

Source: ERG 2025-30 RTS Business case v1.0 provided in response to IR007

673. We therefore consider that this forecast is likely overstated. This is supported by the fact that Ergon has proposed an increase in substation condition-based projects (targeting its worst condition plant), has not incurred an average RTS expenditure over the last five years as Ergon has claimed, and is experiencing a decline in RTS expenditure.

158 ERG 2025-30 RTS Business case v1.0 provided in response to IR007.

Transmission Towers Refurbishment and Replacement Program has not been adequately justified

674. Ergon has provided a business case for its Transmission Towers Refurbishment and Replacement Program with a total cost of $20.9 million which comprises 10% of the category. The projects included in the Tower program are shown in Table 5.28.

Table 5.28: Summary of transmission tower refurbishment program

	FY26	FY27	FY28	FY29	FY30	Total
Units	0	26	46	211	413	**696**
Expenditure ($m, Dec 2022)[159]	0	0.78	1.38	6.33	12.39	**20.87**

Source: ERG 2025-30 Towers business case v1.0 provided with IR007

675. Ergon's towers are experiencing a low failure rate, and similarly low defect rate. In FY23, subsequent to a change in inspection method to focus on tower security, there was a step increase in the number of defects. Ergon also attributes the increase in defects to improved defect data recording.

676. Ergon claims that the majority of tower defects are due to degradation caused by corrosion, and which is addressed by a painting program. Ergon has not provided any detail on how this program is currently undertaken nor the level of historical expenditure that it has been incurring to treat the identified defects.

677. Ergon's tower condition monitoring is in the very early stages of development due to very limited condition data availability and lack of inspection activities. Nonetheless, Ergon's application of its model to towers indicates that 443 assets exceed the target HI of 7.5. A much higher number of towers is included for treatment in the forecast as shown in Table 5.28. The difference is not explained by Ergon.

678. Ergon provides the results of its NPV analysis for a single tower replacement, and not the proposed program. The analysis includes assumptions for each of the key input parameters, and not supported with evidence, has done so on the basis that '*we are not overstating the PoF*.' We don't consider that an NPV analysis developed on this basis is compelling, particularly in the absence of any sensitivity analysis using reasonable bounds of the input parameters.

679. Taken together with the conflicting information around the proposed treatment volumes, and in the absence of any historical data that demonstrates that the current methods employed by Ergon in the management of is fleet of towers is deficient or inefficient, whatever that management strategy may be, we do not consider that Ergon has justified inclusion of this new proactive program in its forecast. In this case, clear definition of the counterfactual, based on the current management strategy would have been helpful in assessing the option of adopting a proactive strategy, then undertaking sensitivity analysis around the volume and perhaps other parameters.

Transformer bunding program is not adequately justified

680. Ergon has provided a business case for its transformer bunding program with a total cost of $18.2 million, which comprises 9% of the category, and includes two projects:

- Ergon Transformer Bunding – REPEX, $17.8 million
- Transformer Bunding Replacement Program, $0.4 million.

681. Ergon has provided a business case[160] that proposes to establish 88 transformer bunds for unbunded or insufficiently bunded transformers. Ergon commenced the transformer bunding program in the current RCP, stating:

159 The business case states that the values are expressed in FY22 dollars, however the totals align with the input to the capex model expressed in FY23 dollars.

160 ERG 2025-30 Transformer bunding business case provided with IR007.

Following a risk prioritisation process, an existing program is underway to provide bunding to establish 79 bunds across our network in the last two years of the 2020-2025 regulatory control period. The remaining 83 unbunded transformers are forecast for rectification in the 2025-2030 period.[161, 162]

682. We acknowledge the need to meet compliance requirements including protection of the natural environment, and creation of a retrospective transformer bunding program for high risk sites. Programs such as this are typically undertaken on a 'pathway' to compliance over a pragmatic time period of ten years or so depending on the volume. Ergon's program over effectively seven years appears to be based on a similar premise, and on the basis that Ergon has prioritised its highest risk sites first then the rationale for undertaking such a program is reasonable.

683. Whilst Ergon has stated that this program is NPV positive, we consider that the analysis overstates the probability of an oil spill event. Ergon has not provided evidence of its assumed 2% PoF and given that this is most likely following failure of the transformer, has not considered the probability of the transformer failure as a pre-requisite of the oil leak. Noting that this is a compliance-based program, having commenced in the current RCP, we would expect that Ergon should have sufficient experience to also provide evidence of an efficient design solution, which is not evident in the documentation we have reviewed.

Sub-transmission substation replacement projects

684. The remaining expenditure is associated with substation replacement projects. We have been provided relevant business cases, which we consider are representative of this expenditure. As stated above, the expenditure is apportioned from a large project involving the replacement of other assets including transformers, switchgear and SCADA. The expenditure attributed to the 'other' category is primarily associated with instrument transformers replaced as a part of these projects.

685. We acknowledge that the inclusion of instrument transformers in this category means that any increase in substation replacement projects is directly related to increases in replacement of instrument transformers. We discuss the merits of the sub-transmission asset replacement projects, based on CBRM methods in Section 5.3.5.

686. We also identified four projects dedicated to the replacement of VTs only, and which comprise $3.1 million ($Dec 2022) in the forecast.

Projects not including instrument transformer replacement are likely higher than a prudent and efficient level

687. In addition to instrument transformer projects, Ergon has included the following projects:

- OTE[163] replacement of infrastructure, security, [redacted] and AI (4 projects) totalling $27.2 million ($Dec 2022)
- SVC replacement at Georgetown Zone Substation - Static Variable Compensator Replacement; and Charleville Static Variable Compensator Replacement totalling $5.6 million ($Dec 2022)
- Land acquisition at KALA – KALAMIA totalling $4.2 million ($Dec 2022).

688. In our assessment of the SCADA protection and control category, we consider that there is insufficient information to support the optimal timing of elements of the OTE project, including the [redacted] project.

689. We have not identified any material issues with replacement of Static Variable Compensators (SVC) or provision for land for future land requirements.

161 ERG 2025-30 Transformer bunding business case provided with IR007.

162 The number of unbunded transformers included in the business case has increased from 83 identified in this reference to 88.

163 Which we understand is Operational Technology Environment.

5.13 Our findings and implications for proposed repex

5.13.1 Summary of findings

Ergon has not provided sufficient evidence to support the extent of its proposed expenditure

690. Ergon has not provided documentation that is consistent with its own governance process and capex forecasting methodology that requires, among other things, robust justification and supporting analysis. For example, we would have expected to see evidence to support the proposed condition-based expenditure forecasts. This would include condition assessment and corresponding risk assessment of the asset class and information regarding contributions of failures and defects that have led to declining network performance or other service measures.

691. During our onsite discussions, we sought to understand how the asset management plans developed for Ergon have been applied to generate the expenditure forecast included in its justification statements, strategic scope documents and ultimately the forecast provided in its RIN. We formed a view at the onsite discussion that Ergon is likely to have supporting information that exists within its business, and which describes the decisions it made and the assumptions it applied in developing its expenditure forecast on a reasonable basis. However, Ergon did not provide such information in response to our requests for information. We did however receive some information that allowed us to reconcile the proposed repex with its models, which was not initially provided.

692. We therefore consider that Ergon has not provided sufficient information to support the proposed level of replacement activity included in its RP as being prudent or reasonable. We note that the AER Expenditure Forecast Assessment Guidelines state that:

> *The AER intends to assess forecast capital expenditure (capex) proposals through a combination of top down and bottom up modelling of efficient expenditure. Our focus will be on determining the prudent and efficient level of forecast capex. We will generally assess forecast capex through assessing: the need for the expenditure; and the efficiency of the proposed projects and related expenditure to meet any justified expenditure need. This is likely to include consideration of the timing, scope, scale and level of expenditure associated with proposed projects. Where businesses do not provide sufficient economic justification for their proposed expenditure, we will determine what we consider to be the efficient and prudent level of forecast capex. In assessing forecasts and determining what we consider to be efficient and prudent forecasts we may use a variety of analysis techniques to reach our views.*[164]

Lack of coherent supporting information

693. As expressed in our review of the ex post assessment, we similarly found that the information provided by Ergon has been problematic and generally not sufficient justification for the proposed repex. In some instances, we were not able to readily reconcile the information between sources, or to determine whether Ergon had not duplicated components of its expenditure.

694. We found material errors and weaknesses in the modelling of the proposed repex presented in its risk-cost and NPV models, and which we consider undermine the conclusions that Ergon has drawn from this analysis.

Repex forecasting methods are not as Ergon has claimed

695. The alternate expenditure models provided by Ergon ultimately allowed us to reconcile the program and understand the composition of the forecast, that was not evident in the RP. However, with this understanding, we find that the repex for the distribution line (excluding substation works) activities is the result of a build-up of historical average defect-based and

[164] AER. Better Regulation | Expenditure Forecast Assessment Guideline for Electricity Distribution. August 2022. Page 18

planned work, and which is not based on risk-cost modelling outcomes as Ergon has claimed in its Regulatory Proposal documents.

696. As a result, Ergon has placed significant reliance on its most recent historical replacement volumes and expenditure to determine its future requirements. This is indicative of a reactive asset management approach, but also perpetuates the high levels of replacement activity and expenditure that we consider Ergon has not adequately justified in the current period.

Economic analysis of options appears to be limited

697. For projects where Ergon provided economic analysis of options, we have concerns that the analysis relies on flawed counterfactuals, does not fully include the costs that should have been considered, includes benefits for periods that do not align with the costs and, in some cases, do not align with the proposed project timing. We did not observe any valid consideration of optimal timing of the proposed expenditure.

698. We consider that these issues and issues with the conclusions that Ergon draws from its analysis, have resulted in Ergon bringing forward works, or proposing a higher volume of replacement activity in the next RCP than is reflective of a prudent level.

Outcome based optimisation of the portfolio, or compositions of the programs within it, is not evident

699. As discussed in Section 3, we do not see evidence that the projects have been optimised across the portfolio against an outcome measure such as risk or service outcomes. We recognise that this feature forms a part of Ergon's (and EQ's) maturity of its investment governance process using Copperleaf, but we do not see how Ergon has satisfied itself that the replacement program as it has proposed is not higher than a prudent and efficient level.

700. This was similarly reflected at a program level, where we expected to see and did not see consistent or sufficient evidence that the projects had been optimised:

- For substation works, there was evidence that projects identified by the CBRM modelling were then subject to bundling with other substation projects, and which led to a lower number of replacements. However, we also saw evidence that suggested assets identified for replacement from the CBRM modelling may be candidates for deferral.
- This contrasted with SCADA, protection and control projects where it was not clear to us how these projects had been optimised, or whether the program was reviewed as a program, that required similar and specialist skills to deliver.

5.13.2 Implications for proposed repex

701. Based on the projects and programs we reviewed, we find that Ergon's repex forecast in its RP does not meet the NER expenditure criteria because it has not demonstrated that it is efficient, prudent and reasonable. We consider that a repex allowance that meets NER criteria would be materially less than Ergon has proposed.

6 REVIEW OF EX POST CONDUCTOR CLEARANCE CAPEX AND ASPECTS OF FORECAST AUGEX

We consider the capex incurred (as repex and augex) during the ex post period to address conductor clearance defects was likely higher than Ergon's requirements, being subject to similar issues to those we identified in our review of ex post repex in section 4. Ergon needed to address clearance defects at sites that presented an immediate safety risk of inadequate clearance to the ground or structure, following verification that the defect exists. However, our analysis indicates that both the number of defects required to be rectified and the cost of solutions undertaken by Ergon were higher than a prudent level.

We consider that Ergon's proposed augex of $310 million for the two augex categories of 'conductor clearance' and 'grid communications, protection and control', being a continuation of programs commenced in the current RCP, is not a reasonable forecast of its requirements for the next RCP. Ergon has identified a need to continue to address conductor clearance defects, however, we consider that the forecast for Ergon's proposed augex for conductor clearance in the next RCP is considerably overstated. Our analysis indicates that Ergon will need to address a materially lower number of defects at a lower unit cost than Ergon has estimated.

We similarly consider that Ergon's proposed augex for grid communications, protection and control categories is considerably overstated. Ergon has not demonstrated the need for some of the elements of the proposed expenditure, or provided sufficient analysis to demonstrate that lower cost alternatives are not preferable, such that a lower forecast expenditure would be prudent.

6.1 Introduction

702. In this section, we present our assessment of the capex incurred as repex and augex for conductor clearance in the ex post period, and the forecast augex that Ergon has proposed for the two categories of 'conductor clearance' and 'grid communications, protection and control' in the next RCP.

703. We reviewed the information provided by Ergon to support its incurred capex and proposed augex forecast, including a sample of projects and programs contained within the categories that we were asked to review. Our focus was to ascertain the extent to which the issues identified in Section 3, and for the clearance program the implications arising as commencing as a repex program in the ex post review period, as discussed in Section 4.

704. We sought to establish the strategic basis for, and the reasonableness of, Ergon's incurred capex for conductor clearance in the ex post period, and the proposed augex for each of the identified categories of expenditure. We do this by first considering the trend for augex, including the forecast augex before considering the case for the proposed expenditure for the categories we have been asked to review. Given the relationship between the proposed augex for conductor clearance, and the historical capex for conductor clearance (as established in Section 4), we have included our assessment of the ex post capex for conductor clearance in this section also. Ergon had initially classified conductor clearance capex as repex, and then from FY22 onwards as augex.

6.2 Overview of Ergon's proposed augex forecast

6.2.1 Overview

705. Ergon has proposed $788.6 million for augex in the next RCP as shown in Table 6.1. Within our scope of review is the clearance program and grid communications, protection and control categories of augex, totalling $310.0 million for the next RCP.

Table 6.1: Augex by category ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	Total
Sub-transmission Growth	25.2	32.0	37.4	44.1	43.9	**182.6**
Distribution Growth	37.4	36.7	42.6	47.5	51.2	**215.4**
Clearance Programs	**37.2**	**35.7**	**36.1**	**34.5**	**37.6**	**181.1**
Reliability	2.8	2.8	2.8	2.8	2.9	**14.0**
Resilience	16.7	20.5	11.0	3.2	6.2	**57.6**
Grid communications, protection and control	**22.9**	**21.8**	**28.3**	**28.4**	**27.6**	**128.9**
Cyber security	1.8	1.8	1.8	1.8	1.8	**9.0**
Total	**143.9**	**151.2**	**160.0**	**162.4**	**171.2**	**788.6**

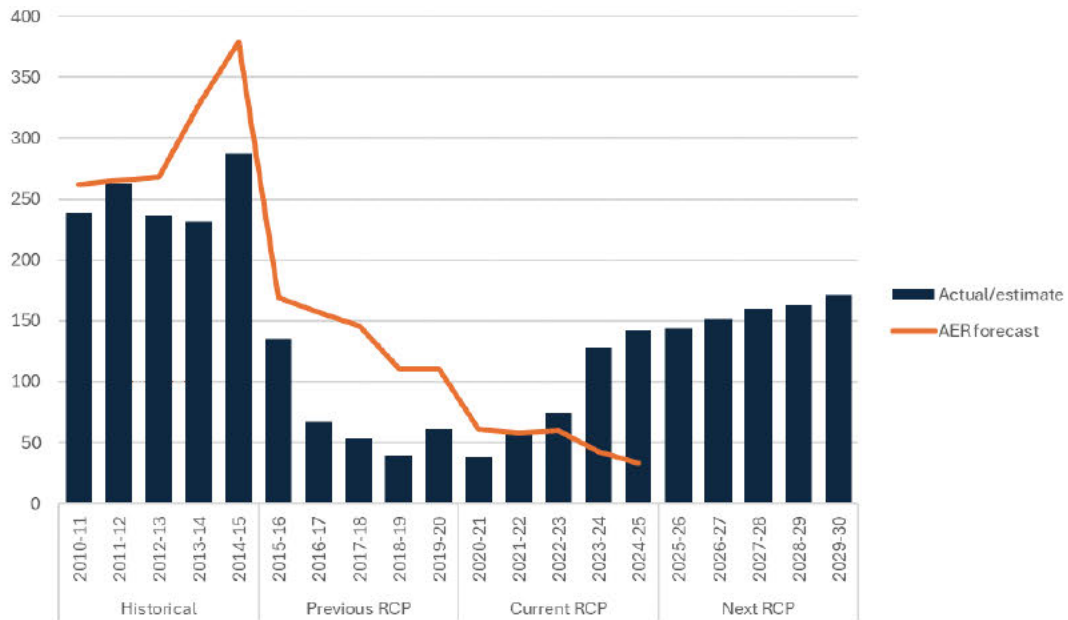
Source: Ergon Regulatory proposal, Table 33

6.2.2 Augex trend

706. Forecast expenditure in the next RCP is reflective of a step increase from the historical expenditure that Ergon has incurred and is expected to incur in the remainder of the current RCP.

707. In Figure 6.1 we show the augex trend compared with the augex component included in the AER capex allowance. All expenditure has been inflated to real FY25 dollars, and for the purposes of allowing comparison to the historical data, also includes Ergon's proposed real cost escalation.

Figure 6.1: Ergon augex trend ($m, FY25)



Source: EMCa analysis of Ergon Regulatory proposal, Table 31 and Table 32

708. Due to the drivers of augex, the capex profile tends to be lumpy in nature, varying both year on year and RCP to RCP. Whilst a trend is instructive in terms of looking for changes in the drivers of augex between RCPs, historical revealed costs are less helpful in aggregate.

709. What is clear is that the 2010-15 RCP included a large investment in augex, and which, following review of the jurisdictional planning standards, was significantly reduced in subsequent periods. The absence of growth (or ability of the network to meet the growth without further augmentation) is observed in the 2015-20 period, and then increases are apparent in the current and next RCPs.

6.3 Assessment of ex post and forecast capex for conductor clearance

6.3.1 Ergon's ex post and forecast capex

Ergon's incurred capex for conductor clearance

710. As explained in Section 4, during the ex post review period from FY19 to FY23, one of the drivers of the overspend was the higher level of capex for its conductor clearance program. Ergon incurred $223.9 million on its clearance program during the ex post review period as shown in Table 6.2, initially classified as repex and then as augex.

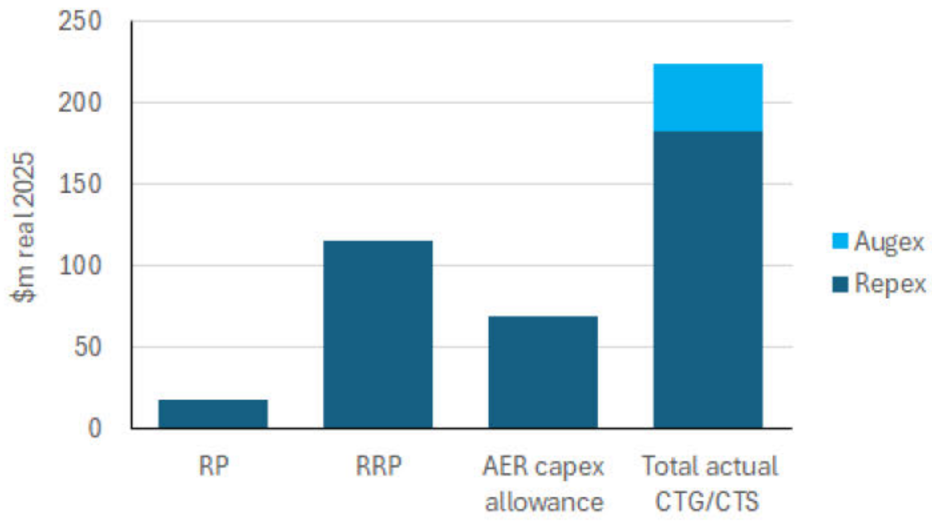
Table 6.2: Conductor clearance capex incurred for ex post period ($m, FY25)

	FY19	FY20	FY21	FY22	FY23	Total
Reported as repex	37.9	67.9	77.2	-	-	**183.1**
Reported as augex	-	-	-	22.0	18.8	**40.9**
Total	**37.9**	**67.9**	**77.2**	**22.0**	**18.8**	**223.9**

Source: EMCa table derived from 5.3.01 Capex ex post justification - overview - January 2024, Table 7

711. Figure 6.2 shows how this relates to Ergon's forecast included in the RP, RRP and finally the provision included in the AER's capex allowance for the current RCP.

Figure 6.2: Comparison of conductor clearance program ($m, FY25)



Source: EMCa analysis of information provided by Ergon in its 2020-25 RRP and 2025-30 RP

712. We have relied on the expenditure breakdown provided by Ergon in its supporting information. The expenditure has been included in other programs, and we have not sought to reconcile this with the RIN category expenditure.[165]

713. Ergon has reclassified its clearance program as an augex program from FY22, consistent with treatment of the clearance program at Energex. Ergon states that the change in classification from a repex program to an augex program is to better align with the driver of this type of expenditure. We have made an adjustment in Figure 6.2 to reflect the total CTG/CTS in the above.

714. Based on our review of the time series of expenditure for the conductor clearance program that Ergon provided in response to our request, we are unable to reconcile the two sources of data. For the ex post review period the data in Table 6.2 totals $224 million, however it included $197 million in its more recent response. Ergon has not explained the difference.

Ergon's forecast augex for conductor clearance

715. Ergon has forecast capex of $181.1 million for its conductor clearance program for the next RCP to remediate 12,270 defects. Annual capex is shown in Table 6.3 as derived from its business case.

Table 6.3: Summary of Clearance to Ground & Structure program for next RCP

Project/program title	FY26	FY27	FY28	FY29	FY30	Total
Clearance to Ground (CTG)						
Number of defects	2,228	2,228	2,228	2,228	2,228	11,140
Unit costs ($)	12,530	12,530	12,530	12,530	12,530	n/a
Clearance to Structure (CTS)						
Number of defects	226	226	226	226	226	1,130
Unit costs ($)	15,307	15,307	15,307	15,307	15,307	n/a
Total ($m, FY23)	**31.4**	**31.4**	**31.4**	**31.4**	**31.4**	**157.0**
Total ($m, Dec 2022 re-profiled)	32.6	31.1	31.3	29.7	32.2	**156.9**
Total ($m, FY25)	**37.2**	**35.7**	**36.1**	**34.5**	**37.6**	**181.1**

Source: Ergon 5.5.01 Business case Clearance to Gound & Structure program – January 2024, Table 4 and Ergon's SCS capex model

716. Ergon proposes to remediate outstanding and forecast level 1-5 defects within its remediation timeframes while monitoring and opportunistically rectifying the lowest priority defect 5 defects. Ergon proposes to phase the program in the context of deliverability of the overall program of work which leads to small differences in each year.

Consolidation program

717. In Table 6.4 we provide a summary of the clearance program in aggregate as advised to us by Ergon in response to an information request. From this same data we provide a time series in Figure 6.3.

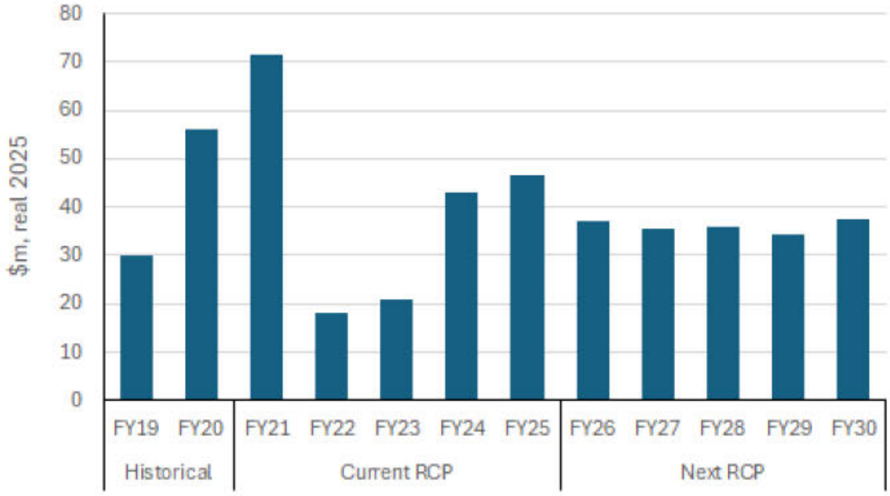
165 For the 2015-20 RCP, 100% of the program was allocated to the overhead categories. For the 2020-25 RCP, the program was allocated in accordance with the Distribution Reset RIN apportionment applied at that time.

Table 6.4: Summary of Clearance to Ground & Structure program ($m, FY25)

	Ex post review period 2018/19 - 2022/23	Current RCP	Next RCP
Clearance to Ground & Structure program	196.8	200.2	181.1

Source: Ergon's response to IR038, Question 5

Figure 6.3: Clearance program time series ($m, FY25)



Source: Ergon's response to IR038, Question 5

718. As noted above, the data provided by Ergon is expressed in $FY25, however the clearance program expenditure included in the ex post review period is stated as $197 million, which is lower than that included in its ex post review documentation of $224 million (see Table 6.2). Ergon did not offer a reason for this difference.

6.3.2 Assessment of ex post conductor clearance program

Conductor clearance program is an ongoing program of compliance

719. Ergon has a legislative obligation including 'Queensland Electrical Safety Regulation 2013, Schedule 4' to maintain minimum electrical clearances of its overhead CTG and CTS to ensure public safety. Ergon also provides regular status updates on its program to the ESO.

720. Ergon states that prior to 2013, electrical clearance issues across the network were identified by visual inspections and assessments performed in its cycle of inspections. In 2015, Ergon engaged a LiDAR provider to survey its distribution network to detect clearance breaches.

Awareness of breaches of compliance creates an obligation to act

721. Ergon's LIDAR program has identified many defects where breaches have been recorded against conductor clearance requirements. It is assumed that the lines to which the identified defects relate were built to the standard of the day, and that the breaches have been determined against that assumption. Ergon provided information that supported this assertion.

722. EQ has established a prioritisation method for rectification of defects, and the timeliness of rectification is monitored by ESO, for both Ergon and Energex.

Ergon has included agricultural land as high risk which is likely contributing to a higher number of defects

723. Ergon has increased the clearance requirements for some specific scenarios, including for cultivated land where:

> *The clearance requirements defined in the Overhead Construction Manuals are more than what is required under the Electrical Safety Regulation 2013.*[166]

724. Ergon has also added specific locations defined as high-risk areas (corresponding with elevated exposure to contact / damage) for the purposes of prioritisation of CTG and CTS issues, including high risk agricultural areas by Local Government Authority.

725. We understand that this increase in standard is a direct result of recent incidents in agricultural areas, and which is likely contributing to a higher level of defects than would otherwise be the case.

Priorities allow for program of defect rectification over time

726. According to the priority rectification times, not all defects will be addressed in the next RCP. For example, Level 4 and Level 5 require four-year and five-year rectification periods, and there are also Level 5 defects classified as 'monitor only', or 'complete as part of other works.' The priority rectification times are shown in Table 6.5.

Table 6.5: Defect levels and timeframes

Priority	Timeframe
Emergency	Highest response priority and rectified as soon as practicable, normally the same day.
Level 1	These defects[167] are accessible CTS (less than 75% of clearance) and high risk CTG given a 9-month rectification timeframe.
Level 2	These defects are the remainder of accessible CTS and non-accessible (less than 66.7% of clearance) with an 18-month rectification timeframe.
Level 3	These defects are the remainder of non-accessible CTS and CTG with min threshold for road crossing with a 3-year rectification timeframe
Level 4	These are the remainder of the CTG defects over areas other than roads, non-trafficable land and road clearances up to the statutory clearance with a 4- and 5-year rectification timeframe.
Level 5 Monitor	These are Level 5 defects outside high-risk areas and do not cross a minor or major road within tolerance of clearance requirement.

Source: Ergon 5.5.01 Business case clearance to Ground & Structure program – public, Page 9

727. We observe that the timeframes for Level 3 – 5, are also described as SFAIRP Timeframe.[168] Ergon has not established the relationship between the timeframes nominated in Table 6.5 and its assessment of SFAIRP.

ESO notices highlight gaps in adherence in Ergon standards

728. Ergon has made us aware of several infringement and improvement notices received from the ESO in relation to conductor clearance. Our review of these notices indicates that they are not instructions or enforcement orders from the regulator to conduct work or meet a

166 Ergon, Standard of conductor clearance prioritisation and remediation (STNW3399) – 3058520. Page 22.

167 Based on our review of the report to the ESO, Level 1 also includes CTS defects in high priority areas.

168 EQL standard STNW3399 Standard for Conductor Clearance Prioritisation and Remediation, Annex C.

given standard that applies across the entire network, but focus on specific parts of Ergon's network where the ESO has determined that Ergon has not achieved its own standards for rectification. The ESO requires Ergon to correct the nominated non-compliances to manage network risk in accordance with its safety management system.

729. As recognised by the ESO, the priority defect levels and rectification timeframes are determined by Ergon in alignment with its risk management framework and safety management system, and not by an external party such as the ESO.

730. In reporting provided to us in response to our information request,[169] and which we understand formed part of a quarterly report to the ESO, we observed that 7,217 defects were identified as Level 5 and remained open with a required rectification date of 30 June 2035. This appears to be comparable with the Level 5 monitor defects identified in Ergon's modelling.

731. We observe statements by Ergon that higher priority works have impacted resource availability to complete some works within the nominated rectification periods.

Delivered solutions claimed to be based on lowest cost option

732. Ergon's standard nominates a range of potential solutions which are consistent with a range of efficient solutions. Ergon states that the designer should apply the lowest cost solution to the defect, which was also conveyed to us during our onsite review meeting discussions. Whilst we have not seen demonstration of this process, and it is not possible to get insight from the blended historical unit rate, we accept Ergon's representation that it has applied this procedure to minimise the expenditure to consumers.

Analysis of the root cause has not been presented to ascertain whether Ergon has applied the lowest cost mitigation in developing the forecast

733. Ergon has one reported incident associated with statutory clearance based on the design standard at the time of construction and records an average of 224 overhead contacts to the electricity network per year. Ergon states that contacts with the overhead network are steadily increasing, and with that the increasing risk of shock or injury to a member of the public.

734. Ergon has not presented analysis of the root cause of the line clearance issue to assist identify its mitigations. Ergon states that:

> *A range of factors such as building or structure encroachment, third party impacts to assets, ground build-up and other supporting asset failures i.e. stays contribute to a conductor breaching statutory clearance requirements.*[170]

735. In accordance with its governing standard, EQ outlines the Ellipse Job codes to assign a cause to allow future Failure Modes Effect Analysis (FMEA).[171]

736. In developing a forecast of future requirements, we consider that it is fundamental to undertake analysis of the likely root cause that leads to the defect, and then determine the appropriate risk mitigation strategies. Risk mitigation strategies may extend to education with third parties, greater use of ground-based inspection methods, all of which provide alternatives to a reactive asset replacement approach, and which may have incurred a lower level of expenditure.

737. We acknowledge the legislative requirement to meet and maintain safe clearance of its overhead conductors, and whilst clearance standards may have changed since the original construction of some lines,[172] changes to the design of a line require that the design complies to the standards in place at the time, including clearance. Moreover, there is likely

169 Ergon response to IR38 question 10, ESO – EQL full defect listing. Q3 23-24.

170 Ergon response to IR007. Question 5.

171 EQ Standard for Conductor clearance prioritisation and remediation – 3058520. Pages 17-18.

172 Clauses referred to as 'grandfather clauses' also exist that accept that existing lines will comply with clearance standards if they continue to comply with the regulatory standards in place at the time of construction.

to be a public safety benefit of doing so. However, Ergon has claimed a single driver of compliance, and not detailed where the solution triggers a new design and therefore a more stringent design (and clearance requirement) or that the solution provides a public safety risk/benefit.

Information provided to explain historical defects indicates a smaller program than Ergon has proposed for the next RCP

738. The AER asked Ergon to provide the annual number of defects remediated from FY16 to FY23 and the associated cost of remediation. The AER provided Ergon's response for our review.[173] We have re-produced this response in Table 6.6 and added the cumulative defects and expenditure.

Table 6.6: Annual defects remediated from FY16 to FY23

Defect work order closed	Completed defects	Expenditure (thousands)	Average unit cost	Cumulative defects	Cumulative expenditure (millions)
FY16	6	14	2,333	6	0.0
FY17	5585	11,558	2,069	5,591	11.6
FY18	7490	24,941	3,330	13,081	36.5
FY19	4699	37,948	8,076	17,780	74.5
FY20	5048	67,862	13,443	22,828	142.3
FY21	4978	77,241	15,516	27,806	219.6
FY22	2313	22,033	9,526	30,119	241.6
FY23	2166	18,849	8,702	32,285	260.4
3yr average FY21 to FY23	*3,152*	*39,374*	*11,248*	*n/a*	*n/a*

Source: Ergon response to IR007, Question 5c

739. We calculate that by the end of FY23, Ergon had incurred $260.4 million in capex, which we assume is expressed in similar terms to the RP, being $FY25. Over that time, Ergon has mitigated 32,285 defects. Based on full year programs, commencing FY17, we estimate that over seven years Ergon has addressed, on average, approximately 4,600 defects per year. However, more recently the three-year average was lower at 3,152.

740. Ergon also provided the data in Table 6.7 which shows that the number of defects identified as at Cycle 7 was 12,050 for CTG and CTS, and which we understand is the total amount identified in the network. Ergon adds a further 4,927 for temperature correction, increasing the total outstanding defects to 16,977. Ergon states that the benefit of the delay in Cycle 7 was that greater time between cycles allowed a greater number of defects to be resolved, and which results in a reducing number of defects to be mitigated.

741. As Ergon has found, we would expect a lower level of defects being identified in the network requiring mitigation in each cycle, as a result of the defect remediation program in place.

173 Ergon response to IR007. Question 5c.

Table 6.7: Number of identified defects by flight cycle, CTG and CTS

Cycle	CTG	CTG (temperature corrected)	CTS	Total
3 (Nov 2015)	15,539		6,317	21,856
4 (Sep 2016)	18,037		2,594	20,631
5 (Mar 2017)	19,263		3,525	22,788
6 (Feb 2018)	19,393		3,060	22,453
7 (Aug 2021)	10,765	4,927	1,285	16,977

Source: EMCa analysis of Ergon response to IR007 question 5c Defect data, and reproduced in Ergon response to IR020, Question 8

742. Using Ergon's more recent three-year average of 3,152 from Table 6.6, it would take 5.4 years to remediate the outstanding defects (including temperature correction) assuming no further defects were identified. Commencing in FY24, the program would be completed in the FY29 and within the next RCP. This is a much lower program than Ergon has proposed. Assuming that Ergon has addressed the highest risk breaches, and the remainder represented lower risk breaches that require lower cost solutions, this timeframe may be shorter. Some of the lower risk defects may, as Ergon has classified, be reduced to monitor and be addressed as a part of business as usual work, and not a separate program. We consider this further in the next section.

6.3.3 Assessment of forecast augex conductor clearance program

Forecast of conductor clearance program based on an estimate of historical surveyed defects

743. During our onsite meeting, we asked Ergon to provide justification for the estimated number of defects in each year of the next RCP and for the forecast unit costs included in the business case that we already had a copy of. We were seeking to understand firstly why future defects had been included, and the basis of the ratios that Ergon had applied. This information was not forthcoming. We were provided with a spreadsheet that included the same information provided in the business case as shown in in Table 6.8.

Table 6.8: Basis of forecast defects by regulatory period

Project/program title	No. of defects	2020-25	2025-30	2030-35	Monitor and complete with other work
Cycle 6 and carryover	35,972	3,012	242	-	1,810
Cycle 7	15,650	2,172	6,103	-	7,348
Cycle 8 (estimated)	5669	45	4,877	747	-
Cycle 9 (estimated)	5669	-	1,048	4,621	-
Total	**62,960**	**5,229**	**12,270**	**5,368**	**9,158**

Source: Ergon - 5.5.01 - Business Case Clearance to Ground & Structure Program and Ergon's response to IR20

744. Firstly, we observe that this dataset does not align with the data provided in Table 6.6 and Table 6.7. From our review of the defect data that we were provided, we were not able to ascertain how the prioritisation of defects is managed following the capture date. The information we were provided did not identify the work order raised date, required by date and work order closure date to allow us to identify the source of the discrepancy.

745. Secondly, the basis for including a forecast of defects from future cycles of LiDAR surveys remains unclear. We observe that these estimates do not form part of the total defects

included in reports to the ESO for Ergon (or Energex) and are not currently known defects by either business.

Forecast number of new clearance defects in next RCP is based on a percentage of historical clearance defects

746. The forecasting approach adopted by Ergon identifies a rate of new defects, based on historical find rates. Specifically, that:

> *The forecast volumes for Cycle 8 are based on a 35% reduction in CTG and a 50% reduction in CTS defects from Cycle 7. The percentage of L1 – L5 defects for Cycle 8 is based on Cycle 7 actual percentages. As the volume of defects decrease over time, a natural frequency of defects is expected to emerge. This natural frequency is expected to represent the Cycle 8 volumes and carried forward to Cycle 9 at 5,669 defects.*[174]

747. Ergon refers to its estimate of future defects as the emergence of a 'natural frequency' of defects, which implies that Ergon expects an ongoing number of lines / bays to breach the clearance requirements under the regulations. We do not consider that this claim has been sufficiently justified, nor have the claims that the levels of new defects that Ergon expects to identify are a reasonable estimate.

748. Overhead lines are designed to meet clearance requirements operating under a range of environmental conditions, and so the cause of breaches of clearance requirements are most likely changes by third parties or to the surrounding environment (change in soil levels, subsidence leading to foundation failure and encroachment of structures) and whilst possible, but less likely, deterioration of the asset between inspections. Ergon has not demonstrated that the find rate of defects is strongly correlated with the age and condition of the line.

749. It follows that if Ergon has processes in place to manage actions of third parties and has inspection and review processes to identify potential for breaches of clearance for activities in proximity to the overhead lines, the incidence of new unknown defects should be small. Defects would otherwise be expected to be identified as a result of ground inspection methods and prioritised for action on a risk basis.

750. If the number of defects identified in Cycle 7 are required to be mitigated as suggested by Ergon, and on the basis that a LiDAR cycle surveys the entire network as we understand it, then the forecast should be based on those that will be completed in the next period. Inclusion into the forecast of new defects that have not been identified by previous cycles of LiDAR, and will be required to be rectified, has not been sufficiently justified.

Temperature correction should further reduce captured defects using LiDAR

751. Introduction of temperature correction will also lessen the likelihood that new defects are captured under different flying conditions, as a result of changes to ambient conditions from the last cycle.

752. Ergon has applied reduction factors of 35% in CTG and 50% in CTS defects to the defects in Cycle 7 to estimate defects for Cycle 8. The reduction factors are applied to the total defects including temperature correction, and not the raw survey results during Cycle 7. As a result, Ergon does not appear to sufficiently take account of the impact of temperature correction in further lowering the number of future identified defects from its survey processes, having addressed a higher number of defects than was identified during previous cycles of its survey processes.

Evidence of adherence to field verification step has not been provided

753. We asked Ergon to clarify the criteria used to identify CTG/CTS breaches from the LIDAR data, and any correction factors that are applied to the LIDAR process. In response Ergon stated that:

174 Ergon's response to IR020. Question 7c.

EQ uses the Queensland Electricity Safety Regulation: 2013 as the source for the legislative clearance criteria. Part 9, Division 4 of the Electrical Safety Regulation 2013 (Qld) outlines the clearance requirements.

The EQ standard STNW3399 Standard for Conductor Clearance Prioritisation and Remediation provides direction on compliance with the Electrical Safety Regulation 2013 (Qld) including how to classify and prioritise clearance issues to ensure compliance. Annex A to D within STNW3399 detail rectification timeframes based on severity, type and location of clearance breach. Treatment of defects in high risk areas forms a key part of the prioritisation process.[175]

754. Ergon started applying temperature correction for Cycle 7, being the only 'correction' that it applies to the data. Ergon also undertakes a checking and verification process to confirm the accuracy of defects. Ergon's response referred to:

- quality assurance steps throughout the survey data processing undertaken by its provider; and
- review steps by Ergon to check the data based on the use of automated scripts and desktop validation.

755. Having discussed these steps at our onsite meeting, we were interested in the steps that Ergon undertook to assure itself that the defects identified from aerial survey were validated as real, by a combination of desktop and field verification. In its response, Ergon describes a method, using an automated programming script, to:

- validate poles against the internal asset database to confirm the pole service status;

- identify duplicate (already existing) work orders and to append the existing work order information for inclusion with the new work order;

- confirm/apply the correct work group to each defect based on location and nature of defect;

- re-validate the defects reported by LiDAR by analysing the minimum ground clearance in places other than the carriageway (OTH) and crossing the carriageway (CTR) against the priority matrix in Appendix A and D from STNW3399;

- analyse the ground clearances of all spans to confirm that the vendor has reported all low clearances that would result in a defect.[176]

756. The script then confirms the defect and generates a number of discrepancies that required desktop review. The desktop review process is largely a function of confirming the correct application of business rules comprising classification and escalation of defects to assist the workflow process[177] rather than field verification of the existence of a defect. Subsequent steps involved generation of the work order, supporting information and customer notification.

757. The only field verification that we could ascertain from Ergon's description relates to job scoping:

In terms of Field audits, depending on the type of defect, triage and assessment occurs to validate and assess the defect for possible solution. CTG defects are assessed by Design and CTS are assessed by Network Officers. A CTS defect may have a customer component such as a shed built too close to an existing overhead line. In these cases,

175 Ergon Response to IR020. Question 7a.

176 Ergon response to IR020. Question 7c.

177 Ergon response to IR020. Question 7.

Network Officers determine both the possible customer impact and the Network solution.[178]

758. We also found an instance of field verification in the governing standard, which similarly refers to field assessment being undertaken as part of design and scoping activities to validate the defect.[179]

759. Whilst the standard appears to provide for instances of 'No Defect Found and Reclassification' we were not convinced from our discussion with Ergon staff that this is consistently applied. In our experience, a field verification step, typically undertaken on a sample basis, adds confidence to the defect identification process. This is typically a feature of good inspection practice, whether from physical assessment, models or other techniques, and happens separate from the design and scoping process. Whilst Ergon does have some steps in place to validate defects, further verification steps help ensure that the process does not materially over or under identify defects for remediation.

Review of work order data suggests that more defects may have been actioned than were required

760. During our onsite meeting, we understood that the accuracy of LiDAR is approximately 0.1m. We reviewed the data provided by Ergon to identify the number of instances of defects whereby the clearance breached the regulatory limit by less than the accuracy level of 0.1m. We looked at Cycle 7, being the most recent results including temperature correction that has been applied by Ergon and found over 3,000 defects were within this limit. We present the number of defects within this accuracy tolerance by voltage in Table 6.9.

Table 6.9: Number of defects in Cycle 7 where clearance was less than 0.1m, by voltage

Voltage level of span	No. of defects	No. of defects where clearance was less than 0.1m	*Percentage of total*
LV	7,758	1,843	*24%*
<=11kV	3,847	506	*13%*
<=22kV	3,744	518	*14%*
<=33kV	236	43	*18%*
<=132kV	1,101	118	*11%*
Communications	52	14	*27%*
Stay	236	2	*1%*
(blank)	3	0	*0%*
Total	**16,977**	**3,044**	***18%***

Source: EMCa analysis of Ergon's response to IR007 Question 5

761. We consider that many of these may be lower priority and may not have required action despite a work order being raised. However, we found that 29% of defects less than the accuracy tolerance of 0.1m had a priority level 1-4 assigned, as shown in Table 6.10.

178 Ergon response to IR020. Question 7.

179 Ergon. Standard of conductor clearance prioritisation and remediation – 3058520. Page 13.

Table 6.10: Number of defects in Cycle 7 where clearance was less than 0.1m, by priority level

Priority level	Count of WORK_ORDER	Sum of Less than 0.1	Proportion
01	1,716	420	29%
02	914	2	
03	3,569	457	
04	2,611	4	
05	8,167	2,161	71%
Total	**16,977**	**3,044**	**100%**

Source: EMCa analysis of Ergon's response to IR007 Question 5

762. We also found a further 243 defect work orders where the breach between the temperature corrected height and the compliance requirement was a negative number, indicating that it was not a breach. We would expect that these would not have had work orders assigned, or the work order would be cancelled before action was taken.

763. When considered alongside other factors, this suggests a bias to treat a higher number of defects, and which has the effect of upgrading the line section to the current design standards.

Future defects are likely to be much lower than Ergon has forecast

764. Given that there was some overlap between the time taken to rectify defects identified in Cycle 6 (February 2018 to June 2019) and the timing of Cycle 7 (July 2020 – September 2023), we would expect that there was a reasonable degree of overlap.

> *At the peak of the Cycle 6 campaign, 35,972 defects were being managed from previous campaigns and Cycle 6. In Cycle 7 there were 15,650 defects raised from the LiDAR program for Ergon Energy and the downward trend is expected to continue into Cycle 8 until plateauing out at the same rate for Cycle 9.*[180]

765. As the LiDAR flight cycle time has moved to three years (across Ergon and Energex), the highest risk items would be expected to be resolved in the three-year period with other lower priority defects extending beyond that time. The subsequent cycles planned by Ergon (Cycle 8[181] and 9) would likely pick up any change of priority in defect from earlier cycles and apply temperature correction for others. Furthermore, any defects not already being addressed, would be prioritised and likely span the 2025-30 and 2030-35 RCPs.[182]

766. However, as we have introduced, there are a number of factors which lead us to conclude that the defects that Ergon will identify are likely to be much lower than Ergon's estimate.

Ergon applies an average cost per physical defect approach

767. EQ has determined the estimated cost for its clearance programs based on an average cost per physical defect, using unit rates from the most recent 12-months of data. However, unit rates are more commonly applied to repeatable scopes of work (e.g. replacing a pole), whereas the resolution of defects can require a wide array of solutions from re-tensioning of the conductor to replacement of a pole and associated pole top equipment. This can result in a wide range of costs per defect.

768. EQ acknowledges that unit costs are most effective for like-for-like scopes of work, and that clearance program solutions can be quite different. However, EQ does not offer an alternative costing method.

180 Ergon 5.5.01 Business case clearance to Ground & Structure program. Page 7.

181 Cycle 8 flights will commence in the 2025 calendar year for Ergon Energy and are planned to finish by the end of the 2026 calendar year.

182 Ergon 5.5.01 Business case clearance to Ground & Structure program. Page 8.

Assumed unit rates are higher than the revealed cost

769. According to Ergon (and for Energex):

> *Unit rates are based on a dataset that totals the financial costs and the actual units/physicals recorded (based on its Unit of Measure) for the rolling 12 months prior, captured by Standard Job and/or NAMP. The Clearance programs are deemed Physical Programs so this data is then analysed using an 'average cost per physical' lens to produce a preliminary unit rate.*[183]

770. The unit rates applied by Ergon are $12,530 ($Dec 2022) for CTG and $15,307 ($Dec 2022) for CTS as shown in Table 6.3. This results in an average blended unit rate of $14,760 ($FY25).[184]

771. The unit rates assumed by Ergon for forecasting the CTG and CTS closely approximate the bundled pole unit rate developed by Ergon in its review of unit rates,[185] and would indicate that, on average, the solution requires a new pole. We would expect that a high proportion of the solutions involve re-tensioning, new pole top hardware (including crossarms) and, less frequently, a new pole (replacing the existing pole or mid-span).

772. Testing Ergon's assumption, we refer to the average unit rates provided in Table 6.11, which indicates that the unit rate for the most recent 12-months, the 12-months prior and the 3-year average are all lower than the rate Ergon has assumed. This suggests that the 12-month average may not have been applied as Ergon has claimed and that the unit rates that it has used have further contributed to an overstatement of required expenditure. .

Table 6.11: Calculation of average blended unit rates ($FY25)

	FY19	FY20	FY21	FY22	FY23	3yr average
Defects resolved	4,699	5,048	4,978	2,313	2,166	**3,152**
Historical expenditure ($m, FY25)	30.1	56.1	71.7	18.2	20.7	**37.0**
Average unit rate ($, FY25)	6,396	11,114	14,404	7,862	9,580	**10,615**

Source: EMCa analysis of defect historical defect volumes from Ergon response to IR007, Question 5c and historical expenditure from Ergon response to IR038 Q5

Unit rates are a coarse costing methodology, which may not be reflective of the efficient cost

773. We would suggest that a more detailed unit rate analysis for such a large program is required, particularly given the maturity of the program, and that the highest risk defects are likely to have been addressed assuming also that the highest risks may have resulted in more costly designed solutions. Whilst all of these assumptions may not remain valid, the unit costs of the solutions to be undertaken within this program vary, and an improved forecasting method may be to consider the proportions of solutions that may be applied, or other means to provide greater confidence in the forecast.

Application of unit rates to conductor clearance may not reflect efficient level of cost

774. As discussed in our review of the cost inputs for the conductor clearance program in Section 6, we do not consider that the unit rate method applied by Ergon (and Energex) is reflective of the revealed cost that Ergon has incurred, or necessarily representative of the efficient level of cost that Ergon will incur for the next RCP.

183 Ergon's response to IR038. Question 13.

184 Calculated by dividing the total expenditure by the total volume.

185 Ergon - 5.2.08 - Cost Comparison of Ergon RIN Unit Costs to the NEM - December 2023.

6.3.4 Our findings of ex post capex and forecast augex for conductor clearance

Ergon has demonstrated that it needed to address conductor clearance defects

775. Ergon has identified a compliance issue with conductors not meeting the clearance requirements as nominated in its overarching regulations, and which consistent with good industry practice it is required to manage the associated risk including remediation once identified.

Ergon identifies conductor clearance defects from its aerial surveying using LiDAR

776. Ergon relies on the outcome of flights of its network using LiDAR for the identification of defects. This formed the basis of the program that commenced during the ex post review period and involves a significant increase in expenditure (and by inference defect resolution) for the last two years of the current RCP.

Incurred capex during the ex post review period for conductor clearance was likely higher than a prudent and efficient level

777. We consider that the incurred capex (as repex) of $183.1 million on conductor clearance during the ex post review period was likely higher than a prudent and efficient level.

778. Our analysis of Ergon's data does indicate that a higher number of defects were identified for action than is prudent, however Ergon did not adequately justify its prioritisation of rectification of these defects and the level of rectification work that it undertook in the ex post period. Whilst Ergon claims that least cost solutions were applied, the high unit rates tend to indicate that Ergon may be replacing more of its network in response to an identified defect than we would expect. We found similar issues in our review of the balance of the repex program in Section 4 and it appears that similar issues applied to this program.

Further increases to the clearance program have not been adequately justified

779. For the last two years of the current RCP, Ergon assumes a further increase in defects. Ergon has not adequately explained the rationale for such an increase and has not provided information that suggests that it sufficiently understands the root cause for this.

Basis for the forecast of new defects is not formed on a reasonable basis, nor adequately considers the impact of other programs to mitigate conductor clearance defects

780. Ergon has not adequately explained the need for the level of conductor clearance augex proposed for the next RCP and has not provided information that suggests that it understands the root cause for this. We consider that Ergon has estimated a higher number of future defects for the next RCP than is reasonable. Ergon has made two key assumptions that we do not consider have a reasonable basis, being

- that despite the identification and rectification of clearance issues currently being addressed, future flights will continue to identify a material number of new defects, and
- Ergon has not sufficiently taken account of the interaction with other programs that will assist resolve issues with conductor clearance.

781. We consider that the extent of conductor clearance rectification that Ergon will require will be materially less than Ergon has proposed.

Ergon will likely incur a lower unit cost for rectifying conductor clearance defects compared with the unit rates that it has assumed

782. We further consider that of the defects that Ergon will treat, the unit costs will be lower than Ergon has assumed. Whilst the volume of defect remediation is likely overstated, we are also not convinced that the solutions that Ergon will deploy are reflected in the assumed unit rate, limited by the last 12 months of data. We consider that greater analysis of the

solutions, costs and proportion of solutions deployed is likely to identify solutions that in aggregate will result in a lower unit cost.

Forecast augex is overstated compared with a prudent and efficient level of expenditure

783. We consider that Ergon's proposed expenditure of $181.1 million for conductor clearance in the next RCP for its conductor clearance program is materially overstated.

6.4 Assessment of forecast augex for grid communications, protection and control

6.4.1 Ergon's capex forecast

784. Ergon has forecast capex of $128.9 million for grid communications, protection and control for the next RCP. Annual capex is show in Table 6.12.

Table 6.12: Grid communications, protection and control capex forecast for next RCP ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	Total
Grid communications, protection and control	22.9	21.8	28.3	28.4	27.6	**128.9**

Source: Ergon SCS capex model

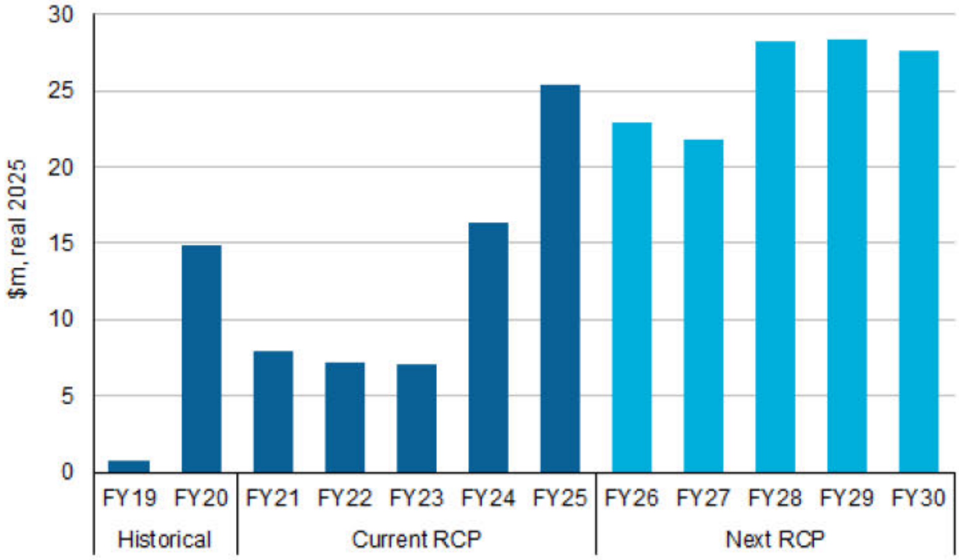
785. In Table 6.13 we provide a summary of the grid communications, protection and control in aggregate as advised to us by Ergon in its response to an information request. From this same data we provide a time series in Figure 6.4.

Table 6.13: Summary of Grid communications, protection and control ($m FY25)

	Current RCP	Next RCP
Grid communications, protection and control	64.0	128.9

Source: EMCa analysis of Ergon SCS capex model and response to IR038, Question 5

Figure 6.4: Grid communications, protection and control category ($m, FY25)



Source: EMCa analysis of Ergon SCS capex model and response to IR038, Question 5

786. In its response to IR038, Ergon states that whilst it has provided historical data, it considers that the accuracy and therefore any reliance placed on the historical data is low. What is most relevant is that the forecast expenditure for the next RCP is a step increase on the expenditure in the current RCP.

787. In our review, we noted that Ergon also uses the term Grid Technology when referring to the expenditure under this category, and we may use this interchangeably when referring to Ergon's proposal in this report.

6.4.2 Program groupings

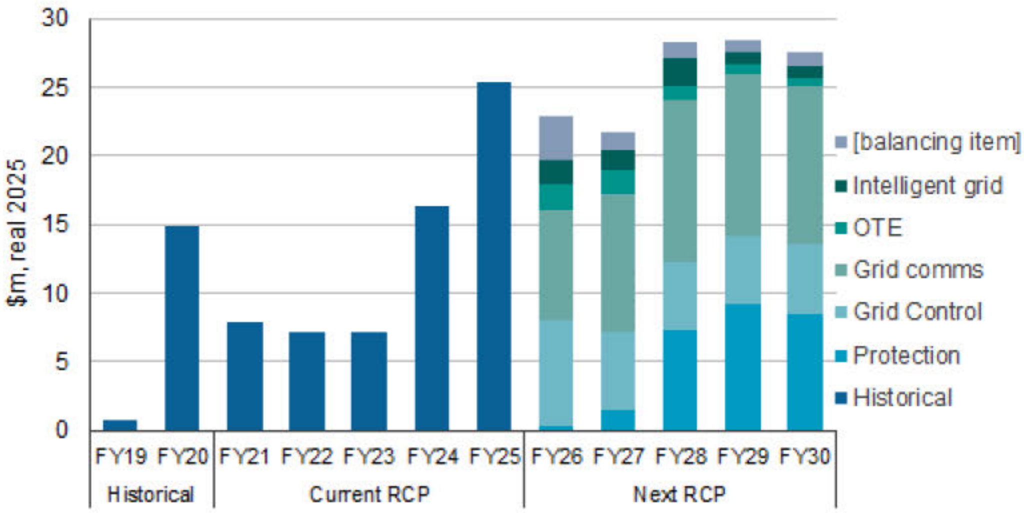
788. To assist our review, we assigned individual projects with a similar project title in Ergon's capex model into program groupings, and which we understood from our discussions with Ergon at our onsite meeting were as Ergon had organised its capex proposal. The project groupings are shown in Table 6.14 and Figure 6.5.

Table 6.14: Grid communications, protection and control category (with EMCa groupings) ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	Total
Protection	0.4	1.5	7.4	9.1	8.5	**27.0**
Grid Control	7.6	5.6	4.9	5.0	5.1	**28.2**
Grid comms	8.1	10.1	11.7	11.9	11.5	**53.3**
OTE	1.8	1.8	1.0	0.7	0.6	**5.9**
Intelligent grid	1.7	1.5	2.0	0.8	0.8	**6.9**
[balancing item][186]	3.3	1.3	1.2	0.8	1.0	**7.6**
Total	**22.9**	**21.8**	**28.3**	**28.4**	**27.6**	**128.9**

Source: EMCa analysis of Ergon SCS capex model

Figure 6.5: Grid communications, protection and control category - with EMCa groupings ($m, FY25)



Source: EMCa analysis of Ergon SCS capex model and Ergon response to IR038, Question 6

789. We observe that grid comms is the largest grouping, with the protection grouping largely back-ended in the next RCP. We added a 'balancing item' , as the remaining components of the program were not clear to us.

790. To confirm our allocations, we asked Ergon to provide a list of projects that comprised the grid communications, protection and control category. Ergon's response[187] included a list of

186 Balancing item added by EMCa to reconcile with proposed capex.

187 Ergon_GridTech_Reconciliation provided with response to IR038. Question 6.

projects that totalled to $128.4 million, which appeared to be comparable to the total in the capex model of $128.9 million. However, on closer examination the project listing included a project that Ergon had indicated in its capex model as DER capex, excluded other projects where similar named projects were included, and included projects that were not readily identifiable as being related to the above groupings.

791. Based on this data, we consider that the largest component of the balancing item is likely to be the Underfrequency Load Shedding Capability Improvement at $4.8 million, for which we have not been provided information.

792. Ergon did not provide a project grouping that we could apply. We therefore present our assessment against project groupings we have assumed by considering a sample of projects assigned to each project grouping. The absence of a project list that reconciles with the augex listed in the capex model, or to the groupings presented to us at the onsite meeting, casts a level of doubt over the robustness of the capex program for this category.

6.4.3 Protection project grouping

Protection project grouping is dominated by two key projects where the expenditure is back-ended in the forecast

793. As shown in Table 6.15, the protection grouping consists of two main components:

- Backup Reach Protection Improvement Program $11.1 million
- Collection of DC and Bus Overcurrent Protection duplication projects, which we estimate is $13.9 million.[188]

Table 6.15: Protection project grouping ($m, FY25)

Project name	FY26	FY27	FY28	FY29	FY30	Total
DC and Bus Overcurrent Protection Duplication (26 projects)	0.2	1.4	3.3	4.8	4.2	**13.9**
Backup Reach Protection Improvement Program	-	-	3.7	3.7	3.7	**11.1**
Proserpine DC and Bus Overcurrent Upgrade	-	-	-	0.5	0.5	**0.9**
Protection Relay Fleet Management Implementation	0.1	0.1	0.1	0.1	0.1	**0.7**
Establish Backup DC at Pandoin	0.0	0.0	0.2	-	-	**0.3**
Total	**0.4**	**1.5**	**7.4**	**9.1**	**8.5**	**27.0**

Source: EMCa project grouping based on Ergon's SCS capex model

794. The expenditure profile is weighted towards the later years of the next RCP, with the back-up protection improvement program not commencing until FY28. This indicates to us that deliverability of the overall program may be challenging and/or that the proposed work could rollover into the following RCP.

We consider there are clear linkages between the protection upgrade projects

795. There are clear linkages between the Backup Reach program and the DC and Bus Overcurrent Upgrade program, including for the drivers of: (i) safety, (ii) compliance, (iii) reliability, and (iv) impacts attributable to DER.

188 This number varies between the projects listed in the capex model, and which calculate totals 26 individual projects that have this title, and the project listing provided by Ergon.

796. Increased customer intolerance to long duration outages would be measured in SAIDI and SAIFI performance at individual distribution feeder levels. Ergon's Network Risk Framework[189] identifies interruptions of greater than three hours but less than 12 hours at level 2 out of six levels. Ergon has not provided analysis of its measured performance in support of this driver.

797. There are also linkages between the augex programs and the proposed replacement of DC supply systems in repex. The combined expenditure on these programs is significant. Also, Ergon expects that the need for expenditure on these programs will continue through to the 2030-35 RCP. The resources required to design, develop, manage and complete the works are likely to be drawn from the same pool, so potential delivery constraints must be considered at the portfolio level.

798. The linkages and potential cost of the programs indicate the need for:

- An overarching strategy
- Research-based solutions development
- Business cases with optimised risk-cost based prioritisation at the portfolio, program and project levels
- Portfolio level resourcing and delivery capability plan
- Rigorous top-down review and challenge.

799. Our assessment of the proposed programs was focussed on the extent to which the above are evident in the information provided by Ergon, and the effectiveness of their application to ensure that the outcomes reflect the requirements of the NER.

We found insufficient evidence of an overarching strategy

800. EQ's Future Grid Roadmap[190] identifies that two-directional flows will be a feature of the future grid but does not provide strategic guidance on the issues that this will create for the existing network or establish a specific connection to the proposed expenditure for the next RCP. The roadmap does note that:

> *This transition won't be easy. It will require cultural change, transition of skills, and constant focus on addressing barriers in order to innovate.*[191]

801. The Future Grid Roadmap does not identify specific technical issues that will need to be overcome to support the grid of the future. We did not locate any other documents providing strategic guidance on the specific transition issue that these programs are targeted at managing.

Options assessments were generally limited

802. Ergon provides Justification Statements for most programs and projects. In many cases the contents of the Justification Statements were common to several projects, except for differences in input values such as costs and inputs to the CBA.

803. In many cases the options analysis was limited to comparison of the preferred option to 'do nothing' (the counterfactual) and 'do everything' options. For some projects Ergon identified that it had given some consideration to other more expensive technologies but had dismissed these on the basis of significantly greater cost than the other options considered.

804. In our experience, technology solution providers operate in highly competitive markets and it is surprising that in most cases Ergon found no effective alternatives to the technology applied in its options assessment.

[189] Ergon - 5.2.06 - Network Risk Framework - January 2024 – public. Page 31.

[190] IR020-Q10_EQL's Future Grid Roadmap.

[191] Ibid. Page 6.

There is insufficient evidence of program level optimisation

805. The documents provided by Ergon indicate that program level assessments have not been undertaken. For example, there is no evidence that Ergon has considered the implications of running both programs concurrently. In addition, we have not seen evidence that consideration has been given to similar portfolio of proposed repex projects running concurrently with the proposed augex portfolio.

806. Many of the resources will be drawn from EQ resources. As Energex has proposed similar work for its protection systems, resource constraints could emerge.

The deliverability assurances were insufficient

807. The expenditure profile for both programs is heavily weighted towards the last three years of the next RCP. Ergon explains that it has experienced resource constraints with its design team during the current RCP. It is unreasonable to expect that the delivery of these two relatively large programs will not face some constraints as they more towards implementation. Accordingly, we consider that the timing of delivery of the combined programs, coincident with the similar repex program, is unlikely to be delivered as planned.

808. Ergon's Network Deliverability Strategy[192] contained minimal discussion on these issues. The three references to protection noted that targeted strategies to specific skill sets are available. However, the implication of the combined similar augex and repex programs was not discussed. Ergon did not set out targeted strategies in the documents it provided to support the proposed expenditure.

Backup reach protection improvement

809. Ergon has demonstrated that a back-up protection issue may exist.

810. Ergon has identified two drivers for the Backup Reach program:

- Failure of a single protection system to detect faults
- Consequential damage to un-faulted parts of the network.

811. The primary issue to be addressed is that EQ has identified that components of its existing protection system are potentially limited in their ability to detect, and therefore to respond to faults on the network. In addition, the increase in connection of distributed generation (DG) on the network is adding concerns as the generator to grid current flows could impede the ability of protection systems to detect and respond to faults.

812. A specific implication of the above is that the upstream protection system (or backup) often located at a higher level of the network may not operate in the event the primary protection does not. This is because the reach (visibility) of the upstream protection system is limited due to the impedance of long distribution lines, and/or reduced fault currents attributable to DG operation.

Ergon has not adequately demonstrated a targeted program is the prudent option

813. During the current RCP, Ergon has been addressing identified backup protection issues as a part of other network projects. Ergon states that this is intended to continue into the next RCP, then specific projects are to be delivered in years 3, 4 and 5. The implication is that specific projects are not yet determined, which was confirmed during our onsite discussion.[193]

814. The business case developed by Ergon is based on a desktop study of a sample of Ergon's network. We note that the AER in its draft and final decision for Ergon's current RCP identified issues with the level of justification provided by Ergon, and that the proposed program at that time was based on only a desktop study:

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192 Ergon – 5.2.07 – Network Deliverability Strategy – January 2024 – public.

193 EMCa_AER Presentation - 13 to 15 May 2024 (Day 1)_provided to AER. Slide 101.

To justify this program, Ergon Energy needs to demonstrate that its current protection schemes do not effectively protect network assets or do not ensure public safety. Further, in the absence of field testing that supports the desktop analysis, we do not have confidence that the desktop analysis represents an accurate calculation of backup protection shortfalls.[194]

815. Like the AER, we recognise that Ergon needs to address protection schemes where it does not provide adequate safety and asset protection outcomes. However, Ergon has not provided evidence that it has addressed the short comings highlighted by the AER in its final decision for the current RCP, specifically that its existing protection systems are not effective, that its existing network planning and project development cannot address the issue and that a specific targeted program is the prudent option.

The project scope, timing and cost remain uncertain

816. Due to the early stage of development of the program, forecast expenditure has been allocated to the last three years of the next RCP. The basis for the replacement of 10 substation protection schemes per year as well as installation of 30 line reclosers per year has not been demonstrated. We consider that this program remains highly uncertain in terms of need, cost and timing.

DC and Bus Overcurrent Protection Duplication program

Ergon proposes a program to duplicate DC supply and bus protection systems to ensure operation of its protection systems

817. This program commenced in the current RCP and is forecast by Ergon to continue beyond the next RCP. The program is significantly weighted towards the last three years of the next RCP. During FY29, 25 out of the portfolio of 26 projects are forecast to be in-flight in the work program for that year.

818. For each identified project, Ergon proposes a solution that will duplicate the DC supply systems and sub-transmission bus protection to ensure that the protection system will operate under a fault condition if one of the DC supply and bus protection systems fail. Ergon considers that this solution will:[195]

- Re-establish adequate backup protection
- Provide backup protection to the distribution network adjacent to the substation, where previously backup was not feasible.

819. Ergon has determined that there are no other credible options that would address the identified issues associated. EQ considers that duplicating the DC supply system and the sub-transmission bus protection scheme is the *only practical solution to restore remote backup protection for an inadequate DC supply system or sub-transmission bus protection scheme*.[196] No further options are considered by EQ in the justification statements provided for the forecast.

Ergon has appropriately identified the drivers but has not always provided convincing evidence of the justification or reason for its selected option

820. Our assessment of the identified drivers for the proposed projects are provided below:

- Changing network use and increased bi-directional flow – it is unclear to us how the proposed solution addresses this issue, the change in current flows and general de-sensitisation effect from additional HV and LV DER will persist. However, we accept that the solution provides greater local protection, avoiding the need for upstream

194 Final decision - Ergon distribution determination 2020-25 - Attachment 5 - Capital expenditure - June 2020.

195 Included in each project justification statement.

196 Individual project justification statements, augmenttion section.

protection to operate in the event that local substation DC supply systems are inoperative.

- Changing customer expectations – EQ has not provided evidence to support its claim that outages attributable to DC supply or bus protection failures are a material driver of declining reliability performance, or that a change in reliability performance is economic.
- Compliance with the NER – the core issue appears to be the requirement for protection systems to operate within specified fault clearance times. To achieve this an N-1 standard is applied to protection systems. This means that when one protection system fails to operate an upstream protection system identifies the fault and isolates the network. Whilst there is time discrimination between the operation of the protection systems, they must isolate the faulted network within the specified clearance times.

  Because DC supply system faults can occur and cause the associated protection system to be inoperable, duplication of this component is used as a solution to reduce the associated risk. In these cases, care is taken to avoid the use of common components within the DC supply systems to prevent common failure modes occurring.
- Safety risks – there are clear safety risks associated with the failure of protection devices to operate. Absent the compliance issue, the program would need to be supported by a robust net benefit assessment, which in our view Ergon has not provided. EQ has also not provided information on how it determined its PoF values used in its NPV model. This information is important to establish a risk-based priority for the proposed program.

Ergon claims it does not comply with the NER and industry practice

821. Ergon considers that the current configuration of its protection schemes has not been meeting the NER or industry standard practice for N-1 on high voltage protection schemes. Ergon refers to two clauses in the NER:

> *The National Electricity Rules (S5.1.9(c)) directs a network service provider to provide sufficient primary protection systems and backup protection systems to ensure that a fault anywhere on its transmission system or distribution system automatically disconnects.*[197]

> *The National Electricity Rules (section S5.1a.8) prescribes clearing times, require duplicate local main and backup protection schemes to meet industry standard practices of reliability and fault discrimination.*[198]

822. NER clause S5.1.9 (c) states:

> *Subject to clauses S5.1.9(k) and S5.1.9(l), a Network Service Provider must provide sufficient primary protection systems and back-up protection systems (including breaker fail protection systems) to ensure that a fault of any fault type anywhere on its transmission system or distribution system is automatically disconnected in accordance with clause S5.1.9(e) or clause S5.1.9(f).*[199]

823. Our understanding is that NER clause S5.1.9 (c) places a responsibility on an electricity distributor to ensure that its protection systems are sufficient to ensure that automatic disconnection of faults occurs within the specified fault clearance times.

824. Clauses S5.1.9(e) and S5.1.9(f) concern the fault clearance times for protection systems.

Demonstration of pre and post compliance outcomes has not been provided

825. For Ergon to conclude that it is non-compliant with NER clause S5.1.9(c), it would need to have determined that its existing protection systems would not isolate faults within the

197 Individual project justification statements.

198 Individual project justification statements.

199 NER - v210 – Full. Page 947.

required fault clearance times. It would also need to identify if this issue is related to its primary or back-up (including breaker fail protection systems).

826. It would not be sufficient to conclude that, on its own, installation of duplication of the DC supply and bus systems would bring Ergon's protection systems within compliance. Determining both pre and post treatment compliance levels requires detailed technical analysis of the protection systems. Specifically, Ergon would need to ensure that its proposed solution to correct the identified issue would bring it into compliance with NER clause S5.1.9 (c), that is, that its protection system would clear faults within the required fault clearance times.

827. We note that the desktop study that Ergon has relied on for inclusion of the protection projects into the forecast did not consider factors such as the current health of the DC supply assets, and reliability impact (which relates primarily to the duration of outages experienced by customers). The proposed program appears to have been formed on a deterministic rather than probabilistic basis.

828. Whilst projected solar PV levels have been used to indicate ongoing implications for protection systems, we have not been provided with an integrated study that accounts for other DER connections such as energy storage, electric vehicle charging and commercial/industrial electrification, that are likely to impact on the way that protections systems will need to operate in the future.

829. In addition, Ergon has not provided evidence that it has undertaken onsite assessments of the existing protection systems to determine the extent to which the existing protection schemes are failing to provide cover for DC supply failure.

830. It would not be sufficient to conclude that, on its own, installation of duplication of the DC supply and bus systems, would bring Ergon's protection systems within compliance. Determining both pre and post treatment compliance levels requires detailed technical analysis of the protection systems.

831. Assuming that the need can be demonstrated, Ergon has not demonstrated that its selected projects address the highest risk items, or that it is otherwise optimised for service outcomes, benefits or deliverability.

Claims of public and personnel safety concerns are not substantiated

832. Ergon has identified that components of its current protection systems are inadequate to protect workers and the public from risks from faults on several sections of its network. Ergon also claims that the operation of its protection system has been adversely affected by bidirectional energy flows attributable to increased DER.

833. Ergon will need to demonstrate how its proposed solution will ensure that it meets its safety obligations in the future.

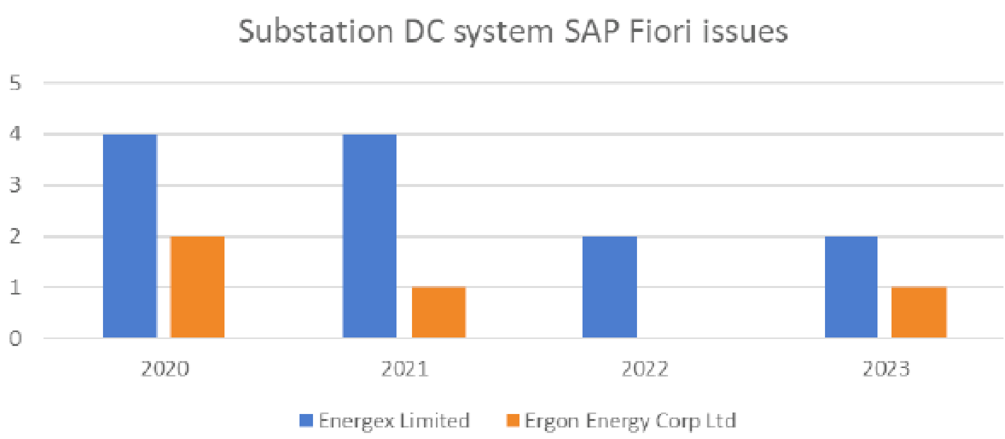
834. The PoF assumption has not been adequately tested. In response to our information request, EQ provided the following explanation for its PoF values:

> *Based on historical relay failure rate data to date, the average failure rate is approximately 0.05% and 0.2% for CTs. However, most failures of a bus protection are attributed to terminal and wiring failures, which are not systematically recorded, making it difficult to determine their precise probability of failure. To account for this lack of data, an estimate for the probability of failure for wires/terminals has been set at 0.03.*
>
> *Furthermore, busbar outages were considered to automatically occur 75% of the time as a result of the protection system failure. Protection malfunctions do not typically result in prolonged outages.*
>
> *In a series configuration, the system's overall reliability cannot exceed that of its least reliable component, adhering to the weakest link principle, which highlights the critical importance of installing a backup bus zone protection system to ensure optimal reliability. Therefore, the equation for the bus zone protection system failure rate is 0.03 As for bus outage, the PoF is 0.75 x 0.03 = 0.023.*

For the DC system, the same logic was applied, but due to less wiring and terminals, the failure rate was adjusted by multiplying by a factor of 0.75. This approach provides a more accurate representation of the DC system's reliability within the overall protection scheme.[200]

835. Notwithstanding that a bus protection scheme is based on several elements, this method relies on the failure rate of the protection relay as the starting point. Ergon has not demonstrated that the failure rate of bus protection schemes is effectively moderated by a factor of 75%, given their low occurrence. For DC system failures, EQ's SAP records show that DC system failure incidents are relatively rare, especially for Ergon at 1 to 2 per year as shown in Figure 6.6.

Figure 6.6: Ergon and Energex records of substation DC system failures.



Source: Ergon - 5.4.20 - Asset Management Plan DC Systems - January 2024 - public

836. We consider that the broad assumptions evident here indicate that Ergon should have sensitivity tested the results from its models, which we did not see in its documentation.

Ergon's proposed program was determined through a desktop study

837. Out of its 400 substations, Ergon considers that the '*majority will have protection schemes negatively affected by new and increasing bi-directional power flows'*.[201] Ergon then applied the following criteria to form a list of substations prioritised for treatment:

- Meshed sub-transmission (and transmission)
- Voltage >100kV [202]
- Adjacent to Powerlink Queensland bulk supply substation
- Number of sub-transmission lines originating or terminating
- Customer numbers
- Requires both a second DC supply system and a sub-transmission bus scheme.

838. The prioritised list was reduced to 120 meshed substations, and then 60 substations that have only one DC supply system. Ergon formed its program based on 27 of its highest priority locations where the augmentation to duplicate local DC supply systems and sub-transmission bus protection schemes is recommended. We consider that assuming the need is demonstrated, the prioritisation criteria are reasonable.

[200] Response_IR036_Ergon_Augex_Forecast_DC_Bus_Q4.

[201] GT AER Justification Statement ROST - Ergon Ver. Page 12.

[202] Ergon states that meshed substations with voltages >100kV would require duplicate DC supply systems and duplicate sub-transmission bus protection to meet the clearing times from S5.1a.8 of the National Electricity Rules.

839. Ergon is likely to deliver a smaller program than it has proposed based on its historical delivery of similar protection upgrade projects (being three projects per annum over five years).

840. With its revised design method, Ergon considers that up to six projects could be delivered per year, or up to 30 in the RCP.[203] We consider that Ergon has used this as an upper limit of the projects it has selected, to arrive at its proposed 27 projects. However, this fails to consider that the program is substantially delivered over three years and not five years of the RCP. If we accept Ergon's upper limit of six projects per year, over three years we arrive at a slightly lower number than Ergon has proposed.

841. In addition, there are several similar projects contained within the Backup Reach Protection Improvement and related repex programs that may draw from the same resource pool. These projects will run concurrently with the DC and Bus Overcurrent Upgrade program.

842. Whilst Ergon notes that the forecast increases in grid communications, protection and control expenditure are not as material to delivery as the increase in its overall program of work, it notes that '*they require targeted strategies to ensure specific skillsets are available to meet delivery.*'[204]

843. We asked Ergon for an explanation on how it plans to deliver the proposed program given that work on the projects is weighted towards the end of the next RCP. In its response[205] Ergon explains that it had introduced a project-by-project delivery method, aimed at delivering the projects within shorter cycles. Ergon assessed that this had enabled it to re-distribute the workload and ensure a smoother progression towards completion of the program.

844. The expenditure profile for this program does not indicate that a re-distribution has occurred. It does indicate a potential backlog of work at the end of the next RCP, especially when considered alongside other programs in the Ergon and Energex portfolio.

6.4.4 Grid control project grouping

Forecast is dominated by a small number of large projects

845. We identified $28.2 million proposed for grid control augex during the next RCP for 15 projects. The top four projects account for 88% of the capex for the Grid Control grouping as shown in Table 6.16.

Table 6.16: Grid control project grouping ($m, FY25)

Project name	FY26	FY27	FY28	FY29	FY30	Total
Grid Control Operational LV Model	1.7	1.7	1.7	1.7	1.7	8.4
Grid Control Distribution Management System Advanced Functions	1.2	1.2	1.2	1.2	1.3	6.2
Grid Control Distribution Management System Version Upgrade	1.4	1.4	1.5	1.5	1.6	7.4
GC Distribution Management System Continuous Improvement Cont Imp (Post DEB - AUGEX	0.5	0.5	0.5	0.5	0.6	2.7
Grid Control Distribution Management System Staging Environment Upgrade	-	0.5	-	-	-	0.5

203 Individual project justification statement.

204 Ergon - 5.2.07 - Network Deliverability Strategy - January 2024 – public. Page 18.

205 Response_IR036_Ergon_Augex_Forecast_DC_Bus_Q3.

Project name	FY26	FY27	FY28	FY29	FY30	Total
Grid Control Field Device Log Rotation	0.4	-	-	-	-	0.4
Grid Control RTU Configuration Management	0.4	-	-	-	-	0.4
Grid Control IEC61850 Non Protection Devices	0.4	-	-	-	-	0.4
GC Operator Training Cap - AUGEX	0.3	-	-	-	-	0.3
Grid Control Automated Distribution Management System Testing	0.3	-	-	-	-	0.3
Grid Control Low Trust FEP	0.3	-	-	-	-	0.3
Grid Control CSD Upgrade 25-26	0.3	-	-	-	-	0.3
Grid Control CSD Upgrade 256-27	-	0.3	-	-	-	0.3
GC Underfrequency Load Shedding DMS Smart Applications	0.1	-	-	-	-	0.1
GC ABB Decommission NS 25 - AUGEX	0.2	-	-	-	-	0.2
Total	**7.6**	**5.6**	**4.9**	**5.0**	**5.1**	**28.2**

Source: EMCa project grouping based on Ergon's SCS capex model

846. Ergon explained during our onsite meeting that the above projects are focused on version maintenance of its Advanced Distribution Management System (ADMS), associated systems, and implementing new advanced capability in the ADMS.

847. The capex for the remaining 11 projects is proposed for the first 1 or 2 years, which is indicative of projects rolled over from the previous RCP and/or front-loading of the forecast capex, whereby the delivery may be different to that proposed. Collectively, these projects comprise around 12% of the forecast capex.

848. Ergon explained that the balance of the expenditure is focussed on building its support capability and providing multiple small business enhancements within its grid control systems.

Inclusion of the ADMS version upgrade project is reasonable

849. The project anticipates the timing of upgrades to EQ's ADMS and Mobility systems. The periodic updates are required by vendors to ensure ongoing support. Ergon emphasises the importance of ensuring the upgrades are maintained:

> *Energy Queensland Limited (EQ) implementation of the [redacted] mobile switching is a state-wide, highly complex mission-critical system for power network control and network outage management.*[206]

850. Whilst the sequencing of the various components of the upgrade is currently uncertain, Ergon's assumed trajectory is reasonable. The allocation of the $7.4 million costs is spread quite evenly across the five years and appears to be consistent with the timeframes anticipated in the body of the justification paper and we find inclusion of this project to be reasonable and good practice.

206 WR1787232 GC DMS Version Upgrade NS. Page 4.

Inclusion of the Operational LV model project is reasonable

851. Under EQ's Unified GIS project (UGIS) Ergon's legacy Geospatial Information System (GIS) will migrate from GE Smallworld to the ESRI GIS platform. As part of this transition the LV switches and sites will be replicated to the DMS.[207] This presents an opportunity for full connectivity of the LV network model to be built into the DMS enabling visualisation in a geographic layout.[208]

852. EQ expects that the importation of the LV Connectivity Model into the DMS for switching capability will open significant opportunities to decrease LV safety risks, improve LV switching operational awareness, and decrease overall Guaranteed Service Level (GSL) and National Energy Customer Framework (NECF) breaches.

853. EQ has identified that the data cleansing effort required to bring Ergon's LV connectivity model into the DMS may be significant. The project Justification Statement did not provide any information on how Ergon is planning to manage the risk and associated costs if this eventuates.

854. The options analysis is limited to a do nothing counterfactual. This appears reasonable as there is not a logical alternative to the migration of GIS data to the DMS.

855. The capex attributable to the project is spread evenly across the five years of the next RCP. Whilst this is probably not what will happen in practice it is a reasonable assumption given that it is being integrated into a larger existing project. The cost estimate also includes a small component for opex.

856. The tangible benefits included in the NPV calculation include 25% workflow efficiencies in switching sheet writing ($336k/year), 33% reduction in Guaranteed Service Level (GSL) and 50% NECF compliance breaches[209] (totalling $165k/year), and fewer switching incidents resulting from a 33% reduction in LV switching safety risk (both fatality and injury). Net benefits are calculated to be approximately $12 million. We have not been provided information on how these benefits have been determined, or the degree, or not, to which the identified benefits can be realised from the data in the existing system.

857. Taking action to build in improved visibility of the LV network when unifying systems is good practice. The benefits expected to be realised appear logical, improving safety for field workers and consumers, whilst at the same time achieving ongoing opex savings are desirable outcomes. We note that project delivery is dependent on the completion of four other related DMS projects.

Absence of a robust delivery and benefits plan to address delivery risks, suggests the broader DMS program will experience delay

858. Ergon identifies that the ADMS platform in use at EQ has the capability to perform *'smart grid technology and capability around smart self-healing power networks, distribution network state estimation, and distribution power flow studies.'*[210] The objective of this project is to realise this functionality through implementing the advanced DMS features that provide FLISR (self-healing network), automatic switching sheet writing and power analysis tools on the as-switched network.

859. Ergon considers that this project may initially be implemented as a pilot project, using the advanced functions on a selected region prior to rolling out over the entire network.

860. The implementation of the advanced functions option is compared with the 'do nothing' base case. The difference between the base case and upgrade options reveals the expected disbenefits if the added functionality is not gained:

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207 We have referred here to a DMS , as Ergon has done, however understand these projects relate to its implementation of an ADMS

208 WR1787231 GC Operational LV Model NS.

209 There was a conflicting reference in the business case where benefits were quoted as 50% reduction in NECF breaches, and 66% reduction when aggregated with GSL breaches.

210 WR7780609 GC DMS Advanced Functions NS. Page 4.

- Ever-growing control room staff numbers to cope with the growing network, and ever increasing switching sheet numbers
- Growing complexity of switching sheets, as the network becomes more complex
- Increased focus on public safety, driving need to patrol feeders following a fault leading to increasing restoration times, outage minutes and unserved energy
- Risk of reconfiguring the network to an unprotected situation due to undetectable fault levels
- Limited visibility of power flows on the network, particularly reverse flows.

861. The net NPV for the project is $35.9 million from:[211]

- Reduced effort required to manually write switching sheets ($3 million per year).
- Reduced time to locate fault ($1.8 million per year).
- Automated fault isolation and restoration resulting in customer minute savings - 165MWh per year.

862. Ergon has also included the DMS Continuous Improvement project to address deferred DMS improvements due to migration of its EMS into the Unified DMS project.[212] Ergon considers that the delays have led to issues that are now approaching critical levels where modifications must be made to the system. Ergon has included additional financial and reliability benefits from this project and has calculated the net benefits from completing the upgrades to be $24.5 million, in the business case.

863. The collective benefits from these two DMS projects exceed $60 million in NPV terms, and when added to other DMS projects are much higher. We note that the basis of input assumptions that underpin the estimate of benefits vary across Ergon and Energex, without explanation.

864. We have not seen evidence of a roadmap, or benefits realisation plan associated with Ergon's DMS projects, or when viewed across EQ. We would expect EQ to put in place rigorous project management monitoring and reporting to track the achievement of these significant benefits.

865. The expenditure profile for both of these projects is allocated evenly over the 5 years of the next RCP. It seems unlikely that this will be the case if the project is implemented, and each project recognises delivery risks due to the dependencies of completing other DMS projects. As a result, when considering the portfolio of improvement projects that Ergon is undertaking, we consider that it is more likely than not that parts of its program will experience delay, and as a result, the expenditure profile extends into the next RCP.

866. As these key upgrade projects are common to both Ergon and to Energex, we would have expected to see an overarching strategy and delivery plan, to assist support the business case for proceeding with these projects, and we did not.

6.4.5 Grid communications project grouping

867. Proposed capex is dominated by a single communications project, however Ergon has not provided supporting information to justify its inclusion.

868. Our initial project grouping identified grid communications projects of approximately $53.3 million for the next RCP, with the largest component a single project Grid Communications Asset Enhancement at a cost of $28.7 million as shown in Table 6.17.

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211 WR7780609 GC DMS Advanced Functions NS. Pages 9-10.

212 WR1787229 GC DMS Continuous Improvement NS.

Table 6.17: Grid communications project grouping ($m, FY25)

Project name	FY26	FY27	FY28	FY29	FY30	Total
GRID COMMS - Communications Asset Enhancements	3.3	5.2	6.8	6.9	6.5	**28.7**
GRID COMMS - Capacity Upgrade Fibre and DO WAN	1.3	1.3	1.3	1.3	1.3	**6.5**
GRID COMMS - Reliability Core MPLS and Fibre	1.1	1.1	1.1	1.1	1.1	**5.4**
GRID COMMS - Reliability Edge Fringenet and Backhaul	0.7	0.7	0.7	0.7	0.7	**3.4**
GRID COMMS - Operational Enhancement	0.3	0.4	0.4	0.4	0.4	**1.8**
GRID COMMS - Reliability Isolated Systems	0.3	0.3	0.3	0.3	0.3	**1.7**
GRID COMMS - P25 Coverage South West	0.3	0.3	0.3	0.3	0.3	**1.5**
GRID COMMS - P25 Coverage Far North	0.3	0.3	0.3	0.3	0.3	**1.5**
GRID COMMS - P25 Reliability Upgrade	0.2	0.2	0.2	0.2	0.2	**0.8**
GRID COMMS - P25 Capacity Upgrade	0.2	0.2	0.2	0.2	0.2	**0.8**
GIRD COMMS - P25 Coverage Capricornia	0.1	0.2	0.2	0.2	0.2	**0.8**
GRID COMMS - Digital Enablement	0.1	0.1	0.1	0.1	0.1	**0.4**
Total	**8.1**	**10.1**	**11.7**	**11.9**	**11.5**	**53.3**

Source: EMCa project grouping based on Ergon's SCS capex model

869. We asked Ergon to provide a summary of its Grid Comms program, to understand the overarching strategy, composition of projects and outcomes. Ergon included forecast augex of $21.3 million ($Dec 2022)[213] for grid communications, protection and control for the next RCP in this investment program document. However, the investment program summary does not identify, discuss, or include key projects including the Grid Comms Communications Asset Enhancements.

870. Ergon has not provided supporting evidence for the scope or timing of this project, that would justify including this project into the forecast augex. At $28.7 million, the project makes up the majority of the Grid Comms program and a material part of the proposed augex for the broader category.

871. In addition to the $21.3 million ($Dec 2022) for Grid Comms augex projects, Ergon also proposes a Grid Comms repex program for the next RCP, which we discuss in Section 5.

Grid Comms projects are further separated into two technology types

872. Ergon allocates its remaining Grid Comms augex projects according to two technology types of 'IP Network and Linear Media' and 'P25 Radio Systems'.

213 ERG IR007 – GRID COMMS Investment Program.pdf. Page 3.

Ergon identified that its grid comms assets are at end of life

873. Ergon explains[214] that its communication assets were established between 2009 and 2013 under a project called UbiNet. It says that many assets with expected lives of 7-12 years have become obsolete and have exceeded the vendor end of life support dates.

874. Ergon's states that the drivers of the portfolio of augex projects are to improve the availability, reliability, performance, coverage and capacity of telecommunications services. We tested the application of the drivers to classify the projects as augex when reviewing a sample of projects.

875. We found that the projects included as augex did provide increased capability and capacity above that which a like for like replacement would not. In some projects such as the P25 base station reliability project, older assets will be replaced but with higher capability solutions. We therefore looked for evidence that Ergon has not double counted replacement projects in augex in addition to its repex communications proposal.

Ergon provided Justification Statements at the project and program level

876. Ergon provided both project and program level Justification Statements to support its proposed investment for augmentation of its grid control assets. At the program level, Ergon aggregated the values derived for each project as shown in Figure 6.7.

Figure 6.7: Grid communications augex program option summary ($Dec 2022)

Option	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025-30
(Base case) Counterfactual	0.30M	0.61M	1.46M	2.07M	4.16M	**$8.61M**
1. Change program size or alternate solution	14.18M	14.22M	14.22M	14.25M	14.25M	**$71.12M**
2. (Proposed) Targeted program	4.25M	4.26M	4.26M	4.27M	4.27M	**$21.31M**

Source: Ergon Grid comms investment program provided with IR007, Table 14

877. Ergon considered two options and compared these to its base case (no investment) counterfactual, being (i) Do everything – alternate solution, and (ii) Optimised change – targeted program.

878. The first option included the full suite of augmentation actions (or an alternate course of action) that Ergon has identified. The second option is a modified version of option 1. The cost of option 1 was not considered to be a credible option at a program level. Ergon identifies this as the targeted program which is 70% lower in cost than the option 1 total.

879. Ergon determined that its preferred option, the targeted augex program, had an NPV of $2.32 million, noting that the benefits fall away materially after 14 years. The NPV analysis considered each of the repex and augex projects, with many having marginal benefits or negative. We did not see evidence for the assumptions included in this model, including where they appeared to deviate from assumptions used elsewhere in Ergon's forecast capex, such as a $30 million Value of Statistical Life (VoSL) and emergency replacement premium of 200%. Absent clear justification of the parameters, given the existing sensitivity of the benefits and marginal nature of some projects, the expenditure as proposed is not justified.

Program of Grid Communications are likely to be overstated

880. We consider that the expenditure profile is indicative of early planning such that the practical deliverability of the proposed programs has not yet been determined. Ergon acknowledges this in several of its Justification Statements.

214 ERG IR007 - GRID COMMS Investment Program.

881. None of the Justification Statements included credible alternatives to the preferred option. We found it surprising that in the highly competitive communications technology market, that Ergon did not identify a broader range of options in its' Justification Statements.

882. We also consider that the proposed grid communications augex programs and projects do not appear to have been subjected to rigorous review and challenge to determine an optimised program.

883. We selected a sample of projects to review in more detail, as outlined below.

Upgrade of capacity for the WAN is reasonable

884. Ergon has identified that it is experiencing high demand on its fibre cables. Ergon state that the capacity constraints are reducing its ability to manage its communications network for re-routing of services during fibre outages and for new service provision planning for network augmentation.

885. Ergon's strategy is to increase capacity for offices and depots to avoid the need to reactively implement solutions and included $5.65 million ($Dec 2022) for the Capacity Upgrade WAN project. However, in its NPV model and business case the value is lower at $3.4 million ($Dec 2022). The difference is not explained by Ergon.

886. The identified drivers of increased capacity have been the uptake of technologies driving Ergon's technology investment such as its future grid, telecom evolution, meeting room upgrades and moving files to the cloud. Ergon's analysis of daily and weekly WAN link average utilisation supports the identified driver of this project. However, the information provided is at a total system level and provides no information on the prioritisation and timing requirements for the rollout across the network.

887. The benefits identified are:

- Compliance with NER S5.1.2.1(d), avoids reliability issues associated with failing cables causing outages and loss of N-1 security while issues are being resolved
- Avoidance of fibre congestion impacting emergency optical service restoration and subsequent business / network operations.

888. The need to increase capacity is supported by evidence that capacity limits are being reached at a total system level, and additional depot capacity requirements.

889. Ergon considered an option to use 3rd Party carrier connections to 20 of the 32 sites it identified where capacity increases are required. Ergon says that it rejected this option due to the remote location of many of these sites and reliability and availability of the required service capacity could not be guaranteed.[215] Whilst Ergon did not provide information on how it has determined the capacity issues it has identified, given the relative remoteness on several of its installations, we consider that the rejection of the option is likely to be reasonable.

890. The solution proposed addresses the identified issues by:

- Deploying alternative technology at targeted locations to recover fibre cores for operational use
- Installing new fibre to reduce fibre core congestion at key locations on the network, to allow migration of operational services in emergency situations.

891. Ergon noted that taking the do-nothing option would not pose an imminent risk to the network, but it could become critical when impacted by other fibre network failures which require temporary fibre reroute to establish services.

892. Notwithstanding the unexplained difference in forecast capex included in Ergon's documentation, the current utilisation of bandwidth capacity (greater than 90% for depots and offices[216]) combined with the pressure that Ergon's strategically driven programs will

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215 ERG IR020 - GRID COMMS Capacity Upgrade WAN - Business Case. Page 7.

216 ERG IR020 - GRID COMMS Capacity Upgrade WAN - Business Case. Page 5.

place on existing systems, support the need for capacity augmentation. We accept the importance of augmenting the capacity of communications systems during the next RCP.

Ergon has not adequately demonstrated the need for the scope of reliability improvement projects that it has proposed

893. Ergon has included two communications reliability improvement projects, Reliability Core MPLS [217] and Reliability Core Fibre at a total cost of $4.6 million ($Dec 2022).

894. The Core MPLS project is driven by Ergon's wish to remove reliability risks associated with single points of failure and improve the performance of communications to important electricity network services including protection, SCADA, and substation voice communications. In total 35 sites are proposed to have a reliability upgrade, deploying three different solutions. However, the criteria used to determine this program was not provided, nor information supporting historical outage numbers, impacts, current experience of failure and associated costs.

895. The NPV result[218] of approximately -$8k suggests to us that the financial business case for this investment is finely balanced and is close to a breakeven project, which is surprising given Ergon's description of the risks that this project is targeting. For example, a risk optimised solution could have been developed and tested.

896. The Core Fibre project is to reduce outage times attributable to single points of failure from fibre cable network, comprising a further 13 sites. Ergon identifies the benefits of completing the proposed work to be avoidance of costly repair works, and compliance with NER S5.1.2.1 (d) due to associated loss of N-1 security during repair works.

897. Ergon identifies that its fibre network currently has areas where fibre cables share common supporting infrastructure, for example, poles, pits, conduits within the electricity network. As for the MPLS project, Ergon does not include information on current failure rates, restoration times, and impact on services.

898. The options analysis for both the MPLS and Fibre upgrades suggests that there are no credible options to the proposed programs other than 'do nothing'. Whilst we note that some alternative technologies are discussed, they are dismissed as being too expensive.

899. Whilst Ergon has described an issue that could well be worthy of addressing during the next RCP, it has not provided convincing evidence and analysis that the proposed timing and scope of the proposed program is optimal. The criteria applied for selection of the proposed scope or whether this project forms part of a larger strategy across multiple RCPs were also not demonstrated. Progressing work on the highest risk sections of its telecommunications networks and developing experience and understanding of the timing of the developing issues may result in a lower level of expenditure.

The analysis provided for the Reliability Edge Fringenet and Backhaul project suggests the benefits are marginal

900. Ergon proposes to deploy cellular 4G/5G/NBN/LEO SAT backup services with the new Software Defined Wide Area Networks (SDWAN) solution to critical/remote sites to improve SCADA/Operational Technology (OT) data reliability.[219] SDWAN is a technology that provides benefits through an automated approach to managing network connectivity to the cloud.

901. In this program, Ergon will *target reliability improvements to the fringe network access edge components at low level of importance, specifically distribution components of the network required to deliver capacity for EQ to locations such as depots and substations*.[220] We understand that Ergon's description relates to work on the 'access' and 'edge'

[217] MPLS is a routing technique in telecommunications networks sending oackets of information along predetermined pathways.

[218] ERG IR020 - GRID COMMS Reliability Core MPLS - Business Case. Page 8

[219] ERG IR020 - GRID COMMS Reliability Edge FringeNet - Business Case. Page 4.

[220] ERG IR020 - GRID COMMS Reliability Edge FringeNet - Business Case. Page 3.

telecommunications architecture layer, at the fringe of its telecommunications network.[221] These layers are the lowest priority of the architecture. Ergon considers that the project will improve the performance of the underlying communications services for protection, SCADA, corporate data services, substation voice communications and a range of other services. Cost savings will be achieved through avoided emergency response to outages, lost productivity and loss of control of substations when SCADA links are down.

902. Ergon's CBA model provides the basis through which it has calculated the benefits, however information on how the input values have been determined has not been provided. The economic analysis suggests a low NPV, which is sensitive to input assumptions.

903. We consider that the above sensitivity analysis is important considering the marginally positive NPV and the relatively short asset life over which the benefits are derived. From an investment perspective this project presents a marginal proposition with uncertainty on the value that will be derived.

6.4.6 Operational Technology (OT) project grouping

Ergon program is based on shared operating systems with Energex

904. This program is the same as the program proposed by Energex both in content and aggregate annual expenditure profile.[222] This is attributable to the shared operating systems and the development of unified platforms under EQ. The proposed capex comprises three projects as shown in Table 6.18.

Table 6.18: Operational technology grouping ($m, FY25)

Project name	FY26	FY27	FY28	FY29	FY30	Total
OT Augmentation	1.3	1.2	-	-	-	**2.5**
OTE [redacted] Continuous Imp - AUGEX	0.5	0.5	0.5	0.5	0.5	**2.5**
OTE Infrastructure Augmen - AUGEX	0.1	0.1	0.5	0.2	0.1	**0.9**
Total	**1.8**	**1.8**	**1.0**	**0.7**	**0.6**	**5.9**

Source: EMCa project grouping based on Ergon SCS capex model

905. Ergon's overarching objective for its OT investments is to:

> *enable Energy Qld to securely provide business solutions for the continued running of existing applications and adoption of next-generation technologies to improve customer choice and provide cost competitive alternatives to traditional network investment.*[223]

906. Whilst development and maintenance of a secure operational environment is important, we do not consider that Ergon has sufficiently justified the proposed options for its proposed OT projects, specifically provision for what appears to be multiple programs aimed at 'provisional' sums for unspecified improvement projects.

221 We form this view based on our review of historical Ergon documents whereby the CoreNet telecommunications sites are separated into a four layered architectural framework: (i) Core Layer - Highest transport and major wide area network (WAN) capacity between major cities and aggregates distribution layer sites. (ii) Distribution / Aggregation Layer - This layer aggregates sites from the access layer onto common WAN capacity. Provides medium WAN capacity between smaller towns. (iii) Access Layer - Aggregates services and connections to common capacity provided by the distribution layer. Typically provides capacity within a township (iv) Edge Subscriber / Terminals / Customer Layer - The subscriber layer connects internal/external customers equipment/users to the access layer.

222 Minor differences are present for year on year expenditure for the component projects between Ergon and Energex, and which are not explained.

223 EMCa_AER Presentation - 13 to 15 May 2024 (Day 1)_provided to AER. Slide 93.

Multiple continuous improvement programs to manage OT infrastructure are not sufficiently justified

907. Ergon has included multiple programs that it describes as continuous improvement, aimed at managing the asset lifecycle of its PoF systems so that they are secure, reliable, efficient, and able to support new technologies and systems[224] and to ensure its technology infrastructure systems can support new and emerging features and technologies that support the operation of critical control systems. [225]

908. Ergon considers that many of its existing OT assets are now approaching or are past their design life. An objective of the proposed program is to ensure Ergon complies with EQ's Digital Asset Management Guidelines to not extend operation of the assets beyond their useful life.

909. Ergon has calculated an NPV for each of its programs. However, we were not provided details of how the benefits were quantified, noting the NPV is only marginally positive.

910. Given the relatively low NPV for these programs, they have the potential to deliver a negative result. We have no information on a 'do nothing' counterfactual, and a general absence of information to support inclusion of the proposed expenditure. Whilst the aims of the proposed program listed above are important, Ergon has not provided sufficient information to justify the inclusion of this project into the forecast, or that multiple programs with a similar purpose are required.

Requirement for an improvement program when the system is proposed to be replaced is not demonstrated

911. Similar to Energex's RP, Ergon has included the OTE [redacted] replacement and continuous improvement project. We discuss the proposed [redacted] replacement project in Section 5, where we conclude that the planned replacement of [redacted] is likely to be reasonable.

912. Ergon has also proposed ongoing augmentation through an existing continuous improvement program. The objectives Ergon has set for this program are:

- *Ensure that the platform is integrated with new and emerging communications technologies as they are adopted.*
- *That critical calls through these technologies are prioritised appropriately.*
- *The platform is foundational in supporting seamless communications between the control room, field workers, and government agencies in providing the reliable and safe control of the network, and for restoration of critical services to the community in major events. onsite slide.*[226]

913. The additional benefits expected to be obtained through the addition of the continuous improvement component are limited. According to Ergon, the additional benefits primarily relate to improved workforce capability and customer and community sentiment. The [redacted] Business Case document does not provide an adequate explanation for why the proposed additional benefits of the continuous improvement project support the additional investment of $2.2 million ($Dec 2022) which is 51% of the cost of the repex for the [redacted] replacement.

914. The proposed sequencing of the investment before and coincident with the planned replacement is also not explained. Based on the limited benefits identified for the additional cost of the continuous improvement project, and our doubt regarding the need for the continuous improvement project, we consider that its inclusion in the OTE augex forecast is insufficiently supported.

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224 OTE AER Infrastructure Improvements Justification Statement – Ergon. Page 4.

225 EMCa_AER Presentation - 13 to 15 May 2024 (Day 1)_provided to AER. Slide 93.

226 Business case Ergon [redacted] Page 11.

6.4.7 Intelligent Grid Enablement project grouping

915. We identified three key projects in Ergon's Intelligent Grid Enablement project grouping. The purpose of the expenditure is to provide '*operational software systems to support emerging customer needs and provide cost competitive alternatives to traditional network investment.*'[227]

916. The Early Fault Detection Research program dominates the expenditure during the next RCP. The other projects are largely completed within the first three years of the next RCP as shown in Table 6.19.

Table 6.19: Intelligent grid project grouping ($m, FY25)

Project name	FY26	FY27	FY28	FY29	FY30	Total
Early Fault Detection, Research and Industry Enablement and Voltage Regulating Distribution Transformer Trial Programs	0.8	0.8	0.8	0.8	0.8	**4.2**
IGE Electric Vehicle Charge Management System	0.6	-	0.6	-	-	**1.3**
IGE Electric Vehicle Charge Management System	-	0.6	-	-	-	**0.6**
Intelligent Grid Customer Connections Portal	-	-	0.5	-	-	**0.5**
IGE LV DERMS - DER Integration Strategy	0.3	-	-	-	-	**0.3**
Total	**1.7**	**1.5**	**2.0**	**0.8**	**0.8**	**6.9**

Source: EMCa analysis of Ergon's SCS capex model

917. Ergon has provided Justification Statements for each of the above listed components, on which we have formed the following views:

- The projects are largely for research and field trials on various issues relating to identified network issues.
- The costs associated with the proposed projects appear to be high. For example, the cost of providing data for the Research and Industry Enablement project is $0.5 million ($Dec 2022). There are no breakdowns of the components contributing to the costs in the justification documentation.
- There was no identification and quantification of the benefits provided other than the NPV outcomes.

918. The project risks identified in the justification statements by Ergon were business/network risks rather than project risks. For example, a project risk identified for the EV charge management system research was '*without the EV Charge Management System, unmanaged growth in EV related energy flows may result in increasing complexities in field and control room operations*'.[228] A project risk may be more appropriately defined as a solution may not be identified.

919. The supporting documentation and the presentation made by Ergon during the onsite meeting has not demonstrated that the initiatives selected for investment are optimal or that the quantification of costs and benefits are reasonable. In addition, we have not been provided sufficient information that demonstrates that provision is not already included in other parts of Ergon's submission (including DER capex), and/or opex forecast to continue its collaboration with industry on similar research and development projects.

227 EMCa_AER Presentation - 13 to 15 May 2024 (Day 1)_provided to AER. Slide 96.

228 Ergon Energy - IGE Electric Vehicle Charge Management System. Table 5.

920. In summary, we understand and accept the need for research and pilot programs to assist Ergon to stay ahead of emerging issues and risks. We consider that these initiatives are so important that they should be given deep consideration in terms of scope and expected outcomes. The standard CBA approach to valuing projects may not be suitable for research projects that may not in the end lead to quantifiable benefits but will none the less have been valuable in some way.

6.4.8 Our findings of forecast augex for grid communications, protection and control

Forecast augex is materially overstated compared with a prudent and efficient level of expenditure

921. We consider that Ergon's proposed increase in expenditure from $64.0 million in the current RCP to $128.9 million in the next RCP for its grid communications, protection and control category is overstated.

We do not find evidence of an overarching strategy that assists justify the scope and scale of the proposed program

922. We do not observe an overarching strategy that applies a framework for the proposed expenditure, and as a result the need for, and relationship between, some of the elements of the expenditure is not sufficiently demonstrated. In general, the level of justification provided was insufficient, and where CBA models were available, we did not have information on the input assumptions that Ergon had used to determine its benefits.

923. The projects are similar to those proposed by Energex, particularly where shared systems / platforms are involved such as for the Operational Technology Environment (OTE), and which underpins the requirement for an overarching strategy and application to each of the Ergon and Energex's instances.

Ergon has not provided sufficient analysis to support the scope and timing of the proposed projects and programs

924. Many of the projects and programs that Ergon has proposed for the next RCP are continuing from similar projects and programs that Ergon has in place, and which based on representations from Ergon, are targeted at identified risks to the grid communications, protections and control assets, and provide benefits to the reliability, security and capacity of the associated assets and systems. To this end, many projects are likely to be prudent to be included in the forecast augex for the next RCP. However, in other cases Ergon has not provided sufficient analysis that the project is required to be undertaken or that lower cost alternatives could not be undertaken, such that a lower aggregate forecast expenditure would be prudent.

925. Ergon's proposed increase in expenditure relative to the current RCP is driven by a small number of projects, where the timing of expenditure is back-ended in the next RCP. We do not consider that these have been sufficiently reviewed from a deliverability perspective. In other cases, the expenditure profile reflects early planning, where the implementation for the project has not yet been considered, and which casts doubt on whether it would be completed within the next RCP.

We consider the proposed cyber security related program and associated expenditure in separate advice to the AER

926. Ergon has referred to cyber security risks in some of its proposed expenditure for its DMS and broader OT infrastructure and which is separate to its proposed cyber security project included in its proposed augex. We have considered Ergon's cyber security program, comprising $9.0 million classified as augex, and separate to its grid communications, protection and control category augex, in separate advice to the AER.

We do not consider that Ergon has subjected its portfolio of projects to sufficient review to optimise the scope and timing if the forecast

927. Overall, we find that the projects and programs that form the grid communications, protection and control category were not subject to sufficient review to determine the optimal portfolio, with respect to risk or other service outcomes, nor were we provided evidence that the level of proposed work in this category was required to maintain risk or service levels. We also found evidence of projects in the Intelligent Grid grouping that were of a research and development nature. If such a review had taken place, we expect that Ergon would identify a smaller program of work that would require a lower level of augex.

6.5 Implications for reviewed components of proposed augex

928. For the components of augex that we reviewed, we consider that:

- Ergon's expenditure of $183.1 million on its clearance program in the ex post period was higher than a prudent and efficient level
- Ergon's proposed expenditure of $181.1 million on a clearance program in the next RCP is materially higher than a prudent and efficient level
- Ergon's proposed expenditure of $128.9 million for grid communications, protection and control is materially higher than a prudent and efficient level.