EMCa
energy market consulting associates

Regulatory Proposal to AER 2015 - 2020

Review of Proposed Capital Expenditure in Ergon Energy's Revised Regulatory Proposal

Report to

Australian Energy Regulator

from

Energy Market Consulting associates

September 2015

This report has been prepared to assist the Australian Energy Regulator (AER) with its decision regarding the appropriate revenues to be applied to the prescribed distribution services of Ergon Energy Corporation Limited (Ergon) from 1st July 2015 to 30th June 2020. The AER's decision is made 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.

This report relies on information provided to EMCa by Ergon. 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, stated or inferred, include considerations of materiality to the requirements of the AER and should be read in relation to this over-arching purpose.

Except where specifically noted, this report was prepared based on information provided by Ergon Energy to the AER as part of its Revised Regulatory Proposal (RRP) and received by EMCa prior to 10th August 2015. Accordingly, any information provided subsequent to this time may not have been taken into account.

Energy Market Consulting associates
802 / 75 Miller St, North Sydney, NSW 2060
and
Level 1 Suite 2 572 Hay St, Perth WA 6000
AUSTRALIA

Email: **contact@emca.com.au**
Web: **www.emca.com.au**

About EMCa

Energy Market Consulting associates (EMCa) is a niche advisory firm, established in 2002 and specialising in the policy, strategy, implementation and operation of energy markets and related network management, access and regulatory arrangements. EMCa combines senior energy economic and regulatory management consulting experience with the experience of senior-level managers with engineering and technical backgrounds in the electricity and gas sectors.

Authorship

Prepared by:	Mark de Laeter, Gavin Forrest and Paul Sell with analytical input from Eddie Syadan
Quality approved by:	Paul Sell
Date saved:	21/10/2015 9:36 AM
Version:	FINAL REPORT v7.0

[This page intentionally blank]

Table of Contents

Findings i

1 Introduction 1

1.1 Purpose of this report 1

1.2 Scope of requested work 1

1.3 Structure of this report 3

2 Expenditure forecasting methodology 4

2.1 Introduction 4

2.2 General observations 5

2.4 Summary 6

3 Revised proposed augex 8

3.1 Introduction 8

3.2 Work in Progress 10

3.3 Remediation of power quality issues due to photovoltaics (PV) 11

3.4 Distribution transformers 15

3.5 Unspecified DNAP 15

3.6 Specified DNAP 17

3.7 Conclusions on reviewed aspects of revised augex 18

4 Revised proposed repex 20

4.1 Introduction 20

4.2 Line asset defect management program 24

4.3 Poles 25

4.4 Pole top structures 26

4.5 Overhead conductor 28

4.6 Underground cable 29

4.7 Service lines 31

4.8 Transformers 33

4.9 Switchgear 36

4.10 SCADA, network control and protection systems 38

4.11 'Other' asset category 40

4.12 Conclusions on revised repex 45

5 Revised proposed 'Other system capex' 47

5.1 Introduction 47

5.2 Operational technology 50

5.3 Protection 59

5.4 Miscellaneous 61

5.5 Conclusions on revised Other system capex 64

Appendix A: Our assessment of Ergon's claims 66

[This page intentionally blank]

Findings

Background

1. Ergon Energy ('Ergon') submitted its Revised Revenue Proposal (RRP) to the AER on 3 July 2015 for the five year regulatory control period 2015/16 to 2019/20.

2. Ergon proposed a revised capital expenditure forecast in its RRP of $3,282.5m ($2014-15).[1] This represents a 3 percent increase from its original proposal. The revised proposed expenditure allowance is 50 percent higher than the AER's Preliminary Decision.

3. The AER requested that we review the claims and new information provided by Ergon in its RRP in relation to certain specific aspects of its revised proposal as defined in our terms of reference[2] and by reference to our findings in EMCa's April 2015 report (our "initial review") to consider whether the reviewed elements of its revised augmentation capital expenditure ("augex") and replacement capital expenditure ("repex") proposal now reflect an efficient and prudent expenditure forecast.

4. The purpose of this review is to consider whether any of the new information provided by Ergon would cause us to amend our initial findings, in whole or in part, regarding the systemic issues identified in our April 2015 report and our associated assessment of their impact.

5. For the elements of augmentation capex under review, the AER also requested that we provide advice on whether Ergon's revised proposal is reasonable, or to otherwise quantify an alternative.

[1] Reflects the total gross capital expenditure for Standard Control Services, excluding customer contributions.

[2] Our terms of reference is limited to the review of elements of the revised capex forecast: (i) distribution network augmentation; (ii) replacement capex including the proposed allowance for a new program for conductor to ground clearance remediation; and (iii) 'other' system capex.

Overarching findings

6. In its RRP Ergon provided some new information and clarification in direct response to the AER's Preliminary Decision and the findings in our original report, and adjusted some elements of its proposed expenditure. Whilst some new information in the RRP is sufficient to mitigate our findings with respect to certain systemic issues identified in our initial review, it is not sufficient to change our assessment that the expenditure proposal, collectively, over-states the level that can reasonably be considered to be efficient and prudent.

Findings specific to Distribution augex

7. Ergon reduced its proposed Distribution augex by 7% to $319m through an adjustment to one of the five sub-categories of expenditure (Specified DNAP[3]). The revised forecast is 16% higher than the AER's Preliminary Decision of $274.6m. Our updated findings concerning the relevant sub-categories of Distribution augex, as compared to our initial findings, are as follows:

   (i) Inadequate links to prudent needs-driven analysis:

   – Ergon has provided additional information regarding its PV-driven PQ program that reinforces the need to address the voltage management issues. We consider that this additional information largely addresses our original concerns in this regard;

   – Ergon has not provided sufficient new information to change our view that the Unspecified DNAP program is inadequately linked to high priority network issues; and

   – We are satisfied that there are adequate links to network drivers in the other three expenditure programs.

   (ii) Inadequate options analysis – our concerns in this area encapsulated Ergon's approach to risk assessment, options considered, and cost-benefit analyses:

   – Ergon has taken a less conservative approach to risk and has reduced its forecast expenditure in the Specified DNAP area. As a consequence, we now consider that the forecast expenditure for this program is likely to be set at a prudent level;

   – Ergon has not considered further timing and volume options to address the forecast impact of PV systems and the inherent uncertainties involved in assumptions underpinning its analysis. We remain unconvinced that the level of expenditure proposed for the 2015-20 RCP is set at a prudent level; and

   – We are satisfied that there is adequate options analysis for the remaining distribution augex programs.

   (iii) Higher cost estimates than seem reasonable – Ergon has clarified its approach to cost estimation and this has somewhat mitigated our initial concerns in this area.

8. Despite the 7% reduction in overall expenditure forecast in this category, coupled with the new information to support and/or clarify some matters, we consider that certain systemic issues are still evident. We estimate the

[3] Distribution Network Augmentation Program

aggregate impact of identified systemic issues in the revised proposed augmentation capital expenditure to reflect an over-estimation bias in the order of a 5-15%.

Findings specific to repex

9. Ergon increased its proposed repex from $934m to $941m in its RRP. Underpinning this increase are a number of changes at the sub-category level, including the introduction of a new repex program.[4] Ergon's revised proposed repex is 39% higher than the AER's Preliminary Decision of $675m.

10. We have undertaken a review of a sample of expenditure included in Ergon's RRP. For the most part, Ergon has not updated the supporting information submitted as part of its RP and has provided only limited new information to support and/or clarify its revised forecast expenditure to address the systemic issues identified in our initial review.

11. We consider that the systemic issues identified in our initial review of Ergon's RP have not been adequately addressed in Ergon's RRP. Accordingly, the systemic issues are likely to remain present in the revised forecast, leading to an over-estimation bias. Our updated findings in regards to the relevant expenditure, as compared to our initial findings, are as follows:

    (i) Level of conservatisms towards risk remains evident:

    – Ergon has proposed an allowance for a new program for conductor to ground clearance remediation that proposes rectification of 15,000 identified defects in the first year of the RCP;

    – We consider that this most recent business case exhibits a highly conservative approach to risk and which Ergon proposes to adopt only on commencement of the next regulatory period. We consider that completion of all identified defects in a compressed timeframe as proposed has not been sufficiently justified.

    (ii) *Inadequate links to prudent needs analysis:*

    – Ergon has provided new information in relation to its CBRM analysis for Transformers and Switchgear, which establishes the need for renewal programs. However, we have identified opportunities where we consider that Ergon is more likely to prudently defer the work. Ergon does not appear to have considered these opportunities or taken them into account in its forecast; and

    – Ergon has made reductions to its forecast expenditure for some programs within the SCADA, network control and protection asset category without explanation, which casts doubt over the prudency of the original analysis and justification.

    (iii) Insufficient evidence of the establishment of an optimal risk/cost position for the portfolio or top-down review:

    – Ergon has made reductions to its forecast expenditure for programs within the 'Other' repex asset category, without

[4] To address conductor ground clearance defects

explanation of the impact to the overall risk position of the business; and

– Ergon's own risk assessment process appears internally inconsistent with regards to addressing identified risk areas.

12. Based on our review of the new information to support and/or clarify Ergon's revised forecast, we consider that material systemic issues are still evident and that the forecast expenditure does not reasonably reflect the capex criteria. We have not been requested to estimate the impact of the systemic issues on the proposed repex forecast.

Findings specific to 'Other systems' and enabling capex

13. Ergon reduced its proposed expenditure in this category from $99m to $95m in its RRP. The reduction arises from a 15% reduction in the 'Miscellaneous' sub-category. The revised forecast is 14% above the AER's Preliminary Decision amount of $83.3m.

14. The 'Other systems' capex category was not included in the scope of our initial review of Ergon's RP. We have therefore taken into account the relevant RRP documentation in our assessment of the proposed expenditure level, not just new information.

15. There are three sub-categories of expenditure in 'Other systems' capex and our findings (as summarised below) were evident in all programs and projects proposed for each sub-category:

(i) *Conservative risk assessment* – in many cases, risk rankings do not appear to appropriately take into account the likelihood of the highest consequence event occurring. This leads to a conservative risk rating that is higher than warranted. In turn, this conservative risk assessment appears to result in default selections that bias Ergon's forecast towards higher levels of expenditure for risk treatment than is prudent; and

(ii) *Inadequate options analysis* – Ergon's options analysis, as presented in its business cases, is generally limited in scope and opaque as to the assumptions underpinning its simplistic cost-comparison analyses. With some exceptions, Ergon typically does not adequately explore the risk-cost trade-off from deferring work within its options analysis.

16. We consider that Ergon's expenditure forecast in this expenditure category is likely to reflect a significant over-estimation bias in the order of 20-30% of the revised proposed expenditure.

1 Introduction

1.1 Purpose of this report

17. The purpose of this report is to provide the AER with our response to claims and new information provided by Ergon in its RRP, specifically:
    - Ergon's Revised Revenue Proposal 2015-20;
    - Supporting information provided to respond to the AER's Preliminary Decision;[5] and
    - Updated expenditure forecast summaries, management plans and engineering reports.
18. We have only assessed those aspects of Ergon's RRP submission that are directly relevant to the scope of our review.[6] Both our current assessment and initial review are based on limited scope reviews consistent with our terms of reference and which do not take into account all factors, or all reasonable methods, for determining a capital allowance in accordance with the National Electricity Rules (NER).

1.2 Scope of requested work

19. The AER issued a Scope of Work to EMCa in July 2015, requesting that we: (i) consider and respond to Ergon's responses in its RRP; (ii) provide advice on the issues raised by Ergon; and (iii) identify whether the results of this assessment have any impact on our original findings.
20. The AER included a specific request for our review to:

[5] We have referred to elements of the consultants reports that relate directly to our terms of reference.

[6] Our terms of reference is limited to the review of elements of the revised capex forecast: (i) distribution network augmentation; and (ii) replacement capex including the new program for conductor to ground clearance remediation. This expenditure is a subset of the capital expenditure within Ergon Energy's Revised Regulatory Proposal.

- review the distribution augex revised proposal and provide advice on whether Ergon's revised proposal is reasonable, or to otherwise quantify an alternative;
- review the 'other system capex' proposal and provide advice on whether Ergon's revised proposal is reasonable;
- review Ergon's revised repex proposal, particularly the materials responding to EMCa's April 2015 report, and provide advice on whether EMCa's original concerns have been addressed by the revised proposal or if EMCa retains its findings from the initial review; and
- review the new material on low spans repex programs and provide advice on whether these programs are reasonable.

21. The AER has sought advice on two aspects of Ergon's RRP that EMCa did not previously consider:
    - 'Other system' capex, noting that this was out-of-scope in EMCa's advice to the AER on Ergon's original regulatory submission; and
    - 'Low spans' for which Ergon seeks additional repex, supported by the introduction of new information.
22. We proposed a review of the new information provided in which we would:
    - undertake a desktop review of the claims and new information included in Ergon's RRP;
    - identify any new information or reasoning that might be relevant to our April 2015 report findings and the AER's Preliminary Decision;
    - expand and/or clarify the reasoning and evidence to support our original findings or, where applicable, amend our original findings; and
    - summarise our findings in relation to any systemic issues identified and the resultant implications of these issues, including to quantify the impact of these issues for Distribution capex and 'Other system' capex.
23. The assessment in this report is based on the information provided to us through this process.
24. In undertaking our assessment we have assumed the following:
    - The emphasis is on considering the new material provided, including any consultant reports, and advising the AER whether: (i) the new information is sufficiently compelling in the context of the NER to support a change to our initial advice to the AER; or (ii) the new matters were not within the scope of our initial advice. To this end, the requested focus is on how Ergon has sought to justify its proposed expenditure and associated volumes in the context of, and in relation to, the requirement to maintain the performance indicators set out under the NER capex objectives (i.e., quality; reliability; security; safety) and in relation to the historical performance achieved.
    - In the case of the augmentation capex to be reviewed, the AER requires us to provide justified, quantified adjustments to the revised expenditure (if any). Our understanding is that the AER is seeking either confirmed or revised adjustments to the proposed augmentation capex for Ergon.

- In the case of the aspects of replacement capex to be reviewed, the AER does not require quantified adjustments.
- Ergon's RRP does not include any consultant reports specifically responding to EMCa's assessment of its RP.

1.3 Structure of this report

25. Our findings are summarised at the beginning of this report.

26. In the subsequent four sections, we describe our assessment and conclusions regarding Ergon's new information in its RRP:
    - In section 2, we consider and respond to the new information provided by Ergon regarding its forecasting methodology and systemic issues;
    - In section 3, we consider and respond to the new information provided by Ergon regarding specific elements of its revised augmentation expenditure program categories for which the AER has sought our advice;
    - In section 4, we consider and respond to the new information provided by Ergon regarding its revised replacement expenditure program categories for which the AER has sought our advice; and
    - In section 5, we consider and respond to the new information provided by Ergon regarding its revised 'Other system' expenditure program categories for which the AER has sought our advice.

27. Appendix A responds to the claims made by Ergon in relation to our original findings and the evidence we relied upon to determine these findings.

2 Expenditure forecasting methodology

2.1 Introduction

28. In this section, we consider the new information provided by Ergon in its RRP, including new supporting information,[7] and whether this leads us to alter the findings set out in our initial review regarding its applied governance and forecasting methodology.

2.1.1 AER assessment approach

29. In December 2014, the AER released its Issues Paper on the Queensland electricity distribution regulatory proposals.[8] In Appendix A to the Issues Paper, the AER describes the distributors and the regulatory framework that is administered by the AER, including the Better Regulation guidelines.

30. The Expenditure Forecast Assessment Guideline[9] describes the AER's position on the capital expenditure approach as follows: "*We intend to use a combination of top down and bottom up assessment to assess forecast capex.*" The guideline includes reference to a number of key changes to the assessment of capex, including "*a greater requirement for the economic justification of expenditure and increased data requirements to support proposals*".

[7] Supporting information submitted as revised from the original proposal

[8] AER December 2014 Issues paper Qld electricity distribution regulatory proposals 2015-16 to 2019-20

[9] AER Better Regulation Explanatory Statement Expenditure Forecast Assessment Guideline

31. The explanatory statement for the Expenditure Forecast Assessment Guideline outlines the elements of the capex assessment process[10] including "*reviewing the economic justification for evaluation"* and "*sample review of projects and programs and applying efficiency findings to other expenditure forecasts."*

32. In its Preliminary Decision, the AER also referred to its application of the Expenditure Forecast Assessment Guideline, referring to its consideration of past expenditure in its assumptions. The AER states:[11]

> *"Past expenditure was sufficient for Ergon Energy to manage and operate its network in that previous period, in a manner that achieved the capex objectives."*

2.1.2 Technical review of Ergon's RP

33. The AER engaged EMCa as its technical consultant to help identify systemic issues that may be resulting in forecasting biases in Ergon's RP replacement capex. As described in our April 2015 report, our approach to this task incorporated an evidence-based assessment of the quality of Ergon's governance, management, planning, forecasting and budgeting processes. Our assessment was based on a review of process documentation provided by Ergon. We tested the extent of Ergon's application of identified processes by reviewing a sample of its augex and repex programs.

34. We consider that our review approach is consistent with the Better Regulations guidelines that were (and remain) in effect prior to our assessment of Ergon's RP. EMCa has applied this same 'fit-for-purpose' assessment approach in multiple prior reviews of regulatory expenditure proposals for Australian transmission and distribution network service providers.

2.2 General observations

35. Ergon has revised a number of supporting documents that primarily relate to: (i) material data errors; (ii) inclusion of new programs; and (iii) providing a summary of its revised forecasts.

36. In general, Ergon has not revised its business cases, engineering reports and management plans associated with its revised forecast.[12] Accordingly, the source of the changes to its forecast were in many cases not clearly evident. In the absence of better information, it would appear that the primary changes were associated with reconciling the total capex with the changes proposed. For example, Ergon introduced a new program '*Conductor Ground Clearance remediation'* in its revised replacement capital expenditure forecast. Ergon also made reductions to other programs in the 'Other' asset category of repex. A

[10] AER, Better Regulation Explanatory Statement Expenditure Forecast Assessment Guideline, pages 54-55

[11] AER Preliminary Decision, Ergon Energy decision 2015−16 to 2019−20, Attachment 6 − Capital expenditure, April 2015, pages 6-17

[12] In response to Information Requests, Ergon provided a number of existing business cases that were not submitted as part of the RP suite of documents. The business cases were taken into account in our review of the specific programs nominated by the AER

new supporting document is provided for the new program; however, no justification is provided for the reductions in other programs.

37. Under the propose/respond regulatory model in place in the NEM, the onus is on Ergon to present clear, consistent and compelling information and evidence to the AER and its consultants in support of its RP and RRP. The regulatory review process also provides Ergon (and other NSPs) with the opportunity to review and respond to the AER's Preliminary Decision and matters raised in reports provided to the AER, such as our April 2015 report. To the extent that any such reports indicate that Ergon did not provide sufficient information to support its RP, Ergon had the further opportunity to provide such additional information as it deemed necessary and/or appropriate through its RRP.

2.3 Corrections to expenditure forecasts

2.3.1 Applied methodology for escalation

38. Ergon confirmed that it has applied escalation factors differently between the expenditure forecasts included in its RIN and expenditure summary supporting documents. We reviewed the updated expenditure forecasts included in its supporting documents, and explanations of differences to the RP where provided.

39. We discuss the material issues as they relate to the augex forecast in section 3.

2.3.2 Reset RIN data errors

40. Ergon identified a number of errors made in the submission of its Reset RIN template 2.2 forecast data. We reviewed Ergon's submission on the adjustments to the reset RIN, and compared the revised expenditure forecasts to these figures.

41. We discuss the material issues as they relate to Ergon's repex forecast in section 4.

2.4 Summary

42. Our April 2015 report was based on a review of Ergon's augmentation and replacement capital expenditure forecast to identify evidence of systemic issues that may result in forecasting biases in Ergon's RP.

43. In its RRP, Ergon provided some new information and/or clarification of its top-down assessment, risk assessment approach and corrected expenditure forecast data. Ergon also made a number of claims to dispute certain findings from our April 2015 report. We address these claims separately in Appendix A.

44. We considered the new information provided and the claims made by Ergon in its RRP. We find that: (i) the new information is limited in scope, and includes assertions that are not supported by Ergon's documentation; and (ii) similar systemic issues are evident in the aspects of proposed augex and capex that

we initially reviewed. Having duly considered the new information and claims, we find that Ergon did not provide sufficient evidence to lead us to modify our original finding (as set out in our April 2015 report) that there are systemic issues in Ergon's expenditure forecasting methodology.

3 Revised proposed augex

3.1 Introduction

45. In this section, we consider Ergon's RRP as it relates to the specific areas of Ergon's augmentation capital expenditure included in our terms of reference from the AER. The scope of our review incorporates Ergon's proposed expenditure on distribution (as opposed to sub-transmission), within its category of Customer-Initiated Augmentation (CIA)[13]. This comprises:

- the continuation of some works in progress, and programs of work on remediation of power quality due to photovoltaics (PV);
- distribution transformers;
- specified Distribution Network Augmentation Programs (DNAP); and
- unspecified DNAP.

3.1.1 Summary of AER's Preliminary Decision

46. In its Preliminary Decision, the AER adjusted (reduced) Ergon's proposed distribution augex by 15%. The AER did not indicate adjustments specific to each of Ergon's proposed sub-categories of expenditure.

47. The AER referred to EMCa's April 2015 report finding that Ergon's proposed level of augmentation capex for the next RCP exhibited systemic issues that collectively biased the forecast towards over-estimation. The AER considered that Ergon's proposed augex:

- had not been adequately linked to a prudent needs-driven analysis, including efficient timing of expenditure and connection of new loads;
- had not been adequately supported by cost-benefit analysis, robust options analysis and appropriately applied risk assessment; and

[13] The CIA category includes two expenditure categories: Subtransmisison and Distribution

- included estimates that have led to a higher level of expenditure than may be required.

3.1.2 Summary of Ergon's RRP

48. Ergon's revised forecasts are shown in the table below, which also shows that Ergon has presented partially and fully escalated expenditure forecasts.

Table 1: Comparison of CIA expenditure between RP and RRP (direct costs)

$m, 2014-15	Distribution augex	Sub-transmission augex	CIA Total
Ergon original proposal (partially escalated)	323	193	**516**
Ergon original proposal (fully escalated)	342	203	**545**
Ergon revised proposal (fully escalated)	319	192	**511**
Variance ($m)	23	11	**34**
Variance (%)	7%	6%	**7%**
AER preliminary decision	275	188	**463**

Source: EMCa analysis

49. We note that in the AER's Preliminary Decision, $33m of its adjustment to Ergon's original proposed expenditure was due to what the AER referred to as 'Unexplained capex' (because there were discrepancies in Ergon's summary documentation and its RIN data). Ergon has sought to explain that the difference identified by the AER was a result of it applying different escalation methodologies to its forecast expenditure summary documentation and in the reset RIN. In its RRP, Ergon advised that it substituted new forecasts *"in accordance with Ergon Energy's Forecasting Methodology, i.e. applying CPI and non-CPI input price escalations"*[14] for Distribution augex and, therefore, 'Unexplained capex' should not be deducted by the AER in its capital allowance. Whilst this matter is external to our assessment of the specified aspects of Ergon's RRP, it is noted here insofar as it affects some numerical reconciliation of cost information.

50. As shown in Table 2, Ergon's RRP includes a revised forecast for total Distribution augex of $319m. The revised forecast is $44m (16%) higher than the level in the AER's Preliminary Decision and $23m (7%) lower than its fully escalated original proposal.

Table 2: Distribution augex expenditure (direct costs)

$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Ergon original proposal	69	64	64	63	63	323
Ergon original proposal (fully escalated)	71	68	68	68	68	342
AER preliminary decision	59	54	54	54	54	275
Ergon revised proposal	68	63	63	63	63	319

Sources: AER – Preliminary decision Ergon Energy – Attachment 6, Tables B1 and B4, and Ergon '07.00.02 (revised), Table 11

51. Table 3 shows the comparison between Ergon's RP and RRP for each of the five sub-categories of distribution network augex. We understand that the figures in the RP are partially escalated and the figures in the RRP are fully

[14] 07.00.02, *(Revised) Forecast Expenditure Summary CIA 2015-2020*, page 8, footnote 2

escalated and therefore cannot be directly compared. As we have not been provided with values that can be directly compared, we have applied our own CPI adjustments to approximately reconcile the supplied total forecasts provided in the RP in 2014-15 dollars.[15,16]

Table 3: Comparison of partially escalated and fully escalated sub-categories of Distribution augex[17]

$m	Ergon's RP $real 2012-13	EMCa converted $real 2014-15	Ergon's RP $real 2014-15	Ergon's RRP $real 2014-15
Work in Progress	42	44		45
Photovoltaic	41	43		44
Distribution transformer	8	9		9
Unspecified DNAP	80	85		88
Specified DNAP	136	143		132
Total	**306**	**324**	**342**	**318**

Source: EMCa analysis - totals may not align due to rounding errors

52. In this section, we consider the new information provided in Ergon's RRP as it relates to each of these specific areas of Ergon's Distribution augex and in accordance with our terms of reference.

3.2 Work in Progress

3.2.1 Background

53. In its RRP, Ergon included forecast expenditure of $45m, which appears to be essentially the same as its RP.

3.2.2 Our assessment

54. We have not observed new information in Ergon's RRP directly concerning works-in-progress (WIP). It is unclear from the information provided what proportion of the 75 WIP projects "*initiated in the final months of 2014-15*"[18] was a result of work being deferred from earlier in the period ('rolled-out') or what proportion of the work was originally planned or had been 'rolled-in'. Introduction of 75 new projects in the final months of an RCP seems high. Nonetheless, it is not unusual for a portion of work to be rolled-out/deferred to the next period, commonly due to reprioritisation as new information becomes available and/or in response to deliverability issues.

[15] Variances of $1m or less may be the result of rounding errors, or tolerances in the escalation factors applied

[16] The absence of adequate explanation of reconciliation differences in Ergon's forecast remains an area of concern.

[17] The total distribution augex of $306m is expressed as $real 2012-13 and partially escalated (07.00.02 CIA Expenditure Forecast Summary, table 9). We have converted this into $real 2014-15 for comparison as $324m. Ergon provided total distribution augex of $342m expressed as $real 2014-15 and fully escalated (SUB09.13 Submission to the AER on its Preliminary Determination Ergon Energy Reset RIN Response to Material Issues, Table 3). We have been unable to derive the fully escalated figures for individual programs due to lack of information.

[18] 07.00.02, *(Revised) Forecast Expenditure Summary CIA 2015-2020*, page 48

55. On balance we consider that the proposed expenditure is likely to represent a prudent and efficient level.

3.3 Remediation of power quality issues due to photovoltaics (PV)

3.3.1 Summary of Ergon's RRP

56. In its RRP, Ergon included forecast expenditure of $44m, which is broadly consistent with its RP.

57. Ergon's proposed 'PV' program is designed to manage voltage fluctuations in the network arising from photovoltaic array systems installed predominantly on residential rooftops. In its Preliminary Decision, the AER identified some systemic issues with Ergon's proposed expenditure. The AER refers to EMCa's findings with respect to the PV program:[19]

> "*EMCa found that this capex has not been justified with a business case demonstrating an economic basis for the projects… Additionally, EMCa considers that Ergon Energy's analysis should take into account how the uptake of solar installations will reduce augmentation requirements on the LV network over the 2015–20 regulatory control period.*"

58. In its RRP, Ergon countered EMCa's findings with information that we summarise as follows:[20]

- Re-submission of the same technical and economic analysis provided in its RP documentation[21] and three associated business cases;
- Information showing that the uptake of PV systems has been tracking slightly above Ergon's 'Low' uptake scenario. Based on the revised AEMO forecast and the 'new' Queensland government's aim to achieve 1 million solar PV rooftops by 2020, Ergon believes the outcome will be far in excess of its 'High' uptake scenario;
- A statement to the effect that Ergon considers that it will require a further $76m above what was requested in its original submission, due to higher than assumed PV growth, but that it has not adjusted the proposed expenditure in its RRP;
- Ergon has not taken into account the potential removal of its ability to require a capital contribution from charging customers for augmentation to the shared network required to mitigate voltage rise directly attributed to the connection of their PV system; and
- Ergon has made no allowance for expenditure to address PV attributed impacts at the medium voltage level.

[19] AER, *Preliminary decision Ergon Energy – Attachment 6 – Capex – April 2015_0,* pages 6-56 (footnote references within the text have been removed)

[20] Ergon, *SUB09.07 Ergon Energy – Capex Augmentation Response,* page 18

[21] Ergon, 07.02.12 *Distribution Network Impacts of Photovoltaic Connections to 2020*

59. Ergon also stated that the growth of PV installations will not contribute to reducing the need for network augmentation required to address peak demand constraints because of a timing mismatch between solar generation (day time) and peak loads (evening).

3.3.2 Our assessment

PV growth forecast

60. We consider that Ergon has provided sufficient information to support its contention that the number of PV connections and installed capacity is unlikely to be below the 'Low' growth scenario upon which its expenditure forecast is based. We also consider that, unless there are changes to the cost structure that make PV ownership less attractive (and depending on any incentives that the Queensland government may introduce), the growth in both number and installed capacity of PV systems in Ergon's distribution network might reasonably exceed its 'Low' growth scenario. Such higher growth in PV connections would also be consistent with AEMO's latest forecast, produced subsequent to our initial review.

PV impact

61. Ergon provided new information that we consider to be sufficient to confirm that:

- the increasing penetration of PV systems in its LV network is driving an increase in voltage excursions beyond statutory limits in some parts of its network; and
- with forecast growth in PV installations (number and capacity), the extent of voltage fluctuations exceeding statutory limits is likely to increase.

62. The question as to whether an increased level of PV penetration will mitigate the need for network augmentation to overcome capacity constraints is not relevant to our review of proposed power quality remediation expenditure arising from PV growth.

Ergon's risk assessment

63. Ergon rated the highest inherent risk (with current controls) of not proceeding with the proposed program as 'Extreme' based on its assessment that the legal and regulatory consequence of continued failure to comply with statutory prescribed voltage tolerances is fines, damage claims and litigation.[22] The analysis supporting this risk rating of 'Extreme' is not apparent.[23]

64. According to Ergon's risk framework, an 'Extreme' risk rating is intolerable and requires immediate action[24] "*to reduce the risk to the tolerable range".* We

[22] Ergon, *07.02.16 Sample Business Case 1 – Photovoltaic Augmentation Central_Unredacted,* page 4. Ergon also identify risk to its Corporate Reputation and to its Physical Assets as 'High' if it does not take action.

[23] Specifically, the consequence category and likelihood assumed are not apparent in Ergon's documentation provided

[24] Ergon, *07.09.30 Risk Management and Insurance*

consider that this represents a conservatively high risk rating. Ergon did not provide evidence to justify why an 'Extreme' risk rating is reasonable.

65. Moreover, we consider Ergon's own actions (in progressively addressing the issue rather than undertaking comprehensive immediate action) to clearly indicate that it does not consider the risk to be 'Extreme'. Similarly, if the physical network risk was 'Extreme', then we would expect to see action by the technical regulator, such as to issue warning notices if immediate action was not taken. Ergon has not indicated that it has received any such notices.

66. We note that Energex (in its RRP) rates the risk of voltage non-compliance (exacerbated by the growth in PV installations) as a 'Medium' risk.[25] Based on the information provided by Ergon, we consider that the impact of PV's on its network does not present a significantly greater risk as compared to Energex's situation.

Ergon's option analysis and strategy

67. Ergon advised that it has been addressing voltage compliance issues as they are identified on a case-by-case basis, noting that the extent of voltage excursions beyond the statutory prescribed voltage range has been increasing with the rapid take-up of PV systems (particularly since 2012).

68. It would appear from Ergon's business case that its Business As Usual (BAU) approach involves no expenditure on the impacts of PVs.[26] However, elsewhere it refers to the cost of network augmentation resulting from customers installing PV systems as being absorbed in the 'Unspecified augmentation' budget.[27] There is no indication of: (i) the extent of this expenditure; (ii) the average cost per 'network issue'; or (iii) what solutions were deployed.[28] The BAU solution in the business case has been misrepresented as a zero cost option. However, based on the information provided, we conclude that Ergon consider the current ad hoc and largely ungoverned approach using the Unspecified augex budget to be more expensive than the three options it considered.

69. The three options include an operational control component and account for different PV growth forecasts (low, medium, high).[29] The business case includes the results of a cost benefit analysis which indicates that the selected option[30] provides the best balance of cost and risk of the options considered. However, the assumptions underpinning this analysis are not apparent from the business case.

[25] Energex RRP, Appendix 4.8, pages 9-10

[26] Ergon, *07.02.16 Sample Business Case 1 – Photovoltaic Augmentation Central Unredacted,* page 5

[27] Ergon, *07.02.12 Distribution Network Impacts of Photovoltaic Connections to 2020,* page 10

[28] We assume that network augmentation solutions such as installing voltage regulators, upgrading distribution transformers and conductor upgrades were applied

[29] *Ergon, 07.02.16 Sample Business Case 1 - Photovoltaic Augmentation Central, page 5*

[30] Option B, which assumes the low PV growth scenario and includes the operational voltage management program

70. Ergon's strategy is based on deploying low cost solutions first with augmentation of the LV network being the 'last resort'. Ergon introduced a more robust connections policy in 2014 to help ensure that all new inverters are set to block export when the voltage exceeds 255 Volts (240V +6%). This should mitigate voltage excursion issues on all new installations, particularly if inverters with reactive power control functionality are deployed. Provided future connections can be made to comply with this requirement, the issue of the future PV connections growth rate becomes less relevant to future expenditure requirements.

71. We remain concerned that the business case and projections are based on: (i) limited experience with the impact of relatively new enforcement of the inverter trip setting at 255V; and (ii) appear to seek to address all existing and projected voltage excursions in the network to reduce the legal/regulatory and safety risk to 'Low' by 2020. We consider that a more reasonable strategy would be to address known issues in areas where the PV penetration is high (e.g., >40%) as a means of reducing overall program cost whilst addressing the areas in which voltage excursions are likely to be highest. We also consider that the following options should be explored in greater depth:

- enforcing voltage set points on installed inverters (at the owners' cost) as a more equitable approach to apportioning the cost of managing voltage excursion issues to PV system owners; and
- changing the operating voltage to 230V.[31]

72. We note the uncertainty regarding the impact of hybrid systems and electric vehicles on the LV (and MV) network and the technology trials Ergon is undertaking.

Ergon's average cost to address voltage excursions

73. Ergon has forecast the average cost to maintain voltages within statutory limits with the projected impact of PVs as $450-$550 per inverter system and an average unit cost of $15,000 capex per augmentation scheme.[32] Ergon also proposes spending $13m (direct) on operational measures, which we estimate to be, on average, a further $150-$185 per inverter installed.

74. We consider that Ergon's unit cost estimates for its selected option are reasonable based on the information provided. However, as indicated above, we also consider that there may be other more cost effective options that have yet to be fully explored.

Overall assessment of proposed PV remediation expenditure

75. Consistent with our initial review, whilst there is a clear need for work to manage the impact of inverter energy systems associated with PV systems, Ergon's proposed expenditure is not supported by a robust business case. Specifically:

[31] We acknowledge that there is a significant cost to this option and a cost-benefit analysis would be required

[32] Ergon, 07.02.12 *Distribution Network Impacts of Photovoltaic Connections to 2020*, page 30

- Ergon's risk assessment is too conservative and a more robust and transparent cost-benefit analysis may reveal that addressing the parts of the network with relatively high (e.g., >40%) penetration only is warranted on an ALARP basis; and
- Ergon does not appear to have rigorously explored: (i) the option to ensure that existing inverters are set to prevent export beyond 255V; and/or (ii) the option of resetting the operating voltage to 230V to mitigate the risk of damage to plant, equipment and appliances.

76. We consider that the potential impact of new information on PV growth rates is to some extent mitigated by Ergon's strategy of enforcing a greater degree of compliance to export voltage limits for all new inverter systems.

77. On balance, the new information provided does not fully address the concerns expressed in our April 2015 report. We consider that Ergon has not adequately justified its proposed expenditure and that the systemic issues we have identified are likely to cause an upwards bias in its proposed expenditure.

3.4 Distribution transformers

3.4.1 Summary of Ergon's RRP

78. In its RRP, Ergon included forecast expenditure of $9m, which is broadly consistent with its RP.

79. Ergon's proposed distribution transformer upgrade program is designed to proactively replace overloaded distribution transformers exceeding their emergency ratings (not the normal cyclic rating, as was the previous expenditure trigger).

80. In its RRP, Ergon reiterated that: (i) the program involves upgrading less than 1% of the total transformer population; (ii) the proposed forecast is below historical levels; and (iii) it involves a reactive approach.

3.4.2 Our assessment

81. Based on the information provided, we consider that the proposed expenditure is likely to represent a prudent and efficient forecast. Ergon proposes replacement of a relatively small number of transformers based on a strategy that is compatible with a period of relatively low demand and energy growth. It should result in only the highest-risk transformers being replaced.

3.5 Unspecified DNAP

3.5.1 Summary of Ergon's RRP

82. In its RRP, Ergon increased its forecast by $4m to $88m. Ergon did not provide evidence to support the proposed increase.

83. In response to matters that we raised in our April 2015 report on its RP, Ergon provided new information and clarification statements in its RRP such as:[33]

- *There is no evidence based on historical trends (both customer complaints and historic expenditure) to suggest that Ergon Energy's Unspecified expenditure requirements will decrease in future years. In fact, if anything, trend analysis indicates an increasing requirement;*
- *Customer side increased visibility of network performance will place further pressure on Ergon Energy's Unspecified program;*
- *…the Unspecified program provides support for any necessary reinforcement of the LV networks in the future; and*
- *…the reduction of the specified program by 10.1% will place some additional pressure on the unspecified sub-category.'*

3.5.2 Our assessment

Inadequate analysis to link drivers to expenditure forecast

84. In its RRP, Ergon did not provide sufficient justification for its claim that the trend in customer complaints and historic expenditure supports its proposed expenditure forecast, nor has it provided new information in response to our original concern about the apparent lack of modelling and analysis in support of the underlying expenditure forecast.

85. It is our experience that a "*find as we go*" strategy leads to inefficient and ineffective expenditure due to a tendency to:

- address issues that are not necessarily warranted on a cost-risk basis; and
- address issues in an ad-hoc, un-coordinated manner.

86. The net result is a bias towards over-expenditure as the expenditure is: (i) less well governed; (ii) the approach indirectly encourages treatment of a larger number of issues than would otherwise be determined on a prudent needs driven and risk basis; and (iii) opportunities for cost efficiencies in scoping and packaging work may also be foregone.

87. Ergon has not presented sufficiently compelling information to convince us that the over-expenditure bias is not still prevalent in its Unspecified DNAP program. In our initial review, we concluded that Ergon should present modelling and analysis to support the underlying drivers of the expenditure. Specifically, in its RRP, we expected to see analysis in Ergon's response to demonstrate that:

- the expenditure would be directed to network issues of sufficient risk/urgency to warrant remedial work;
- the trends of network issues to be addressed support the level of expenditure proposed;
- appropriate strategies would be deployed to ensure prudent and efficient expenditure; and

[33] Ergon, *SUB09.07 Ergon Energy – Capex Augmentation Response,* page 17

- the work was delivering the desired outcomes.

88. We note that Ergon reduced its forecast expenditure from previous levels to account for the impact of other programs and to compensate for reduced demand growth.

89. We consider that if Ergon had the claimed strong governance (expenditure controls) over this expenditure sub-category, it would have been able to provide supporting analysis and evidence to demonstrate that the expenditure was set at a prudent and efficient level. Insufficient information was provided to demonstrate that this is the case. Accordingly, we consider that the systemic issues identified above are indicators that Ergon's proposed expenditure has an upwards bias.

3.6 Specified DNAP

3.6.1 Summary of Ergon's RRP

90. Ergon's Specified DNAP project is designed to address known capacity and voltage issues on the distribution network. In its RRP, Ergon proposed a reduced forecast of $132m *"based on a changing distribution feeder demand forecast and revised risk assessments of the studied options required to remove identified constraints."*[34]

3.6.2 Our assessment

91. Ergon stated that it has reduced the Specified DNAP program by revising its risk tolerance:

> *"This 13% reduction includes the removal of 54 specified projects, including all projects with starting year risk scores of 12 (ALARP) and all projects with a risk score <24 at the end of the 2015-20 regulatory control period. These projects were assessed in detail during the re-prioritisation revision process. Feeders associated with the 54 removed specified projects supply >30,000 customers, including 384 priority customers of which 93 are in the life support category".*[35]

92. We sought evidence to support the elements of this claim. Firstly, we understand that the 13% reduction is based upon a reduction of forecast expenditure from a level of $152m to $132m. We could not find the source of the proposed original $152m forecast and therefore could not verify the accuracy of this claim. We note that Table 1 in Ergon's revised version of document 07.00.02 refers to a reduction of Specified DNAP expenditure of 10.1%.

[34] Ergon, 07.00.02 (Revise), page 61. We note that there are several references to different levels of reduction and, due to conflicting data in Ergon's source material, it is unclear what the comparable amount in the RP was.

[35] *Ibid,* noting that this extract and Ergon's RRP documentation more broadly contains apparently conflicting information about the extent of reductions in dollar and percentage terms between the RP and RRP.

93. Secondly, we note that Ergon has removed projects from the program that included risk ratings of 'Low' and 'Moderate' and, apparently, a number with 'High' risk ratings (i.e., with scores of 18-23, noting that it has included projects with a score of 24 and higher). Figure 1 below is a reconstruction of Ergon's Risk and Consequence Matrix, overlaid with Ergon's Risk Tolerability scale.

Figure 1: Ergon's Risk & Consequence Matrix and Risk Tolerability Scale

Risk Analysis 6x6 multiplication R = C x L		Consequence					
		1	2	3	4	5	6
Likelihood	6	6	12	18	24	30	36
	5	5	10	15	20	25	30
	4	4	8	12	16	20	24
	3	3	6	9	12	15	18
	2	2	4	6	8	10	12
	1	1	2	3	4	5	6

Risk score	Risk Level
30-36	Intolerable
25-29	Very high
18-24	High
11-17	Moderate
6-10	Low
1-5	Very low

Source: Based on Figures 15 and 16, Ergon 07.00.02

94. We consider that the basis for Ergon's exclusion of 54 projects from its revised Specified DNAP program results from Ergon implementing changes to its assessment process which appear to be aligned with our original findings. At a systemic level, we consider that this is likely to render this program more reflective of a prudent level. Whilst we are concerned by the lack of reconciliation of the impact that this has had, on balance, we consider that the reduction made by Ergon appears to be within an appropriate range.

3.7 Conclusions on reviewed aspects of revised augex

3.7.1 Systemic issues leading to over-estimation

95. In our initial review, we identified three systemic issues with Ergon's RP augex expenditure program, including the Distribution expenditure program. We concluded that the systemic issues reflect a bias towards the over-estimation of forecast expenditure. Specifically, we found that the proposed level of augmentation capex for the next RCP:

- has not been adequately linked to a prudent needs-driven analysis, including efficient timing of expenditure and connection of new loads;
- has not been adequately supported by cost-benefit analysis, robust options analysis and appropriately applied risk assessment; and

- includes estimates that have led to a higher level of expenditure than may be required.

96. In its RRP, Ergon reduced its Distribution augex expenditure forecast by approximately 7%, largely driven by a claimed 13% reduction in its Specified DNAP sub-category. Of the five Distribution augex programs, the new information and clarifications provided have led us to moderate our findings with respect to two of the expenditure categories; we have not modified our findings on the other three categories:

- **Works-in-progress (WIP)** – consistent with our initial review, we consider that the proposed expenditure is reflective of a prudent and efficient level;
- **PV driven PQ program** – primarily as a result of new information on the PV growth outlook (both in terms of number of connections and installed capacity), we consider that Ergon's case for expenditure has been strengthened somewhat. However, we remain unconvinced that the full amount of expenditure proposed for the 2015-20 RCP is justified;
- **Distribution transformer augmentation** – consistent with our initial review, we consider that the proposed expenditure is reflective of a prudent and efficient level;
- **Unspecified DNAP** – consistent with our initial review, we have not found sufficiently compelling information from Ergon to conclude that the proposed expenditure is reflective of a prudent and efficient level; and
- **Specified DNAP** – Ergon advised that it reduced its expenditure by removing 54 projects planned to respond to network risks rated below 24 on its 36 point scale. We consider that the remaining proposed expenditure is more likely to represent a prudent and efficient level.

97. We therefore consider that our concerns with Ergon's original forecast have been only partially addressed by the new information.

3.7.2 Assessment of prudent and efficient level of expenditure

98. We have reviewed each of the five programs comprising the Distribution augex category, including strategy and planning documents and business cases. Taking into account the updated information provided by Ergon, we consider that in some cases:

- Ergon's risk assessment remains conservatively biased;
- There is insufficient evidence to support its claims and strategies; and
- Ergon's options analysis remains inadequate with some options not considered in sufficient detail, including lack of transparency of the assumptions underpinning cost-benefit analyses and failure to explicitly relate the proposed work to the ALARP 'test'.

99. Overall, we consider that there remains an upward cost and risk bias in Ergon's Distribution category forecast. Based on our assessment, we consider that the aggregate cost-overestimation impact on proposed Distribution augex is in the order of 5%-15%. The forecast which would result from applying this adjustment to Ergon's RRP is broadly comparable with the recommended adjustment range in our April 2015 report regarding Ergon's original RP.

4 Revised proposed repex

4.1 Introduction

100. In this section, we consider the replacement capital expenditure allowance (repex) that Ergon has proposed in its RRP. Our review objective is to determine the extent to which any systemic expenditure planning and forecasting issues, as identified in our April 2015 report, have been addressed by amendment of its forecast or through the provision of new information. In our initial review of Ergon's RP, we considered that the systemic issues identified served to indicate that Ergon's proposed repex was not reasonable and did not satisfy the expenditure requirements of the NER.

4.1.1 Summary of AER's Preliminary Decision

101. The AER expressed concern with Ergon's top-down assessment, concluding that: [36]

> *"Ergon Energy's forecasting methodology predominately relies upon a bottom-up build (or bottom-up assessment) to estimate the forecast expenditure and that the top-down constraints imposed by their governance process are insufficient for us to be able to conclude that the forecasts are prudent and efficient."*

102. In its Preliminary Decision, the AER states that it has relied upon: [37]

> *"the outcomes of our predictive modelling and evidence that Ergon Energy has a bias towards conservative risk assessment and has programs of expenditure which are not adequately justified."*

[36] AER 2015, Preliminary decision Ergon Energy proposal 2015-16 to 2019-20 Attachment 6 – Capital expenditure, pages 6-9

[37] AER 2015, Preliminary decision Ergon Energy determination 2015-16 to 2019-20 Attachment 6 – Capital expenditure, Table 6.2

103. The AER did not accept Ergon's proposed repex of $894m[38] and instead substituted an alternative replacement capex forecast of $675m, representing a reduction of approximately 24 percent.[39]

104. The AER separated its review of Ergon's repex forecast into *modelled repex* (applying predictive modelling) and *un-modelled repex* (applying alternative assessment techniques):

- For its *modelled repex*, the AER included:
  - $271m for Pole and Overhead conductor categories, consistent with Ergon's RP; and
  - $178m for the remaining modelled categories (Transformers, Switchgear, Service lines and underground cables).
- For its *un-modelled repex*, the AER has placed "*more weight on trend analysis and EMCa's findings.*"[40] The AER substituted an alternative forecast for pole top structures and SCADA of $61m and $126m respectively based on historical repex from the last period, and accepted $38m for 'Other' repex, which aligned with Ergon's proposal.

4.1.2 Summary of Ergon's RRP

105. In its RRP forecast, Ergon made a further increase of 1% ($7.1m) from the corrected total repex forecast of $934.0m, to a revised forecast of $941.1m. This is 39% higher than the AER's Preliminary Decision, as shown in Table 4.

Table 4: Summary of Ergon's repex (direct costs)[41]

$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Ergon Energy regulatory proposal (Note 1)	176	193	165	177	172	883
Ergon Energy regulatory proposal (Note 2)	174	194	166	182	179	894
Ergon Energy regulatory proposal (corrected)	182	202	175	189	186	934
AER preliminary decision	131	146	125	137	135	675
Ergon Energy revised regulatory proposal	214	197	168	182	179	941

Source: EMCa analysis

106. Ergon states in its RRP that it has:[42]

> *"re-examined both financial and non-financial data in both the forecast and historic RIN information provided in Table 2.2.1 of Template 2.2. In doing so, a handful of material errors have been identified which require a correction to the Table 2.2.1 forecast data only."*

107. The major changes to the repex forecast from correcting the 'material errors' that Ergon states that it identified in the RIN include:

[38] AER 2015, Preliminary decision Ergon Energy determination 2015-16 to 2019-20 Attachment 6 – Capital expenditure, page 6-66

[39] These figures are direct costs and do not include indirect costs that Ergon attributes to repex.

[40] AER 2015, Preliminary decision Ergon Energy determination 2015-16 to 2019-20 Attachment 6 – Capital expenditure, page 6-84

[41] Note 1: Sourced from 07.00.01 Forecast Expenditure Summary Asset Renewal (October 2014). Note 2: Sourced from Reset RIN (October 2014)

[42] Ergon Energy SUB09.13, Submission to the AER on its Preliminary decision, Ergon Energy Reset RIN Response to Material Issues, page 18

- understating the total repex by $39.7m ($2014-15) due to the incorrect deduction of Metering SCS expenditure from the total repex;
- over estimation of Field devices repex in volume and expenditure, by $54.9m ($2012-13) in the RIN;[43]
- under estimation of unit cost rates for service lines, affecting the volume forecast only; and
- top-down adjustments applied by Ergon to the forecast totals which Ergon states resulted in an over estimation of SCADA repex (due to the Field devices forecast), and under estimation of all other asset categories.

108. Overall these 'corrections' have increased the original forecast by 4.4%, from $894m to $934m.

109. Ergon has applied the corrections, additions and other adjustments to its revised forecast in the RIN as summarised in Table 5 and Table 6 below.

110. Table 5 shows the movement in individual repex groupings between the original proposal, corrected original proposal and the revised proposal. In 'correcting' its forecast, Ergon increased its forecast expenditure for the asset categories of Poles, Pole top structures, Overhead conductors, Underground cables, Transformers and Switchgear and Other by between 11.1% and 11.3% and reduced SCADA by 25.6%.[44] Ergon also introduced a new program under the 'Other' asset category of repex being for *Conductor ground clearance remediation* with a forecast expenditure of $39.4m, whilst reducing others.

Table 5: Summary of Ergon's repex by asset group

Asset Group, $m $2014-15	Ergon Energy original proposal	Ergon Energy corrected proposal	Ergon Energy revised proposal	Variance against corrected
Poles	76	85	84	-1%
Pole top structures	103	115	109	-5%
Overhead conductors	195	216	216	0%
Underground cables	15	17	16	-8%
Service lines	56	62	60	-3%
Transformers	177	197	200	1%
Switchgear	70	78	72	-7%
SCADA, network control and protection systems	163	121	109	-10%
Other	38	43	74	75%
Total	**894**	**934**	**941**	**1%**

Source: Ergon Energy Reset RIN

111. Table 6 shows the movement in individual repex program categories between the original proposal, corrected original proposal and the revised proposal. The most significant of these changes are an increase of 75% ($31.9m) in 'Other' repex, and reductions of 10% ($12m) to SCADA, network control and

[43] We note that Ergon has advised that the forecast expenditure provided in the Engineering Report ($2012-13) was correct. In our initial review, we based our technical review upon the expenditure in the engineering report.

[44] SUB09.13 RIN material issues, Table 9

protection systems, 7% ($6.0m) to switchgear, and 5% ($5.5m) to pole top structures.

Table 6: Summary of proposed repex programs by relevant Management Plan

Management plan $m, 2014-15	Ergon original proposal	Ergon corrected proposal	Ergon revised proposal	Variance against corrected
Line Defects Remediation	330	352	345	-2%
Overhead and underground plant and equipment	2	2	2	-1%
Overhead feeder circuits	232	246	277	13%
Zone and bulk supply plant and equipment	161	168	159	-5%
Earthing systems	44	47	46	-1%
Protection and control systems	34	35	32	-10%
Underground feeder circuits	2	3	3	-2%
Auxiliary substations components	23	25	20	-18%
Telecommunications	56	57	57	0%
Balancing item	11			
Total	**894**	**934**	**941**	**1%**

Source: EMCa analysis, based upon SUB09.13 RIN material issues. Totals may not align due to rounding errors.

112. We note from Table 6 that the forecast expenditure relating to the overhead feeder circuits management plan has been increased by 13% ($31m), corresponding to the inclusion of the proposed conductor ground clearance remediation work. Other items have been retained at similar levels or reduced when compared with Ergon's corrected forecast. The areas of largest reduction are:

- zone and bulk supply plant and equipment ($9m), driven by a reduction in forecast expenditure in the transformer renewal program;
- auxiliary substation components management plan, driven by a reduction in the DC system upgrades ($3.8m) and AFLC ($0.7m); and
- protection and control management plan, driven by a reduction in the protection relay replacement program ($3.4m) and aged RTU replacement program ($0.1m).

113. We have included a balancing item in Table 6 to reconcile the analysis based on information provided in the expenditure forecast information provided to us for the original proposal,[45] to align with the totals relied upon by the AER and to reflect Ergon's RIN totals.

4.1.3 Presentation of our analysis

Repex model

114. Ergon expressed concern with the AER's application of its repex model and treatment of asset categories. We were not asked to review the application of the AER's repex model for use in its predictive modelling for repex. We have considered Ergon's comments where they are relevant to the consideration of

[45] Our figures are based on the original forecast expenditure dated October 2014

our technical review of asset category repex forecast and our terms of reference.

Modelled versus un-modelled repex

115. Ergon's response is organised in terms of *modelled* and *un-modelled* asset categories of repex, consistent with the AER's Preliminary Decision. Whilst we have undertaken our assessment of asset categories independent of the classification of *modelled* and *unmodelled*, we have presented our assessment in a similar sequence to that presented by Ergon and the AER.

4.2 Line asset defect management program

116. In its RRP, Ergon included $345.1m for line asset defect management. The line asset defect management program is the largest program in Ergon's network maintenance strategy, and Ergon has forecast this separately to other asset category programs.

117. The line asset defect management program involves work on several asset groupings, including 'Poles', 'Pole top structures', 'Overhead conductor', 'Underground cables', 'Service lines', 'Transformers' and 'Switchgear'. We have undertaken our review (in subsequent sub-sections) according to each asset grouping, which includes work forecast as a part of the line asset defect management program in addition to specific issues-based programs.

118. Ergon has not provided a full reconciliation of its line asset defect management program expenditure across each of the asset groupings. However, from the information provided, we have estimated the allocation of this program expenditure to the relevant asset groupings. This estimate is shown in tables in the subsequent subsections.[46]

119. We reviewed the supporting information provided by Ergon, including the management plans that relate to the proposed expenditure and, specifically, Ergon's line defect asset defect management methodology and analysis. For some asset categories, Ergon provided discussion of known defects and commented on the likely defect trends and impact to expenditure. Our review was hindered by a lack of accurate accounting for the composition of this expenditure and lack of a clear linkage between the proposed expenditure and supporting analysis in its engineering reports and plans.

120. In our initial review, we observed some downward movement in the program. However, we did not see evidence of sufficient justification of the forecast and identified areas where there appeared to be an over-estimation bias. We had expected to see greater analysis of condition data and defect trends to support the forecast replacement volumes across all asset categories and consideration of alternative risk treatment strategies in the options analysis. Based upon the level of historical repex spend, and proposed increases in

[46] We have developed these estimates to assist in providing an indication of the materiality of our findings; the estimates do not directly influence our findings themselves

targeted replacement programs, we expected to see much stronger reductions to line asset defect management expenditure than was proposed.

121. In its RRP, Ergon provided some clarification of its line asset defect management expenditure (including citing examples where condition data was relied upon in the development of its forecast). Ergon also reduced its forecast by approximately 2% over the RCP against its corrected forecast. From the information provided, we were not able to identify the rationale for this small change. Overall, we do not consider that the new information is sufficiently compelling to address the nature of our concerns, or demonstrate that the forecast is prudent and efficient.

122. To assist our review of the repex forecast by asset category, we estimated the components of the line asset defect management expenditure by subtracting the program expenditure from the total RIN expenditure for each of the asset categories. We consider this to provide a reasonable indicator of the line asset defect expenditure; however, it may not account for all adjustments.

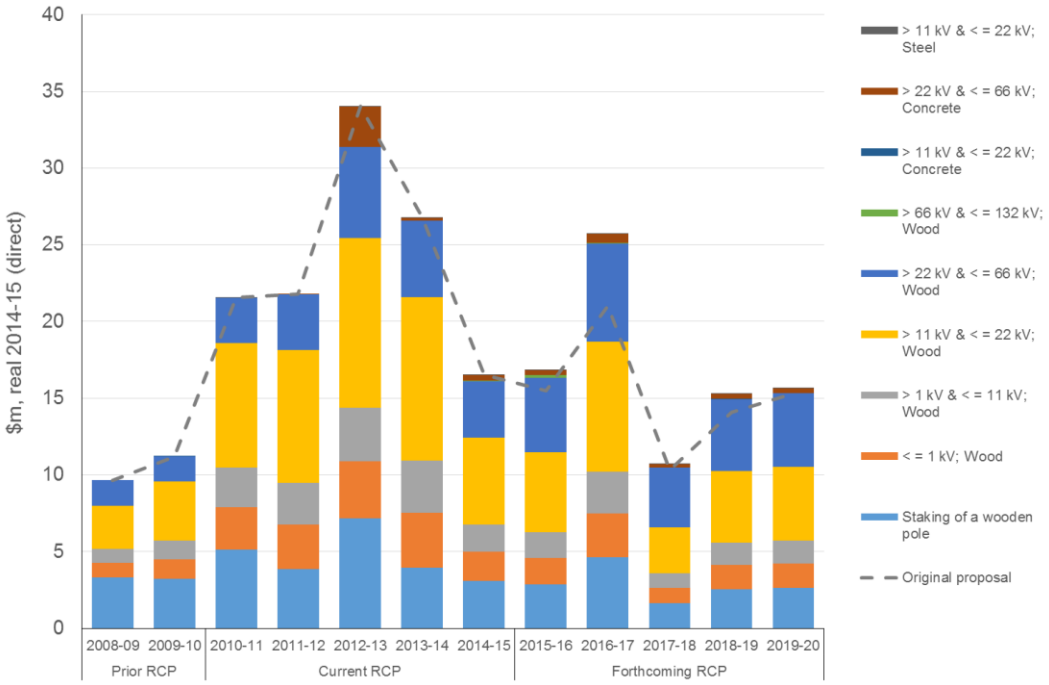
4.3 Poles

4.3.1 Expenditure overview

123. In its RRP, Ergon proposed a repex forecast of $84m, which compares with a 'corrected' amount of $85m in its original RP.

The historical repex for poles and Ergon's proposed repex for the forthcoming RCP, are depicted in Figure 2 below.

Figure 2: Ergon's pole asset category repex profile compared with historical spend



Source: Ergon Energy RIN

124. The average expenditure for the forthcoming RCP is broadly consistent with the estimated expenditure in the final year of the current RCP.

125. As shown in Table 7, Ergon's revised forecast repex for poles is broadly consistent with its corrected forecasts. Ergon has identified that all pole repex is in its line asset defect remediation program.

Table 7: Composition of poles repex by major program

Repex program/projects $m, 2014-15	Ergon original proposal	AER preliminary decision	Ergon corrected proposal	Ergon revised proposal	variance to corrected proposal
None specified			0	0	-
Estimated Line asset defect remediation program			85	84	-1%
RIN Total	**76**	**76**	**85**	**84**	**-1%**

Source: EMCa analysis

4.3.2 Assessment

126. We did not find any systemic issues evident in our initial review of this asset category. Ergon has not provided any new information that would lead us to change our view.

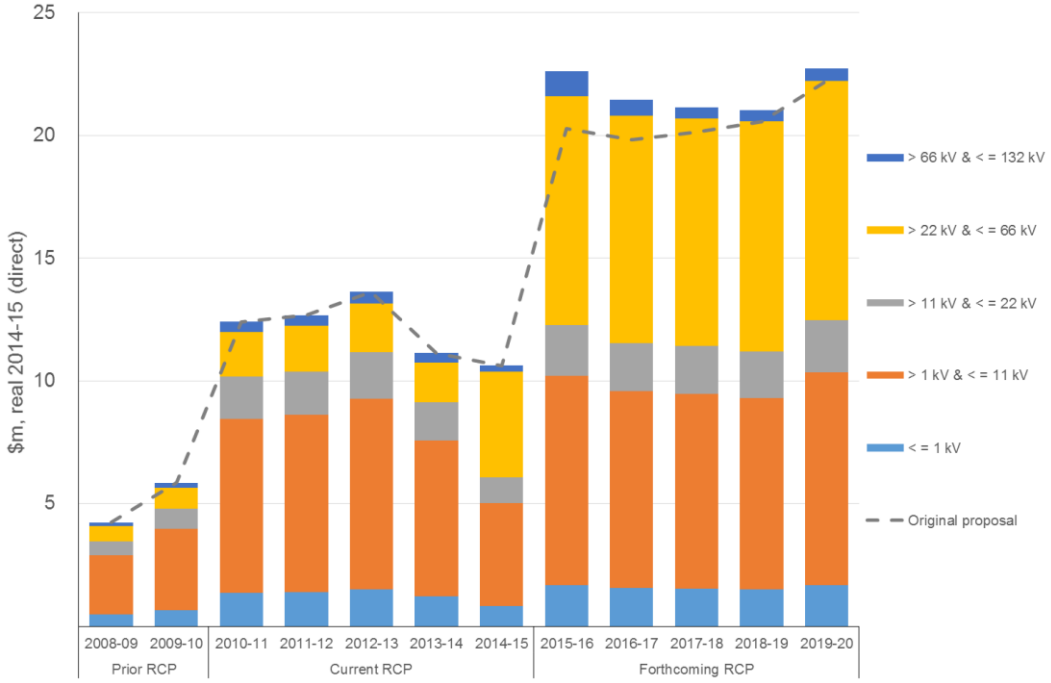
4.4 Pole top structures

4.4.1 Expenditure overview

127. In its RRP, Ergon proposed a revised repex forecast of $109m, which compares with a 'corrected' amount of $115m in its RP. The historical repex for

pole top structure and Ergon's proposed repex for the forthcoming RCP, are depicted in Figure 3 below.

Figure 3: Ergon's pole top asset category repex profile compared with historical spend



Source: Ergon Energy RIN

128. The expenditure that Ergon has forecast over the forthcoming RCP represents a step increase from the current RCP, corresponding with an increase in expenditure for 11kV, 33kV and 66kV pole top structures over the RCP.

129. Ergon has corrected its original RP forecast, increasing it by approximately 11% to account for the issues with its RIN data. We have not identified any further changes.

130. In Table 8, we provide a composition of the pole top structure repex programs as identified by Ergon.

Table 8: Composition of pole top structures repex by major program

Repex program/projects $m, 2014-15	Ergon original proposal	AER preliminary decision	Ergon corrected proposal	Ergon revised proposal	variance to corrected proposal
Subtransmission line refurbishment program			53	50	-6%
Laminated crossarm replacement			2	2	-2%
Estimated Line asset defect remediation program			59	57	-4%
RIN Total	**103**	**61**	**115**	**109**	**-5%**

Source: EMCa analysis

131. Ergon reduced its revised forecast by $6m (5%) from its corrected forecast. We note that Ergon has identified $56.6m (52%) of its pole top structures repex in its line asset defect remediation program. We discuss the two nominated programs further below.

4.4.2 Assessment of subtransmission line refurbishment

132. In our initial review of this asset category, we considered that there was insufficient analysis to conclude that the proposed program reflects optimal timing, volume and cost for sub-transmission pole-top replacement.

133. Ergon has not provided new information, nor has it made material adjustments to its forecast to address our concerns. Accordingly, we do not find cause to change our initial finding that there is insufficient analysis to justify the proposed level of expenditure.

4.4.3 Assessment of (distribution) laminated cross-arm replacement

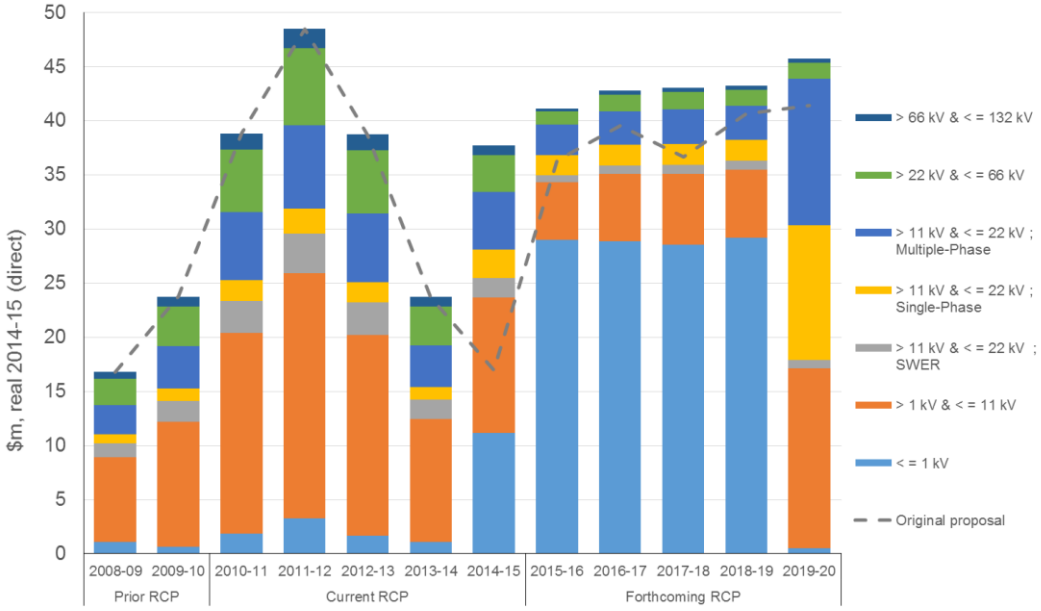
134. In our initial review, we did not identify any systemic issues with this expenditure item.

4.5 Overhead conductor

4.5.1 Expenditure overview

135. In its RRP, Ergon proposed a repex forecast of $216m, which compares with a 'corrected' amount of $216m in its original RP. The historical repex for overhead conductors and Ergon's proposed repex for the forthcoming RCP are depicted in Figure 4 below.

Figure 4: Ergon's overhead conductors repex profile compared with historical spend



Source: Ergon Energy RIN

136. The average of the forecast expenditure over the RCP represents a steady increase from the average expenditure in the current RCP, corresponding with an increase in its LV replacement expenditure over the RCP.

137. In Table 9, we provide the composition of the overhead conductor repex programs as identified by Ergon. Ergon's revised forecast repex for overhead conductors is broadly consistent with its corrected forecasts.

Table 9: Composition of overhead conductor repex by major program

Repex program/projects $m, 2014-15	Ergon original proposal	AER preliminary decision	Ergon corrected proposal	Ergon revised proposal	variance to corrected proposal
Distribution feeder reconductoring program			169	167	-1%
Connector and splice replacement			4	4	0%
Estimated Line asset defect remediation program			43	45	4%
RIN Total	**195**	**195**	**216**	**216**	**0%**

Source: EMCa analysis

138. We note that $167m (77%) of the forecast for overhead conductors is associated with its distribution feeder re-conductoring program.

4.5.2 Assessment

139. In our initial review of this asset category, we expressed reservations about the completeness of Ergon's analysis (which cast doubt over the treatment of risk, prudent timing and expenditure forecast for this expenditure category).

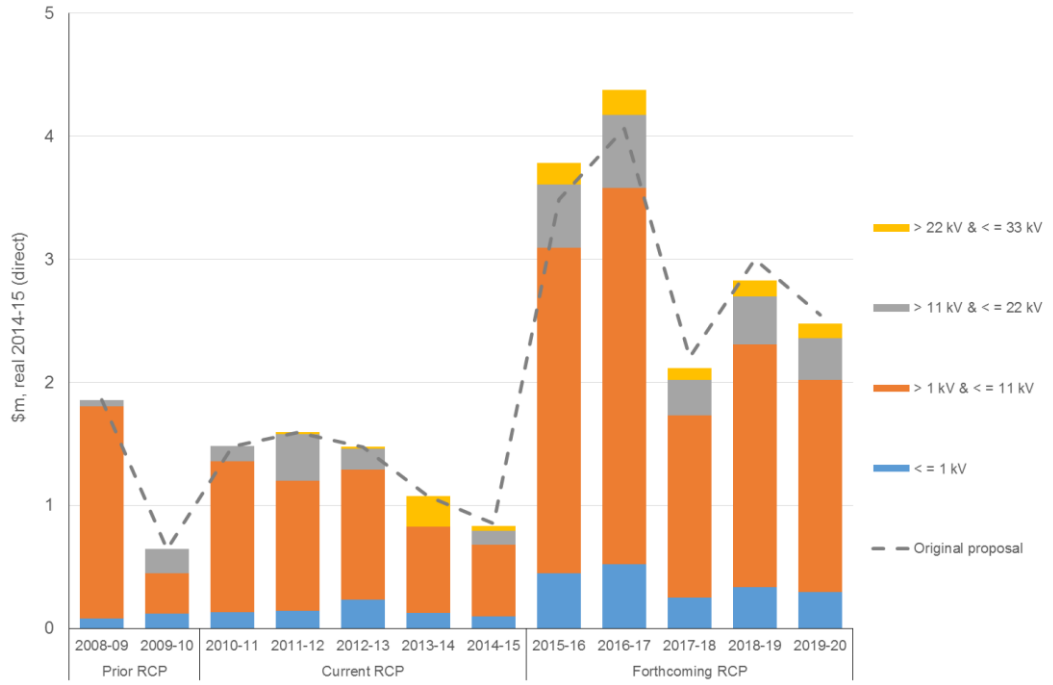
140. Ergon has not provided new information or made material adjustments to its forecast to address our concerns. Accordingly, we do not find cause to change our initial finding that there is insufficient analysis to justify the proposed level of expenditure.

4.6 Underground cable

4.6.1 Expenditure overview

141. In its RRP, Ergon proposed a repex forecast of $16m, compared to a 'corrected' amount of $17m in its original RP. The historical repex for underground cables and Ergon's proposed repex for the forthcoming RCP are depicted in Figure 5 below.

Figure 5: Ergon's underground cable asset category repex profile compared with historical spend



Source: Ergon Energy RIN

142. In Table 10, we provide a composition of the underground cable repex programs as identified by Ergon.

Table 10: Composition of underground cable repex by major program[47]

Repex program/projects $m, 2014-15	Ergon original proposal	AER preliminary decision	Ergon corrected proposal	Ergon revised proposal	variance to corrected proposal
Cast iron pot head replacement			3	3	-2%
Estimated Line asset defect remediation program			14	13	-10%
RIN Total	**15**	**178 (part)**	**17**	**16**	**-8%**

Source: EMCa analysis

4.6.2 Assessment

143. We note that Ergon reduced its revised forecast by 8% from its corrected forecast primarily associated with a $1m (rounded) reduction in its line asset defect remediation program. Whilst the result is a revised forecast that is comparable with its original forecast, the rationale for the minor change is not explained in Ergon's RRP.

144. We did not find any systemic issues evident in our initial review of this asset category. Ergon has not provided any new information that would lead us to change our view.

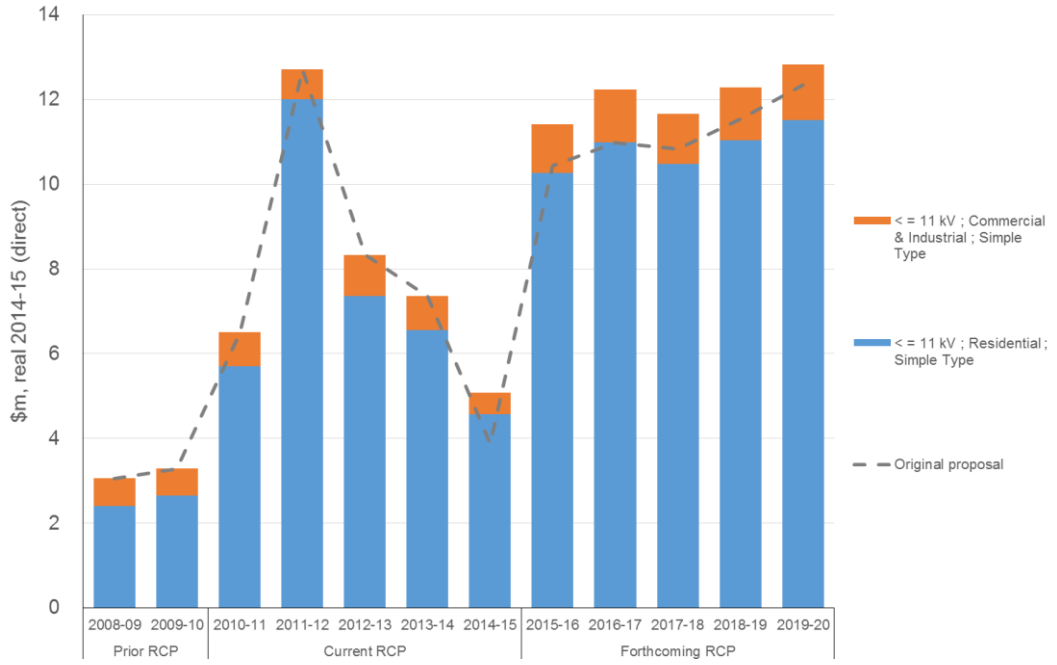
[47] For the modelled categories of Transformers, Switchgear, Service lines and Underground cables, the AER Preliminary Decision included a total allocation of $178m.

4.7 Service lines

4.7.1 Expenditure overview

145. In its RRP, Ergon proposed a repex forecast of $60m, which compares with a 'corrected' amount of $62m in its original RP. The historical repex for service lines and Ergon's proposed repex for the forthcoming RCP are depicted in Figure 6 below.

Figure 6: Ergon's service lines asset category repex profile compared with historical spend



Source: Ergon Energy RIN

146. In Table 11, we provide a composition of the service lines repex programs as identified by Ergon.

Table 11: Composition of service lines repex by major program[48]

Repex program/projects $m, 2014-15	Ergon original proposal	AER preliminary decision	Ergon corrected proposal	Ergon revised proposal	variance to corrected proposal
Colour coded service cable replacement			10	10	-1%
Neutral screen service cable replacement			5	5	0%
Brand X service cable replacement			2	2	0%
Replacement of non-ceramic fuses			1	1	-2%
Estimated Line asset defect remediation program			44	42	-4%
RIN Total	**56**	**178 (part)**	**62**	**60**	**-3%**

Source: EMCa analysis

147. Ergon has proposed a reduction of $2m (3%) to its revised forecast from its corrected forecast.

[48] For the modelled categories of Transformers, Switchgear, Service lines and Underground cables, the AER Preliminary Decision included a total allocation of $178m.

4.7.2 Assessment of colour coded services

148. In our initial review, we stated that there is insufficient demonstration of a needs-based assessment of the forecast expenditure associated with Ergon's colour coded services. We found evidence of conservative risk assessments, with a resultant bias to include projects and/or programs into the forecast.

149. In its RRP, Ergon has stated that "*EMCa appears to have erroneously read the associated table*",[49] referring to the results of a service cable audit documented in Ergon's Colour Coded Service Replacement Engineering report.

150. Whilst Table 3 in Ergon's Colour Coded Service Replacement Engineering report states that the deterioration rate was 30% (being 10 of the 30 audited 'figure 8' cables), our April 2015 report commented on the percentage of deteriorated cables relative to the total population of service cables audited (being 10 of 160 cables). This comparison was correctly expressed as 6%. Our reading of the engineering report suggested that the audit was originally targeting suspected 'figure 8' colour coded services; however, only 30 of 160 cables were confirmed as 'figure 8' type.

151. Of the service cables audited in Longreach, Blackwater, Rockhampton, Yeppoon and Cairns, we note that the majority (80%) of deteriorated 'figure 8' service cables were found in a single location (Longreach). An electric shock incident occurred in Longreach in 2012 caused by deteriorated insulation on this cable type. It is unclear whether the risk posed by 'figure 8' service cables has now been addressed in Longreach. We would expect that Ergon has addressed this identified risk within its existing line asset defect management program.

152. Ergon has placed significant reliance on an audit of less than 1% of 'figure 8' services[50] of Ergon's network, and in response to the electric shock incident in one area of the network, to develop a proposed replacement program across the entire network. We did not see consideration of the risk in other parts of the network, where samples of the cable were determined to be in 'good' condition from the audit. Further, Ergon considers the current risk control as level 8 (qualified) which is described as "*Controls that have been applied go a reasonable way to reduce the risk or impact, but documentation and/or operation of control could be improved.*"[51]

153. We consider that Ergon has not provided compelling new information or made material adjustments to its forecast to address our concerns. Accordingly, we do not find cause to change our initial finding that there is insufficient analysis to justify the proposed level of expenditure.

[49] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, page 60

[50] From our reading of 07.01.11 Engineering Report Colour Coded Low Voltage Overhead Customer services, Ergon assume that 15% of colour coded services are likely to be of the 'figure 8' type, estimating a total of 8,300 figure 8 services (page 26). Ergon revise this estimate down to 6,475 to include replacements that are likely to occur under its defect program to 2014-15 (page 27). Ergon used the results of an audit of 30 figure 8 services, with the majority of issues in one location to justify this program.

[51] Corporate risk assessment tables, page 11

4.7.3 Assessment of other programs

154. In our initial review, we considered that the programs associated with the neutral screened cables and XLPE (brand specific) services were reasonable. We did not identify any change to the proposal for these programs.

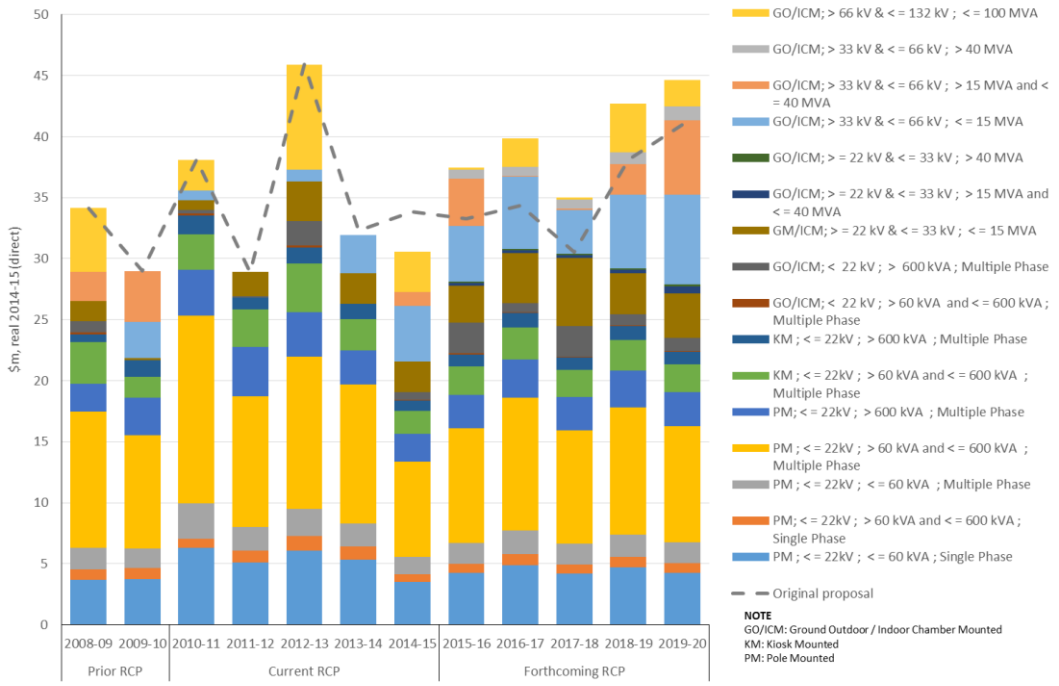
155. We did not review the replacement of non-ceramic fuses as part of our initial review. We have commented on the elements of the line asset defect management expenditure separately.

4.8 Transformers

4.8.1 Expenditure overview

156. In its RRP, Ergon proposed a repex forecast of $200m, which compares with a 'corrected' amount of $197m in its original RP. The historical repex for overhead conductors and Ergon's proposed repex for the forthcoming RCP are depicted in Figure 7 below.

Figure 7: Ergon's transformers asset category repex profile compared with historical spend



Source: Ergon Energy RIN

157. In Table 12, we provide a composition of the transformer repex programs as identified by Ergon.

Table 12: Composition of transformer repex by major program[52]

Repex program/projects $m, 2014-15	Ergon original proposal	AER preliminary decision	Ergon corrected proposal	Ergon revised proposal	variance to corrected proposal
Transformer renewal			80	82	3%
Modifications to distribution earth defect thresholds			47	46	-1%
Estimated Line asset defect remediation program			71	72	2%
RIN Total	**177**	**178 (part)**	**197**	**200**	**1%**

Source: EMCa analysis

158. Ergon has proposed an increase of $3m (1%) in its revised forecast from its corrected forecast; however, the increase is not explained in its RRP.

4.8.2 Error identified in Ergon's transformer renewal analysis

159. In our initial review, we noted that it would appear that Ergon's investment in CBRM (including the EA technology models) is allowing the business to produce a repex forecast that is supported and justified on the basis of asset health, with replacement prioritised on risk.

160. Upon review of the CBRM information for power transformers, we had identified several transformers from the *Transformer Replacement and Refurbishment Detailed Plan*[53] targeted for replacement with a year 10 Health Index (HI) of less than 4. These were: (i) NQ HEPA T2 (to be replaced in 15/16); (ii) WB DEGI T1 (to be replaced in 17/18); and (iii) CA PARK PH-T1 (to be replaced in 19/20); with a total cost of $4.2m. We also observed a number of other transformers where the year 10 HI is considered to have fair condition.

161. In its RRP, Ergon acknowledged that a single transformer with a year 10 HI of less than 4, reflecting a transformer in good condition, was included in its RP program. Ergon stated that this was identified and subsequently removed from the transformer renewal program in its RRP.

162. In the absence of better information to justify inclusion of the additional units in the forecast, we consider there is a reasonable likelihood of deferral of some work.

4.8.3 Differentiation of asset types

163. In our initial review, we raised a concern that Ergon's management strategy did not differentiate between power transformers, ground mounted regulators and reactors, or between voltage levels. In its RRP, Ergon states:[54]

> *"…Ergon Energy has recognised these assets are all of similar construction, involving some form of insulated winding immersed in oil, contained in a steel vessel with suitable bushings, and are subject to the same asset management strategy. They are expected to have similar lives, and similar asset management issues, and are appropriately modelled together. The*

[52] For the modelled categories of Transformers, Switchgear, Service lines and Underground cables, the AER Preliminary Decision included a total allocation of $178m.

[53] 07.01.05 Engineering Report Power Transformer Replacement and Refurbishment program, Annex B, Figure 9, page 41

[54] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, page 48

CBRM process, which considers condition data, overall risk, network impacts and maintenance costs appropriately accounts for any minor differences."

164. Whilst we accept that the differences may be combined into its CBRM process, the risks associated with failure of these assets is typically very different. Ergon appears to recognise this; however, we did not find evidence of how the different risks were considered in developing its forecast:[55]

"…health indices represent asset condition, such condition is only part of the picture. Each asset exists in a unique part of the power network, and the position in the network and its related impact upon nearby assets and provision of service are also important elements to be considered."

4.8.4 Assessment of transformer renewal

165. Ergon describes the scope of its preferred option for transformer renewal as being based on the prioritised output of the CBRM models, combined with analysis of other factors. Ergon also states that SME knowledge and judgement has been applied to specific transformers which has had the result of reducing the replacement quantity when compared with the CBRM output.

166. In its RRP, Ergon describes its analysis of the CBRM information for transformers and how it was used to support the development of the forecast. We have reviewed this new information and consider that, whilst the analysis demonstrates a need for inclusion of a transformer renewal program, we remain concerned that Ergon has not demonstrated that it has taken a prudent risk-based management approach to the transformer replacement program.

167. We observed that a number of transformers appear to be identified with high HI values (indicative of very poor condition) by the end of the period, which may suggest that a risk based assessment was undertaken for these units. This is contrasted against the inclusion of transformers with low HI values as described above. We accept that there are often a combination of factors that may lead to development of a transformer renewal program including management of strategic or high risk sites. In the absence of better information, we were not able to explain the relationship between the HI values, or other risk information with the proposed forecast. Also, we typically observe that target HI values differ between distribution and substation transformers, commensurate with the level of risk. We did not observe this level of differentiation in Ergon's analysis.

168. Based on our review of this new information, we do not find cause to change our initial finding that there is insufficient analysis to justify the proposed level of expenditure.

[55] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, pages 46-47

4.8.5 Assessment of distribution defect earth management strategy

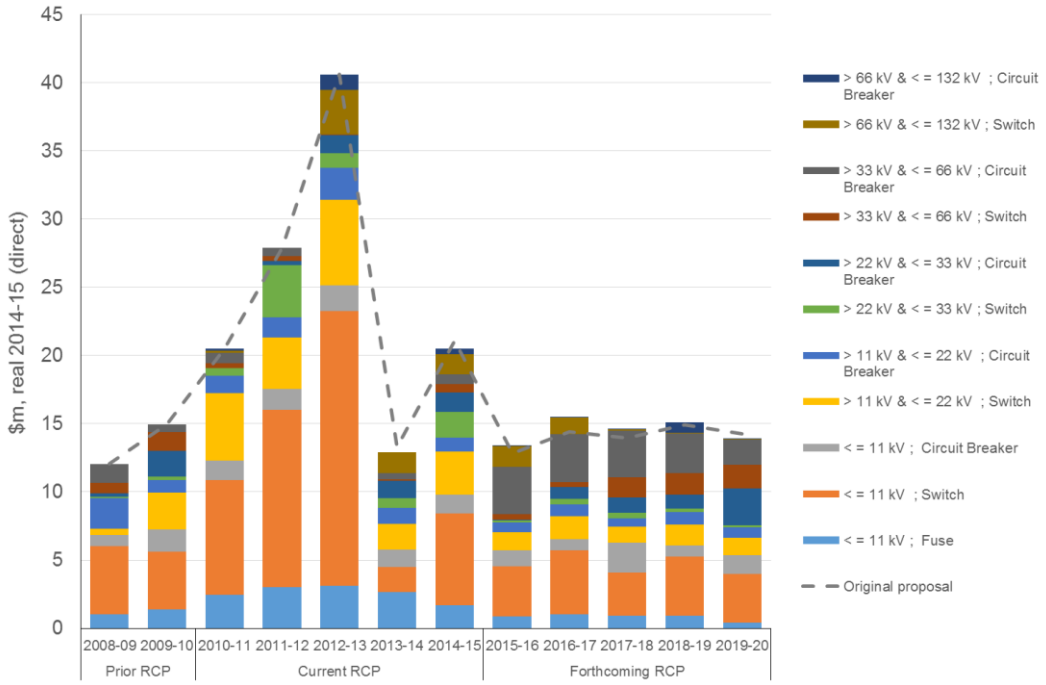
169. Ergon has not provided any compelling new information or material adjustments to its forecast to address our concerns. Accordingly, we do not find cause to change our initial finding that there is insufficient analysis to justify the proposed level of expenditure.

4.9 Switchgear

4.9.1 Expenditure overview

170. In its RRP, Ergon proposed a repex forecast of $72m, which compares with a 'corrected' amount of $78m in its original RP. The historical repex for switchgear and Ergon's proposed repex for the forthcoming RCP, are depicted in Figure 8 below.

Figure 8: Ergon's switchgear asset category repex profile compared with historical spend



Source: Ergon Energy RIN

171. In Table 13, we provide a composition of the switchgear repex programs as identified by Ergon.

Table 13: Composition of switchgear repex by major program[56, 57]

Repex program/projects $m, 2014-15	Ergon original proposal	AER preliminary decision	Ergon corrected proposal	Ergon revised proposal	variance to corrected proposal
Circuit breaker and switchboard replacement			31	27	-12%
Isolator replacement			13	12	-12%
EDO fuse replacement in High Bushfire Risk areas			1	1	1%
Estimated Line asset defect remediation program			33	32	-1%
RIN Total	**70**	**178 (part)**	**78**	**72**	**-7%**

Source: EMCa analysis

172. Ergon has proposed a reduction of $6m (7%) to its revised forecast from its corrected forecast, and included a number of adjustments to its composite programs. However, these changes are not explained in its RRP.

4.9.2 Assessment of CB, switchboard replacement and isolators

173. In its RRP, Ergon states that its CBRM modelling of its condition monitored substation switchgear items was only established during the current RCP, and has recommended a similar replacement volume.[58] Ergon describes its analysis of the CBRM information for switchgear and how it was used to support the development of the forecast.

174. We note Ergon's comments in relation to its strategy to replace "*highest risk assets*" that also "*accomplishes replacement of most of the assets with worst condition*."

175. In response to our concerns regarding the options analysis and consideration of HI outcomes, Ergon states that "*Ergon Energy evaluated risk rather than just the health index of each asset.*" [59]

176. We consider this is indicative of good practice and, similar to our comments for transformer repex, we sought evidence of how this was applied by Ergon in developing its forecast. From the information reviewed we consider that, whilst the analysis demonstrates a need for inclusion of a switchgear replacement program, it is insufficient to demonstrate that Ergon has taken a prudent risk based management approach to the switchgear replacement program.

177. Based on our review of this new information, we do not find cause to change our initial finding that there is insufficient analysis to justify the level of expenditure proposed.

[56] We have assumed the composition of programs based on our reading of Ergon's RRP

[57] For the modelled categories of Transformers, Switchgear, Service lines and Underground cables, the AER Preliminary Decision included a total allocation of $178m

[58] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, page 51

[59] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, page 52

4.9.3 Assessment of other programs

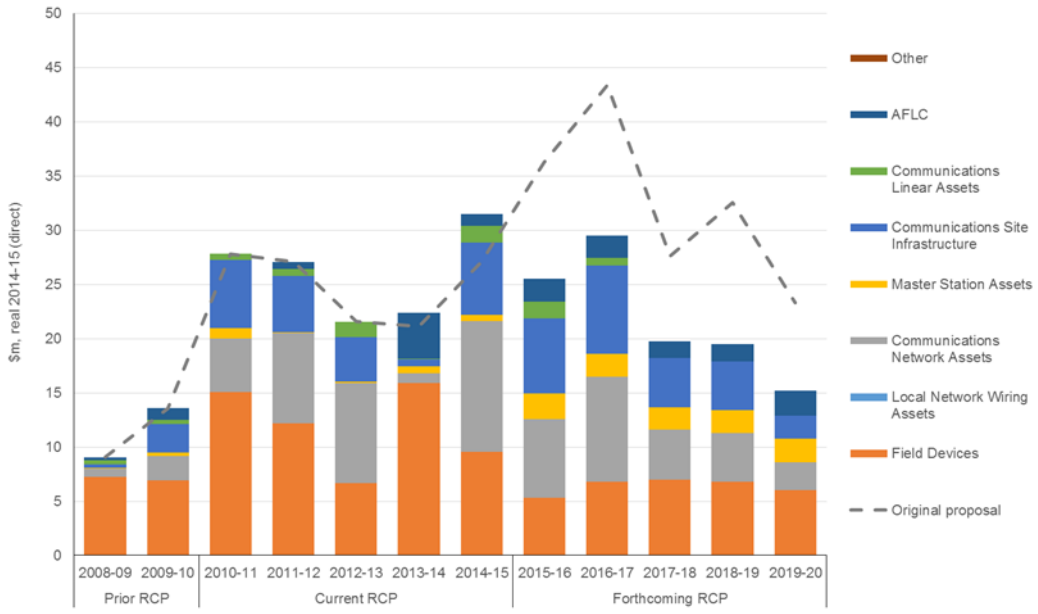
178. In its RRP, Ergon proposed a forecast of $1m for the replacement of EDO fuses in high bushfire risk areas. We did not review this program as part of our initial review, due to its low materiality.

4.10 SCADA, network control and protection systems

4.10.1 Expenditure overview

179. In its RRP, Ergon proposed a repex forecast of $109m, which compares with a 'corrected' amount of $121m in its original RP. The historical repex for SCADA, network control and protection and Ergon's proposed repex for the forthcoming RCP are depicted in Figure 9 below.

Figure 9: Ergon's SCADA asset category repex profile compared with historical spend



Source: Ergon Energy RIN

180. In our initial review, we identified 'Field devices' as the single largest item of expenditure for this asset category (53%) coinciding with a significant step-increase forecast over the forthcoming RCP.

181. In its RRP, Ergon reduced its forecast for expenditure on field devices to $31.9m, which is down from $56.3m incurred in the current RCP. In total, Ergon has reduced its forecast of SCADA repex by 10% from $121.5m to $109.5m. As shown in Table 14, this is comparable with its historical expenditure.

182. In Table 14, we provide a composition of the major SCADA repex programs as identified by Ergon.

Table 14: Composition of SCADA repex by major program

Repex program/projects $m, 2014-15	Ergon original proposal	AER preliminary decision	Ergon corrected proposal	Ergon revised proposal	variance to corrected proposal
Protection relay replacement			27	24	-12%
Corenet active network replacement			19	19	0%
Radio refurbishment - Mackay to Maryborough			17	17	0%
Radio refurbishment - Western Queensland			13	13	0%
DC system upgrades			14	11	-26%
AFLC replacement			10	10	-7%
Corenet infrastructure replacement			9	9	0%
Aged RTU replacement			8	8	-1%
Balancing item			4	0	-89%
RIN Total	**163**	**126**	**121**	**109**	**-10%**

Source: EMCa analysis

183. We note that Ergon has reduced its corrected RP forecast by 10% and has made a number of adjustments to its program that are not explained in its RRP. The revised proposal represents an expenditure level that is $17m lower than the AER's Preliminary Decision.

4.10.2 Assessment of protection relay replacement

184. In our initial review, we noted that Ergon had not provided sufficient justification for the change in performance and risk level for the proposed forecast expenditure as part of its options analysis. In its RRP, Ergon reduced this program by $3m (12%), but did not explain the basis for the reduction.

4.10.3 Assessment of other programs

185. We note that other programs were also reduced in the revised forecast; however, the basis for these reductions was not evident in Ergon's RRP.

4.10.4 Overall assessment of SCADA, network control and protection

186. It is not clear from the information provided by Ergon in its RRP whether: (i) the reductions it has made are associated with a top-down review of its forecast; and/or (ii) individual programs have been reviewed to address the systemic issues identified in our initial review. While Ergon has not provided information to demonstrate that it has addressed the systemic issues, its reduction to this program, to some extent, might reasonably reflect reductions that would occur by addressing these issues.

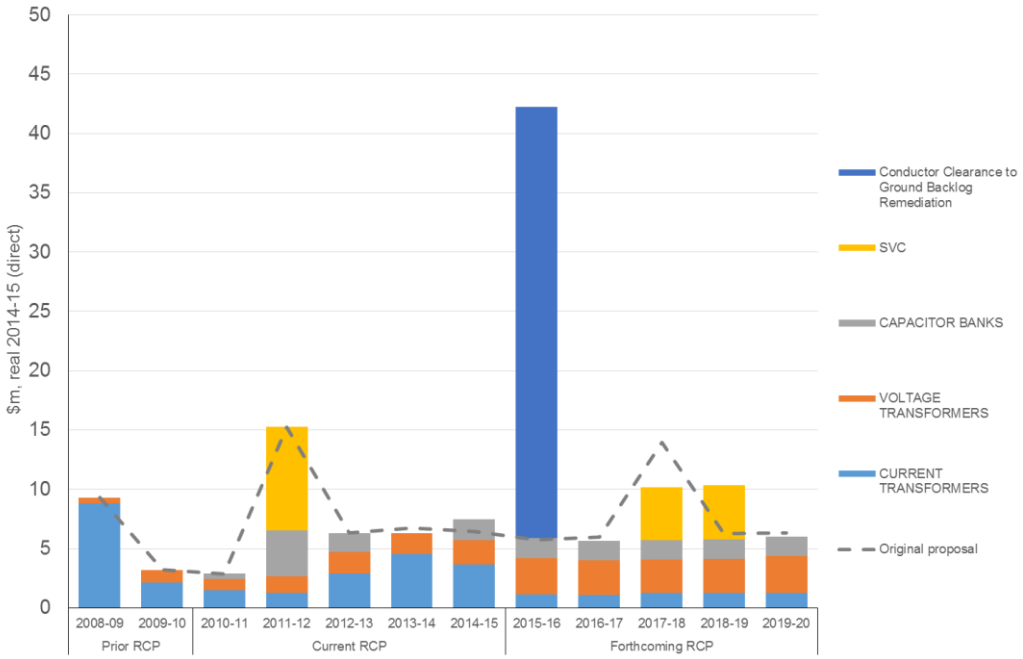
4.11 'Other' asset category

4.11.1 Expenditure overview

187. In its Preliminary Decision, the AER included $38m in its alternate estimate of total forecast capex, consistent with the expenditure level of $38m forecast *repex* included in Ergon's RP.[60]

188. In its RRP, Ergon proposed 'Other' repex forecast of $74m, which compares with a 'corrected' amount of $43m in its original RP. The historical repex for the 'Other' asset category and Ergon's proposed repex for the forthcoming RCP are depicted in Figure 10 below.

Figure 10: Ergon's 'Other' asset category repex profile compared with historical spend



Source: Ergon Energy RIN

189. From Figure 10, we observe two major changes to its forecast:

- Deferment of a component of the expenditure associated with the replacement of the SVC from 2017-18 to 2018-19; and
- Inclusion of $36.4m expenditure in the first year of the forthcoming RCP for the new conductor ground clearance remediation program.

190. In Table 15, we provide a composition of the major 'Other repex' programs as identified by Ergon.

[60] AER 2015, Preliminary decision Ergon Energy determination 2015-16 to 2019-20 Attachment 6 – Capital expenditure, page 6-85

Table 15: Composition of 'Other' repex by major program

Repex program/projects $m, 2014-15	Ergon original proposal	AER preliminary decision	Ergon corrected proposal	Ergon revised proposal	variance to corrected proposal
Conductor clearance to ground defect remediation 2015-2020 (new)			0	36	-
Instrument transformer replacement and			24	21	-12%
Static VAR Compensators Replacement			11	9	-13%
Capacitor bank replacement			9	8	-12%
Balancing item			-1	-0.2	-80%
RIN Total	**38**	**38**	**43**	**74**	**75%**

Source: EMCa analysis

191. We note that Ergon increased its forecast by 75% ($31.9m) from its corrected proposal, driven by inclusion of the new conductor ground clearance remediation program and partly offset by a reduction in its forecasts for a number of other programs. Ergon did not provide any further supporting information in relation to its reduced expenditure forecast for SVC, capacitor banks, voltage transformers and current transformers. We did not find any systemic issues associated with expenditure for these programs in our initial review.

192. We note that the revised proposal of $74.4m represents a $36.4m increase relative to the AER's Preliminary Decision

193. We have considered the new conductor clearance to ground backlog remediation program separately below.

4.11.2 Assessment of the proposed conductor clearance to ground backlog remediation program

Overview of program

194. In its RRP, Ergon proposed additional forecast expenditure of $36.4m for a conductor clearance to ground backlog remediation program in 2015/16. Ergon supplied new information and updated relevant supporting documents to justify this expenditure.[61]

195. Ergon describes the driver of this expenditure as being "*to meet statutory obligations for operating and maintaining a safe electrical network, specifically related to overhead conductor clearance to ground.*"[62] Ergon describes the risk in terms of legal and regulatory non-compliance, injury to persons and direct damage arising from contact with the network. Ergon refers to this forecast expenditure as a 'mandatory investment', being *one which is either a mandated directive or regulatory requirement*.[63]

[61] 07.01.47 Low Conductor Business case, 07.00.01 (Revised) Forecast Expenditure Summary Asset Renewal and 07.09.02 (Revised) Management plan overhead feeder

[62] 07.01.47 Conductor Clearance to Ground Defect Remediation 2015-20 Parent Gate: 1 - Strategic Investment Decision v0.5, page 2

[63] 07.01.47 Conductor Clearance to Ground Defect Remediation 2015-20 Parent Gate: 1 - Strategic Investment Decision v0.5, page 1

Establishing the need for the expenditure

196. Ergon initially identified 24,000 defects of conductor to ground clearance from its first full cycle of ROAMES. Following its second full cycle, Ergon reduced the initial defect assessment from 24,000 to 15,000 through a process of refinement and validation that concluded in June 2015. Ergon states that the "*15,000 defects identified by ROAMES are in addition to the anticipated quantities identified by the asset inspection process,*"[64] which it claims are more typically associated with service wires.

197. Ergon considers that the current asset defect management methodology has been ineffective. Further, Ergon states that: [65]

> *"There is no evidence to suggest that the Fugro-ROAMES identified 15,000 defects have suddenly occurred in the last year or inspection cycle, and it is therefore concluded that it is highly likely that the defects will have existed for some time despite the periodic and regular site inspections. There is no evidence that these low conductor defects will be 'found' any faster than the current rate."*

198. Ergon describes corrections to account for the "*Ergon Energy specification and legislative requirements*". However, no details were provided regarding how these factors were accounted for, or what consideration of other contributing factors was undertaken as part of its analysis (if any). We consider that the specification change and the assumed legislative requirement are likely to have a material impact on the forecast volume and expenditure level, as discussed further below.

199. Multiple variables impact line to ground clearances at transmission and distribution voltages. Further, many of these variables are subject to change over time (e.g., conductor loading, air temperature and land use). Whilst the requirements of ground clearance are absolute, the changing variables in operating a line have a significant impact on the risk that any line may present and the corresponding management strategy that may be required to mitigate that risk.

Assessment of risk

200. Ergon provided limited information to support its risk assessments of regulatory non-compliance (including degrees of non-compliance). The supplied risk assessment is for the entire program. Details of risk levels that may change across different parts of their network, or against different defects, were not included. A degree of granularity is essential in undertaking an assessment of prudent expenditure using risk assessment, cost benefit assessment, options analysis or other means of justifying and prioritising the work.

201. In its business case, Ergon states that its "*assessment of risks and appropriate and reasonable treatment methods for these risks associated with conductor clearance to ground must use the so far as is reasonably practicable (SFAIRP)*

[64] 07.01.47 Conductor Clearance to Ground Defect Remediation 2015-20 Parent Gate: 1 - Strategic Investment Decision v0.5, page 4

[65] 07.01.47 Conductor Clearance to Ground Defect Remediation 2015-20 Parent Gate: 1 - Strategic Investment Decision v0.5, page 8

methodology."[66] Whilst we found inclusion of references to Ergon's governing legislation, we did not find an explicit reference to a risk methodology for SFAIRP in its business case or risk management framework.

202. Notwithstanding the potential requirement for some risk mitigation identified from the results of the ROAMES survey, we have not seen sufficient evidence to justify the need for the proposed level of expenditure and that is supported by assessment of the legal, regulatory and/or safety risks.

Consideration of level of risk

203. Well-managed NSPs employ risk management policies and practices that seek to manage the overall risks to the business. In doing so, risk assessments are undertaken to inform the prioritisation of expenditure to the highest areas of risk. Also, such NSPs typically consider a range of controls to treat the risk which serves to: (i) manage the overall risks posed to and by the NSP; (ii) adopt a responsible approach to individual risk assessment and treatment; (iii) ensure the treatments are achievable and deliverable; and (iv) consider the cost to consumers.

204. A key element of an NSP's risk framework is the Board's risk appetite, which determines the level of risk that the NSP considers tolerable. In making decisions and judgements about what can be done within the operating constraints of the NSP, we consider that maintaining a tolerable level of risk does not imply removal of all risk.

Management approach to risk appears internally inconsistent

205. In its consideration of other asset risks, Ergon has applied risk assessments and judgements that reflect a prioritised approach. For instance:

- *7/0.064 conductor replacement program*: Removal of small copper conductor from Ergon's network, initially focussing on HV conductor. Following review of an electric shock incident in 2013, a number of actions resulted including re-focussing the replacement strategy on LV conductor. Notwithstanding the concerns raised in our initial review, we note that Ergon has considered control measures in its response, and has adopted a targeted / prioritised approach to the replacement program.
- *Laminated crossarm replacement program*: Treatment of problematic laminated wood crossarms included as part of its inspection and defect management program that has included adoption of a prioritised approach initially focussed on high rainfall areas in Far North Queensland.

206. Accordingly, we observe that Ergon's assessment of risk, and specifically application of ALARP/SFAIRP in the case of low spans, is not consistent with Ergon's application of risk management and work prioritisation that it has taken for other significant programs where it has applied a risk-based prioritisation approach.

[66] 07.01.47 Conductor Clearance to Ground Defect Remediation 2015-20 Parent Gate: 1 - Strategic Investment Decision v0.5, page 6

Insufficient consideration of available options

207. Ergon provided a strategic level estimate as part of its Gate 1 approval, but provided no evidence of consideration of alternative risk treatment options, such as to address the highest priority low spans through the use of relatively low cost measures such as fencing, signage or landscaping. Rather, Ergon proposed a single program to resolve all defects in a single year based on a single unit cost. There is no evidence that other prospective risk treatment options available to Ergon were considered and which would be expected to have a material impact on the cost estimate.

208. We note that Ergon has applied further refinements to the rectification process to achieve improved efficiency. However, we did not see evidence of consideration of: (i) efficiencies achieved across the program; (ii) efficiencies with other elements of the augex and repex program (such as where an augmentation project may mitigate the risk); (iii) consideration of lower cost options; or (iv) where the cost of remediation would be disproportionate to the risk avoided.

Insufficient incident data to support forecast

209. We reviewed the performance data provided by Ergon to support the assessment of increasing incident trends. Whilst conductor contact incidents appear to be increasing over the period 2009-10 to 2014-15, there is no breakdown to indicate the percentage of incidents that relate to low conductor that is the basis of the proposed expenditure, as opposed to other factors such as high loads (which Ergon state is also increasing over the same period).

210. Similarly, we note the apparent increasing trend in the number of Priority 1 conductor clearance to ground defects that have been identified though a complete 4-year inspection cycle. However Ergon dismisses the reliability of the inspection process for identifying low conductor defects as part of its justification for relying on ROAMES.

211. We consider that the supplied data is insufficient to conclude a reliable increasing trend of low conductor incidents, or to support the proposed volume of defect rectification.

Overall assessment of proposed allowance for conductor clearance to ground remediation program

212. Following its ROAMES survey, Ergon established a requirement to respond to the identified defects. Based on the volume of defects when compared with its normal inspection processes, development of a dedicated program would seem reasonable.

213. We reviewed the business case information provided in support of this expenditure and found evidence that the forecast exhibits many of the systemic issues observed in the development of Ergon's total replacement capital expenditure and which reflect an inflated forecast. Systemic issues include:

- Conservative approach to risk, which includes a bias to include full programs in the forecast to be completed as quickly as possible and within

the RCP rather than adopting a prudent risk management approach giving consideration to the risk/cost trade-off across the portfolio of work;

- Internally inconsistent approach to risk across its portfolio that raises concerns regarding the prudency of some work;
- Insufficient options analysis including consideration of risk treatment options that might result in more efficient costs for this program; and
- Insufficient consideration of opportunities for prioritisation of work, including addressing the highest risk sites first and packaging work with other programs.

214. Whilst we consider that a program is likely to be required, we consider that the program that Ergon has introduced in its RRP is neither prudent nor efficient. We consider it likely that Ergon will find that there is opportunity to de-scope, to prioritise, to identify complementary efficiencies and to identify mitigation measures which would contribute to a prudent and efficient program.

4.12 Conclusions on revised repex

215. In its RRP, Ergon proposed a repex program within 1% of its original proposal. For the most part, Ergon did not update the supporting information originally submitted as part of its RP. Ergon did provide clarifications and new information for the following:

- Transformers – description of CBRM information in support of its proposed forecast expenditure;
- Switchgear – description of CBRM information in support of its proposed forecast expenditure; and
- Conductor ground clearance remediation program – inclusion of a new program, with associated business case for the remediation of low ground clearances.

216. Whilst it is not clear from the information presented whether the program level reductions contained within the SCADA, network control and protection and 'Other' asset categories have been applied to address the systemic issues we identified, the reductions are indicative of the results of applying a similar top-down review. Despite these individual changes, the total repex forecast remains comparable with Ergon's RP.

217. We remain concerned with the lack of justification to support a prudent and efficient forecast for the line asset defect management program. This program totals $345m or 37% of total forecast repex. Considering the number of other proposed programs targeting specific issues and end-of-life conditions for assets on Ergon's network, we expect that Ergon could reduce its generalised line asset defect management program by a larger amount. If this was not the case, then we would expect Ergon to have provided analysis for its line asset defect management program to clearly demonstrate that:

- the expenditure was directed to network issues of sufficient risk/urgency to warrant remedial work, and separate to those identified within its targeted programs;

- appropriate strategies are being deployed to ensure prudent and efficient expenditure;
- opportunities to package work across multiple programs have been assessed; and
- Ergon has removed any potential overlap in its programs that may lead to an inefficient forecast (such as where its conductor replacement program, and other repex programs, are likely to resolve low ground clearance issues and vice versa).

218. Based on our review of a sample of expenditure included in Ergon's RRP, we consider that the systemic issues identified in our initial review have not been adequately addressed. Accordingly, it is our view that the systemic issues described below are likely to be present in the revised forecast, leading to an over-estimation bias:

- the top-down challenge process appears to have embedded a level of conservatism towards risk;
- insufficient evidence is presented regarding the establishment of an optimal risk/cost position for the portfolio; and
- there is an absence of robust risk assessments.

5 Revised proposed 'Other system capex'

5.1 Introduction

219. In this section, we consider Ergon's RRP as it relates to the specific areas of Ergon's Other System and Enabling Technology category of capital expenditure ('Other System capex') as included in our terms of reference.

220. EMCa did not review Ergon's RP for this category. The current review therefore covers all relevant material provided by Ergon and not only new information provided subsequent to its original RP.

5.1.1 Summary of the AER's Preliminary Decision

221. The AER applied a -15% adjustment in its Preliminary Decision, determining that $83.3m (rather than the $99m proposed by Ergon) represented a prudent and efficient amount for this expenditure category.

222. The AER's Preliminary Decision was to reduce the 'Other System' capex by "*removing the impact of the identified overestimation bias evident in the Ergon Energy forecast of other system-enabling capex by adopting the upper range established by EMCa for the distribution and sub-transmission forecasts.*"

223. The AER considered that the following systemic issues were evident:[67]

- The benefits to consumers and Ergon were, generally, not quantified and assessed against the costs of the programs;
- There was insufficient risk assessment and it was not evident to the AER that the proposed volume of work had been optimised for risk;

[67] AER – Preliminary decision Ergon Energy – Attachment 6 – Capex – April 2015_0, page 6-61

- There was insufficient exploration of alternative options and solutions and of the cost/benefit of the options, and
- Performance outcomes and targets for the projects were generally not defined.

5.1.2 Summary of Ergon's RRP

224. 'Other system' capex addresses issues with the network and with the operation of the network that do not conventionally align to standard capex categories. There are three sub-categories of 'Other system' expenditure:
    - Operational technology
    - Protection; and
    - Miscellaneous.
225. Ergon expects to underspend the AER's 2010-15 allowance of $274m for 'Other system' capex by $90m (-33%). Ergon explained the reasons for the underspend as including:[68]
    - accounting reclassification ($65m);
    - lower than expected maximum demand;
    - response to the 2011 ENCAP Review; and
    - delivery constraints (due to the impact of cyclones).
226. As shown in Table 16 below, Ergon proposed total expenditure of $99m[69] in its original RP. Ergon noted that the AER endorsed the need for expenditure in this category, but that it does "…*not agree there is a systemic bias of 15 per cent associated with estimating and business risk justification.*"[70]
227. Ergon's RRP includes a total amount of $95m, a reduction of $4m (-4%) from its RP forecast of $99m. The revised forecast is 14% higher than the AER's Preliminary Decision of $83m. Ergon's proposed RRP expenditure in this category is $89m (48%) less than its 2010-15 expenditure, primarily because of the completion of three large projects.[71]

[68] Ergon, 07.00.04 (Revised) Other System and Enabling Technology, page 8

[69] In Ergon's RRP document 07.00.04 (Revised) Table 1, the total proposed Other System capex in its RP is denoted as $103m. The difference is explained in Ergon's report SUB09.13 submitted as part of its RRP

[70] SUB00.01, pages 40-41

[71] Ubinet Stage 1, SWER projects, and CARE program

Table 16: Other System capex – original and revised expenditure profile (direct, $m, real 2014-15)

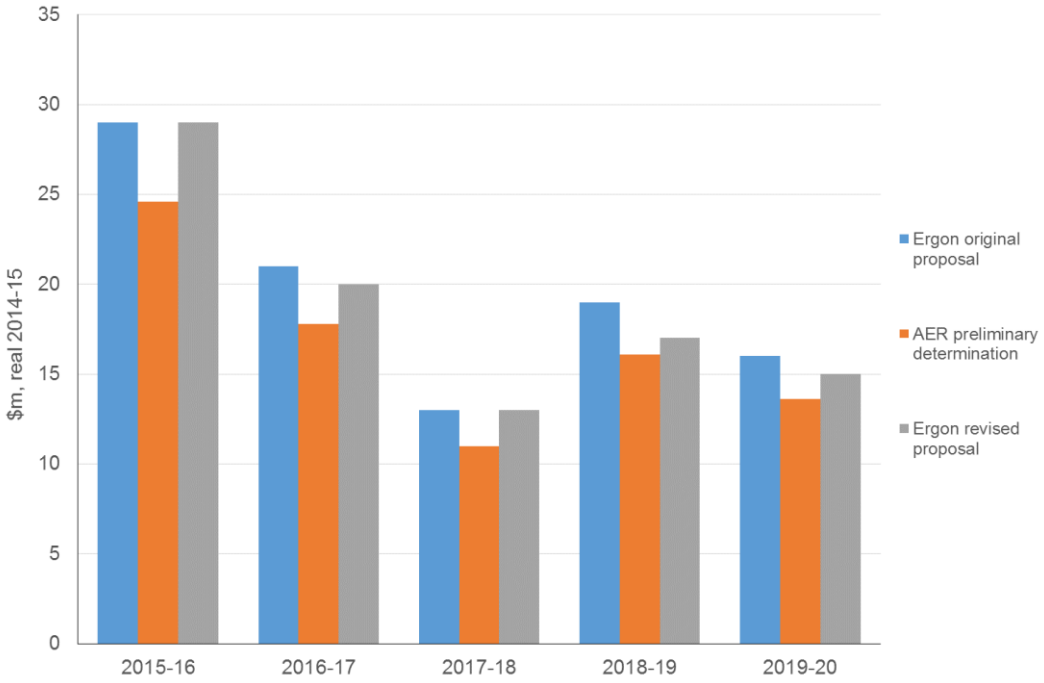
$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Ergon original proposal	29	21	13	19	16	99
AER preliminary decision	25	18	11	16	14	83
Ergon revised proposal	29	20	13	17	15	95

Source: Table B.1 & B.4 AER Preliminary decision Ergon Energy attachment 6 (Capex April 2015) and 07.00.04 (Revised) Other System and Enabling Technology Table 1

228. In its RRP, the only material adjustment that Ergon has made from the RP is in the 'Miscellaneous' sub-category in which the largest change is to the expenditure proposed for transformer bunding.

229. Figure 11 illustrates the adjustments graphically, with Ergon generally retaining the same expenditure profile as in its RRP.

Figure 11: Other System capex – Ergon original and revised proposal and AER Preliminary Decision ($m, real 2014-15)



Source: Table B.1 & B.4 AER Preliminary decision Ergon Energy attachment 6 (Capex April 2015) and 07.00.04 (Revised) Other System and Enabling Technology Table 1

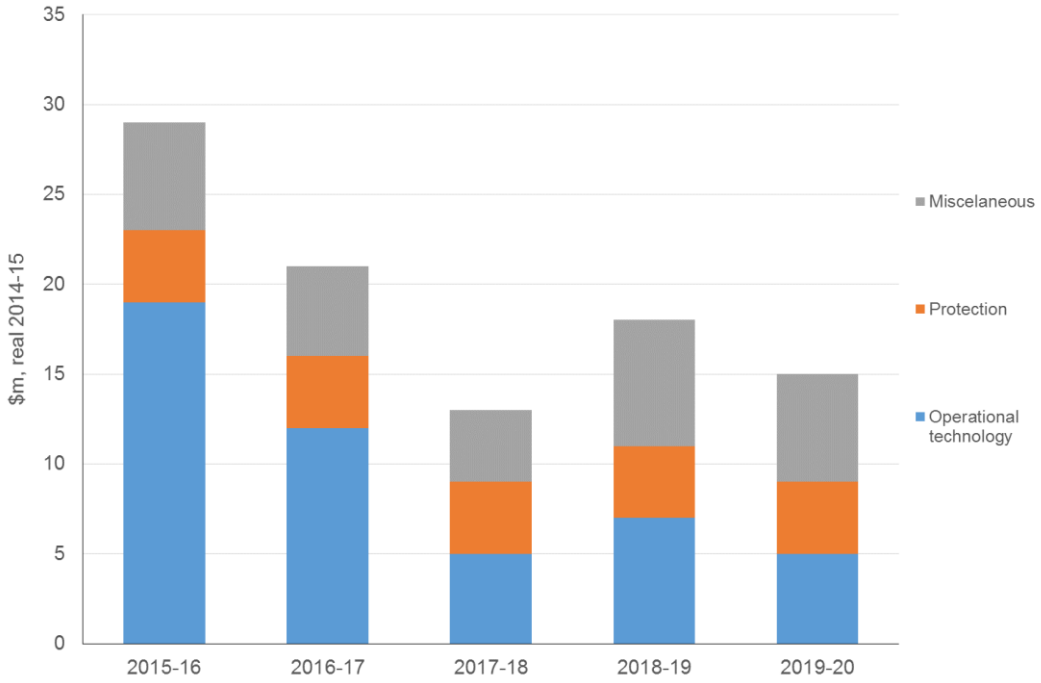
230. Table 17 and Figure 12 show the components of expenditure over the 2015-20 RCP. As discussed in more detail below, the reduced expenditure proposed from year 3 of the RCP onwards is primarily due to the planned completion of three operational installations.

Table 17: Revised Other System capex – category breakdown (direct)

$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Operational technology	19	12	5	7	5	47
Protection	4	4	4	4	4	20
Miscellaneous	6	5	4	7	6	27
Total	**29**	**21**	**13**	**18**	**15**	**94**

Source: 7.00.04 (Revised) Other System and Enabling Technology, Table 6, 7 & 8

Figure 12: Other System capex – revised proposed expenditure profile



Source: 7.00.04 (Revised) Other System and Enabling Technology, Table 6, 7 & 8

5.2 Operational technology

5.2.1 Overview

231. Ergon describe the expenditure in this category as supporting "*the transition to a smart network to facilitate customer choices, improve the utilisation of the existing power network and to defer capital intensive augmentation projects.*"[72]

232. Table 18 shows the revised expenditure for the seven initiatives Ergon proposed for the 2015-20 RCP. The total forecast expenditure of $47.1m is comparable with its RP.

233. Figure 13 shows this information graphically. The Operational Technology category comprises a number of discrete projects, several of which commenced in the 2010-15 RCP.

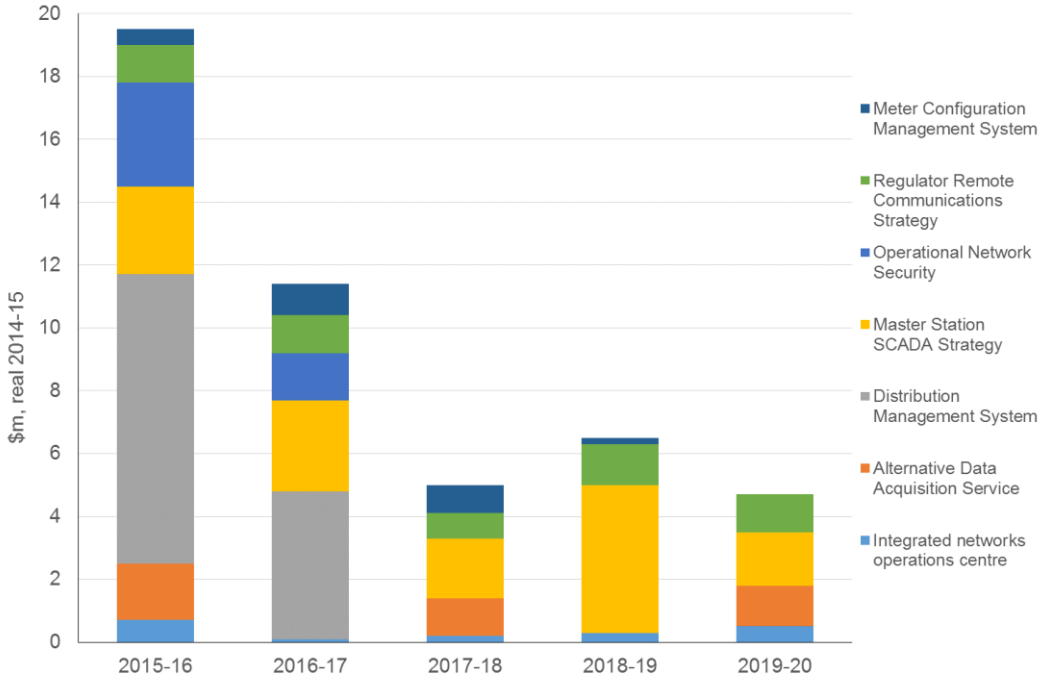
[72] 07.00.04 (Revised), page 9

Table 18: Revised Operational Technology capex (Direct costs)

$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Integrated networks operations centre	0.7	0.1	0.2	0.3	0.5	**1.8**
Alternative Data Acquisition Service	1.8	0.0	1.2	0.0	1.3	**4.3**
Distribution Management System	9.2	4.7	0.0	0.0	0.0	**13.9**
Master Station SCADA Strategy	2.8	2.9	1.9	4.7	1.7	**14.0**
Operational Network Security	3.3	1.5	0.0	0.0	0.0	**4.8**
Regulator Remote Communications Strategy	1.2	1.2	0.8	1.3	1.2	**5.7**
Meter Configuration Management System	0.5	1.0	0.9	0.2	0.0	**2.6**
Total	**19.5**	**11.4**	**5.0**	**6.5**	**4.7**	**47.1**

Source: 7.00.04 (Revised) Other System and Enabling Technology, Table 6

Figure 13: Revised Operational Technology capex (Direct costs)



Source: 7.00.04 (Revised) Other System and Enabling Technology, Table 6

5.2.2 Integrated operations centre (iNOC)

Background

234. The iNOC is designed to be a dedicated operation centre for managing the increasing number of 'intelligent electronic devices' (IED) on the network. Ergon considers that *"it will become increasingly important to monitor active device assets to ensure that they function correctly and are available to perform when required."*[73] The primary objective of the $2m expenditure program is to improve asset efficiency. Ergon advised that if it fails to manage the devices appropriately, "*there will be a reduction in the quality, reliability and security of the power network."*

235. The iNOC will monitor the status of IEDs to "*ensure that they are functioning correctly and available to perform when required'* [which] *will become increasingly important as the number of devices increases."*[74] Ergon identified

[73] Ergon, 07.00.04 (Revised), p. 17

[74] Ergon, *iNOC Gate 1 BC,* p. 4

the inherent risk of not proceeding with the proposed initiative as 'Medium', with the Net Present Cost (NPC) of not proceeding estimated at $10.4m.[75]

236. Ergon considered four options[76] and determined that the least cost approach involved co-locating IED management functionality with the communication network operation centre (cNOC) using established systems and processes. The NPC of the preferred option is $8.5m. The direct capital cost of establishing the iNOC is estimated to be $1.7m (labour and materials). The cost estimate is based on recent experience and vendor costs. The operational cost is estimated by Ergon to be $1.8m (but it is not clear over what period of time).[77]

237. Ergon identified unquantified operational savings, but advised that they are unlikely to be realised until the subsequent RCP.[78]

238. Ergon proposed establishing the iNOC in 2015/16, yet identified in the supporting business case that there are no potential financial consequences from deferring the project until 2017.[79]

Our assessment

239. As far as we can discern, Ergon has not provided any new information concerning this initiative in its RRP or in response to Information Requests.[80] We consider that:

- Whilst no risk analysis has been provided to support Ergon's risk level of 'Medium', there is likely to be a need at some time in the future to monitor the functionality of IEDs;
- As the number of IEDs grows and as failure rates increase, a small, specialist function that leverages the capabilities of the cNOC is likely to be the most efficient and effective approach to managing the assets;
- The need for 24/7 operation and establishment of the iNOC in 2015/16 has not been substantiated, given:
    - The risk is classified as 'Medium';
    - Ergon has identified no financial cost from deferring the initiative until at least 2017 and analysis of the change in cost-benefit from deferral of the proposed approach beyond 2017 was not provided (i.e., it was not apparent if this was considered as an option);
    - The NPC of the BAU approach is only 20% higher than the proposed option which, given the absence of supporting information and assumptions, is not a compelling margin;

[75] *Ibid*

[76] Business as Usual (BAU), stand alone management section, implement within the cNOC environment, functional group systemised IED management – see iNOC Gate 1 business case

[77] *Ibid, pages 5, 8*

[78] 07.00.04, page 18

[79] *Ibid, pages 5-6*

[80] Information Requests AER Ergon 083 and 084 were requested in relation to the RRP with responses received on 9 August 2015

- There is an associated operational cost of $1.8m;
- Benefits will not accrue for five years and no quantification has been presented; and
- There appears to be an overlap in the functionality provided by the proposed iNOC/ADAS projects with the proposed $14.0m expenditure on the SCADA master station strategy (which includes expanded functionality).

5.2.3 Alternative Data Acquisition Service (ADAS)

Background

240. Ergon proposes to establish a dedicated service to collect data from the growing number of IEDs in the network at a cost of $4m "*in order to understand how the distribution network is performing and apply this data to enhance network performance and planning strategies".*[81] Ergon's SCADA system is currently used for this purpose, but Ergon maintains that "*this type of data collection and control should not be performed using the existing SCADA system"*[82] because of the critical nature of the SCADA system and the cost to expand it.

241. The ADAS would be a repository for data in the operational environment, interfacing with the IEDs. Ergon identified the inherent risk of not proceeding with the proposed initiative as Medium, with the NPC of not proceeding estimated at $11.8m.[83]

242. Ergon considered two options (Extend existing SCADA and ADAS) in addition to BAU. The NPC of the preferred option is estimated to be $6.0m compared to the BAU NPC of $6.7m. The estimated capital cost is $4.3m (primarily for materials). The ongoing operational cost is not identified and Ergon did not identify operational savings.

243. Ergon proposes to establish the ADAS in 2015/16 with further expenditure in 2017/18 and 2019/20.

Our assessment

244. Ergon provided the Phase 2 business case as new information in support of its proposed expenditure, which is unchanged from its original proposal. We consider that:

- Whilst no risk analysis has been provided to support Ergon's risk level of Medium, as the number of IEDs grow, establishing an alternative to the SCADA interface is likely to be the best option;
- The need for establishing the ADAS in 2015/16 with investment of $4.0m with the two further provisions for expansion has not been substantiated, given:

[81] Ergon, *07.00.04 (Revised),* page 18

[82] Ergon, *ADAS Phase 2 Business Case,* page 5

[83] *Ibid, page 5*

- The risk is classified as 'Medium';
- No analysis of the change in cost-benefit from deferral of establishing ADAS in 2015/16 was provided (i.e., it was apparently not considered as an option);
- The NPC of the BAU approach is only 11% higher than the proposed option which, given the absence of supporting information and assumptions, is not a compelling margin;
- Ongoing operational costs have not been identified; and
- No tangible benefits have been identified in documentation provided to us.

5.2.4 Distribution Management System (DMS)

Background

245. The DMS is a suite of integrated applications that model the distribution network and provide tools for operating the network. Ergon commenced its DMS project in the 2010-15 RCP at a total estimated cost of $35.3m *"to deliver core DMS capability and efficiency improvements in its control room and in its outage management."*[84]

246. Project commencement was delayed and Ergon has included $13.9m in the 2015-20 RCP to conclude the project by 2016/17. This would result in total expenditure similar to the original estimate.

247. The risk of doing nothing was rated as 'Extreme' based on commercial and financial exposure, with 'High' network performance risk. The 'Extreme' ranking was based on the financial impact, estimated by Ergon to be $34m NPC which is consistent with the do nothing option due to the need for more operational staff.[85]

248. The project is predicated on improving efficiency of the Operations Control Centre, with the tangible net benefit originally estimated to be $4.9m NPV and a total cost of ownership of $7.5m NPC.

Our assessment

249. Ergon's strategy of establishing a contemporary DMS is consistent with utility strategies in Australia and around the world.

250. We consider that the expenditure allowed for in the 2015-20 RCP estimated as required to complete the project commenced in the 2010-15 RCP is likely to represent a reasonable estimate of the prudent and efficient cost forecast.

[84] Ergon, 07.00.04 (Revised), page 20

[85] Ergon, *DMS Business Case Supplementary Information referenced in Business Case,* p. 10

5.2.5 Master SCADA System (MSS)

Background

251. Ergon's MSS strategy "*sets out the programs required for maintaining the existing SCADA master station infrastructure and developing the capabilities of the master station to meet Ergon Energy's future network monitoring and control requirements.*"[86] The 10 year strategy commenced in 2015, with $14.0m of expenditure proposed in the 2015-20 RCP.

252. The risk of doing nothing is assessed as 'High', based on legal and regulatory consequences (security breaches).

253. Two options were considered in addition to doing nothing: (1) a proposed 'staged' strategy; and (2) replacing the existing SCADA master station. The preferred option has the lower NPC and, according to Ergon's analysis, reduces the monetised risk by about 80%.

254. The cost of the work proposed in the 2015-20 RCP was based on *"material costs recorded in Ellipse for previous projects, and vendor pricing of software costs."*[87]

255. The business case does not include any assessment of delivery risk for this large and complex project, either as a standalone project or in the context of the other significant OT initiatives that Ergon plans to pursue.

Our assessment

256. In broad terms, we consider that Ergon's MSS strategy is based on addressing common industry issues and trends and that it is appropriate to plan staged enhancement of its current functionality rather than a 'big bang' replacement.

257. However, we do not consider that the expenditure proposed by Ergon is likely to represent a reasonable, prudent and efficient level because:

- The risk assessment of doing nothing at 'High', which is based on unsubstantiated cyber security threats, does not provide a compelling case for commencing the project in 2015/16;
- The strategy document refers to increased use of IEDs, but does not present a compelling case for enhanced SCADA functionality in the short term;
- We have seen no evidence of consideration and management of delivery risk at the project or OT portfolio level and, in turn, consider that there is a reasonable likelihood that the proposed sub-projects will not be delivered on schedule;[88]

[86] Ergon, *07.00.04 (Revised),* page 22

[87] *Ibid*

[88] Noting that the DMS project is running two years late and is likely to absorb considerable specialist internal resources at the same time as the MSS project is mooted to commence

- Based on the information provided, we infer that the cost estimate is preliminary; and
- There are apparent overlaps in proposed functionality between the MSS, iNOC, and ADAS projects, at least in the short term, given the proposed increase in SCADA functionality to monitor IEDs proposed in the MSS business case.

5.2.6 Operational Network Security (ONS)

Background

258. Ergon proposed expenditure of $4.8m capex in the first two years of the 2015-20 RCP to implement 'best practice' security to secure the operational communications network against external and internal cyber threats. The proposed program is derived from advice from a cyber security expert presented to Ergon in 2010. Ergon now considers that the proliferation of new devices and other issues have collectively led to an elevated level of risk that needs to be addressed.

259. The risk is assessed as 'Medium'.[89] The residual risk after treatment is not identified. The potential cost of not treating the risk is identified as $62.0m. In the options comparison summary, the risk is monetised as $1.6m. It is not clear why there is such a large difference between the two numbers. Based on the information provided, the risk is that Ergon's OCN could potentially be used to access Ergon infrastructure:

> *"Should a well-planned cyber event occur, the key risk to Ergon Energy would be the destruction of one or more substation assets such as power transformers and switchgear."*[90]

260. Three options in addition to the BAU case are presented in the business case.[91] The preferred option (C) is identified as incurring a NPC of $20.8m with no impact on the monetised risk. The preferred option is justified by Ergon on the basis that it is "*in line with the National Security Agency recommendations around Technology regarding Defence in Depth…Ergon Energy will be able to scalably reduce the size of attack surfaces open to Internal threats thereby greatly limiting the amount of damage able to be done by a[n] internal threat.*"[92]

261. The cost of the project has been estimated using a vendor pricing tool and standard labour rates.[93]

[89] Ergon, Operational Network Security Business Case Gate 1, noting that in document 07.00.04 (Revised), the risk is rated as High.

[90] Ergon, 07.00.04 (Revised), page 24

[91] Implement best practice security, implement Edge Only Security, Completion of Best Practice business case during current AER period.

[92] *Operational Network Security Business Case Gate 1, section 2.4 a)*

[93] 07.00.04, page 24

Our assessment

262. Ergon identified a 'Medium' (or possibly 'High') security threat from internal and external sources and proposed a multi-pronged strategy to align its systems with what is referred to as Best Practice in the area. The risk rating is not substantiated.

263. We consider it reasonable to assume an increasing prevalence of cyber security threats and we consider that Ergon should take prudent steps to mitigate identified risks. However, we do not consider that Ergon's case for expenditure of $4.8m in 2015/16-2016/17 (or indeed in the 2015-20 RCP) is adequately justified. Specifically, the cost-benefit analysis is not compelling because:

- the selected option does not reduce the risk;
- the cost of the selected option greatly outweighs the benefit; and
- the option of a slower staged approach is not considered.

5.2.7 Regulator Remote Communications Strategy (RRC)

Background

264. Ergon proposed expenditure of $5.7m on its RRC strategy over the course of the 2015-20 RRP to equip 75% of its 584 HV regulator sites with remote communications. The drivers of the project are to make it easier for operators and planners to maintain and operate the network and to potentially defer augmentation work.[94]

265. Ergon assessed the inherent risk as 'Medium' and identified seven options in its strategy document.

266. Ergon proposed to undertake the work in four stages with the emphasis on using existing equipment wherever possible. It is the least cost option of those considered and will result in 84% of all regulator sites having communications capability by 2020 (thereby eliminating 84% of the risk). The NPC of the proposed option is $4.3m and the avoided risk is identified as $1.8m.

267. Ergon commented on the risks of deferring the program as follows:

> *"Delay to achieving Ergon's corporate visions. Likely increase in customer complaints due to more PV and other Inverter Energy Systems installations which lead to fluctuating voltages. DMS will be installed but will not have access to regulator data."*[95]

268. Ergon advised that the project costs have been developed based on standard labour rates and internal knowledge. Ergon also identified potential maintenance savings towards the end of the 2015-20 RCP, but the quantification of the benefits is not apparent.

[94] 07.00.04 (Revised), page 25

[95] Regulator Remote Comms Strategy Business Case, page 7

Our assessment

269. Voltage regulators play an important role in the network and there are operational advantages in having remote visibility and control of the devices. Ergon does not explain why it has been installing regulators without communication up until this RCP and why it is only now proposing to introduce the initiative.

270. We consider that Ergon's staged approach based on minimising investment is reasonable. However, we are not convinced that the full extent of the proposed expenditure is warranted because:

- Ergon has assessed the risk as 'Medium', but without supporting analysis;
- The project is discretionary and the avoided cost is, based on Ergon's calculations, 2.5 times the assessed benefit; and
- The average cost of the third stage, at $22k per regulator, appears high in the context of the benefits, noting that the average cost per regulator of the first two stages is $9k and $12k respectively.[96] Eliminating stage 3 would appear to significantly improve the benefit cost ratio; and
- The fourth stage (replacing regulators with comms-enabled regulators on failure) should be justified on its own merits (i.e., based on a cost-benefit analysis) which Ergon did not provide.

5.2.8 Meter Configuration Management System (MCMS)

Background

271. The MCMS is designed to provide ongoing supply chain cost reductions and improvements in work process efficiency and customer service via a generic hand-held unit which can be used to configure electronic meters and ripple receivers in the field.[97] Ergon proposed expenditure of $2.6m, all within the first four years of the 2015-20 RCP.

272. Ergon assessed the risk of not proceeding with the proposal as 'Medium' and quantified the potential costs of not proceeding as $171m.

273. Ergon considered two options in addition to BAU in its business case: (1) selecting the generic hand-held devices; and (2) using "*dedicated configuration management tools.*" The monetised avoided risk in the options comparison is $0.1m and the NPC of the selected option is estimated to be $41m.[98] It is the lower cost option of the two. Ergon assumed that the equivalent functionality from widespread AMI will not be available in the foreseeable future. Ergon advised that "*2017 is the latest year this project could be commenced due to*

[96] Based on data in 07.04.10, pages 22-24

[97] 07.00.04 (Revised), page 26

[98] This appears to be a very low assumed benefit in the context of the qualitative description in both the business case and the statements in Ergon's document 07.00.04 (Revised).

the increasing population of Electronic Meters which is expected to surpass 40% of total Metering Equipment."[99]

274. The cost of the program has been developed from meter vendor costings and estimates of labour and similar past costings.

Our assessment

275. Ergon presented a compelling qualitative case for its MCMS project coupled with a confusing and unconvincing quantitative analysis of the benefits. For example, based on our experience, the business case:

- shows that the potential savings from proceeding with the project are likely under-estimated and the capital cost is likely over-stated;
- provides a qualitative assessment of why the project start cannot be delayed until 2017, but does not provide a compelling quantitative assessment of why the cost-benefit improvement from deferral is insufficient to be the recommended approach; and
- appears to use only preliminary costs and does not consider delivery risk.

276. Consistent with our earlier findings regarding Ergon's OT initiatives, we consider that the initiative has merit; however, the cost and timing of the work has not been supported by compelling justification.

5.3 Protection

5.3.1 Overview

277. Ergon proposed expenditure of $20m ($4m p.a.) in its RRP, which is unchanged from its original proposal. The AER did not report a specific adjustment to this expenditure category in its Preliminary Decision.

278. The expenditure is confined to two programs: (1) Protection Review Program Rectification; and (2) Sensitive Earth Fault (SEF) Protection Program. We consider each program below.

5.3.2 Protection Review Program Rectification

Background

279. Ergon proposed expenditure of approximately $3.4m p.a. ($17m over the 2015-20 RCP). It is based on continuation of work that commenced in 2012 with protection feeder reviews. Ergon states that "*Work recommended in zone substations is based on previous completed substation protection reviews, whereas work on distribution feeders is based on a limited number of feeder reviews completed to date."*[100]

280. The protection reviews identified that the current level of protection did not comply with all of Ergon's minimum Substation Protection Standards. Ergon

[99] Ergon, *Metering Configuration Business Case,* pages 5-6

[100] 07.04.11, page 6

identified that the issues, which do not apply to all feeders, expose it to "*increasing levels of safety and reliability risks.*"[101]

281. In its business case, while the highest identified risk is 'Medium', there is no explanation of the risk rating. It only considers a single option – continuing to implement the findings of the Protection Review Program on an ongoing basis.

282. The avoided monetised risk is identified as $5.6m and the NPC of implementing the program is estimated to be $17.5m (a ratio of 3:1).

283. Ergon developed the cost estimate for the work from a bottom-up 'building block' approach in which it has identified seven work packages, which are in turn based on historical costs and SME review. The building blocks (or 'installations') are then applied in the expected number of installations required for a particular feeder.[102]

Our assessment

284. We do not consider that Ergon has provided a robust business case to support the level of expenditure for a risk rated as 'Medium' for the following reasons:

- No statistics are presented showing increasing protection mal-operation, or a direct link to safety incidents;
- Ergon presents timing options for slowing down or accelerating the program, but does not provide a compelling case for choosing the accelerated option;
- The cost of the program is disproportionately high compared to the avoided, monetised risk (noting that the assumptions underpinning the analysis for the single treatment option are not presented); and
- There is no link between the expenditure and expected outcomes/targets.

285. Whilst we support this program, Ergon has not provided a case that would justify increasing its expenditure from the level that it is incurring in the current RCP, in order to progress it on an accelerated basis in the next RCP.

5.3.3 Selective Earth Fault (SEF) Protection Program

Background

286. Ergon proposed continuing an existing program to retrofit SEF protection on distribution feeders. SEF protection assists with detecting phase-to-ground currents and providing a trip signal and/or alarm. Ergon advised that it has identified 43 electrical events involving personal injury through electric shock that could have been prevented by SEF protection schemes. As SEF can also lead to tripping broken conductors, it can reduce the likelihood of bushfire ignition. Ergon proposed expenditure of $3m over the 2015-20 RCP on retrofitting SEF protection to 19 substations (4% of Ergon's substation

[101] *Ibid*

[102] 07.00.09 (Revised) Unit Cost Methodologies Summary 2015 to 2020, pages 58-59

population). The rate of implementation is based primarily on delivery capacity.[103]

287. Ergon assessed the untreated risk of not 'investing' in the program as 'High' in five risk categories, including Health and Safety and Corporate reputation. Ergon considers two options in the business case in addition to BAU: (1) retrofitting SEF at 12 substations; and (2) retrofitting SEF at 6 substations. The monetised untreated risk is estimated to be $15.8m.[104]

288. The bottom up cost estimates are based on standard labour rates and internal knowledge of the cost of materials and equipment.[105]

Our assessment

289. SEF protection is an industry standard protection scheme. It was one of the recommended technical solutions from the Victorian Bushfire Royal Commission. SEF protection mitigates, but does not prevent the risk of: (i) electric shock (including electrocution) through direct personal contact with energised broken overhead conductors; and (ii) bushfires, through ignition of vegetation when energised broken conductors are in contact with the ground.

290. Although we have not reviewed Ergon's cost-benefit analysis, the ratio of cost to benefit of 1:5 is indicative of a prudent initiative.

291. Ergon has concluded that it is capable of delivering 60% more SEF protection schemes than it considered in its business case and it is able to draw on recent cost data to forecast its 2015-20 RCP costs.

292. We are satisfied that this program is likely to represent a prudent and efficient level of expenditure.

5.4 Miscellaneous

5.4.1 Overview

293. Ergon proposed expenditure of $27m in its RRP on three miscellaneous programs:

- LV spreader and fuses;
- Substation AC system upgrade; and
- Substation Power transformer bunding.

294. The expenditure is 10% less than it proposed in its RP.

[103] 07.00.04 (Revised), page 28

[104] SEF Protection Business Case, page 4

[105] 07.00.04 (Revised), page 30

Table 19: Other system capital expenditure – Miscellaneous (direct cost)

$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Ergon original	6	6	5	8	7	32
Ergon revised proposal	6	5	4	7	6	27

Source: Table 8- 7.00.04 (Revised) Other System and Enabling Technology and Table 8 - 07.00.04 Other System Enabling Tech Exp Summary.

5.4.2 LV spreader and Fuse

Background

295. Ergon proposed $8m of expenditure over the 2015-20 RCP on installing LV spreaders and fuses. The LV spreaders are designed to reduce the risk of conductor clashing, with Ergon proposing up to three spreaders per span, if necessary. Ergon plans to install LV spreaders across its entire network at a cost of about $35 per unit.[106]

296. LV fuses are designed to protect LV conductors against thermal overload and fault current resulting from a variety of network fault conditions. Ergon analysed recent conductor failures and concluded that retrofitting LV fuses at all distribution transformer locations will "*mitigate public safety concerns and risk, by reducing the opportunity for lines to fail when they clash.*"[107]

297. In its business case, Ergon identified three 'High' risks (health and safety; corporate reputation; legal and regulatory) and two options (in addition to BAU) for addressing them. The two options are based on three stages, with stage 1 to be completed prior to the 2015-20 RCP in each case. The preferred option A involves installing the same number of spreaders and fuses as Option B, but extends into the 2020-25 RCP (Option B is set to conclude by 2020).[108]

Our assessment

298. Ergon's business case presents a reasonable risk assessment based on a well-known and researched set of hazards and common industry solutions. However, it does not provide a robust business case for retrofitting LV spreaders on all spans in the entire network and LV fuses on all transformers.

299. Whilst Ergon has considered a staged approach through its options analysis, we consider that the risk/benefit trade-off, for example, of limiting spreader retrofitting to feeder spans over a certain (relatively long) length would help demonstrate that the program was optimised. This is indicative of a prioritisation approach that could be applied more generally. Further, we expect that Ergon will find opportunities for prudent deferral relative to the expenditure allowance it has proposed.

[106] 07.00.04 (Revised), page 32

[107] *Ibid*

[108] LV Spreader and Fuses Business Case, page 5

5.4.3 Substation AC system upgrade

Background

300. Ergon proposed expenditure of $8m over the course of the 2015-20 RCP to "*separate substation LV supply systems to mitigate public safety risks due to transfer of earth potential rise."*[109]

301. Ergon rated the risk as 'High' (for Health & safety and Corporate reputation) and presented two options in addition to BAU: Option A - upgrading services over 10 years; or Option B - upgrading services over 20 years. Option A is estimated to offer a cost/benefit ratio of 1:0.25, whereas Option B has a ratio of 1:0.5, reducing the monetised risk by 80% in the process. Ergon proposes adopting Option A.[110]

302. The cost is based on standard estimates. There is no consideration in the business case of the risk to achieving the proposed program in 10 years.

Our assessment

303. In our experience, the hazard (potential death) is real, but the likelihood of this outcome is very low (i.e., Unlikely). Using Ergon's risk framework, this would lead to a 'Moderate' risk assessment. When combined with the cost/benefit ratio calculated by Ergon, its assessment methodology would tend to support Option B rather than Option A. We expect that, with more analysis, Ergon could identify an optimised program of work commencing with the highest risk locations and requiring significantly less than the proposed expenditure in the 2015-20 RCP.

5.4.4 Substation power transformer bunding

Background

304. Ergon proposed expenditure of $11.0m over the course of the 2015-20 RCP to mitigate non-compliant transformer bunds at substations. This is $2m less than the RP amount, but we can find no explanation in the RRP documentation for this change. Ergon advised that it has completed risk assessments of breaching the requirements of the Environmental Protection Act 2003 and has considered two options to mitigate what it rates as a 'High' risk.

305. Ergon presented the rationale for its risk ranking across three dimensions and two options, in addition to BAU, for mitigating the risk: (i) to be completed over 7 years; and (ii) to complete the remedial bunding program over 14 years. Ergon presented the justification for selecting the recommended option of completing the work within 7 years as:

[109] 07.00.04 (Revised), page 33

[110] Substation AC System Upgrade Business Case, page 5

> *"This is the preferred option because by the end of the next regulatory period it will have removed all higher risk sites without bunding and oil containment from Ergon's asset base."*[111]

306. Costs are based on standard estimates.

Our assessment

307. Ergon identified a common industry non-compliance issue and proposed to address all non-compliant sites within seven years. Ergon does not support its risk ranking of 'High' with analysis (e.g., number, severity and trend of oil spills due to inadequate bunding). Its selection of the option to render all bunds compliant within 7 years is based on the regulatory cycle and lacks an engineering-based justification. Based on Ergon's own analysis, the cost/benefit ratio for the selected option is 1:0.56, whereas for the 14 year program it is 1:0.94.

308. We consider that the risk assessment is conservative and the selected option is not representative of a prudent and efficient program based on the information presented.

5.5 Conclusions on revised Other system capex

5.5.1 Systemic issues leading to over-estimation

309. In our review of Ergon's revised proposed 'Other system' capital expenditure program, we found that:

(i) The programs identified by Ergon have merit in that they address network or operational issues that require some attention in the 2015-20 RCP; and

(ii) There is evidence of systemic issues similar in nature to those that we encountered in reviewing other components of proposed expenditure, though with greater impact:

- Ergon's risk assessment tends to be conservative, with risk ratings not appropriately taking into account the likelihood of the worst case event occurring;
- Ergon's options analyses tend to be limited and the assumptions regarding comparative cost-benefit analyses are unclear and would not support adequately informed decision-making;
- Ergon has tended to adopt a conservative approach when selecting the treatment option, often selecting the lowest risk option even when this did not appear to be justified by the cost-benefit analysis nor by the risk ratings (before and after treatment).

[111] 07.04.13 Sample Business Case 5 – Substation Power Transformer Bunding, page 5

5.5.2 Assessment of prudent and efficient level of expenditure

310. We considered the impact of the systemic issues that we identified for each of the programs proposed by Ergon. We consider that the aggregate impact on proposed 'Other system' capex is in the order of a 20%-30% over-statement of a prudent and efficient level of expenditure.

Appendix A: Our assessment of Ergon's claims

Overview

311. Ergon has relied on the new information and clarifications that it provided in its RRP, including revised supporting documents (where applicable). Ergon did not seek independent review of its expenditure forecast or of our technical review of its initial RP.

312. In this Appendix A, we consider Ergon's claims made in its RRP that are of a general nature and not relevant only to specific aspects of our review.

Approach to risk assessment[112]

Regulatory framework

313. Ergon has made repeated reference to meeting its legislative obligations, including to the Queensland regulatory environment which it states requires Ergon to employ SFAIRP (So Far As Is Reasonably Practical) principles when assessing electrical safety risks.

314. Ergon states that:[113]

> *"Queensland law requires a different risk assessment obligation to be undertaken for safety mitigation. The assessment obligation is commonly labelled as "SFAIRP" – So Far As Is Reasonably Practical. Under this obligation, Ergon Energy is bound by tighter and more onerous obligations than those espoused by the ALARP analysis process, including taking action to mitigate lower level risks than those assigned 'high' and 'intolerable'."*

315. Ergon further states that:

> *"Ergon Energy has correctly applied the SFAIRP principle in relation to electrical safety risks, which has led to more mitigation measures and costs than would be attributed as a result of an ALARP approach. Ergon Energy therefore requests the AER review these statements and the various proposal documents, and forecast costs in this light."*

316. We consider that Ergon is subject to comparable legislation with respect to electrical safety to other DNSPs operating in the NEM. Like other DNSPs, the

[112] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, page 18

[113] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, page 40

AER requires Ergon to provide sufficient justification for its proposed expenditure allowance.

Application of SFAIRP

317. In its response, Ergon describes its obligations:[114]

> *".. to employ SFAIRP in its assessments of safety risk, which imposes a more demanding mitigation obligation when compared to the ALARP approach. The documents provided by Ergon Energy in its proposal that propose to resolve safety issues specifically employ the SFAIRP obligation and its application in decision making."*

318. As Ergon has described, this is a feature of the regulatory framework and compliance is required. Ergon's overt reference to this requirement in its RRP suggests that this was a significant consideration in the development of its forecast. In our review of information provided by Ergon, we did not find explicit reference to SFAIRP in its documentation to justify its forecast expenditure,[115] or in its risk management framework documents.

319. Ergon has provided a list of programs[116] that have employed a SFAIRP assessment and those that employed an ALARP assessment. We reviewed a sample of these programs to find evidence of reference to an SFAIRP assessment. With the exception of the conductor clearance to ground remediation business case, we did not find a reference to SFAIRP.

320. We also did not find evidence of rigorous analysis of risk to demonstrate that the ALARP test had been applied correctly, or that the justification of the expenditure was supported by the assessment of risk.

Conservative approach to risk assessment

321. In our initial review, we noted a dominance of high ratings associated with regulatory and legislative risk. We also observed this conservative approach to risk in the revised supporting information provided by Ergon for its RRP.

322. We observed that Ergon's 'high' risk ratings are consistently associated with its assessment of regulatory and legislative risk. Ergon's assessment of consequence and likelihood is undertaken independently in some cases. In our view, a regulator is more likely to take/escalate action on a DNSP in the absence of it demonstrating responsible management in response to identified safety risks. Given responsible management strategies for a risk or potential compliance breach, subject to the materiality of the breach and safety risk, it would be more typical to see a high consequence with a lower likelihood assigned or a moderate consequence with a higher likelihood. However, our review of Ergon's supporting documents identified a prevalence of risk ratings with both 'high' consequence (e.g., actions taken against Board Director) and

[114] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, page 20

[115] With the exception of the conductor clearance to ground remediation program discussed separately in this report

[116] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, pages 21-22

'likely' probability (e.g., within 1 year). We consider that this does not represent a valid risk assessment in a well-managed business.

323. Overall, we consider that this conservative approach to risk assessment is likely to have led to an overestimation bias in Ergon's forecast. In our initial review, we identified this in relation to Ergon's application of ALARP and our review of Ergon's RRP further reinforces this finding.

Upward bias reflecting costs and risk

324. Ergon states that it:[117]

> *"considers that the observed 'upwards bias' is nothing more than required and appropriate application of legislative obligations (use of SFAIRP consideration), and results in the need to replace higher volumes when compared to an ALARP consideration."*

325. We consider that, in the absence of information provided by Ergon to adequately justify its proper application of ALARP, or of any other required assessment framework, the upwards bias observed does not meet the capex objectives of the NER.

Summary

326. We conclude that there is no basis for change to our initial finding that there is insufficient analysis to justify the proposed level of expenditure. Arising from our review of Ergon's claims of higher legislative and safety risks, the systemic issues we have identified are likely to reflect an upwards bias in its proposed expenditure.

Management of prudent deferrals

Managing risks of deferment

327. In response to our concerns regarding the impact to level of risk on the network by deferment of repex to respond to natural events, Ergon states:[118]

> *"Ergon Energy asserts that changing its repex program to suit prevailing conditions, such as cyclones or a significant systemic failure mode that presents public safety risk, while managing within its overall regulatory budget allowance is demonstrating the appropriate and prudent performance expected by customers."*

328. Our initial review considered whether elements of Ergon's proposed capital expenditure allowance appropriately met the requirements of the NER capital objectives. In this context, we sought indications that Ergon could and had assessed the risk implications of undertaking (or limiting) its repex program. In this regard, its understanding of the implications of having deferred repex as a result of cyclones is an indicator of its capability to assess the need for proposed expenditure.

[117] [SUB09.10 page 40]

[118] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, page 23

329. All DNSPs retain the responsibility to make prudent decisions to manage their networks. Our advice to the AER has the objective of assisting it in determining capital allowances, rather than approving specific projects and programs.

330. We sought, but did not find, evidence as to how Ergon manages its network risk in regards to repex implications of events such as cyclones, whether this indicated that a level of contingency was provided in the capital allowance, and whether that contingency was reasonable.

Prudent timing of expenditure

331. In response to our concerns regarding observed step changes in expenditure coinciding with the commencement of the RCP, and orientation to undertake work 'if approved', Ergon states that:[119]

> *"Ergon Energy accepts EMCa's apparent criticism about program stability and the ability to defer repex, but asserts that this reflects the mark of a prudent and efficient asset manager. For all of its repex forecasts, Ergon Energy provided supporting documentation demonstrating the need for its major programs of repex work."*

332. Notwithstanding Ergon's justifications for certain work to be undertaken, in a network that requires continuous management based on continuous assessments of engineering-driven need, we consider it unlikely that timing of programs would naturally align with regulatory cycles or that the need (or otherwise) for a program should depend on the inferred 'approval' by the regulator of items in the proposed expenditure allowance.

Summary

333. We conclude that there is no change to our consideration of the difference between the basis for our assessment of Ergon's proposed expenditure allowance and Ergon's claims of operating as a prudent and efficient asset manager.

Review approach

334. Ergon considers that its forecasts are justified, and that:[120]

> *"The documented sparse detail of the review by EMCa does not lend itself to present an adequate technical review or conclusion, and hence Ergon Energy disputes EMCa's findings in this regard."*

335. In our review of Ergon's regulatory proposal, we undertook a top-down governance-level review supported by a sample-based, bottom-up assessment of programs and projects. Where we made observations regarding the sample of reviewed projects, these are included as evidence of the systemic issues and biases that we identified within Ergon's augex and repex capital forecasts. Our conclusions regarding systemic issues are supported by these program and project sample reviews coupled with our review of Ergon's expenditure

[119] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, page 24

[120] Ergon Energy SUB09.10 Submission to the AER on its Preliminary Decision Asset Renewal, page 55

forecasting processes and methodologies. The basis for our assessment is consistent with the AER's Better Regulation guidelines. Moreover, our advice is not the sole basis on which the AER's Preliminary Determination was made.