Technical Review of Revised Regulatory Proposal

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

Report to

Australian Energy Regulator

from

Energy Market Consulting associates

Strata Energy Consulting

April 2015

This report has been prepared to assist the Australian Energy Regulator (AER) with its final determination of the appropriate revenues to be applied to the prescribed distribution services of Essential Energy from 1st July 2014 to 30th June 2019. The AER's determination is conducted in accordance with its responsibilities under the National Electricity Rules (NER). This report covers a particular and limited scope as defined by the AER and should not be read as a comprehensive assessment of proposed expenditure that has been conducted making use of all available assessment methods.

This report relies on information provided to EMCa by the AER and by Essential Energy. EMCa disclaims liability for any errors or omissions, for the validity of information provided to EMCa by other parties, for the use of any information in this report by any party other than the AER and for the use of this report for any purpose other than the intended purpose.

In particular, this report is not intended to be used to support business cases or business investment decisions nor is this report intended to be read as an interpretation of the application of the NER or other legal instruments. EMCa's opinions in this report include considerations of materiality to the requirements of the AER and opinions stated or inferred in this report should be read in relation to this over-arching purpose.

Except where specifically noted, this report was prepared based on information provided by the AER pertaining to Essential Energy's Revised Regulatory Proposal replacement capex forecast expenditure.

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About EMCa

Energy Market Consulting associates (EMCa) is a niche 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 managers with engineering/technical backgrounds in the electricity and gas sectors.

About Strata

Strata Energy Consulting Limited specialises in providing services relating to the energy industry and energy utilisation. The Company, which was established in 2003, provides advice to clients through its own resources and through a network of Associate organisations. Strata Energy Consulting has completed work on a wide range of topics for clients in the energy sector both in New Zealand and overseas.

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Summary and findings

Background

1. Essential Energy submitted its Revised Revenue Proposal (RRP) to the AER in February 2015 for the five-year Regulatory Control Period (RCP) from 2014/15 to 2018/19. The AER has requested that EMCa review the claims and new information provided by Essential Energy in its RRP regarding our October 2014 report (our "initial review") and consider whether Essential Energy's revised proposed replacement capital expenditure reflects an efficient and prudent expenditure forecast.

2. We have re-assessed the impact of the systemic issues identified in our October 2014 report to take into account the new information provided by Essential Energy.

3. In its RRP, Essential Energy has proposed an unchanged repex quantum of $857m (excluding capitalised overheads) for the 2015-19 RCP.

Our findings

4. In our initial review of Essential Energy's RP, we identified that repex prudency was undermined by systemic issues that contributed to an over-estimation bias. Specifically, we identified the following issues:

    i. asset management approach is immature;

    ii. repex program has material deliverability risk;

    iii. activity forecasts have a questionable basis;

    iv. approach to risk is overly conservative;

    v. options analysis and cost-benefit analysis are inadequate; and

    vi. cost estimation approach is unclear.

5. In its RRP, Essential Energy has provided updated strategies, options analysis, data, and expenditure profiles and has clarified its approach in areas that were not previously made clear in its RP.

Our revised assessment

6. The AER has asked EMCa to consider if Essential Energy's RRP repex forecast now reflects an efficient and prudent expenditure forecast taking into account the new information provided.

7. We note that the Better Regulations Guidelines state that:[1] "*We will generally assess forecast capex through assessing: the need for the expenditure; and the efficiency of the proposed projects and related expenditure to meet any justified expenditure need. This is likely to include consideration of the timing, scope, scale and level of expenditure associated with proposed projects. Where businesses do not provide sufficient economic justification for their proposed expenditure, we will determine what we consider to be the efficient and prudent level of forecast capex.*"

8. We have reassessed the findings from our October 2014 report to consider Essential Energy's new information, noting that Essential Energy is required to provide sufficient economic justification of the timing, scope, scale, and level of expenditure associated with proposed projects.

9. Based on the new information provided in its RRP, Essential Energy has substantively addressed the systemic issues identified in our initial review. Notwithstanding we consider that Essential Energy has retained a residual bias towards conservative risk assessment and has programs of expenditure which are not adequately justified, as summarised below:

    i. there remains evidence of a conservative bias in Essential Energy's risk assessment approach through the application of its Riskex tool;

    ii. Essential Energy typically has not undertaken or presented robust quantitative cost-risk analysis to demonstrate economically optimal timing and volume of work;

    iii. Essential Energy has not adequately justified the average wood pole replacement cost, nor justified that its wood pole strategy is the most effective way to reduce risk at the most efficient cost; and

    iv. Essential Energy has not adequately justified the prudency of its CONSAC cable replacement program.

10. In summary, we are satisfied that Essential Energy's RRP has mitigated our initial concerns regarding elements of the asset management approach, cost estimation and deliverability risk. However, we consider that Essential Energy's observed bias towards conservative risk assessment and lack of sufficient justification for cost and activity forecasts, in some instances, indicates that its revised repex proposal does not represent a reasonable forecast of prudent and efficient expenditure.

[1] AER Better Regulation Expenditure Forecast Assessment Guideline for Electricity Distribution, page 24

1 Introduction

1.1 Purpose of this report

11. The purpose of this report is to provide the AER with our updated assessment of Essential Energy's RRP and to respond to new information provided by Essential Energy in its Attachment 6.6 '*Response to AER draft decision of replacement expenditure'* and associated documents.

12. Both our current assessment and our 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). We understand that the AER will establish a capital expenditure allowance for Essential Energy based on assessments undertaken by its own staff.

1.2 Scope of requested work

13. The AER issued a Scope of Work to EMCa requesting that we consider and respond to Essential Energy's RRP Attachment 6.6, in which Essential Energy provides its response to our October 2014 report. We were also requested to consider, where relevant, the supporting information provided in an independent review of the risk based prioritisation process that was prepared for Networks NSW.

14. We proposed a desktop review of the information provided in which we would:

- review the documentation provided and identify any new information or reasoning that might be relevant to our October 2014 findings regarding Essential Energy's proposed repex;
- clearly identify the reasons for acceptance, in whole or in part, of Essential Energy's position where we are convinced that the new information provides sufficient evidence to support amendment of our October 2014 findings; and

- as necessary, expand and clarify the reasoning and evidence to support our October 2014 findings in circumstances where the new information does not provide sufficient evidence to warrant amendment.

15. The AER asked us to proceed with this work on 18th February, 2015. The assessment in this report is based on the information provided to us through this process.

1.3 Structure of this report

16. Our main findings are summarised at the beginning of the report.

17. In the subsequent sections and appendices, we provide our assessment of Essential Energy's revised repex forecast and address the claims it has made regarding EMCa's initial review:

- In section 2, we summarise Essential Energy's revised repex proposal;
- In section 3, we provide our revised assessment of the systemic issues identified in our initial review and revisit the five expenditure programs that inform our assessment;
- In Appendix A, we respond to Essential Energy's claimed factual inaccuracies in our October 2014 report; and
- In Appendix B, we list the documents reviewed in preparing this report.

18. We have not responded to matters that do not directly relate to EMCa's original scope of work, but which are addressed in Essential Energy's Attachment 6.6, namely: trend analysis; benchmarking; predictive modelling; the repex model; and unmodelled repex (from sections 4.1 – 4.5 of Essential Energy's report).

2 Essential Energy's revised repex proposal

2.1 Our initial RP assessment of proposed expenditure programs

19. When assessing Essential Energy's original RP, we reviewed a sample of its replacement programs. The assessment was comprised of Essential Energy's poles, switchgear, conductors, transformers and cables repex programs.

20. In our initial program assessment, we found that Essential Energy's justification was generally inadequate to support the volume, timing and cost of the proposed expenditure.

21. The findings from our initial program assessment are summarised in section 3. We have revisited this initial assessment to consider the new information provided to us by Essential Energy for review.

2.2 Summary of Essential Energy's revised response

22. In its RRP, Essential Energy has proposed an unchanged repex quantum of $857m for the 2015-19 RCP (excluding capitalised overheads). Essential Energy's proposed expenditure program components are the same as in its initial RP, as reported in our October 2014 report. Accordingly, we have not repeated this information here. Essential Energy has provided further supporting information for these programs, which we assess in the next section.

23. Essential Energy has listed five reasons why it does not believe that the AER's draft decision assessment of the amount of repex required ($657.7m) is adequate. We

interpret Essential Energy's primary concern to be that the AER has placed reliance on the technical review by EMCa and that we have "(*misled) the AER, as many of the statements made are general in nature and are misleading or incorrect when applied to Essential Energy."*[2]

24. EMCa's response to each of Essential Energy's claims is provided in Appendix A. In summary, we consider that our scope and approach is consistent with the AER's requirements and the Better Regulations guideline that was developed and published prior to our initial review of Essential Energy's RP. It is our further view that our methodology is fit for purpose in providing technical advice to the AER regarding whether Essential Energy has proposed an efficient and prudent expenditure forecast. We have carefully reviewed the claims made by Essential Energy and consider the assertion that any part of our initial review was misleading and/or inaccurate to be wholly unfounded.

[2] Essential Energy, Attachment 6.6 Response to AER Draft Decision of Replacement Expenditure, page 4

3 Assessment of additional information provided by Essential Energy

3.1 Assessment of systemic issues

25. We have drawn upon the additional information provided by Essential Energy. Our revised assessment is described in detail in sections 3.2 and Appendix A. In summary, we consider that Essential Energy has substantively addressed the systemic issues identified in our October 2014 report through the provision of new information. However, we still have material concerns with its risk assessment, activity forecast and expenditure justification, as described below:

    i. ***Capital governance*:** we are now satisfied that Essential Energy has followed the multi-level and iterative process established by the NNSW Board. A number of decision support tools were used in the 'top-down' assessment that resulted in an 11% ($175m) reduction of the original 'bottom-up' proposed repex program. However, we maintain our initial view that its governance process would benefit from a robust cost-benefit analysis of (at least) the major investment projects/programs. Essential Energy is required to provide economic justification of its expenditure proposal. In the absence of such analysis, we consider that the Board does not have sufficient information to undertake its governance role to assure a prudent and efficient program is proposed.

    ii. ***Asset management:*** In the sample of asset classes that we reviewed, we are satisfied that Essential Energy has demonstrated (through updated data quality, options analysis and asset strategies) that its asset management processes, and their application, are generally aligned with standard industry practice. However, we retain a significant residual concern with its risk assessment and activity forecasts, as discussed below.

iii. ***Delivery risk:*** Essential Energy has now developed a comprehensive Delivery Plan for the 2015-19 RCP. We are satisfied that this provides sufficient assurance that it is able to deliver the forecast program of work without compromising cost efficiency.

iv. ***Activity forecasts*****:** Essential Energy has updated its pole and cable management strategies and has re-profiled its conductor expenditure. In each case, the adjustments serve to mitigate the majority of our original concerns. We remain unconvinced that Essential Energy has identified and justified the prudent volume and timing of activity for all of the programs that we reviewed.

v. ***Risk assessment:*** In its RRP, Essential Energy has explained the interaction between its various risk assessment and portfolio prioritisation tools. We accept that this explanation is generally consistent with the Corporate Risk Framework. However, we retain the view that its application of the 'Riskex' methodology has contributed to conservative risk assessment. Further, Essential Energy has introduced a new tool that we believe leads to questionable levels of forecast volume and timing of work, albeit in only one asset sub-category.

vi. ***Options analysis:*** Essential Energy has updated its option analysis in one asset sub-category and described the sources of critical review that it used to overcome the limited availability of robust cost-benefit analyses in other asset categories. Whilst it appears that Essential Energy is focusing on the appropriate assets, and our initial concerns have been mitigated as a result, we remain unconvinced that Essential Energy's options analyses have been optimised and that the activity forecasts are prudent in all cases.

vii. ***Cost estimation*****:** Essential Energy has provided more detailed information on its cost estimation methodology and its application to individual repex programs. Accordingly, we consider that our initial concerns have now been substantially addressed.

3.2 Assessment of expenditure programs

3.2.1 Introduction

26. In this section, we provide our response to Essential Energy's RRP Attachment 6.6. We re-visit our original assessment of the sample of Essential Energy's replacement programs and provide an updated position after considering the new information provided by Essential Energy.

27. In our assessment of the RP documents pertaining to these programs, we found sufficient justification to support Essential Energy's focus on these categories of expenditure - as each presented substantial risks based on condition assessment and fault statistics. However, at the sub-program level, we found insufficient justification to reasonably support the volume, timing and cost of the proposed expenditure.

3.2.2 Poles

EMCa's original assessment

28. We determined that Essential Energy needs to progressively increase the number of poles that it replaces and reinforces.

29. We raised concerns that Essential Energy had not sufficiently justified its aspirational pole failure target, proposed strategies and the activity forecast. Specifically, we were concerned about the resultant low reinforcement/replacement ratio. We did not find a sufficiently robust case for the volume of replacement and reinforcement work proposed and, therefore, for the expenditure required during the 2015-19 RCP. We also questioned Essential Energy's capacity to deliver its proposed work.

30. We suggested that Essential Energy should revisit its serviceability criteria, recognising that this was driving its relatively low reinforcement ratio. We noted that other utilities had higher pole reinforcement/replacement ratios, with Ausgrid's at "*40% or higher*" and stated that "*further analysis would be required to establish the optimum volume of and ratio of pole replacement and reinforcement for Essential's wood pole population, cognisant of the challenges with wood pole inspection. This is outside the scope of our review".*[3]

Essential Energy's new information

Adopting Ausgrid's approach

31. The AER based its draft determination on Essential Energy adopting Ausgrid's 47% reinforcement ratio (for LV poles). In response, Essential Energy:

    (i) equated the adoption of Ausgrid's pole reinforcement ratio as also requiring adoption of Ausgrid's serviceability criteria; and

    (ii) determined that adoption of such a regime has an unsustainable high expenditure outcome, costing double its proposed expenditure over 2015-19.

Revised pole management strategy

32. Essential Energy has made a "*moderate change in its serviceability criteria and a step increase in pole reinforcement rates*".[4] The revised serviceability criteria is based on considering poles for reinforcement that have a factor of safety between 1 and 3 but not less than 1. Poles with a safety factor less than 1 are replaced. This has led to a $2.63m increase in its total 2015-19 expenditure forecast for additional wood pole reinforcements.

33. Essential Energy states that *"[T]here is no expected improvement in the pole replacement rate for this regulatory period due to the higher reinforcement rate. There is no change in the condemnation criteria…there may be some future benefit in the next regulatory period with regard to the replacement rate as a result of the increased*

[3] EMCa, October 2014 report, footnote 34, page 21

[4] Attachment 6.6, Appendix D

reinforcement rate, but none is or can be expected in this regulatory period due to the step change in serviceability criteria".[5]

34. Essential Energy has restated that its aspirational pole failure target of 1:20,000 poles is justified because:

(i) it has the highest pole failure rate in the NEM;

(ii) it has undertaken a detailed end-to-end review of pole management; and

(iii) its "*transition to the target will be achieved by administrative controls, a moderate change in serviceability criteria, and a step change in pole reinforcement rates".*[6]

Deliverability

35. Essential Energy has provided additional analysis which shows that:

(i) it has consistently met its pole inspection, replacement and reinforcement targets with no outstanding activities; and

(ii) since its RP, it has augmented its pole reinforcement resource capability with contract resources to deliver the increased reinforcement program.

EMCa's updated position

Ausgrid's Approach

36. Based on our assessment of the new information provided by Essential Energy (particularly the advice from URI Engineering[7]), we find that adopting Ausgrid's reinforcement/replacement ratio is unlikely to be optimal for Essential Energy because:

- Essential Energy requires serviceability criteria that are appropriate for its asset base;
- the appropriate serviceability criteria for Essential Energy are unlikely to reflect Ausgrid's reinforcement/replacement ratio, and
- Ausgrid's serviceability criteria appear to be conservative with respect to reinforcement decisions and are unlikely to be optimal for Essential Energy's wood pole population.

Revised pole management strategy

37. In Essential Energy's RP, it forecast a flat reinforcement rate of 600 poles p.a. (i.e., 0.2% of the 298,279 poles scheduled to be inspected p.a.) and an annual average of 9,117 pole reinforcements (3.1% p.a.) over 5 years, representing an increase of 24% over the 2015-19 period from the previous RCP.[8] In its RRP, Essential Energy's revised

[5] *Ibid,* page 48

[6] *Ibid*, Appendix D, where administrative controls include improvements to the inspection manual and management of identified defects

[7] *Ibid,* Appendix E

[8] Essential Energy RP, *Asset Investment Case ESS_17 and ESS_46, Table 13*, page 40

serviceability criteria now leads to a flat reinforcement rate of 1,280 poles p.a. (0.4%) with the same number of pole replacements (45,586 over 5 years).

38. From our review of the new information in Attachment 6.6, we do not see:

(i) a robust cost-benefit analysis demonstrating that the target of 1:20,000 pole failure rate is optimal and/or that the above revisions to the serviceability criteria (and the consequent reinforcement/replacement rates) are optimal;

(ii) evidence of the predicted pole failure rate improvement over the course of the RCP (i.e., as a transition to the 1:20,000 failure rate target); and

(iii) evidence of detailed consideration of alternative and potentially more efficient approaches to pole management than the proposed 'pole-by-pole' basis - such as working to replace/reinforce poles in the highest risk zones and to reinforce poles as a life extension strategy in other (lower risk) regions.

39. We also note that UCI Engineering stated in Attachment 6.6 that "*the only ways that reinforcing can be economically beneficial in the medium term are:*

a. *If there is a definite spike in aged poles that are nearing the end of their life…*

b. *If pole replacements are still at a level that will prevent the pole population from ageing beyond a sustainable level…*"[9]

40. We note that Essential Energy's wood pole age profile[10] spikes at c.160,000 poles in the 45-50 year age range (with a further peak some 20 years later of c.150,000 poles), satisfying UCI Engineering's first criterion, and that Essential Energy's current replacement rate satisfies the second of UCI Engineering's "*economic reinforcement criteria*".

41. We therefore find no reason to change our original advice that Essential Energy: (i) needs to progressively increase the number of poles it replaces and reinforces; and (ii) has not demonstrated that it has optimised the replacement and reinforcement volumes for the 2015-19 RCP to reduce risk at the most efficient cost.

Deliverability

42. We noted a steady decline of the pole expenditure profile in the period 2010/11 – 2013/14, based on Essential Energy's RIN data[11] and questioned Essential Energy's commitment and capability to efficiently delivering increasing pole treatments over the 2015-19 RCP.

43. We are satisfied by Essential Energy's response to our concerns and no longer regard deliverability as a material threat to achievement of its pole program in the 2015-19 RCP.

[9] Attachment 6.6, *Appendix E*

[10] ESS17 and ESS_46, *Figure 6,* page 13

[11] EMCa original report, Figure 4, page 20

3.2.3 Switchgear

EMCa's original assessment

44. We generally found Essential Energy's focus on switchgear failure based on condition and risk assessment to be reasonable. However, we identified the following issues in some asset sub-categories:

- qualitative risk assessment methodology leading to conservative results;
- lack of quantitative cost-benefit analysis to confirm the timing and volume of work, noting that historical replacement rates were often used;
- the RIN expenditure profile did not match the replacement approaches set out in the investment proposals; and
- the apparent use of only rudimentary bases for unit costs in some programs.

Essential Energy's new information

Replacement strategy

45. In response to EMCa's initial concerns, Essential Energy has provided new information which we summarise as follows:[12]

(i) Essential Energy is heavily dependent on reliable and functional switchgear assets because it operates a radial network with little redundancy in the event of switchgear failure;

(ii) its fleet of aged switchgear exhibits relatively high failure rates;

(iii) its replacement strategies are tailored to the individual drivers and replacement strategies for different asset categories which are, in turn, informed by failure data, diagnostic testing and risk assessment; and

(iv) by utilising a bottom-up, condition-based replacement approach and by employing initiatives to reduce overall program costs (such as grouping several asset replacements within one program) its forecast unit costs are lower than its historical costs and compare favourably with NEM benchmarks.

Forecast replacement quantity

46. Essential Energy advises that: [13]

(i) For high quantity, low cost switchgear assets located within the distribution network (i.e., ABS, links, fuses and reclosers), Essential Energy has proposed to maintain historical levels of replacement where there is a constant rate of failure. In cases where failure rates are declining due to technology changes, it has included a reduced replacement level in its RP; and

[12] Attachment 6.6, pages 56-57

[13] *Ibid,* page 58

(ii) For low quantity, high value assets (circuit breakers and switchboards), Essential Energy does not rely on historical levels – it replaces them when they are no longer in a serviceable and safe condition.

Forecast repex

47. Essential Energy advises that: [14]

(i) the category analysis RIN has been updated with the actual expenditure in 2013/14 and reveals a flatter investment profile;

(ii) the step-change in 11kV circuit breakers is based on an updated condition-based understanding of the fleet (including through FMECA) and is a reflection of poor asset condition, with oil-filled circuit breakers and circuit breaker types that present high frequencies of conditional and functional failures driving expenditure; and

(iii) it has shifted its focus from outdoor to indoor circuit breakers, supplanting the former strategy of like-for-like replacement and changed its strategy to undertake vacuum retrofitting where practicable.

Application of risk assessment

48. Essential Energy reiterates that its risk assessment is in accordance with its corporate policy (CEOP2111).[15]

EMCa's updated position

49. We have reviewed the specific programs for switchgear replacement and consider that the proposed expenditure strategies are reasonable. We find that Essential Energy has sought to manage its expenditure program to reflect the higher risk assets and has tailored the replacement programs to achieve the most effective risk reduction options.

50. The new information provided by Essential Energy has mitigated our concerns with its RP. Our residual and material concern is that it has not provided any new cost-benefit analysis to support the timing and volume of proposed projects. We note that quantitative cost-benefit analyses can help to identify opportunities for prudent expenditure deferral. Despite the absence of such analysis, we are satisfied that there would likely be only a modest amount of expenditure deferral.

3.2.4 Conductors

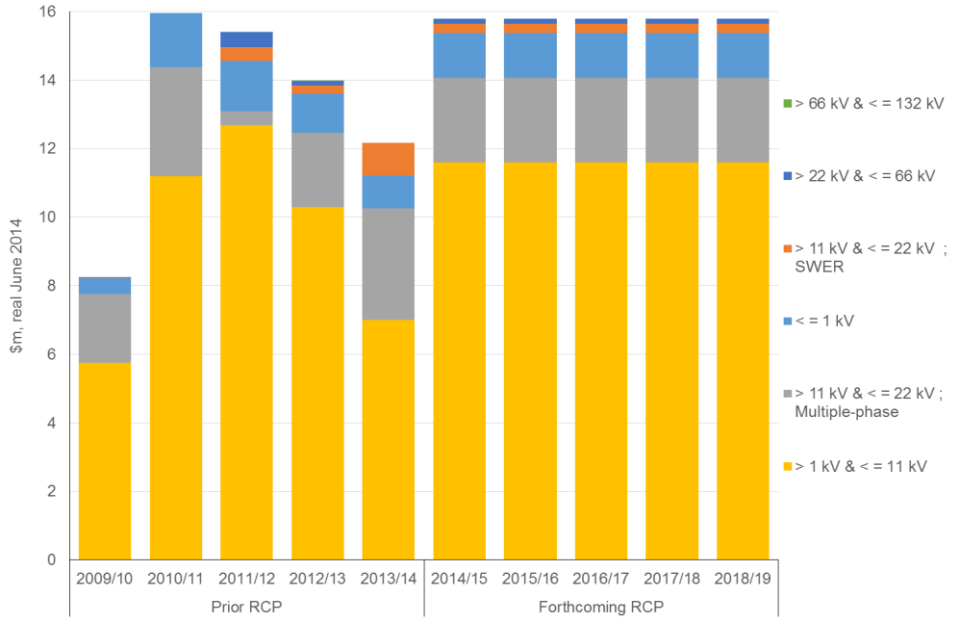
EMCa's original assessment

51. We acknowledged the need for expenditure on the selected overhead conductor classes. However, we were: (1) concerned about the prudency of the step change in activity from the previous RCP to the 2015-19 RCP - refer to Figure 1 below from our October 2014 report; (2) unconvinced that Essential Energy would deliver the nominated (higher) volume of work at the indicated cost in its RP; and (3) we did not see evidence of a robust long term delivery strategy.

[14] *Ibid,* pages 59-61

[15] *Ibid,* pages 62-63

Figure 1: Essential Energy conductor repex compared with historical spend (RP)



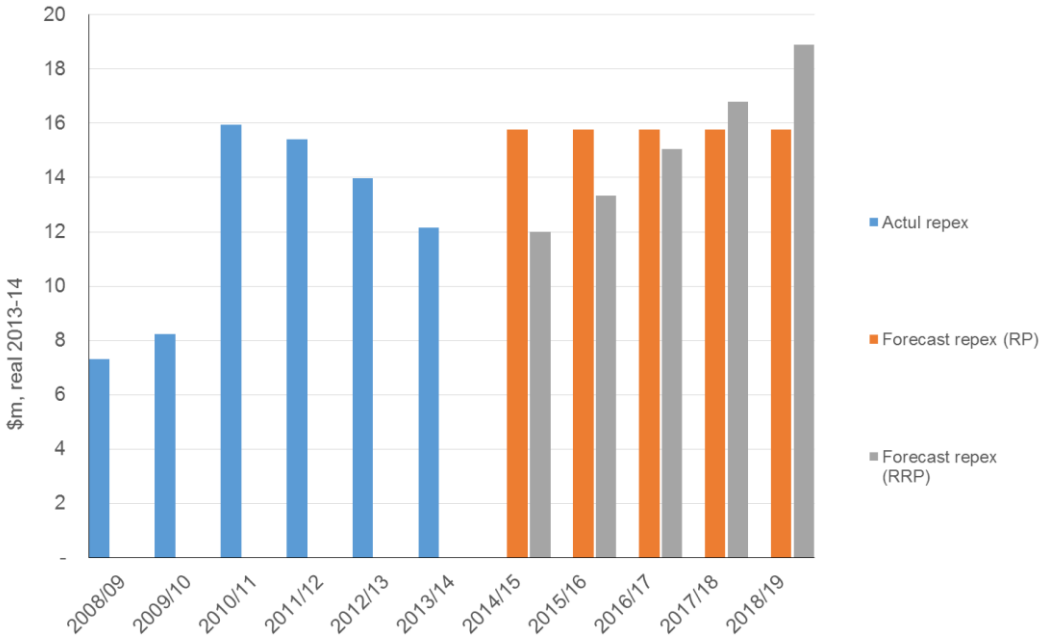
Source: EMCa original report, Figure 6, page 25 (from Essential RIN data)

Essential Energy's new information

Basis of the program

52. Essential Energy has provided its revised 2015-19 RCP conductor replacement profile, as shown in Figure 2 below.

Figure 2: Essential Energy revised forecast reconductoring program (RRP)



Source: Essential Energy RRP[16], Attachment 6.6, Table 4-21

[16] There is $133m in the repex category '*Other by DNSP Defined*' in the initial RP RIN. However, in the RRP, that amount appears to have been distributed to the other categories - including approximately $13m to overhead conductors.

53. Essential Energy advised that: (1) its revised program is based on condition assessment; (2) it utilises inspection and outage data to identify the conductors in need of replacement; and (3) the program is not delivery constrained.

54. In responding to our initial concern that it may not be considering all possible options (including innovative approaches), Essential Energy has advised that it: "*intends to:*

- *Replace conditionally failed small conductors;*
- *Decommission redundant small conductors; and*
- *Support customers moving off-grid where it is economically efficient."*[17]

EMCa's updated position

Conductor strategy

55. Essential Energy has 157,000 route km of small diameter bare overhead conductor in its network and it proposes to replace 0.3% per annum on average. Updated failure statistics provided in the RRP, show a compound growth rate of 7% p.a. over the last 6 years.[18] There is therefore a prima facie case for increasing the replacement volume from the previous RCP.

56. However, Essential Energy is required to demonstrate that its expenditure is economically justified and we have not seen evidence from a cost-benefit analysis that the average annual replacement rate of 350 km pa is prudent. As discussed below, it appears to be a delivery-constrained amount.

57. In parallel with the replacement work, we consider that a prudent and efficient operator would investigate all possible options for reducing the future replacement volume required, including by replacing grid supply over long radial lines with distributed generation and removing the redundant lines. However, it is unlikely that this would substantially reduce the replacement volumes for the 2015-19 RCP.

Deliverability and unit costs

58. Essential Energy replaced 235 km p.a. of conductor on average in the previous RCP. We initially expressed concerns that the proposed 50% increase in conductor replacement to 350km p.a. might provide a delivery challenge.

59. It is difficult for us to reconcile Essential Energy's claim that the program is condition-based rather than delivery-constrained. Figure 2 above indicates that Essential Energy intends to progressively build its delivery capability over the RCP and has provided no evidence to suggest that the incidence of defective conditions will increase according to the expenditure profile that it has proposed.

[17] *Ibid*, pages 68-69

60. Regarding deliverability, Essential Energy has provided supplementary information[19] to indicate that its 2014/15 target expenditure of $15.78m will exceed the annual $12.0m estimate shown in Figure 2. This target expenditure is roughly equivalent to the annual average over the 2015-19 RCP to achieve c.350km p.a. We consider this to mitigate our initial deliverability concern. Our residual concern is related to the apparent lack of condition-based justification for the progressive increase in annual expenditure over the RCP.

3.2.5 Transformers

EMCa's original assessment

61. In our initial review we identified the following concerns:

- there was inadequate justification of the difference in RIN expenditure profiles between the two RCPs;
- Essential Energy had used rudimentary assumptions about optimal refurbishment rates, with qualitative references to costs and benefits;
- there was little evidence of cost-benefit analyses being used to assist in assuring the optimal timing and volume of work, and
- there was little evidence of economic justification of standard transformer sizes.

Essential Energy's new information

Expenditure profile

62. Essential Energy has advised that the transformer repex profile is comprised of two 'components' of expenditure:[20]

i. distribution assets - which have a stable and predictable investment profile (as replacement is driven by conditional failures within a large, stable asset population); and

ii. power transformers - which comprise a smaller numerical base and, whilst also subject to condition monitoring, are less frequently replaced and therefore result in a more volatile expenditure profile.

Replacement strategies

63. Essential Energy has advised that:

(i) Its reference to a 2% replacement rate in its justification of pole top transformers (associated with overhead substation refurbishment) was only used as a 'top-down' sense check and that "*The need for the programme is underpinned by the difference in lifetimes of the core substation assets (pole top transformer and pole) to the surrounding equipment (EDO fuses, surge diverters, droppers, connections,*

[19] *Ibid,* page 67

[20] *Ibid,* page 70

shrouds, earthing, etc.)… Refurbishment of the pole top assets that have deteriorated is required to achieve the full service life…"[21]

(ii) It has proven capex savings of 11-17%, with further savings expected from leveraging its purchasing power due to increased volumes, and there are (as yet) unquantified opex benefits from adopting standard transformer sizes at various ratings and voltage levels.

Cost-benefit analysis

64. Essential Energy has not provided new information in response to our concern about the lack of cost-benefit analysis.

EMCa's updated position

65. Essential Energy has explained that the volatility in the RIN data is due primarily to the timing of expenditure on power transformers, which is infrequent and large - unlike the high volume expenditure forecast for replacement of distribution transformers, which is constant and small. We are satisfied with Essential Energy's explanation.

66. We are also satisfied with Essential Energy's response to our initial concern about the lack of justification for the aspects of its transformer replacement strategy, as discussed above.

67. We note that Essential Energy has provided no new information in response to our initial concern about the lack of cost-benefit analysis to provide assurance that the prudent timing of transformer replacement and refurbishment has been selected.

3.2.6 Cables

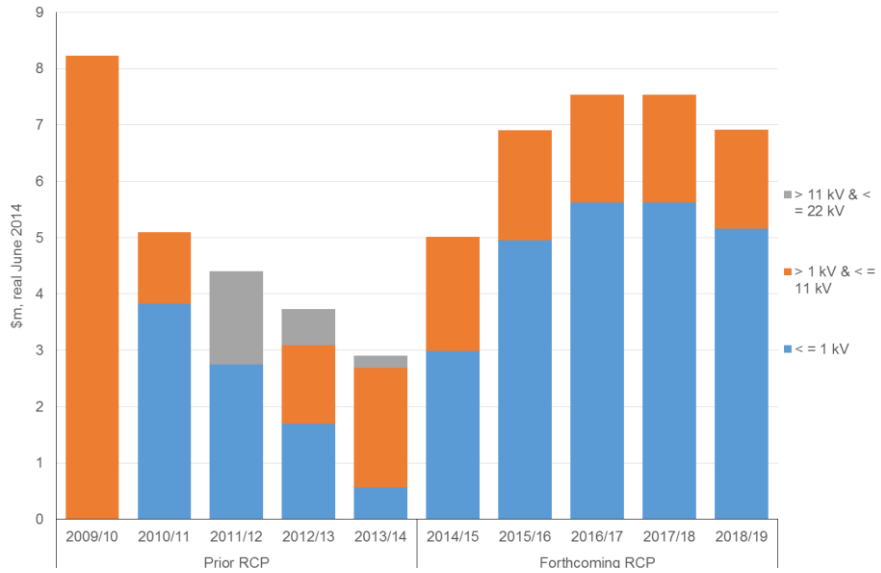
EMCa's original assessment

68. We identified the following issues in our initial review:

- RIN expenditure, as shown in Figure 3 below, did not appear to be reliable;
- the proposed rebate to private owners for underground conversions seemed to be uneconomic; and
- there was a lack of robust information and analysis to support the concentric neutral aluminium conductor (CONSAC) cable proposal.

[21] *Ibid,* page 71

Figure 3: Essential Energy cable repex compared with historical spend (RP)



Source: EMCa October 2014 report, Figure 8, page 29 (from Essential RIN data)

Essential Energy's new information

Historic expenditure

69. In its RRP, Essential Energy advises that: [22]

(i) the historical data is inaccurate – CONSAC cable replacement projects have not been captured accurately in accounts;

(ii) a change in strategy for CONSAC cables has been recently implemented; and

(iii) there is a strategy for replacement or undergrounding of rural overhead mains to respond to an increasing failure rate.

Proposed underground conversions

70. Essential Energy is operating an incentive program that provides a rebate to a small volume of customers with low voltage assets on their property where it is not possible to determine ownership. Essential Energy labels these as 'Category 3' assets. In all other cases, the assets are either the responsibility of Essential Energy or private owners. Private owners fund power line maintenance and replacement (Category 4) and Essential Energy is directly responsible for Category 1 and 2 overhead assets. [23]

71. Essential Energy advised that further data collated during 2013/14 has "*provided additional clarity into the apportionment of costs to Essential Energy's customers. The incentive offered is the total amount calculated to return the overhead network to a*

[22] *Ibid,* page 73

[23] *Ibid,* page 74

serviceable 'like for like' standard…"[24] Rebates are estimated by Essential Energy at $23.2m over the 2015-19 RCP.

72. Essential Energy stated that the incentive program benefits the community as a whole by reducing the risk of bushfires and the maintenance liability for the assets.

CONSAC cable

73. Essential Energy has reviewed its System Investment document ESS_43, which initially considered only two options for dealing with the 'Very High' safety risk posed by CONSAC cables, including: (1) run to fail; and (2) proactive removal of 96km of the worst-condition cable.

74. Essential Energy indicated that it considered the following five options to address this risk: (1) do nothing - run to fail and repair; (2) planned replacement of all the cable in 2015; (3) planned replacement in the 2015-19 RCP; (4) planned replacement over 15 years; and (5) reactive replacement upon failure. Option (5) was selected for the reasons described below. Essential Energy also noted that other DNSPs with CONSAC cable have adopted the same approach.

> *"The option analysis has resulted in a reactive run to failure replacement program which provides the most cost effective outcome…Essential Energy deems the systematic replacement of all CONSAC cables in the regulatory control period to be unnecessary based on the failures experienced."*[25]

75. Essential Energy has determined that the unit costs assumed in the RP were underestimated because limited installation cost data was available. It now has an updated unit cost of $0.57m per km based on nine recent and diverse projects. This updated unit cost is 285% higher than the initial estimate of $0.20m per km.[26]

76. In summary, Essential Energy has proposed an identical expenditure forecast of $18.9m for the CONSAC program despite the change in replacement strategy and the 285% increase in unit cost.

EMCa's updated position

Historical expenditure

77. Essential Energy advised that its historical information is inaccurate and that the step change is not as significant as shown in Figure 3 above. Essential Energy explained that it did not record historical expenditure data in the RIN categories required by the AER and allocated historical expenditure to each category using the same proportions estimated for the 2015-19 period. This resulted in a consistent 20% increase in each of the 3 categories identified in our initial review.[27] We accept Essential Energy's explanation, noting that our original observations on this matter had no direct bearing on our initial findings.

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[24] *Ibid*

[25] *Ibid,* page 76

[26] *Ibid,* p. 75 and ESS_43, page 22

[27] *Ibid,* pages 3-4

78. We have focused this program assessment on Essential Energy's new information concerning the two key programs underpinning the 2015-19 RCP cable expenditure profile: (1) Proposed underground conversions; and (2) CONSAC cable.

Proposed underground conversions

79. We note that the program ('OH2UG') has been underway for many years with the purpose of providing an incentive for landowners to convert existing aged low voltage (LV) overhead lines to UG systems at the time substantial re-investment is required.[28]

80. We consider it reasonable that Essential Energy has assumed a conservative approach with respect to 'Category 3' assets.[29]

81. Essential Energy states that:

- "*Whilst the value of community benefits is difficult to establish, it is considered likely that they would exceed the programme investment costs";*[30] and
- "*From a cost perspective, Essential Energy would continue to incur expenditure for inspection and maintenance of the overhead line assets if they were not converted to underground and consequently a cancellation of this program would not result in savings".*[31]

82. In the absence of a robust cost-benefit analysis, we are unable to confirm Essential Energy's claimed net societal benefits for the UH2UG program and/or that the cost is justified by reduced maintenance on the overhead lines. Accordingly, we are unable to verify that the program is justified economically. Based on the information provided, we consider that Essential Energy is unlikely to be worse off (economically or technically) in offering the rebate to Category 3 owners.

CONSAC cable

83. Essential Energy has, through the revisions to its cable investment strategy, addressed two of our primary concerns with its original proposal, namely: (1) the paucity of options considered; and (2) the unit cost estimate. However, Essential Energy has raised two new concerns in the RRP as described below:

(i) It has introduced a new (draft) 'project selection guide' which "*details a method of identifying and prioritising these networks based on five parameters; history of faults, highly disruptive situations, high repair cost, other network benefits and the planners' knowledge of the asset. Each parameter is weighted using a point system ranking them into four risk categories: low, medium, high and very high*".[32] This description does not match the more detailed table provided[33] and the rationale for

[28] ESS_29, page 6

[29] The question of responsibility for these assets has been tested in court proceedings with unfavourable outcomes for distributors in Victoria and NSW (ESS_29, p. 3)

[30] *Ibid*, page 33

[31] *Ibid,* page 33

[32] Attachment 6.6, page 77

[33] *Ibid, Table 4-26,* page 78

adopting the specific 'allowances' for weighting the parameters is unclear. We do not consider that this is a robust approach to determining the economically prudent and efficient program of works for this asset class; and

(ii) We do not consider it credible that, despite adopting a new strategy and a 285% higher unit rate, Essential Energy's RRP expenditure forecast is identical to the RP forecast at $18.9m. It appears that the new risk evaluation parameters described above have been combined with the new cable replacement unit cost to forecast a level of expenditure that is not adequately justified. This supports our initial view that the 2015-19 RCP expenditure level was not adequately justified.

3.3 Summary and concluding comments

Poles

- In our initial review, we found that Essential Energy did not present a sufficiently robust case for its adherence to its current inspection and serviceability criteria, nor for the cost effectiveness of its current and proposed strategies.
- Our revised assessment is that Essential Energy has not demonstrated that it has optimised the replacement and reinforcement volumes for the 2015-19 RCP to reduce risk at the most efficient cost.

Switchgear

- In our initial review, we found that Essential Energy did not provide adequate justification of its proposed treatment plans, both in terms of options selection and for the timing and volume of activity.
- The new information provided by Essential Energy has mitigated the majority of our concerns with its switchgear replacement program. Our residual concern, which we consider to be material, is that Essential Energy has not provided a cost-benefit analysis to support the timing and volume of proposed projects.

Conductors

- In our initial review, we found that Essential Energy did not provide convincing information that it could deliver the nominated volume of work in the RCP and mitigate uncertainty over the scope and cost of undertaking the work.
- Essential Energy has provided a revised expenditure profile and demonstrated that the target volume is deliverable. However, we were not provided with a cost-benefit analysis to demonstrate that the revised timing, scope, scale, and level of expenditure is justified.

Transformers

- In our initial review, we found that Essential Energy did not provide compelling evidence that it had applied robust cost-benefit analysis of the various options for all transformer classes in order to derive a prudent and efficient replacement/refurbishment expenditure forecast for its transformer fleet.
- Essential Energy has provided additional information that mitigates our initial concerns about key aspects of its program. However, it has not provided a robust cost-benefit analysis to conclusively demonstrate that its program is optimised.

Cables

- In our initial review, we found that Essential Energy applied only rudimentary options, risk and cost-benefit analysis to its cables program, such that there was insufficient evidence that the replacement expenditure forecast was prudent and efficient.
- Essential Energy has provided additional information about its OH2UG program, coupled with a revised CONSAC cable strategy with improved analysis. Whilst this helps to mitigate our initial concerns, we consider that economic justification of the prudency of its expenditure (i.e., via a robust cost-benefit analysis) has not yet been demonstrated. Accordingly, we remain unconvinced that the scope, timing, scale and level of expenditure is justified.

Appendix A Response to Essential Energy's claims

Introduction

84. Essential Energy contends that many of the statements made by EMCa are general in nature and are misleading or incorrect when applied to Essential Energy.

85. In the following sub-sections, we summarise Essential Energy's position and provide our response, taking into account the new information provided.

Asset utilisation

The AER's position in the draft decision

86. The AER "*expects that there is a positive correlation between asset condition and utilisation".*[34] It found that Essential Energy is expected to have significantly increased spare capacity in its network during the 2014-19 period and that, as a result, asset condition will be positively impacted. The AER's position was supported by the EMRF, which commented that: "*a lightly loaded asset is likely to have a longer life than an asset that is a heavily loaded asset…*"[35]

87. The AER's position was not based on advice provided by EMCa. We therefore have not commented on this issue.

Average asset age

EMCa's original assessment

88. We stated that: "*On balance we are persuaded that there is justification for Essential to undertake a larger repex program than it has in the 2009-14 RCP, but Essential has not sufficiently justified the amount of increase that it has proposed".*[36]

89. In our view, Essential Energy had not presented robust options analyses (i.e., that were commensurate with an $857m program of work). This lack of options analyses led us to question the timing and volume of work proposed. We had no concerns regarding Essential Energy's key repex categories.[37]

[34] AER, *Draft decision*, pages 6-80

[35] *Ibid*

[36] EMCa, *Review of Proposed Replacement Capex*, pp. ii-iii

[37] Poles, pole top structures, overhead conductors, service lines, switchgear, SCADA, and transformers

Essential Energy's position

90. Essential Energy has claimed that:[38]

    (i) EMCa's position is equivalent to allowing the average asset age of Essential Energy's assets to increase; and

    (ii) This, in turn, is counter-intuitive because:

    - Essential Energy's assets are already 13% higher than the average of the NEM DNSPs;
    - The average weighted life of Essential Energy's assets is 4% greater than the NEM DNSPs and 9% higher than the Victorian DNSPs; and
    - The volume of asset defects and conditional failures in Essential Energy's network is rising, and the volume of failures per 100 km is four times higher than for the Victorian DNSPs.

91. Essential Energy also identified an error in the RIN data that led the AER to conclude that: "*Essential Energy is forecasting an improvement in residual service lives…This suggests that Essential Energy may be seeking more repex than is necessary for some assets classes to maintain their function compared to the past".* [39] Essential Energy has provided new information from which it has deduced that "*a lot more of Essential Energy's assets are significantly aged and, in general, the rate of capex spend is not keeping pace with the ageing network".*[40]

EMCa's response

92. At an overview level, age is a reasonable proxy for asset condition, but it is not a good basis on which to make investment decisions at the activity level. The following Essential Energy network condition and performance characteristics provide a prima facie case for investment in the 2015-19 RCP that is sufficient to (at least) arrest the decline in residual asset lives:[41]

    - relatively high age of Essential Energy's assets;
    - declining residual lives trend throughout the 2009-14 RCP;
    - relatively high asset failure rates;
    - relatively high number of escaped bushfire starts and electric shock incidents; and
    - flat/declining SAIDI over the same period.

[38] *Ibid,* page 3

[39] Essential Energy, *Attachment 6.6*, Appendix G

[40] *Ibid*

[41] *Ibid,* pages 30-37

93. In its RP, Essential Energy proposed a 24% repex increase (from $697m to $857m).[42] As indicated above, EMCa was supportive of an increase in Essential Energy's repex expenditure, however:

- we did not provide advice to the AER on what represented a prudent and efficient amount;[43] and
- we had particular concerns with the lack of justification of the volume, timing and cost of the proposed work.

94. The corrected residual service life results provided by Essential Energy in its RRP represent a dramatically different picture of the impact of Essential Energy's proposed 2014-19 RCP expenditure. If the information is accurate, it shows that, rather than all asset residual service lives increasing, some (cables, zone substations, and transformers) will continue to decline while the rest exhibit only slight increases. Generally, we consider that Essential has not provided a satisfactory justification for the volume or timing of proposed work and note the prospective argument that a greater focus on declining asset categories may be warranted.

Risk management practices

EMCa's original assessment

95. Our concerns with Essential Energy's risk assessment were based on:

(i) The *portfolio level review* - we were concerned with the outcomes of the top-down analysis, which indicated a bias to over-estimating the expenditure required (coupled with inadequate business-level review); and

(ii) The *individual repex program level review* (bottom-up analysis) - we were concerned with the quality of risk assessment and, in turn, the project timing and volume justification. We found that Essential Energy's risk assessment was compromised by an over-reliance on qualitative assessment, with insufficiently robust quantitative cost-benefit assessment (if any).

Essential Energy's position

96. In response to our concerns with the quality of program level risk assessments and with apparent upwards bias resulting from the top-down portfolio level assessments, Essential Energy advised that:[44]

(i) it utilised two complementary risk assessment tools, its consequence ratings are reflective of likely scenarios, and its staged risk assessment review process increased the relativity of the risk assessments and removed overly conservative assessment;

[42] EMCa, *Review of Proposed Replacement Capex*, page 6

[43] Which is consistent with the Scope of Work agreed with the AER

[44] *Ibid,* pages 3-4

(ii) the vast bulk of replacement expenditure is as a consequence of asset inspection programs where assets have been identified as conditionally failed; and

(iii) the average asset life and failure rates are high when compared to its peers, its replacement strategy is a lower cost/higher risk strategy than most of its peers, and the quantum of its repex for 2015-19 is comparatively less than its peers.

EMCa's response

97. Essential Energy has aged assets and the primary driver for its replacement programs is condition assessment (and failure data). However, in reviewing its risk assessment approach, we found aspects of bias towards conservatism in its qualitative risk assessment that were typically not supported by provision of complementary quantitative risk assessment.

98. In its RRP, Essential Energy has explained how it applied the Riskex 'calculator' to help overcome the limitation of the Corporate Risk model.

99. Essential Energy's Riskex (Risk Score Calculator Program) is described in CEOP2111.01. We acknowledge that this approach is superior to using the relatively 'coarse' criteria in the corporate model and note Essential Energy's qualification that it is "*intended as a guide to identify level of risk. The risk score so calculated should be interpreted with caution. It should be used as a basis for consistency of reasoned judgement".*[45]

100. Whilst we note that the Riskex tool is based on OHS Risk Assessment AS/NZS 4804:2001 and HB205-2004 OHS Risk Management Handbook and that the ratings have been adopted from Fine, Journal of Safety Research 1971, we have a number of residual concerns with the Riskex approach as set out below:

(i) The aggregation of risk scores from the five risk categories can lead to an overly conservative outcome. For example, it is possible for a risk scenario with a maximum risk category score of 'Moderate Risk' to result in an aggregate score equivalent to 'High Risk' or even 'Very High Risk'. Our understanding is that both of these risk ratings are 'Intolerable' to Essential Energy's Board and must be addressed 'immediately'. Our review of available literature on this topic supports the selection of the single largest risk and corresponding risk cost, or aggregation on a logarithmic scale to avoid the disproportionate effect;

(ii) In at least one case, the Business Interruption consequence rating of 'Disaster' was applied which seemed to be excessive in the context of the probability and exposure ratings for the scenarios in question.[46] The 'Disaster' definition has a very wide range of SAIDI minutes lost (i.e., from 24 -240 minutes for rural customers).[47] In these cases, 'Very High Risk' or 'High Risk' ratings can apply to failure scenarios which are possibly not warranted; and

(iii) In another case, we found the combination of probability, exposure and consequence to be overly conservative. For instance, in ESS_29, it appears that the

[45] CEOP2111.01, *Operational Procedure – Risk Ratings Investment Cases and AMP's, Jan 2014,* page 4

[46] ESS_17 and ESS_46

[47] CEOP2111.01, page 11

probability of a fatality from overhead line failure is attributed a probability of 'Quite possible' with an exposure rating of 'Occasional' (which is 1-2 times per month).[48]

(iv) In another case, Essential Energy developed an entirely different risk prioritisation methodology, which we found to be overly subjective (as discussed in section 3.2.6).

101. CEOP2111.01 states that "*The Riskex Risk Score Calculator is useful in calculating the 'qualitative' risk of asset failures, however there is a need to be able to 'quantify' the risk for asset failures".*[49]

102. We note Essential Energy's revised strategy of complementing a subjective risk assessment with quantitative risk assessment. In our initial review, we observed that there was very little quantitative risk assessment. In its RRP documentation, Essential Energy supported this finding by noting that:

> *"… despite best efforts to refine and enhance risk assessment models that any qualitative risk model is exposed to a degree of subjectivity…a quantitative risk assessment methodology has been developed…and Essential Energy has a strategic intent to transition to this form of risk assessment where possible, and utilised it in one investment case submitted in the regulatory proposal".*[50]

Capital governance

EMCa's original assessment

103. We found that Essential Energy's capital governance framework appeared to be out of date, that the application of the framework was inadequate and whilst the enhanced practices from the Network NSW Board are evident, there remained gaps in Essential Energy's processes.

Essential Energy's position

104. Essential Energy has advised that: [51]

(i) Whilst an out-of-date governance framework was included in the RP documentation, it has been using the common NNSW governance process since 2013;

(ii) An independent review undertaken by Jacob's consulting of the approach taken by NNSW confirms the adequacy of the top-down approach in developing the capital program; and

(iii) Its portfolio and program development includes a rigorous challenge process (with several stages of review) that assesses prudency of volume, timing and cost, and

[48] ESS_29, *Figure 35,* page 34

[49] *Ibid,* page 33 – Essential Energy adopted the ALARA/ALARP risk model as in HB 436 / IEC 61508-5 and ESSA Guidelines with specific limits

[50] Essential Energy, *Attachment 6.6*, Appendix C

[51] *Ausgrid, Attachment 6.2 Capital Governance,* pages 3-4

the risk implications of a range of reduction scenarios. EMCa did not take into account information provided to it to explain the process.

EMCa's response

105. With AER representatives present, we were advised by Essential Energy, Ausgrid, and Endeavour Energy at respective on-site meetings that the NNSW Board had reduced each DNSP's bottom-up forecast. In the case of Essential Energy, the quoted Board adjustment was -16%.

106. This indicated to us that the NNSW Board was indeed fulfilling an important role in challenging the bottom-up risk-based assessment from the businesses. However, as discussed in our October 2014 report, we were not convinced by the information provided in our repex review that the 'board-adjusted' replacement expenditure forecast represented a prudent and efficient level. Moreover, Essential was not able to explain the process that had been undertaken by NNSW, or its implications.

107. In our October 2014 report, we noted that we were provided with some information on the NNSW top-down process subsequent to our assessment and therefore that we did not have the opportunity to review the NNSW process in its entirety.[52]

108. We have now had the opportunity to review this information and the further information provided by Essential Energy in its RRP. We note that the 'renewal' program was reduced by 11% through the iterative governance process.

109. Based on our assessment of the information provided by Essential Energy in its RRP (and information provided subsequent to our initial assessment, but prior to the RRP) our revised position is that:

(i) Essential Energy appears to use the current NNSW capital governance process, although there remain a number of partially implemented policies and procedures;[53]

(ii) The process includes an iterative top-down assessment, using a number of decision support tools that resulted in a -11% adjustment (not -16%) to the repex program; and

(iii) We remain concerned (but to a lesser extent than in our initial review) that the top-down review did not incorporate sufficiently robust analysis from the bottom-up process to facilitate its decision-making. We consider that the governance process would be assisted by a robust cost-benefit analysis for at least each major investment program.[54]

[52] EMCa, *Review of Proposed Replacement capex in Essential Energy's Regulatory Proposal 2014-19',* footnote 13, page 10

[53] Attachment 6.2, page 7

[54] We acknowledge that it is Essential Energy's intent to develop and implement such an approach

Data quality

EMCa's original assessment

110. In our original report, we found that Essential Energy had insufficient asset information to determine which assets need attention and to inform its intervention strategy. We were concerned that data quality shortcomings compromised its decision-making.

Essential Energy's position

111. Essential Energy has advised that: [55]

(i) it accepts that its asset data could be enhanced;

(ii) it is not possible for it to have perfect asset history; and

(iii) it has adequate data to make good judgements in relation to repex as demonstrated by: (1) its comprehensive wood pole data - "*the largest single timber pole data source in Australia and possibly worldwide";* (2) conductor age and defect records extending back 15 years; (3) full diagnostic tests for zone substation assets; and (4) it has implemented the Electricity Network Incident database which links outage incidents to its asset management systems.

EMCa's response

112. In our initial review, we did not state that perfect data was required for good asset management. We identified the following concerns:

(i) Essential Energy's CONSAC cable program investment analysis was compromised by lack of quality data;[56]

(ii) Essential Energy's OH2UG program was affected by lack of information about asset ownership, with a consequent *potential* inappropriate cost allocation;

(iii) the quality of its wood pole data was inadequate, whilst acknowledging claims that it had improved over the last few years. Both our opinion and Essential Energy's claim is supported by its consultant which states: "*EE have improved their data quality significantly in the last 4-5 years, but it would take another 2 or more inspection cycles to be able to confidently project replacement requirements";*[57] and

(iv) Essential Energy appeared to have only included quantitative risk assessment for one of its asset classes because it did not have sufficiently accurate information to perform this quantitative assessment for other asset classes. In its RRP, we note Essential Energy's "*strategic intent is to transition to this form of risk assessment where possible…"*[58]

[55] *Attachment 6.6,* pages 40-41

[56] Attachment 6.6, page 75

[57] Attachment 6.6, *Appendix E*

[58] *Ibid, Appendix C*

113. Whilst we believe Essential Energy has provided sufficient internal evidence to support our initial finding, our concerns have been somewhat mitigated by the additional information provided by Essential Energy in its RRP.[59]

Options analysis

EMCa's original assessment

114. We concluded that based on the sample of projects reviewed, Essential Energy's options analysis was inadequate due to one or more of the following:

(i) insufficient (feasible) options are considered; and/or

(ii) lack of adequate cost-benefit analysis.

Essential Energy's position

115. Essential Energy has advised that: [60]

(i) It acknowledges that improvements can be made to the options analysis process as it continues "*to mature and develop under the NNSW framework, particularly in providing improved documentation and evidence of all options considered*";[61]

(ii) In many cases the reasonable options are limited to 'do nothing' or 'replace on conditional failure';

(iii) In the case of the 'do nothing' options, they generally do not meet a legislative requirement or present an unacceptable risk to the public. In these cases, Essential Energy does not provide detailed cost-benefit analyses; and

(iv) It presented only feasible economic options rather than crowd the investment cases with fanciful options that would not be prudent or fiscally acceptable.

EMCa's response

116. In our review of the sample set of programs of work described in section 5 of our original report and discussed further in section 3 of this report, we found either a lack of feasible options being considered or a lack of rigorous analysis (or both).

117. We consider different volumes and/or timing of activity to reflect 'options' (without including infeasible scenarios). These often present as hybrid strategies (i.e., to account for the extra risk accepted for some assets to allow greater emphasis on high risk assets, particularly when resources are limited). We see no benefit in considering 'fanciful' options in business/investment cases.

[59] For example, in sub-categories of switchgear, cables, and conductors

[60] *Ibid,* pages 3-4

[61] Attachment 6.2, page 11

118. Essential Energy has generally not presented robust, quantified cost-benefit information to help determine the economically justified timing and volume of investment.

Cost estimation

EMCa's original assessment

119. We identified that we were not able to establish how Essential Energy constructs its estimates, including how contingency allowances are applied.

120. We reached this position because we looked for evidence of the application of Essential Energy's various costing methodologies in the investment business cases. Due either to: (1) lack of information (as presented in the investment case)[62]; (2) seemingly excessive estimates (based on our experience);[63] and/or (3) Essential Energy's own advice that its estimates were 'unstable',[64] we were often unable to determine whether Essential Energy had derived efficient cost estimates.

121. We also observed that Essential Energy had not included the efficiency gains from the NNSW $170m reduction in procurement costs in its forward repex estimates, nor was any other information provided regarding efficiency gains being passed on to customers (in part) from improved work practices or other sources.

Essential Energy's position

122. Essential Energy has now provided a detailed reconciliation of its costing methodology to each of its programs (per Table 4-15 of Attachment 6.6), which includes the 'rationale' for applying the particular methodology. The accompanying description of its forecasting methodology gives us increased confidence that the cost estimates used in Essential Energy's forward repex expenditure estimates are reasonable.

123. It has advised that it does not 'list' contingency amounts "*as some projects will be more expensive, and others less expensive".*[65] Essential Energy has also advised that its share of the '*NNSW procurement initiative'* relevant to repex is likely to be only a few percent for a number of reasons.[66]

EMCa's response

124. We are satisfied that based on the new information provided by Essential Energy that:

- Essential Energy's cost estimating methodology is adequate and is generally applied logically to its various repex programs;

[62] This was consistently the case with respect to contingency management

[63] Pole replacement unit cost seemed excessive based on our experience (pertaining to rural situations)

[64] CONSAC cables program – refer to ESS_16, page 40

[65] Attachment 6.6, page 44

[66] *Ibid*, page 43

- Essential Energy applies contingency allowances appropriately to its repex programs and has not included them inappropriately in its repex proposal to the AER; and

- The benefit from the NNSW procurement process to its repex costs is likely to be immaterial within the accuracy bounds of preliminary cost estimates for a five year repex program.

125. With the exception of its average pole replacement cost (which we consider to be excessive) and in the absence of any countervailing information from Essential Energy, we are satisfied that Essential Energy's unit cost estimates are reasonable.

Deliverability constraints

EMCa's original assessment

126. We had concerns about deliverability risk at two levels:

(i) At the portfolio level - Essential Energy proposed an increase to its repex program for the 2015-19 RCP, but we saw no evidence of a robust resourcing and delivery strategy that identified the inevitable resourcing challenges and set out strategies for their mitigation; and

(ii) At the program level – we saw several cases where the RIN data provided by Essential Energy indicated step changes in delivery volumes of complex brownfields work (i.e., resource intensive and logistically challenging activities) without any consideration of delivery risk in the investment cases.

Essential Energy's position

127. Essential Energy has advised that: [67]

(i) deliverability of the proposed capital works program is a low risk because it delivered a larger capital works program in the 2009-14 RCP;

(ii) maintenance management (excluding vegetation management) is forecast at similar levels to 2012/13 and subsequent years;

(iii) the reduction in greenfield work and augmentation work more than compensates for the increase in brownfield and replacement work; and

(iv) the resource skill set is transferrable from greenfield and augmentation work to brownfield and replacement work.

EMCa's response

128. We are persuaded by Essential Energy's development of a Deliverability Plan (Attachment 6.11) that it will be able to deliver the proposed work.

[67] *Ibid,* page 45

Subtransmission assets

EMCa's original assessment

129. We were concerned that subtransmission replacement and refurbishment was justified on the basis of the age of the assets.

Essential Energy's position

130. Essential Energy advised that our concern is inaccurate because: (1) age is only used a proxy across the asset population to estimate what quantities may reach a state of conditional failure in the next five years; and (2) subtransmission asset strategies in particular are determined on condition, with the exception of battery replacements, which are determined on measurable loss of capacity, which correlates closely with age.[68]

EMCa's response

131. Based on this clarification from Essential Energy (and the revised information provided in response to our particular concerns about the risk assessment and determination of treatment strategies discussed for the sample of projects reviewed), we consider that our concerns have been addressed.

Apparent increase in pole, conductor and services estimates

EMCa's original assessment

132. By analysing the RIN data provided by Essential Energy, we determined that "*the proposed repex for the three lines categories (poles and pole top, conductors and service lines) has been calculated simply as a 20% increase on prior period expenditure*".[69]

Essential Energy's position

133. Essential Energy advised that, in the 2009-2104 RCP, it did not record expenditure data in the categories required by the AER for the RIN. It therefore allocated historical expenditure to those categories using the same proportions estimated for the 2015-19 period. This resulted in a consistent 20% increase in each of the 3 categories EMCa identified. [70]

[68] *Ibid,* page 46

[69] EMCa, Original Report, page 6

[70] *Ibid,* pages 3-4

EMCa's response

134. We accept Essential Energy's explanation, noting that our original observations on this matter had no direct bearing on our assessment other than to support our concern that the RIN data was of variable quality and utility and needed to be treated with caution.

Summary and concluding comments

135. With the following exceptions, Essential Energy has provided new information that has substantively addressed, but does not warrant amendment to, our original findings:

- **Deliverability** – since our initial review, Essential Energy has developed a deliverability strategy and plan that overcomes our original concern.
- **Subtransmission assets** – Essential Energy has explained its derivation of specific data in its RIN which in turn corrects our assumption. However, this was a relatively minor input to our original findings and remains so.

Appendix B Documents reviewed

136. In providing advice (this report) to the AER in response to Essential Energy's RRP, EMCa reviewed a number of documents specific to its revised replacement expenditure. Refer to Table 1 below.

Table 1: RRP documents considered

Document Title
Revised Regulatory Proposal 1 July 2014 – 30 June 2019, 20 January 2015
Attachment 6.6 Response to AER Draft Decision of Replacement Expenditure
CEOP2111.01 Operational Procedure: Risk Ratings Investment cases and AMP's
Timber Poles Overview and Opportunities