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Regulatory Proposal to AER 2015 - 2020

Review of Proposed Capital Expenditure in Energex'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 Energex 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 Energex. 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 Energex to the AER as part of its Revised Regulatory Proposal (RRP) and received by EMCa prior to 9 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:	Gavin Forrest, Mark de Laeter and Paul Sell with analytical input from Eddie Syadan
Quality approved by:	Paul Sell
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Findings

Background

1. Energex 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. Energex proposed a revised capital expenditure forecast in its RRP of $2,889.7m ($2014-15). This represents an 11 percent reduction from its original proposal. The revised forecast is 22 percent higher than the AER's Preliminary Decision.

3. The AER requested that we review the claims and new information provided by Energex in its RRP in relation to the terms of reference[1] and 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 Energex 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 Energex's revised proposal is reasonable or to otherwise quantify an alternative.

Assessment of components of augex

6. We considered the revised proposal and supporting information pertaining to three categories of program expenditure: (i) LV fuses; (ii) Reliability; and (iii) Power Quality. For each category, we found that Energex:

[1] Our terms of reference is limited to the review of specific elements of the revised capex forecast: (i) reliability, power quality and LV fuse components of augmentation; and (ii) OTHER and SCADA categories of repex.

- Has mitigated, to some extent, our concerns regarding the systemic issues identified in our initial review;
- Has confirmed, to our satisfaction, that expenditure is required in each of the categories of work to address network-related safety and compliance risks; and
- Has not provided sufficiently compelling information to support its revised proposed expenditure levels.

7. In the case of the LV fuse program, we do not see sufficiently compelling information to change our initial assessment that the program could reasonably be undertaken over a longer time period.

8. In the case of the Reliability (Worst Performing Feeder) program, we consider that, despite Energex's revised unit cost, the average assumed feeder rectification cost is still higher than the cost Energex is likely to incur. We also retain our initial view that Energex may be able to prudently reduce the number of feeders it addresses annually, while still complying with its externally-imposed requirements.

9. In the case of the Power Quality (PQ) program, we do not consider that Energex has justified its strategy. We consider that a more reasonable basis for an allowance would be to assume that Energex directs more expenditure to remediate known and reasonably foreseeable network PQ issues in priority order, rather than to significantly expand its monitoring program.

10. In summary, we do not consider Energex's revised forecasts of required expenditure to be reasonable. Table 1 summarises our proposed adjustments to augmentation capex for each expenditure category.

Table 1: Summary of EMCa recommended adjustments by augex category

Augmentation capex	Recommended adjustments
LV fuses program	10-20%
Reliability (WPF) program	15-25%
Power Quality program	25-50%

Source: EMCa analysis

Assessment of components of repex

11. The AER requested that we review the 'Other' and 'SCADA' asset categories of repex. For both categories of expenditure, we found that Energex has taken steps subsequent to the AER's Preliminary Decision to:
    - Review the requirement for the programs, including re-assessment of risk;
    - Consider the optimal scope of work, including consideration of priority based approaches to the work and opportunities for prudent deferral;
    - Consider an expanded number of options in its analysis, including targeted risk mitigation techniques; and
    - Consider lower cost solutions.

12. In the case of both expenditure categories, we have undertaken a review of a sample of programs representing over 80% of the forecast expenditure. We consider that the steps taken by Energex to review its forecast for the RRP have confirmed the systemic issues identified in our initial review and which led to an overestimate in Energex's initial RP of the required scope and expenditure forecast for the 'Other' repex category.

13. Based on the information provided, we consider that the revised level of 'Other' repex and 'SCADA' repex now proposed by Energex in its RRP is reasonable and appears likely to reflect a prudent and efficient forecast. However, to the extent that Energex has not demonstrated that the implications of lower expenditures would not be acceptable, we cannot exclude the possibility that a reasonable forecast might still be lower than what Energex has proposed.

1 Introduction

1.1 Purpose of this report

14. The purpose of this report is to provide the AER with our response to claims and new information provided by Energex in its RRP, specifically:
    - Energex's Revised Revenue Proposal 2015-20; and
    - Consultant reports provided as supporting Appendices 4.2 to 4.9 inclusive.[2]
15. We have only assessed those aspects of Energex's RRP submission that are directly relevant to the limited scope of our review. 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).

1.2 Scope of requested work

16. The AER issued a Scope of Work to EMCa in July 2015, requesting that we: (i) consider and respond to Energex's responses in its RRP; (ii) provide advice on the issues raised by Energex; and (iii) identify whether the results of this assessment have any impact on our original findings in relation to the following categories of expenditure:
    - **Augex -** review Energex's RRP for LV fuses, Reliability and Power Quality expenditure and provide advice on whether the revised proposal is reasonable, or otherwise quantify an alternative.[3]
    - **Repex -** review supporting material for Energex's revised 'Other' and 'SCADA' repex programs and provide advice on whether these new materials change EMCa's initial views on its program-level advice.

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

[3] These are categories of Energex's proposed augex

17. 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 Energex's RRP and supporting documents;
    - Identify any new information or reasoning that might be relevant to our April 2015 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 augmentation capex only.
18. The assessment in this report is based on the information provided to us through this process.
19. 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: (1) the new information is sufficiently compelling in the context of the NER to support a change to our initial advice to the AER; or (2) the new matters were not within the scope of our initial advice. To this end, the requested focus is on how Energex has sought to justify its proposed expenditure and associated volumes in the context of, and in relation to, its requirement to maintain the performance indicators set out under the NER capex objectives (i.e., quality; reliability; security; safety) and in relation to 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 Energex's proposed augmentation capex.
    - In the case of the aspects of replacement capex to be reviewed, the AER does not require quantified adjustments.
    - Energex's RRP includes consultant reports and other supporting documents pertinent to the specific aspects of augex and repex to be reviewed.

1.3 Structure of this report

20. Our main findings are summarised at the beginning of this report.
21. In the subsequent four sections, we describe our assessment and conclusions regarding Energex's new information in its RRP:
    - In section 2, we consider and respond to the new information provided by Energex regarding its forecasting methodology and systemic issues;
    - In section 3, we consider and respond to the new information provided by Energex regarding the specific elements of its revised augmentation expenditure program categories for which the AER has sought our advice; and

- In section 4, we consider and respond to the new information provided by Energex regarding the specific elements of its revised replacement expenditure program categories for which the AER has sought our advice.

2 Expenditure forecasting methodology

2.1 Introduction

22. In this section, we consider the new information provided by Energex in its RRP, including Appendices 4.2 to 4.9 (inclusive), and whether this leads us to alter the findings set out in our initial review relating to its applied governance and expenditure forecasting methodology.

2.2 General observations

23. In the information we reviewed, Energex has not directly responded to the AER's concerns with regards to the identified systemic issues. Rather, it presented revised forecasts for specific areas of expenditure and commented on specific issues raised by the AER which pertain to its program of work. Energex stated that the revised expenditure reflects the outcome of an expanded options analysis and revision of its risk assessment.

24. Energex provided new information within Appendices to its RRP as justification for its revised expenditure forecast. We have taken this new information into account, consistent with our terms of reference.

25. Under the propose/respond regulatory model in place in the NEM, the onus is on Energex to present clear, consistent and compelling information and evidence to the AER and its consultants in support of its RP. The regulatory review process also provides Energex 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 Energex did not provide sufficient information to support its RP, Energex has had the further opportunity to provide such additional information as it deems necessary and/or appropriate through its RRP.

2.3 Risk Management

26. In our initial review, we found evidence of a conservative risk assessment that led to a systemic bias for overestimation of the expenditure forecast. For replacement capex, we also found evidence of step increases in proposed expenditure that we considered to lack sufficient justification.

27. In its RRP, Energex stated that it has:[4]

> *"revised its risk profile based on feedback from the AER and customers on the balance between network performance and electricity prices for customers. Energex believes that this revised program appropriately balances customer outcomes with its risk profile, safety and legislative obligations and network performance objectives."*

28. Energex also refers to its revised capital forecast resulting in a higher level of residual risk.[5] In describing the revised expenditure forecasts for replacement expenditure, Energex stated:[6]

> *"The revised program has been prioritised based on safety, legislative compliance and sustainable development of the network. In doing so, Energex has adopted a higher level of risk balanced against customer price impact."*

29. In its business cases supporting the revised level of replacement expenditure, Energex (on repeated occasions) appears to attribute its risk appetite decisions, at least in part, to the AER:[7]

> *"In their draft determination, the AER has made it clear it expects Energex to operate with a higher level of risk."*

30. We note similar comments by Energex in its RRP which suggest that the AER may be seeking to determine a level of acceptable risk for Energex. We do not consider this to be the role of the AER, or of EMCa as consultants to the AER, nor is it consistent with our understanding of the capex objectives or the NER more generally. It is our view that the selection of an appropriate risk assessment methodology (and its subsequent application) is the responsibility of Energex, to be conducted in accordance with the risk management framework and risk appetite determined by its Board.

31. Whilst Energex refers to changes in its risk appetite - and considers that a risk/cost trade-off review has been undertaken - it has not provided evidence of the changes to risk of the revised program or explained the impact on the level of risk across its portfolio to confirm that it has achieved an optimal portfolio.

[4] Energex revised regulatory proposal 3 July 2015, page 24

[5] Energex revised regulatory proposal 3 July 2015, page 25

[6] Energex revised regulatory proposal 3 July 2015, page 35

[7] Appendix 4.3 Business cases for other unmodelled repex, Energex Reactive Asset Replacement Program, page 1

For instance, Energex has not provided evidence that would allow us to confirm the following statement for replacement capex:[8]

> *"This [unmodelled repex] reduced program represents the minimum work required to maintain the safety, security and reliability of the Energex network consistent with current legislative obligations and the long term interests of its customers."*

32. We consider that the review process undertaken by Energex in its RRP, resulting in an 11 percent reduction in forecast expenditure, has confirmed the existence of a conservative risk assessment (the systemic issue) leading to an over-estimation of expenditure (the resultant bias). As compared to its original RP, Energex appears to have taken prudent steps to review its forecast to reduce this over-estimation bias. However, from the evidence provided, we cannot confirm that this bias has been wholly removed.

33. We have therefore undertaken a review of the programs of expenditure to assess whether the results of Energex's adjustments appear reasonable.

2.4 Options analysis

34. In our initial review, we did not find sufficient consideration of options analysis. Further, we found insufficient analysis of the recommended options in some instances. Energex stated that it has expanded its options analysis for its business cases in its revised proposal.

35. We have sought evidence of Energex's expanded options analysis as part of our review of the programs of expenditure.

2.5 Revised RIN data

36. In its RRP, Energex has identified some changes to its RIN and made other changes to its expenditure forecasts. We have relied upon the new data provided by Energex for our review. All tables and figures relate to 2014-15 dollars, as presented by Energex.

2.6 Summary

37. We find that in developing its revised expenditure forecast, Energex has improved its justification of expenditure by:

- Updating its risk assessment for expenditure forecasts;
- Expanding its options analysis;
- Including options for reducing scope and prudent timing of expenditure; and
- Including revisions to average unit costs.

[8] Energex revised regulatory proposal 3 July 2015, page 38

38. Having given due consideration to the information that Energex provided, we find that Energex has taken steps to address the systemic issues as set out in our April 2015 report for the categories of expenditure that we reviewed. We have undertaken a review of the specific expenditure forecasts that AER has requested of us, to determine whether any evidence of systemic issues remains and to determine whether the revised forecasts are reasonable.

3 Revised proposed augex

3.1 Introduction

39. In this section, we consider Energex's RRP as it relates to the specific areas of Energex's augmentation capital expenditure included in our terms of reference from the AER. Our limited scope review includes: (i) Growth and compliance; (ii) Reliability; and (iii) Power Quality augex.

3.2 Growth and compliance capex – Low Voltage fuses

3.2.1 Summary of AER's preliminary decision and Energex's RRP

40. In its Preliminary Decision, the AER referred to the systemic issues identified by EMCa. In our initial review, we questioned the apparent lack of justification for the step change increase in the expenditure proposed. Further, we did not find Energex's risk assessment to be sufficiently compelling to support the proposed completion of the program by 2017/18.

41. Energex's revised reliability expenditure of $70m is the same as its original proposal, as shown in Table 2 below.

Table 2: Energex's revised proposed LV fuse expenditure forecast (direct costs)

$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Energex original proposal	23	23	23	0	0	70
Energex revised proposal	23	23	23	0	0	70

Source: Energex, Appendix 4.6, Table 2

42. Energex's new information, to confirm support for its proposed LV fuse expenditure, is based on Aurecon's assessment that the existing risk is

appropriately treated by Energex's proposed LV fusing program. Aurecon also supports Energex's other remedial activities.[9]

3.2.2 Our assessment

43. LV fuses are designed to increase the prospects of de-energising faulted LV circuits when the fault current is insufficient to trip the HV fuses. Energex identified the highest risk event as the possibility of death from human contact with fallen, energised conductors.

44. In its RRP, Energex and Aurecon present differing risk ratings to illustrate the prospective impact of LV fuse treatment as shown in Table 3 below.

Table 3: Energex and Aurecon risk assessments for LV fuse treatment

Risk rating	Without LV fuses	Treated per original program	Treated with RRP program (complete in 2017/18)
Energex	Medium	Low-medium	Low
Aurecon	Extreme	not presented	High

Source: Energex, Appendix 4.5 and Appendix 4.6

45. We consider that Energex's risk rating before and after the installation of the remaining LV fuses is more appropriate than Aurecon's. In our view, Aurecon has overestimated the likelihood rating of a fatality occurring from a wires-down incident where the installation does not have a LV fuse installed.[10]

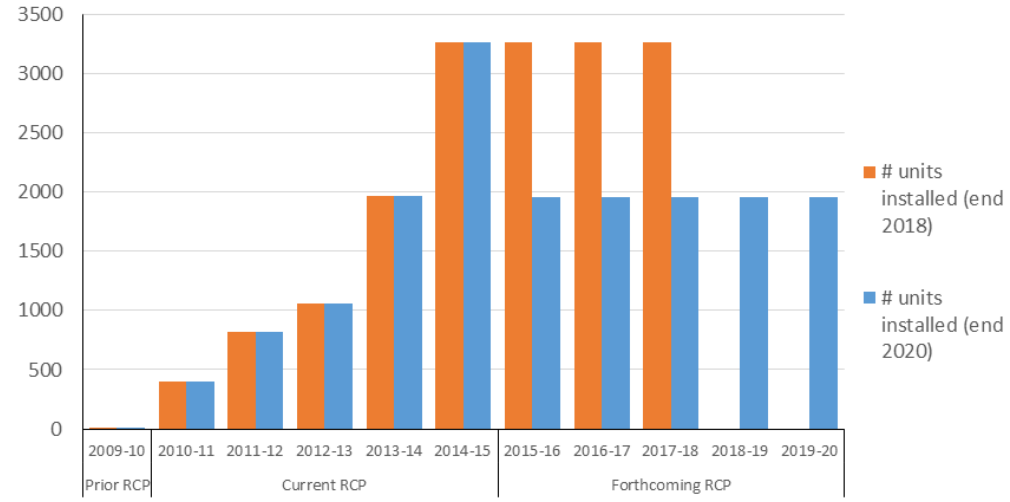
46. We also consider that a prudent network operator would prioritise its work based on its assessment of the highest risk sites, such that the risk associated with installations without LV fuses is likely to reduce over time, particularly as the likelihood of contact reduces in areas of lower customer density and reduced accessibility to the electricity network.

47. We show the change in strategy adopted by Energex diagrammatically in Figure 1 below. Energex's original program (until c.2013) was based on installing approximately 2,000 LV fuses per annum, with program completion by 2020. The revised program (from c.2014) proposes continued installation of 3,269 units per annum (to reflect 2014/15 performance) for the remainder of the RCP, with program completion by 2017/18.

[9] Appendix 4.5, section 4, pages 21-24

[10] Aurecon does not present a risk assessment framework in its report, however it identifies the highest risk as a fatality and the likelihood of a fatality prior to installing LV fuses as 'unlikely'. In the absence of an Aurecon risk framework, we assume that Aurecon applied Energex's risk framework, which indicates that a fatality would be occurring once per year, which from the information we have reviewed is not the case.

Figure 1: LV fusing program by RCP[11]



Source: EMCa analysis of Appendix 4.5, Table 4.1

48. We observe the significant uplift in program volume (and associated expenditure) in the current RCP. We did not see evidence to support completion of the program by 2020 - or that would address the need to bring forward its completion to 2017/18.

49. We consider that the installation of LV fuses is consistent with industry practice and provides an important engineering control to help mitigate a material safety risk. However, based on the information provided, Energex has not presented sufficient evidence to justify program completion within the 2015-20 RCP.

50. We consider that Energex should:

    (i) Prioritise its installation program on the basis of risk (highest to lowest);

    (ii) Continue to apply existing mitigation measures such as its public awareness campaign, vegetation management, fitting of LV spacers, rapid response to wires-down reports, and a conductor replacement program;[12] and

    (iii) Consider opportunities to package completion of the program for lower risk sites with other related augex and repex programs over time.

3.2.3 Implications to expenditure forecast

51. We consider that the acceleration of the program that commenced in 2013/14 to complete the program in seven years has not been adequately justified. If Energex follows the precepts outlined in section 3.2.2, we consider that 10-20% of the forecast expenditure could prudently be deferred to the next RCP.

[11] We have estimated replacement volumes for completion of the program by 2020 for illustration purposes only. This is based on the remaining population of LV fuse installations spread equally over the forthcoming RCP.

[12] Appendix 4.5, page 23; Energex also proposes a move toward LVABC. We consider this will help reduce risk, but it is out of our scope to consider the justifiable scope of any of these programs.

3.3 Reliability capex

3.3.1 Summary of AER's Preliminary Decision & Energex's RRP

52. In its Preliminary Decision the AER raised several issues with Energex's forecast reliability expenditure, drawing on EMCa's assessment:[13]

- Energex may not have removed isolated events nor taken into account improving reliability performance trends in selecting its WPF program;
- Average system reliability is improving, indicating that Energex's assumed level of reliability expenditure could be reduced over time;
- Energex had not provided trend analysis of WPF reliability improvement to support the continued level of expenditure;
- Energex had not provided a cost benefit analysis for demonstrating the need for increasing expenditure for reliability improvement; and
- The proposed options for addressing reliability have contributed to a higher unit cost and were not sufficiently justified.

53. Energex revisited its expenditure proposal taking into account the above feedback. In its RRP, Energex proposed revised reliability improvement expenditure of $39.8m. Whilst this is $19.1m less than its original proposal, it is still $19.2m higher than the AER's preliminary determination, as shown in Table 4 below.

Table 4: Energex's revised reliability expenditure

$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Energex original proposal	15	11	11	11	11	59
AER preliminary determination	5	4	4	4	4	21
Energex revised proposal	11	7	7	7	7	40

Source: Appendix 4.7, Reliability WPF Revised Proposal, Table1

54. Energex provided new information to support and/or clarify its revised forecast of reliability expenditure. In summary:

- The proposed expenditure is only to address its interpretation of the requirements of its Distribution Authority (DA) regarding Worst Performing Feeders (WPF);
- In selecting the feeders to be rectified during the 2015-20 RCP, Energex confirmed that it had removed 'isolated' events;
- Energex set the expenditure level at what it believes is necessary to meet the minimum WPF-related requirements of the DA (through rectifying 22 feeders per annum[14]) and provided WPF reliability trend information which shows deteriorating average performance;

[13] EMCa, *Review of proposed augex and repex in Energex,* pages 61-62

[14] Representing 20% of the rural feeder population and 1.5% of urban feeders over the five years of the 2015-20 RCP

- During the period 2010-15, it expended $47.8m to address 146 WPFs;[15]
- Energex did not revise the 22 feeders per annum that it has proposed to address in the 2015-20 RCP, but did reduce the cost of doing so by assuming that less expensive solutions will suffice; and
- Energex commissioned Aurecon to review its revised reliability forecast and, based on its assessment of five years' worth of historical performance data and expenditure, Aurecon concluded that Energex's revised reliability capex is the minimum required to comply with its obligations.

3.3.2 Our assessment

Distribution Authority (DA)

55. Energex is subject to the requirements of its DA. Section 11 describes the purpose and criteria for 'improvement programs' to "*enable customers with the worst reliability outcomes to benefit from tailored network improvements*".[16] In addition to monitoring and reporting on 11kV worst performing feeders, the Distribution Authority states that:[17] "*the distribution entity will implement a program to improve reliability on the worst performing 11kV feeders based on the criteria set out in Clause 11.2(c) …*"

Determination of the size of the WPF program

56. Energex claims that its program is "*the minimum requirement to comply with its Distribution Authority".* [18]

57. Our reading of the DA requires Energex to establish a worst performing program, and defines two entry criteria for the 'eligible' distribution feeders that should be the subject of reliability improvement based on SAIDI/SAIFI performance. We have not identified a minimum size of the WPF program; rather, this appears to be at the discretion of the distribution entity.

58. Aurecon has interpreted the requirements more explicitly, stating that the DA requirement is "*a requirement to improve a number of feeders in the group [of WPF] rather than a requirement to improve the average performance of the group of feeders, or to achieve a mandated target."* Aurecon also surmises that Energex's strategy is "*to maintain the relative reliability performance of the worst performing feeder cohort over the next regulatory period".*[19]

59. Energex also provided trend of average WPF performance as shown in the two graphs below. The trends show that despite stated WPF expenditure of $47m in the 2010-15 RCP, average rural WPF perormance has deteriorated.

[15] Appendix 4.5, page 5

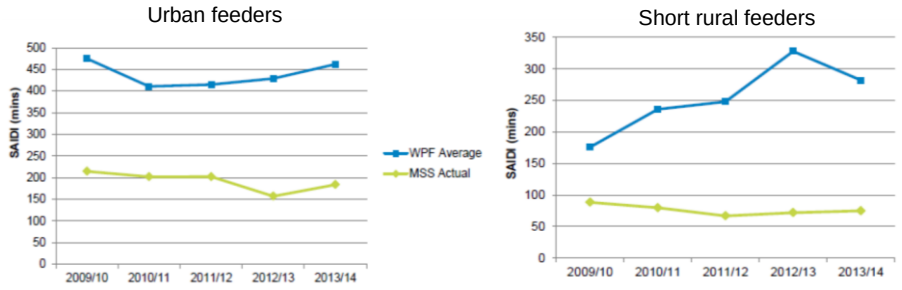
[16] Distribution Authority No. D07/98, page 10

[17] Distribution Authority No. D07/98, clause 11.2 (b), page 10

[18] Energex, Appendix 4.7, page 3

[19] *Appendix 4.5,* page 8

Figure 2: WPF SAIDI performance trends – rural and urban feeders

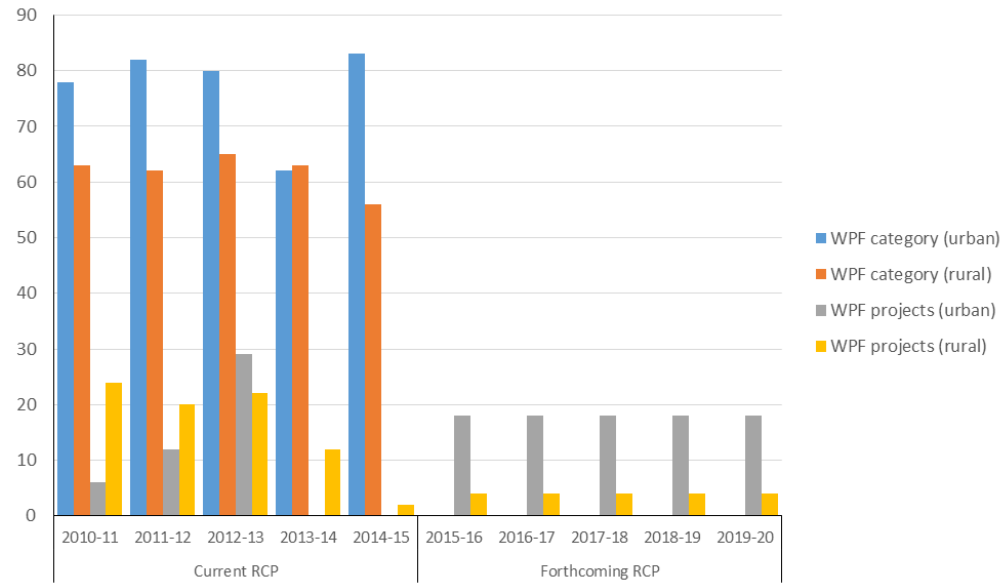


Source: Energex, Appendix 4.7

60. We consider that a reasonable interpretation of the purpose of the DA improvement program to "*enable customers with the worst reliability outcomes to benefit from tailored network performance"*[20] is for Energex to focus on the 'worst of the worst' performing feeders *and* that in determining the number of WPF to be addressed, consideration be given to maintaining the relative performance of the population of WPFs.

61. In Figure 3 below, we show Energex's WPF program over the current RCP alongside the forecast WPF program over the forthcoming RCP. In the current RCP, Energex included 117 projects at an average of 23 feeders per annum. We were unable to find evidence to support the apparent decline in the number of projects completed in the final two years of the current RCP.[21]

Figure 3: Worst performing feeders and projects 2010-2015[22]



Source: Appendix 4.5, Table 2-1

62. We expect that Energex would now be in a position to update its WPF list based on the more current and informative three year average data from

[20] Energex Distribution Authority, cl 5.1

[21] Appendix 4.5, Table 2.1, page 5

[22] Data from 2014/15 published in June 2015 is noted as works in progress

2012/13 – 2014/15, but in its RRP it has drawn on 2011/12 – 2013/14 performance only.[23]

63. Based on the information provided, Energex propose to address 110 feeders at a rate of 22 feeders each year in the RCP. Energex has not provided a cost benefit analysis to justify the selection of 22 feeders per annum, nor has it provided sufficient information to demonstrate the impact of the proposed expenditure on the average WPF SAIDI performance. Aurecon concluded that addressing about a third of the WPFs each year would be required.

64. We observe that, of the list of 2015/16 WPFs, the reliability performance over the last three years for five specific WPF's has improved dramatically despite the fact that average performance exceeds the 327 min WPF threshold.[24] We consider that these feeders are candidates for removal from the rectification list. We also consider that it is reasonable to assume that a similar number of candidate feeders would not satisfy a reasonable cost-benefit hurdle each year due to improved performance trends. We consider that there is an opportunity to reduce the number of feeders addressed each year without materially affecting the average WPF performance over the medium term.

65. In summary, we do not consider that Energex has provided sufficient information to conclude that rectification of 22 feeders (starting with the selected 2015/16) cohort) is the minimum requirement to satisfy the purpose of the DA.

The cost of doing the proposed work

66. Energex's average direct unit cost in the previous RCP was $178k for urban feeders and $259k for rural feeders.[25] Using the 18:4 rural/urban feeder spilt proposed for Energex's 2015-20 program, this would equate to an average unit cost of $245k per feeder. This compares to an average unit cost of $110k per feeder in Ergon's program[26] and Energex's revised proposed average of $363k per feeder in its RRP. Energex notes that it addressed feeders with the largest 'bang for the buck' in the 2010-15 WPF program and expects that more expensive solutions will be required in the next RCP. We have not seen sufficient evidence to support a near 50% higher average unit cost relative to Energex's 2010-15 RCP, nor have we seen evidence to support an average unit cost that is approximately 300% higher than Ergon's.

67. Based on Aurecon's analysis, we consider it reasonable that real direct costs per feeder will increase on average over the 2015-20 period as more expensive solutions are deployed, but not to the extent proposed.

[23] Ibid, Table 2, page 4

[24] The five feeders are all short rural feeders and the 2013/14 SAIDI is significantly less than the 2011/12 and/or 2012/13 result *and* it is less than the WPF threshold of 327 min

[25] Appendix 4.5, page 5

[26] Ergon, 07.00.05 *Reliability Quality of Supply Expenditure Forecast Summary*, page 21, noting also that this is the basis for Ergon's expenditure forecast

3.3.3 Implications to expenditure forecast

68. Taking into account our assessment that if Energex undertakes cost benefit analyses of its proposed WPF program and finds that its average direct feeder unit cost is unjustifiably high, we consider that expenditure at a level between 15-25% less than Energex's revised proposed forecast is likely to represent a prudent and efficient amount.

3.4 Power Quality capex

3.4.1 Summary of AER's Preliminary Decision & Energex's RRP

69. The AER's Preliminary Decision raised several issues with Energex's forecast Power Quality (PQ) related capital expenditure, drawing on EMCa's assessment:[27]

- Energex had not provided adequate justification for the proposed volume of PQ monitoring devices, including robust consideration of the forecast PV penetration, risk, options, cost benefit analysis, and the extent of PQ monitoring in other jurisdictions; and
- Energex had not adequately justified the volume of remedial work (primarily additional distribution transformers to split LV areas), including robust consideration of options such as the change to 230 volts.

70. In its RRP, Energex has not changed its proposed PQ expenditure of $38m, as shown in Table 5 below.

Table 5: Energex's revised Power Quality expenditure

$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Energex original proposal	6	5	5	11	12	38
AER preliminary determination	4	3	3	7	7	24
Energex revised proposal	6	5	5	11	12	38

Source: Appendix 4.8

71. Energex provided new information to support and/or clarify its proposed (unchanged) power quality expenditure. In summary:[28]

- Energex revised the forecast number of PV connections and installed capacity and provided additional supporting analysis by Aurecon;
- Energex concluded that its connections forecast need not be changed (although it expects that it is at the low end of the range of likely growth[29]) and that the capacity forecast should be increased by 10%;

[27] EMCa, *Review of proposed augex and repex in Energex,* pages 61-62

[28] Appendix 4.8 *Revised power quality program*, p. iii-iv

[29] Due in part to (i) AEMO's recently revised forecast and the new Queensland government's target of one million PV installations by 2020

- It has a greater level of PV penetration than other DNSPs in NSW and Victoria and does not have communications-enabled meters;
- It assessed the safety risk of high PV penetration as 'Medium' and has developed its strategy for monitoring and remediation to reduce the risk to 'Low' (which it considers will satisfy its ALARP criterion);
- It directed its voltage compliance solutions to areas where PV penetration is expected to be greater than 40% and over 600m long, recognising that "*a range of opex solutions will be appropriate to manage more moderate safety and legislative compliance issues*";
- The LV monitoring program will reduce "*future OPEX and CAPEX expenditures to an estimated $1 Million p.a…."* which "*will provide a payback period of around 5 years (initially)";*
- Aurecon has separately concluded that "*it is essential to establish a monitoring program"* and that "*reducing the number of monitors proposed would result in insufficient accuracy for the results to be effective"; and*
- Aurecon has reviewed Energex's proposed capex on remediation works and considers "*Energex's cost allowance to be at the lower end of their estimated range of expected outcomes and could result in Energex having to manage a higher network risk associated with the impact of solar PV penetration."*

3.4.2 Our assessment

PV penetration forecast

72. We consider that Energex 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 that its expenditure forecast is based on. We also consider that: (i) unless there are changes to the cost structure that make PV ownership less attractive; and (ii) depending on the incentives (if any) that the Queensland government introduces, the growth in both number and installed capacity of PV systems in Energex's distribution network might reasonably exceed the 'Low' growth scenario. Such higher growth in PV connections would be consistent with the AEMO's latest forecast, produced subsequent to our initial review.

Risk assessment

73. Energex does not present a risk rating for failure to meet its compliance obligation under the Queensland Electricity Regulations.

74. Energex has rated the safety risk from high PV penetration as 'Medium' and the residual risk after the monitoring program is instituted to be 'Low-Medium', reducing to 'Low' once the transformer tap re-setting program is complete.[30] Energex has not provided compelling information to support this assessment. We remain of the view that the risk mitigation benefit of the monitoring program is likely to be overstated.

[30] Appendix 4.8, pages 9-10

75. Energex's risk framework requires risks rated at 'Medium' to be managed in line with ALARP principles, which requires the cost of a risk mitigation program to be assessed against the benefits to help assess whether the proposed remedial action to achieve a 'Low' risk ranking is justified.

Monitoring program

Options considered

76. Aurecon provided information to support Energex's proposed program based on the sample size necessary to provide statistically valid inputs for its modelling.

77. Energex's program assumed a fixed plant approach to its PQ monitoring program.

78. Energex countered the concern that it has proposed a much larger PQ monitoring program than in any other jurisdiction by advising that: (i) its current and forecast PV penetration is higher than any other supply area; and (ii) it has considered two other options to gather data to manage voltage excursions and neutral integrity risk by:

- Leveraging off existing smart meters; and
- Leveraging off forthcoming communications-enabled smart meters.

79. We expected Energex to also have considered (in detail) the option of a mobile plant approach since, once areas of high PV penetration are identified and subsequently rectified, the usefulness of the permanent monitors in the area is greatly diminished.

80. Whilst we remain of the view that Energex requires some form of monitoring program, we do not see evidence that it has considered all viable options, nor do we consider that the extent of the monitoring program proposed is fully justified.

ALARP and cost benefit analysis

81. Energex provided what appears to be conflicting information regarding the benefits and payback period of its proposed monitoring program. In Appendix A of Appendix 4.8, Energex presented analysis to show annual savings of $2.0m, which will pay back the $25m capital cost in 10 years, not the five years claimed.[31] In the executive summary of the same report, the PQ monitoring program is said to reduce future opex and capex *to* $1m per annum, but the detail provided indicated annual savings of $1m (or $5m over five years *if* the benefits accrued from year 1, which is unlikely). This would lead to a payback period in excess of 20 years, not the five years claimed.

82. When considering the ALARP test, the cost of the PQ monitoring program proposed appears to be disproportionately high compared to the benefit. Furthermore, a significant source of benefit is said by Energex to come from 6-

[31] Assuming it will take at least 1-2 years for the full benefits stream to be realised

8% reduced remediation costs which does not appear to have been taken into account in the revised forecast.

Remediation Program

Extent of the issue

83. Aurecon provided additional information to show that the effects of reverse power flow on both the LV and 11kV networks are likely to be higher than revealed by Energex's modelling; it advised that widespread breaches of statutory voltage limit requirements are likely when PV penetration reaches and exceeds 40%.

Options considered

84. Energex has qualitatively described the options of reducing the LV voltage set point to 230V and retrospectively addressing inverter set point non-compliance issues.

85. We consider that Energex has not explored either of these options fully. In particular, we consider that adopting a strategy of enforcing greater compliance to export voltage limits from existing inverter installations, even if only partially successful, would likely mitigate some of the potential impact of increased PV growth rates and reflect a more reasonable assumption in setting Energex's expenditure allowance.

Program cost

86. Aurecon provided new information to support its conclusion that the proposed expenditure of $13.4m is at the lower end of its estimated range. Based on Aurecon's analysis, we consider that the average cost is likely to be greater than $16k per LV area.

Energex's PQ strategy

87. We consider that Energex's case for implementing a $25m PQ monitoring program has not been justified. We also consider the proposal to spend only $13.4m of the $38.4m PQ program (i.e., 35%) on actually remediating essentially known or foreseeable PQ issues on the network to be a misdirection of expenditure. We would expect to see a greater proportion of expenditure directed to remediation works.

88. We consider that the new information provided has confirmed that the growth in PV installations (and capacity) is likely to exacerbate existing and known network issues.[32] It is our view that the new information provided indicates that the average cost of rectification is likely to be higher than Energex has allowed for in its proposal.

89. Given the disproportionate cost versus the benefit of the proposed monitoring program, we consider that a reasonable and prudent allowance should be

[32] Aurecon has identified 3013 transformers with PV penetration in excess of 35%

based on a revised strategy that directs more expenditure to addressing readily identifiable network issues and prioritising the work according to greatest risk.

90. We also consider that the following options should be explored in greater depth and are likely to further assist in reducing the required expenditure from the level that Energex has proposed:

- enforcing voltage set points on installed inverters (i.e., at the owners' cost) as a more equitable approach to apportioning the cost of managing voltage excursion issues to the PV system owners; and
- changing the operating voltage to 230V.[33]

3.4.3 Implications to expenditure forecast

91. We see no compelling evidence in Energex's RRP to change our initial finding that expenditure at a level between 25-50% below Energex's revised proposed forecast is likely to be more reflective of a prudent and efficient amount.

3.5 Summary

92. We have reviewed the LV fuses, Reliability and PQ elements of Energex's RRP and we consider that Energex has:

- Primarily through its consultant, Aurecon, provided additional information pertaining to the systemic issues identified in our initial review, including:
    - More fully explained risk assessment;
    - More detail supporting forecasts;
    - Strengthened options analysis (typically through enhanced analysis/explanation of options already identified, rather than through the introduction of new options);
- Improved the link between the expenditure and the driver of the expenditure, and
- Reduced expenditure in one of the three augex categories (reliability).

93. We consider that, whilst Energex provided sufficient information to support its contention that each of the three programs of work is required, it has not provided sufficiently compelling information to support the volume, timing or cost of the expenditure proposed.

94. In our initial review, we found that the systemic issues identified reflected a bias towards cost and risk overestimation that is likely to exist across Energex's total augmentation capex forecast. In this review, we considered the new information provided for each augex expenditure category. It is our view that the forecasts for LV fuses, Reliability and PQ augex in its RRP do not represent a reasonable forecast that meets the requirements of the NER.

[33] There would be a significant cost to this option and a cost-benefit analysis would be required

95. We consider that prudent and efficient levels of augex for LV fuses, Reliability and PQ are likely to lie within the ranges indicated in our implication assessments for each expenditure category.

4 Revised proposed repex

4.1 Introduction

4.1.1 Scope

96. In this section, we consider Energex's RRP as it relates to the specific areas of Energex's replacement capital expenditure included in our terms of reference from the AER.

97. The AER engaged us to review the reasonableness of part of Energex's revised forecast for *unmodelled repex*, specifically the categories of 'Other' and 'SCADA'. We discuss Energex's response to the AER's preliminary decision for the categories of 'Other' and 'SCADA' separately in our assessments in sections 4.2 and 4.3.

4.1.2 Summary of AER's Preliminary Decision and Energex's RRP

98. In its Preliminary Decision, the AER did not accept Energex's proposed repex and instead substituted an alternative replacement capex forecast of $621.8m. This represented a reduction of approximately 50 percent when compared with Energex's original proposal of $1,249.5m.[34]

99. The AER separated its review of Energex's repex forecast into *modelled repex* (applying predictive modelling) and *un-modelled repex* (applying alternative assessment techniques). The un-modelled repex forecast comprised 'Other', 'SCADA' and 'Pole top structures' repex categories. In its Preliminary Decision, the AER substituted an alternative forecast of $149.2m for un-modelled repex. This represented a reduction of approximately 70 percent when compared with Energex's original proposal of $486.2m for these categories.

[34] These are the figures for direct expenditure,(i.e., excluding indirect costs)

100. Energex's proposed allowance for the 'Other' and 'SCADA' *un-modelled* repex asset categories represented a significant step increase on prior RCP expenditure for these categories. The AER considered that Energex had not established the need for such an increase. The AER provided an alternative estimate for forecast capex to reflect the capex criteria[35] based upon Energex's historical expenditure from the 2010-15 RCP of $39 million and $42 million respectively.

101. In its RRP,[36] Energex included the results of its consultant's review of its revised repex forecast for 'Other' and SCADA. In reviewing Energex's original submission, its consultant (Advisian) stated that:[37]

> *"On the basis of evidence presented in Energex's original submission in support of its un-modelled REPEX, Advisian concurs with the view of the AER and its consultant EMCa that insufficient information was provided to justify the levels of expenditure proposed by Energex."*

102. In its RRP, Energex has both significantly reduced its forecast expenditure allowance and provided new information as part of its claim that these reduced allowances now meet the relevant NER requirements.

4.2 'Other' asset category

4.2.1 Summary of Energex's RRP

103. In its RRP, Energex stated that its:[38]

> *"revised program has been prioritised based on safety, legislative compliance and sustainable development of the network. In doing so, Energex has adopted a higher level of risk balanced against customer price impact. This has resulted in a reduced revised forecast …"*

104. The revised proposal of $100m represents a 64 percent reduction from Energex's original proposal of $281m, but remains 158 percent higher than the AER's preliminary determination of $39m, as shown in Table 6 below.

[35] AER 2015, Preliminary decision Energex determination 2015-16 to 2019-20 Attachment 6 – Capital expenditure, pages 6-86

[36] Energex RRP, appendix 4.2

[37] Appendix 4.2 Letter of Attestation – Energy un-modelled repex, page 4

[38] Energex revised regulatory proposal 3 July 2015, page 35

Table 6: Summary comparison of total 'Other' repex

$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Energex original proposal	50	56	47	67	62	281
AER preliminary determination	7	10	7	8	7	39
Energex revised proposal	15	16	21	25	23	100

Source: Energex RRP, Table 4.8

105. Table 7 below shows the movement in individual repex programs between Energex's original RP and its RRP.

Table 7: Variance analysis for 'Other' repex by program[39]

Other repex program - $m, 2014-15	Energex original proposal	Energex revised proposal	Variance
Reactive asset replacement program	39	25	-36%
Obsolete protection scheme replacement program	64	24	-62%
Replace distribution aging cable terminations program	33	18	-45%
Instrument transformer replacement program	9	7	-22%
C&I circuit breaker remote control program	2	2	0%
Planned batter replacement program	2	2	-29%
Air break switch replacement program	1	1	146%
Commercial SCADA RTU program	9	9	0%
SCADA feature implementation program	5	5	0%
SCADA software continuous improvement program	2	2	0%
OT Environment - Establishments and migrations	4	4	0%
OT Environment - Refurbishment	1	1	17%
Programs excluded from RRP	111	0	
Total	**281**	**100**	**-64%**

Source: EMCa analysis derived from Energex Revised Regulatory Proposal, table 4.7

106. We relied on Energex's classification of 'Other' repex and its comparison of total 'Other' repex between its original RP and RRP for our analysis.[40] We included a line item for 'Programs excluded from RRP' in the table to account for the $111m of expenditure removed from the RRP. We have not undertaken a review of the programs removed from the forecast by Energex, nor have we been requested to.

107. We note that the majority of program expenditure has been revised down. The changes can be summarised as:

(i) programs removed from the forecast (-$111.1m);

(ii) programs retained with a reduced level of expenditure (-$71.1m); and

(iii) programs with an increased level of expenditure (+$1.0m).

108. In addition, Energex retained a number of programs with a combined value of $21.5m.

109. Energex stated that:[41]

"These asset replacement programs have been revised to reflect changes to scope and timing including project deferrals and lower cost solutions…..

[39] Some variances may not be visible due to rounding

[40] The program forecast expenditures from the RP and RRP have been sourced from Appendix 4.3

[41] Energex revised regulatory proposal 3 July 2015, page 36

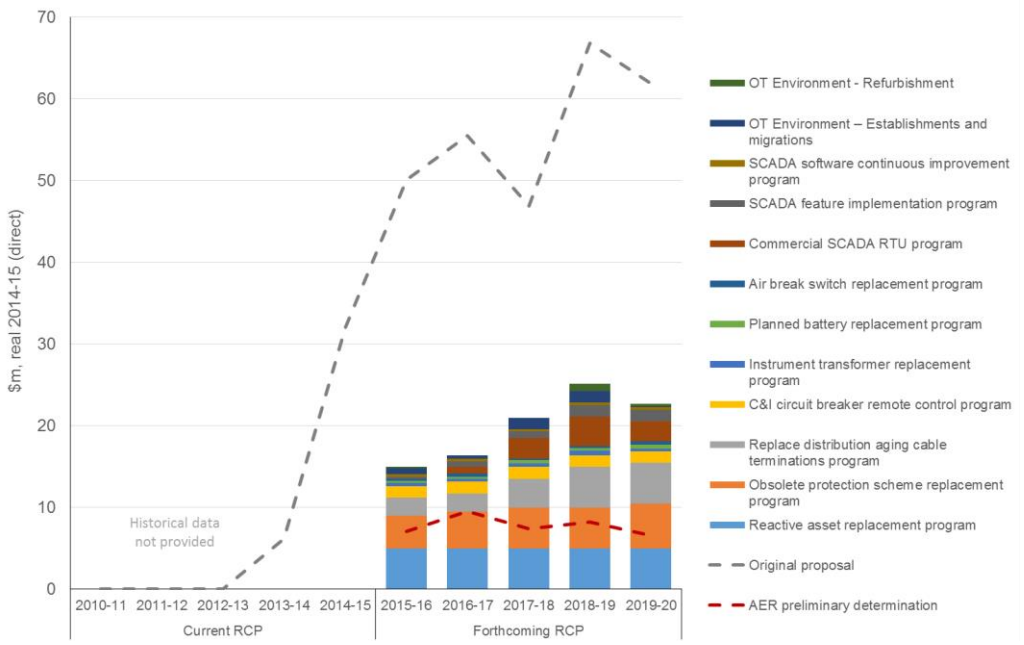
The reduced program represents the minimum work required to maintain the safety, security and reliability of the Energex network consistent with current legislative obligations and the long term interests of its customers."

4.2.2 Our assessment

Energex's RRP expenditure trends

110. In Figure 4 below, the repex for the 'Other' asset category that Energex proposed in its RRP is compared with the allowance it proposed in its original RP and with the allowance in the AER's preliminary determination.

Figure 4: Asset category expenditure profile - 'Other' repex



Source: EMCa analysis from Regulatory Information Notice (RIN) - RP and RRP

111. Energex provided only two years of historical/estimate data for the years 2013-14 and 2014-15 totalling $38m in its original RIN submission. The AER relied on this data to establish its historical level of expenditure. Energex did not provide historical actual/estimate data for this asset category in its RRP RIN submission.

112. We reviewed a sample of programs nominated in Table 7 to form a view as to whether Energex has provided sufficient information to support the program now proposed and to identify any systemic issues that may lead us to form a view that its proposed allowance is not reasonable, in terms of the relevant NER criteria. We note that the revised forecast expenditure profile indicates an increasing trend over the RCP. This is primarily driven by increases in: (i) the proposed aging cable terminations program; and (ii) the proposed commercial SCADA RTU program.

Reactive asset replacement program

113. In its RRP, Energex reduced its expenditure forecast by 36%, from $38.9m to $25.0m. In Appendix 4.3 of its RRP, Energex stated that:[42]

> *"the program has been reviewed and a number of items allowing for replacement of assets which have failed diagnostic testing criteria have been removed. These assets are now planned to be managed by other risk mitigation approaches. Energex has negotiated with some manufacturers to undertake repairs and share the costs for known problematic assets. These costs will now instead be managed under the OPEX program. This information was unavailable at the time of the initial submission."*

114. Energex provided background to the historical spend and case studies which suggests, all other factors being equal, that there is a reasonable likelihood of similar failure modes and rates of replacement.

115. Details of the rationale of the adjustments to the forecast or assessment of the changing risk levels associated with the revised expenditure level were not provided. The revised level of expenditure is broadly consistent with historic levels. In the absence of better information, we consider it is likely that Energex has proposed its forecast on this basis.

Obsolete protection scheme replacement program

116. In its RRP, Energex reduced its expenditure forecast for this program by 62%, from $63.7m to $24.0m.

117. Energex advised that, unlike previous RCPs, the proposed replacements of obsolete protection schemes are not aligned with primary plant replacements in the reduced forward capex program. Energex concluded that a stand-alone program is required.

118. Energex revised its forecast to target only high priority protection scheme replacements which address safety risks and/or legislative compliance outcomes. In general, obsolete protection schemes mitigating customer impact risks were removed. Energex retained works associated with the highest customer impact risk - the 2018 Commonwealth Games.

119. Energex described a number of issues and options to address identified risks with obsolete protection schemes including consideration of alternative risk mitigation techniques; in other cases, it removed the program.

120. Energex stated that the increasing forecast reflects incorporation of scheme replacement works with other capex project works early in the regulatory period. As the period continues, there are less capex projects that address obsolete schemes and therefore an increasing reliance on secondary systems focused projects.

[42] Appendix 4.3 Unmodelled repex: Business cases for 'Other' repex, Energex Reactive Asset Replacement Program, page 15

Replace distribution aging cable terminations program

121. In its RRP, Energex reduced its expenditure forecast for this program by 45%, from $32.7m to $17.9m.

122. Energex described a change in strategy for replacement of cast iron cable terminations due to the ageing population and resultant increasingly high safety risk. Energex proposed a risk prioritised approach (initially targeting 402 high risk sites within 150m of school zones) to mitigate the risk identified in high traffic areas in the case of catastrophic cable failure. A further 1,309 sites are proposed to be prioritised over the forthcoming RCP, with the remaining identified sites deferred to the following RCP.

123. Energex proposed a 10 year replacement program to replace all cast iron cable terminations by 2024/25. Energex described the program as "*the best option as it denotes a risk based approach to sites at high risk to public safety, aged asset life replacement and consideration to resource capability/constraints over the regulatory period.*"

Instrument transformer replacement program

124. In its RRP, Energex reduced its expenditure forecast for this program by 22%, from $9.2m to $7.2m.

125. Although proposed expenditure has been reduced, the program volume remains unchanged from the original proposal. Energex stated that the expenditure is required to address the safety risks associated with catastrophic failure of instrument transformers.

Commercial SCADA RTU program

126. In its RRP, Energex retained its original expenditure forecast for this program of $9.4m.

127. The scope of the works has not changed compared to the original submission. Energex advised that the timing of the expenditure can be deferred for one year, but considers that further deferral would be unacceptable as the current fleet will have aged to the point where further costly redesign will be unavoidable to ensure reliability and maintainability.

Other programs

128. In addition to the above programs, we reviewed a sample of the remaining expenditure programs as part of the 'Other' category of repex.

4.2.3 Implications for expenditure forecast

129. We have undertaken a review of a sample of programs, representing over 80% of the forecast expenditure. The steps taken by Energex to review its forecast for the RRP has confirmed the systemic issues identified in our initial review and which led to an overestimate of the required scope and expenditure forecast for the 'Other' repex category.

130. We have identified evidence that Energex has taken steps to:

- Review the requirement for the programs, including re-assessment of risk;
- Consider the optimal scope of work, including consideration of priority based approaches to the work and opportunities for prudent deferral;
- Consider an expanded number of options in its analysis, including targeted risk mitigation techniques; and
- Consider lower cost solutions.

131. It is our view that the steps taken by Energex in its RRP are more likely to have resulted in a forecast allowance for 'Other' repex that meets the expenditure requirements of the NER than was the case with its initial RP. However, on the evidence provided, we cannot exclude the possibility that a lower amount would still represent a reasonable forecast of the prudent and efficient level of required expenditure.

4.3 SCADA asset category

4.3.1 Summary of Energex's RRP

132. In its RRP, Energex stated that:[43]

> *"..SCADA, Communications and protection replacement programs are driven by technical obsolescence of ageing components including hardware and software. Energex has reviewed the forecast submitted in its original proposal taking into consideration stakeholder and customer feedback and priorities based on network and technology risk. In doing so, Energex has adopted a higher level of risk balanced against customer price impact."*

133. The revised proposal of $62m represents a 50 percent reduction from Energex's original proposal of $125m, but remains 46 percent higher than the AER's preliminary determination of $42m as shown in Table 8 below.

Table 8: Comparison of revised SCADA repex - summary

$m, 2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Energex original proposal	28	24	29	25	19	125
AER preliminary determination	8	10	8	9	7	42
Energex revised proposal	10	11	13	14	14	62

Source: Energex RRP, Table 4.10

134. Table 9 below shows the movement in individual repex programs between the original proposal and the revised proposal that led to this reduction.

[43] Energex revised regulatory proposal 3 July 2015, page 36

Table 9: Comparison of revised SCADA repex by program

Other repex program $m, 2014-15	Energex original proposal	Energex revised proposal	Variance
Protection relay replacement program	32	15	-53%
Core IP-MPLS Telecommunications network (Matr	30	14	-54%
Optical fibre cable infill	25	12	-53%
Pilot cable replacement program	11	11	0%
Obsolete telecommunications equipment	7	7	0%
RTU replacement program	7	4	-45%
Obsolete SCADA equipment	1	1	0%
Programs excluded from RRP	13	-	-
Total	**125**	**62**	**-50%**

Source: EMCa analysis derived from Energex Revised Regulatory Proposal, table 4.9.

135. We relied on Energex's classification of 'SCADA' repex and its comparison of total SCADA repex between its original proposal and RRP for our analysis.[44] We included a line item for 'Programs excluded from RRP' in Table 9 to account for the $13m of expenditure removed from the RRP. We have not undertaken a review of the programs removed from the forecast by Energex, nor have we been requested to.

136. Energex stated that:[45]

> *"The reduced program represents the minimum work required to maintain an appropriate and sustainable level of expenditure necessary to maintain the safety, security and reliability of the Energex network consistent with current legislative obligations and the long term interests of its customers."*

4.3.2 Our assessment

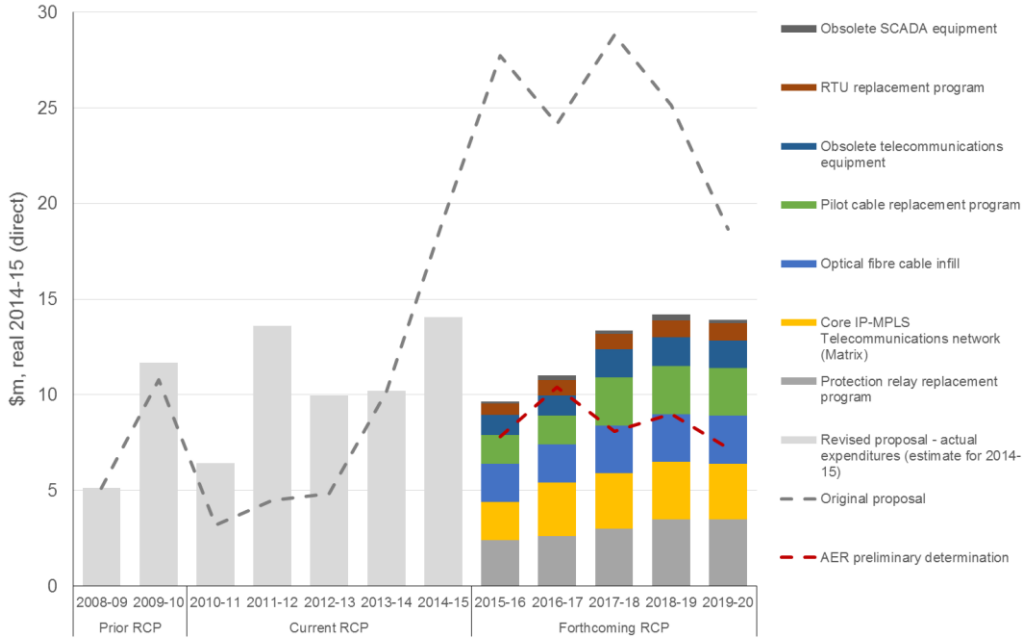
Expenditure trends

137. In Figure 5, the asset category repex for SCADA, network control and protection systems now proposed by Energex in its RRP is compared with the allowance it proposed in its original RP and with the allowance in the AER's preliminary determination.

[44] The program forecast expenditures from the RP and RRP have been sourced from Appendix 4.3

[45] Energex revised regulatory proposal 3 July 2015, page 37

Figure 5: Asset category expenditure profile SCADA repex



Source: EMCa analysis from Regulatory Information Notice (RIN) - RP and RRP

138. We have shown the original proposal and the revised proposal historical actuals and forecast expenditure in the figure above. Energex provided different historical actuals for this asset category in its RRP when compared with its original submission in its RP, showing an increase of approximately $12m over the current RCP. The difference is primarily driven by a higher expenditure in 'Communication Network Assets' of approximately $15m over the current RCP. Energex categorised this asset category differently in the RIN for its historical/estimates; therefore, we have only provided the aggregate figures for comparative purposes with its RRP.

139. The revised forecast expenditure profile reflects an increasing trend over the RCP, from a starting point that is approximately equal to the average over the current RCP. The increasing trend is primarily driven by increases in the: (i) protection relay replacement program; (ii) pilot cable replacement program; and (iii) replacement of obsolete telecommunications equipment.

140. Energex removed programs totalling $12.9m (10 percent) of the original forecast, in addition to reviewing a number of retained programs. We reviewed a sample of programs in our assessment as described below.

Protection relay replacement program

141. In its RRP, Energex reduced its expenditure forecast for this program by 53%, from $32.2m to $15.0m.

142. Energex stated that the ongoing requirements for protection relay replacement are not well aligned with the replacement of primary plant, and have therefore proposed inclusion of this dedicated program. Energex reduced the

replacement quantities of its protection relay replacement program (from 2,000 to 850 over the RCP) on the basis of "*tolerating increased risk levels*".[46]

143. Energex has adopted a protection relay replacement ranking methodology that seeks to identify age and/or reliability priority and adjusts for low populations and the potential for loss of load. We have not reviewed this methodology in detail, and note that the analysis results in a forecast failure rate based on historical observed failure rates and an age profile. The proposed replacement program "*builds upon Energex's recent obsolete relay replacement program which commenced in 2013 and replaced approximately 800 obsolete protection relays across the network.*"[47]

144. Energex included analysis of three replacement volumes: 850 relays; 2,000 relays; and 400 relays compared with a 'do nothing' option. The 'do nothing' option is based on a run-to-failure approach with no protection relay replacement program and has an untreated risk rating of 'Medium'. Energex stated that this option results in "*risks increasing over time and soon reaching intolerable levels*,"[48] but is not considered to be ALARP.

145. Whilst Energex did not express its options analysis in terms of benefits or risk, it described the required relay replacements[49] over the next twenty years, with the sustainability curve being the cumulative difference between the two amounts. Energex stated that its options analysis considered opportunities for more efficient relay replacement by bundling with other projects.

146. Energex stated that its preferred option included in its RP was based on the "*least risk option*"[50] and was preferred "*in the absence of funding restraints*".[51] Whilst Energex has adopted a lower program level, we would have expected to see greater analysis of the change in risk profile in its options analysis as was identified in our initial review.

Core IP-MPLS Telecommunications network (Matrix)

147. In its RRP, Energex reduced its expenditure forecast for this program by 54%, from $29.6m to $13.6m.

[46] Appendix 4.4 Unmodelled repex: Business cases for "SCADA" repex, Energex Protection Relay Replacement Program, page iii

[47] Appendix 4.4 Unmodelled repex: Business cases for "SCADA" repex, Energex Protection Relay Replacement Program, page 1

[48] Appendix 4.4 Unmodelled repex: Business cases for "SCADA" repex, Energex Protection Relay Replacement Program, page 17

[49] The "Replacement Requirement" is defined as those relays which should be replaced in order to maintain long-term sustainability. This includes all relays in the first or second priority category, and also includes approximately 50 percent of the third priority category.

[50] Appendix 4.4 Unmodelled repex: Business cases for "SCADA" repex, Energex Protection Relay Replacement Program, page 20

[51] Appendix 4.4 Unmodelled repex: Business cases for "SCADA" repex, Energex Protection Relay Replacement Program, page 22

148. Energex revised this program to extend the timeframe for delivery of the total program, connecting 115 sites[52] of the required 194 sites over 2015-2020 with the remaining Energex sites being connected to the IP/MPLS network during the 2020-2025 regulatory period. Energex stated that the revised proposal "*maintains alignment with the business outcomes outlined in the Energex Telecommunications Strategic Plan 2015-2020.*"[53]

149. Energex stated that:[54] "*The implementation of Option 3 provides a sustainable approach for managing the strategic risks associated with the continuation of the IP-MPLS Telecommunications Network rollout.*"

150. Energex stated that by adopting its recommended option, a corresponding savings to the associated program for Optical Fibre Cable In-Fill will be realised.

151. Energex makes reference to technology obsolescence risks, operational risks and increases to operational costs; however, these are not quantified in the business case. Similarly, Energex makes reference to a number of benefits associated with this program, and impaired benefits through deferral, but the benefits are not quantified.

152. Given that this program commenced in 2008, with establishment of operational technology environments at both operational data centres, technical support centre, network operations centre and nodes and telecommunications services to approximately 170 sites, we expected to see a more extensive cost benefit analysis, commensurate with the size of program proposed.

Optical fibre cable infill

153. In its RRP, Energex reduced its expenditure forecast for this program by 53%, from $24.5m to $11.5m. The Optical Fibre Cable In-Fill program expenditure during the current RCP totalled $11.5m.

154. Energex stated that:[55]

> *"the risk of not proceeding with core telecommunications requirements is not tolerable as this program is an enabler for the rollout of the Core IP/MPLS Telecommunications Network. Energex has however been able to reduce expenditure requirements for the program by adopting a staged approach to further implementation, tolerating increased customer outage risks and increased duration of outages for secondary systems at smaller zone substation and C&I substations as a result."*

[52] This options includes a lower functionality solution for the C&I substation sites when compared with the proposal included in the RP for all 194 sites.

[53] Appendix 4.4 Unmodelled repex: Business cases for "SCADA" repex, Core IP-MPLS Telecommunication Network (Matrix), page iv

[54] Appendix 4.4 Unmodelled repex: Business cases for "SCADA" repex, Core IP-MPLS Telecommunication Network (Matrix), page 15

[55] Appendix 4.4 Unmodelled repex: Business cases for "SCADA" repex, Energex Optical Fibre Cable In-Fill, page 1

155. Energex's preferred option proposes the continued rollout of the Core IP/MPLS Telecommunications Network at a reduced rate, which includes implementing less network resilience goals and accepting the congested cable constraints identified in its original proposal.

156. We note that the risk assessment for the preferred option described the business impact risk as 'High'; however, the impact of this risk is not quantified. The impact of further reductions to this program, which would assist in determining whether the optimal program expenditure has been determined, is not evident in the analysis.

157. Energex stated that the revised expenditure aligns with the business outcomes outlined in its telecommunications strategic plan[56] and is consistent with the revised timing of the Core IP/MPLS Telecommunications Network program, which now extends into the 2020-25 regulatory period.

158. We note that the original proposal was referred to as the 'accelerated program' and that Energex acknowledged that it did not include sufficient justification and options analysis. Whilst Energex has adopted a reduced program level in its options analysis, the program appears to be technology driven including delivery of business benefits which are not well defined in the analysis.

159. We note the apparent dependence of this program on other programs. Whilst reductions in the forecast of 53% have been proposed by Energex, we do not see that Energex has evaluated the optimal level of expenditure across the program, including the relationship with other expenditure programs.

Pilot cable replacement program

160. Energex proposed to retain the original forecast for this program of $10.5m, and has updated the timing for efficient delivery.

161. The proposed program includes planned and reactive works to target high risk and poor condition cables. Energex included CBRM techniques to assist forecast proactive risk and evaluate risk.

162. Energex's Telecommunications Strategic Plan 2015 – 2020 has deemed copper pilot cables as an obsolete technology. Energex plans to install a fibre optic cable to take advantage of fibre connectivity in place of a copper pilot cable where it nears its end of life and, importantly, where the cost is justified.

163. Energex considered an expanded list of options for its revised program, proposing to replace approximately 100km of pilot cable. A key driver is improving the network resilience due to the critical nature of communications links to the operation of the electricity distribution network

[56] Energex Telecommunications Strategic Plan 2015-20

Other programs

164. We reviewed a sample of the remaining programs from the SCADA category of repex that includes examples of revising the scope of this program and deferring lower risk work.

4.3.3 Implications for expenditure forecast

165. We have undertaken a review of a sample of programs, representing over 80% of the forecast expenditure. We consider that the steps taken by Energex to review its forecast for the RRP have confirmed the systemic issues identified in our initial review and which led to an overestimate of the required scope and expenditure forecast for the SCADA repex category.

166. In this review, we identified evidence that Energex has taken steps to:

- Review the requirement for the programs, including the assessment of risk;
- Consider the optimal scope of work, including opportunities for prudent deferral; and
- Consider an expanded number of options in its analysis, including targeted risk mitigation techniques.

167. It is our view that the steps taken by Energex in its RRP are more likely to have resulted in a forecast allowance for SCADA that meets the expenditure requirements of the NER than was the case with its initial RP. However, on the evidence provided, we cannot exclude the possibility that a lower amount would still represent a reasonable forecast of the prudent and efficient level of required expenditure.

4.4 Summary

168. Energex reviewed its *un-modelled* repex forecast and priorities based on safety, legislative compliance and network and sustainable development of the network including the risk of obsolete technology, and has reduced its forecast considerably from the amounts proposed in its initial RP.

169. In considering the reasonableness of Energex's revised repex forecast for SCADA and 'Other' repex against the capex objectives, we consider that Energex has:

- Demonstrated that it has mitigated, to a large degree, the identified systemic issues for these asset categories;
- Reduced forecast expenditure to a level that could be considered to more closely reflect a reasonable level of expenditure to manage the identified risks; and
- Undertaken a significant review of and challenge to the revised forecast, including seeking independent advice.

170. Energex included the assessment undertaken by its consultant (Advisian), which states:[57]

[57] Appendix 4.2 Letter of attestation – Energex Unmodelled repex, page 5

> *"In Advisian's view, the development of the 19 business cases relating to un-modelled "Other" and "SCADA" REPEX, whilst representing an increase on the levels proposed in the AER's Preliminary Decision, present a more credible indicator of the "right sizing" of the program. They still represent a significant reduction on the original proposal (in the range 50 – 64%), but have a sound basis…"*
>
> and
>
> *"…Advisian is therefore of the view that the revised level of proposed expenditure has been developed using a robust methodology, and provides a reasonable balance of risk and cost for these categories of expenditure for the 2015/16 – 2019/20 regulatory period."*

171. Energex did not provide details of its top-down review, or optimisation process that would have shown us the implications of lower levels of expenditure than it has now proposed. We were also not provided with evidence of any changes to its risk management framework or assessment methodology that may have been considered as part of this work. We also note the rising trend in proposed expenditure for both categories, which raises the prospect that Energex may eventually find it prudent to defer some of the increase in the later years into the next RCP.

172. Based on the information provided, we have been unable to conclude that the systemic issues identified in our initial review have been addressed in full or that Energex has reduced its proposed expenditure to levels that strike the appropriate balance between cost and risk.

173. However, on balance, we consider that Energex's revised expenditure appears likely to be reflective of a prudent and efficient level.