EMCa

energy market consulting associates

Power and Water Replacement Capex forecast for the 2024-29 regulatory period

ASSESSMENT OF REPEX MODELLING USING THE AER'S REPEX MODEL

Report prepared for:

POWER WATER CORPORATION

December 2022

Preface

This report has been prepared to assist Power and Water with preparation of its replacement capital expenditure (repex) forecast included in its Regulatory Proposal for the 2024-29 regulatory period, by developing, testing and interpreting the outputs of the AER's Repex model as a top-down assessment of its proposed repex forecast.

This report covers a particular and limited scope as defined by Power and Water and should not be read as a comprehensive assessment of proposed repex that has been conducted making use of all available assessment methods. This report relies on information provided to EMCa by Power and Water. 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 Power and Water 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 NT NER or other legal instruments.

EMCa's opinions in this report include considerations of materiality to the requirements of Power and Water 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 Power and Water prior to 9 December 2022 and any information provided subsequent to this time may not have been taken into account.

Enquiries about this report should be directed to:

Paul Sell

Managing Director
+61 (0)412 559 138
psell@emca.com.au

Prepared by

Gavin Forrest with input from Paul Sell

Date saved

17/01/2023 7:58 AM

Version

Final v2

Energy Market Consulting associates

ABN 75 102 418 020

Sydney Office

Level 25, 100 Mount St, North Sydney NSW 2060
PO Box 592, North Sydney NSW 2059
+(61) 2 8019 7060
contact@emca.com.au
www.emca.com.au

Perth Office

Level 1, 2 Mill St, Perth WA 6000
+(61) 8 9421 1704
contact@emca.com.au
www.emca.com.au

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

1.1 Background and scope

1. Power and Water has engaged EMCa for assistance to develop, test and interpret the outputs of the Repex model as a top-down assessment method of its proposed repex forecast.

2. Power and Water prepared a Repex model and submitted it to the AER for the current regulatory control period (RCP). Power and Water sought our assistance to identify requirements, populate and test the outputs of an updated Repex model, covering the next regulatory period, from 2024 to 2029.

3. The key deliverables of this work were to produce the following:

   - Populated and tested Repex model using updated data;
   - Preliminary Report and assistance to Power and Water with understanding and validating the outputs from the model; and
   - Final Assessment Findings Report for submission to the AER.

4. This document serves as the Final Assessment report.

1.2 Key information sources

5. We have relied on the following information to undertake our assessment:

   - Category Analysis Regulatory Information Notices (RINs), for 2019/20 and 2020/21;
   - Draft CA RIN for 2021/22 prepared by Power and Water;
   - Repex forecast for the period 2023/24 to 2028/29, referred to as IP10, including draft Reset RIN; and
   - Results from the AER's Repex model included in the Victorian DNSP draft determination.

1.3 Structure of our report

6. In section 2, of this report we describe the approach and assumptions applied in our assessment of the outputs of the AER's Repex model.

7. In section 3, we provide an overview of the historical and forecast repex as a basis for comparison with the outputs of the AER's Repex model.

8. In section 4, we provide the results of our analysis of the repex modelling results using the AER's Repex model, based on the data and assumptions included at section 2 and forecast repex included in section 3.

9. In section 5, we provide a summary of our findings.

10. In Appendix A we provide a graphic comparison of the results of the AER Repex model using the threshold scenario and Power and Water's repex forecast.

2 APPROACH AND ASSUMPTIONS

11. Power and Water is subject to regulation outlined in the Northern Territory National Electricity Rules (NT NER). Under the NT NER, one of the methods used by the AER to review Power and Water's forecast capital expenditure will be a top-down assessment of the repex forecast based on the outputs of its 'Repex model.' The Repex model forecasts high level replacement capex requirements. It also allows the AER to benchmark our forecasts against other DNSPs.

12. Power and Water is required to submit a version of the Repex model to the AER with its regulatory submission. Whilst the AER will undertake its own modelling, the basis for this assessment is known and can form part of the supporting information with Power and Water's regulatory submission.

2.1 Repex model overview

13. Key characteristics of the AER Repex model include:

- Provides a top-down forecast of business asset replacement needs based upon the age of the existing asset base, forecast useful life of the assets and efficient unit costs.
- Asset age used as a proxy for the various factors that drive asset replacements.
- Based on a probabilistic normal distribution 'replacement algorithm.'
- Specifically deals with replacement of an asset with its modern-age equivalent (i.e. excludes demand-driven replacement of network components with assets of a higher capacity).
- Grouping of assets (Asset categories) needs to reflect commonality of useful lives and unit costs.

2.2 The AER's assessment approach

14. For our assessment, we have developed a Repex model, calibrated the Repex model and developed the four scenarios applied by the AER in its recent determinations in accordance with its published guidance materials.

2.2.1 Four AER scenarios

15. The scenarios applied by the AER are defined by variations in the unit costs and asset lives applied to each asset category, and which form inputs to the Repex model.

16. The four scenarios can be interpreted as follows:

- The Historical scenario is a type of intra-company benchmark forecast, which produces a forecast assuming the DNSP maintains the asset lives and unit costs it has been able to achieve in the recent historical period, as evidenced by the reported performance in the CA RIN.
- The Costs and Lives scenarios are two more aggressive scenarios (i.e. they will typically produce a lower forecast than the Historical scenario). These two scenarios separately consider the forecast assuming either historical unit costs or lives can be improved. In this regard, any historical unit costs or lives that are worse than the median of all NEM DNSPs' unit costs or lives move to the median. The Costs scenario also moves the unit cost to the forecast unit cost in circumstances where this is lower than both the historical and median unit cost.

- The Combined scenario is the most aggressive forecast (i.e. this scenario will typically produce the lowest forecast). This scenario assumes all unit costs and lives can move to the NEM DNSPs' median (or the forecast unit cost if it is lower).

2.2.2 Defining the threshold forecast using scenarios

17. The AER has nominated a threshold forecast for use as the reference in its determinations. The threshold forecast is calculated as the maximum aggregate forecast given by the Costs and Lives scenarios.

18. In reviewing the threshold forecast, it should be noted that:

    - The threshold forecast may be higher or lower than indicated by the Historical scenario. A lower threshold forecast may indicate that the DNSP has further opportunity to improve its asset replacement decisions or efficient unit costs.
    - Acknowledging that the Cost and Lives scenarios apply aggressive selection of inputs, the AER consider that selection of the maximum of the two scenarios provides the least aggressive reference for the DNSP to be compared with.

19. In cases where the repex forecast exceeds the threshold forecast, the AER will likely seek additional information to understand the rationale for the difference, including as a part of a bottom-up review of the forecast.

2.2.3 Application of the Repex model

20. In guidance published in 2020 by the AER, the Repex model is used as part of its assessment of forecast repex requirements where:[1]

    'The repex model advises and informs us where to target a more detailed bottom-up review, and to define a substitute repex forecast if necessary.'

21. Importantly, in accordance with the AER's capex assessment guidelines, the AER uses a combination of assessment methods to determine whether the proposed capex (including repex) meets the capex objectives and capex criteria of the NT NER. This includes a top-down review, governance and management review and engineering review of the proposed bottom-up forecast.

2.3 Model developed for our assessment

22. The Repex model that we constructed aligns with the modelled RIN groups and asset categories identified by the AER, and the methodology aligns with the most recent AER guidance on the application of the Repex model. In the subsections below, we provide further information on this instance of the model.

2.3.1 Asset categorisation

23. We have undertaken the assessment using modelled categories in accordance with the AER's guideline and as has been assessed previously by the AER. Specifically, the repex modelling includes the RIN groups and associated asset categories of:

    - Poles;
    - Overhead conductors;
    - Underground cables;
    - Service lines;
    - Transformers; and

1 AER repex model outline | electricity distribution determinations | February 2020, page 4

- Switchgear.

24. This is referred to as the 'modelled' component of repex. The excluded RIN groups are referred to 'unmodelled' repex and includes all repex in the groups of pole top structures, SCADA and communications and the other asset group.

25. The AER clarified its guidance in 2020, where it states that:[2]

> *'The repex model is most suitable for asset groups and categories where there is a moderate to large asset population of relatively homogenous assets. It is less suitable for assets with small populations or those that are relatively heterogeneous.'*

26. Also, that:[3]

> *'We do not model asset categories reported by three distributors or less. This is because the model cannot make a meaningful comparison on unit costs or expected replacement lives with other distributors. Examples include 132kV underground cables and Stobie poles.*
>
> *Similarly, we may also exclude unique assets or repex projects on a case-by-case basis, where we determine that they will adversely affect the modelling results.'*

27. In undertaking the modelling, we did not exclude any further RIN groups, However, as a part of our assessment in section 3 of this report we have identified asset categories within these RIN groups that should be excluded for these and other reasons.

2.3.2 Calibration period

28. In its 2019 guidance, the AER refers to the nomination of the calibration period as follows:[4]

> *'..our position is to set a default period of the first three years of the current regulatory control period for the draft decision, adding the fourth year of the current period for the final decision. However, we are open to altering this period where the distributor shows evidence that this would likely improve the repex modelling results. In arriving to this position, we considered that the most recent three years of actual expenditure in the current regulatory period is likely to be most representative of future expenditure and free from any RIN reporting changes.'*

29. The AER clarified its guidance in 2020, where it states that:[5]

> *'The calibrated expected replacement lives is different to the replacement lives that distributors report. This is because we assume the following during the calibration process:*
>
> *• The calibration period is a historical period where a distributor's replacement practices are largely representative of its expected future replacement needs.*
>
> *• We do not estimate a calibrated expected replacement life where a distributor did not replace any assets during the calibration period, because the calibration process relies on actual historical replacement volumes to derive a mean and standard deviation.*
>
> *• Where a calibrated replacement life is not available, we substitute the value of a similar asset category.'*

30. We have assessed the modelled repex using a calibration period of the last three-year actuals being the regulatory control period including 2019/20, 2020/21 and 2021/22. These

[2] AER repex model outline | electricity distribution determinations | February 2020, page 4

[3] AER repex model outline | electricity distribution determinations | February 2020, page 5

[4] AER review of repex modelling assumptions | December 2019, page 7

[5] AER repex model outline | electricity distribution determinations | February 2020, page 6

years are considered most representative of the current practices, including forming part of the first regulatory period that Power and Water has been subject to under the NT NER.

31. Also, in accordance with the above AER guidance, we have substituted the value of a replacement life or unit cost from a similar asset category where a calibrated value is not available, where the result does not adversely affect the modelling results.

2.3.3 Most recent RIN data

32. The Repex model has been updated based on the draft 2021/22 CA RIN information, and which includes the age profile. Specifically, this refers to section 2.2 and 5.2 of the CA RIN.

33. A Reset RIN was not available at the time of our assessment. The repex forecast has been developed with allocations to asset categories that would form the basis of the Reset RIN. We have used this draft Reset RIN information for our assessment. Where we have identified the potential for reclassification of some items as a part of finalisation of the Reset RIN, we have noted this in our assessment.

34. The forecast costs for the next RCP would be derived from draft Reset RIN information being the division of the total forecast expenditure divided by the total replacement volumes for each asset category. However, due to the preliminary nature of the Reset RIN and the issues identified throughout this review, the information does not lead to a reasonable estimate of the forecast unit costs. This information has not been incorporated into our assessment at this time.

35. For example, the derived forecast unit cost for LV poles is $3.30k and which is materially lower than $9.32k for the NEM median, and $23.84 as the calibrated historical unit cost. Part of the reason is the blended nature of the unit cost, including a high volume of pole re-butting and animal proofing resulting in a lower 'blended' unit rate. Similar examples exist throughout the repex forecast and would need to be checked before being used for the repex modelling.

2.3.4 Base year dollars

36. We have adopted 2021/22 as the base year dollars being the last year of the reported RIN.

2.3.5 Historical year adjustments

37. We adjusted the RIN information to account for CPI and labour rate changes, to compare the data on a consistent basis.

38. The labour rate uplift relates to changes in Power and Water's labour cost accounting that apply from FY22 and which Power and Water has described in its regulatory submission documentation. We applied uplift factors advised by Power and Water in order to 'backcast' FY18 to FY20 opex to the equivalent cost accounting that now applies (and which is consistent with the basis for Power and Water's expenditure forecasting for the next period). The assumptions to adjust for the labour rate uplift are shown in the table below.

Table 2.1: Labour rate uplift factor

Financial year		Labour rate uplift	Scale factor
FY22	2021/22	0	1
FY21	2020/21	0	1
FY20	2019/20	0.152854	1.152854
FY19	2018/19	0.210529	1.210529
FY18	2017/18	0.109699	1.109699

Source: Data supplied by Power and Water. We note that the uplift factors were provided part way through the back casting process that Power and Water has now undertaken, as a proxy for the backcast costs that Power and Water has now derived.; however, we consider that any differences in resulting historical costs are unlikely to be material.

2.3.6 Benchmarking data

39. The Repex model draws on asset replacement lives and unit costs based on the population of NEM businesses using the NEM median. This is output from the AER's own benchmarking tools. In our assessment, we have relied on the lives and unit costs applied by the AER in its most recent determinations, being for the Victorian DNSPs.

2.4 Model calibration process

40. For each asset category, the calibration process has involved the following steps in accordance with the repex handbook (AER, 2013):[6]

1. Stage 1 - Calibrate life
   - Get the actual historical replacement volumes over the calibration period in accordance with updated AER guidance and reported RIN information.
     - The AER also provides for an alternative option where replacement volumes may be estimated based upon the volumes in the age profile and the proportion of this associated with replacements. Assessment of the movement in the age profile of assets suggests that this method is not able to be used for Power and Water.
   - Calculate the average annual replacement volume over the calibration period.
   - Adjust the mean replacement life until the forecast volume of replaced assets in the first year of the forecast period equals the average actual volume, calculated above.
2. Stage 2 - calibrate unit cost, at the asset category level. A similar process to that described above for the replacement lives is applied, using the average annual actual historical replacement expenditure and adjusting the unit costs.
3. Stage 3 - re-calibrate to allow for the trend in replacement volumes seen through the model to
   - determine the annual percentage increase in the forecast volumes calculated by the model.
   - re-adjust the asset life to ensure the replacement volumes in the first year of the forecast period reflect this growth.

41. The re-calibration of the replacement lives as a part of Stage 3 allows the mean life to be set to ensure that the first year of the forecast produced by the model equals an adjusted average annual replacement volume during the calibration period. The adjustment is set to reflect the initial growth rate in the replacement volume that is forecast by the model. This adjustment is necessary to approximate the change due to using the end-point age profile, rather than the profile that reflects the mid-point of the calibration period. The adjusted average annual replacement volume is calculated as:

*(1 + x%)^3 * (average annual volume replaced over calibration period)*

where x% is the initial forecast growth rate calculated through the model, and the power of 3 is necessary to advance the growth over 3 years i.e. from the mid-point in the calibration period to the first year of the forecast.

[6] AER, Electricity network service providers, Replacement expenditure model handbook, November 2013

3 OVERVIEW OF POWER AND WATER'S HISTORICAL AND FORECAST REPEX

42. In this section, we provide an overview of the forecast repex proposed to be included in its submission to the AER, and which follows application of Power and Water's review and challenge processes. This has been included to compare the output of the repex modelling using the AER's Repex model for the next RCP to this forecast.

43. We also make observations of the historical repex, and implications for application and comparison to the results of the repex modelling from the AER's Repex model.

44. This information is provided based on $2022 and therefore may vary slightly due to updated assumptions since the finalisation of this report.

3.1 Forecast repex

45. Power and Water propose a repex forecast of $156 million (real 2022) for the next regulatory period 2024-29.

46. Of the total forecast repex, $89m is considered within the scope of the AER's repex model as 'modelled' repex following application of the approach and assumptions presented in section 2. On average, the modelled repex accounts for approximately 57% of the forecast total repex over the next regulatory period.

Table 3.1: Forecast expenditure – modelled and un-modelled repex, $m real $2022

Item	2024-25	2025-26	2026-27	2027-28	2028-29	RCP Total
Modelled categories	19.0	22.7	16.7	15.3	15.5	89.2
Un-modelled categories	23.4	16.3	10.1	8.8	8.2	66.8
Total	42.5	38.9	26.8	24.1	23.7	156.0

Source: EMCa analysis of proposed forecast repex

47. In the table below, we show the proposed repex by asset group from the Reset RIN for the modelled asset categories.

Table 3.2: Forecast expenditure – modelled repex by asset group, $m real $2022

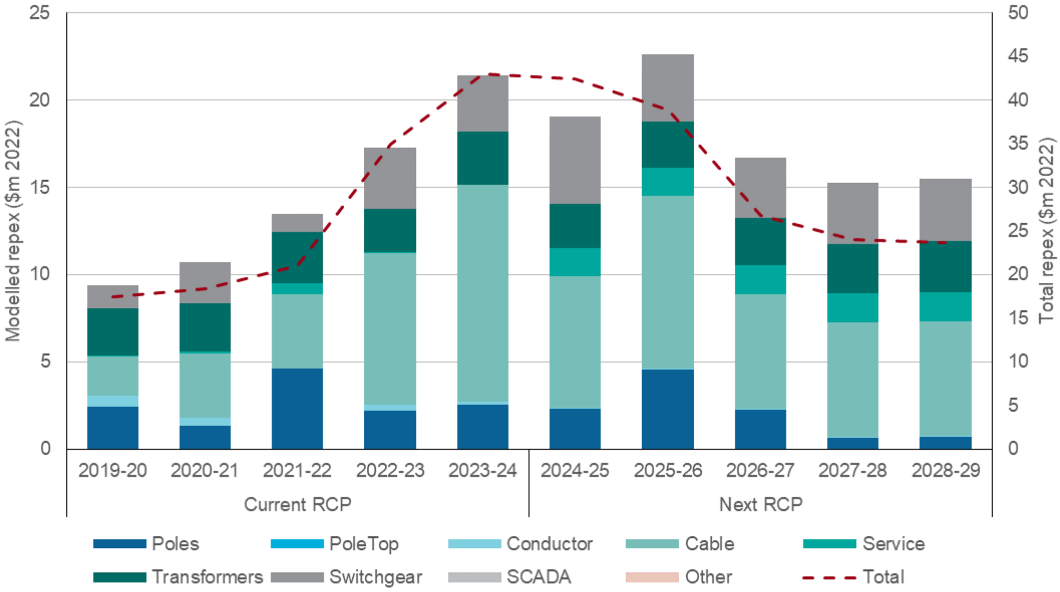
Asset group	2024-25	2025-26	2026-27	2027-28	2028-29	RCP Total
Poles	2.3	4.5	2.3	0.6	0.7	10.4
Conductor	0.1	0.1	0.1	0.0	0.0	0.3
Cable	7.5	9.9	6.6	6.6	6.6	37.1
Service	1.7	1.7	1.7	1.7	1.7	8.3
Transformers	2.5	2.6	2.7	2.8	2.9	13.6
Switchgear	5.0	3.9	3.5	3.5	3.6	19.4
Total	**19.0**	**22.7**	**16.7**	**15.3**	**15.5**	**89.2**

Source: EMCa analysis of data supplied by Power and Water

3.2 Expenditure trend

48. In Figure 3.1, we show the expenditure trend for the current RCP and the next RCP, based on current estimates for the remainder of the current RCP and forecasts for the next RCP. We show the components of the modelled repex by asset group, and total repex for reference using a secondary axis. The trend is similar.

Figure 3.1: Historical and forecast expenditure trend - modelled repex ($m real 2022)



Source: Data supplied by Power and Water

49. The historical values have included a correction to real 2022 dollars, and adjustment for the labour rates as discussed earlier, so that the expenditure is on a comparable basis. These are the values we have used throughout our assessment.

3.3 Observations on historical expenditure

50. From the figure above, it can be seen that the repex profile of modelled categories is back-ended in the current RCP. We understand this is the result of several coincident factors:

- Impact of COVID, specifically the availability of resources and materials to complete the required work;
- Delays to design and procurement decisions for major projects; and
- Re-prioritisation of the works program to complete priority connections to meet government policy obligations.

51. Accordingly, the level of incurred capex in the current regulatory period to date is lower than that included in the AER allowance for repex and which was originally proposed to be front-ended. Power and Water proposes a rapid increase in capex delivery in the final two years of the current regulatory period, and which will result in an estimated level of repex that closely aligns with the AER allowance at a total level.

The implication of this expenditure profile for the repex modelling, is that the lower than planned replacement expenditure and volumes in the first three years of the current regulatory period will result in understating the longer-term replacement requirements. In other words, the longer-term replacement requirements are materially influenced by the current period expenditure profile, and which has been distorted by the factors referred to above.

4 ANALYSIS OF REPEX MODELLING RESULTS

52. In this section, we provide our analysis of the repex modelling results using the AER's Repex model, based on the data and assumptions included at section 2 and forecast repex included in section 3.

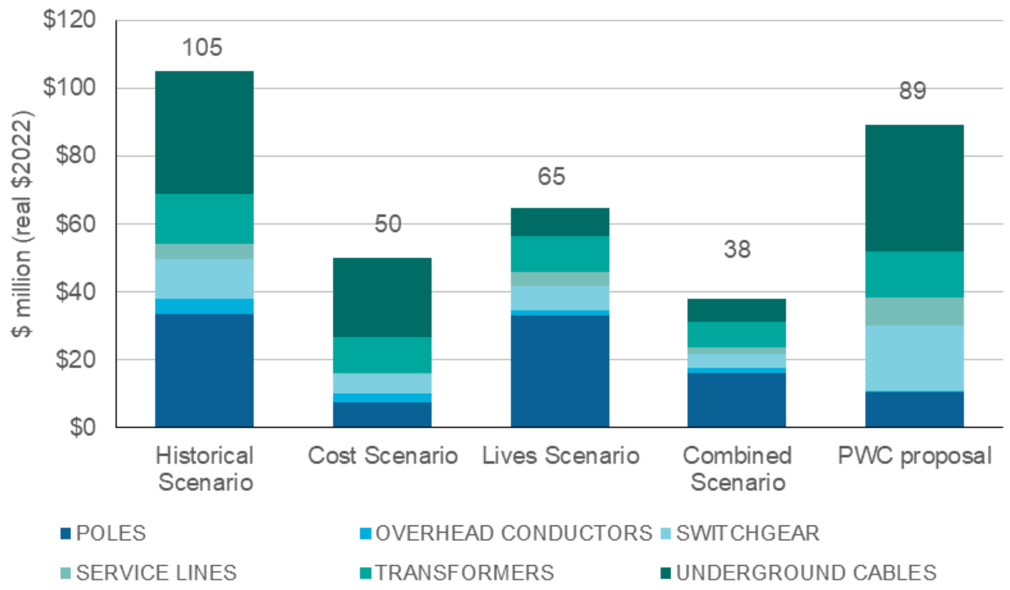
4.1 Summary of results for next RCP

4.1.1 Overview

53. Following calibration of the AER's Repex model for Power and Water, we developed the four scenarios applied by the AER in its recent determinations in accordance with its published guidance materials (as described in section 2).

54. Figure 4.1 shows the results of the scenario modelling we have undertaken.

Figure 4.1: Comparison of forecast repex by scenario - modelled repex ($m real 2022)



Source: AER Repex model analysis

55. The threshold value is the Lives scenario, being the higher of the cost and lives scenarios. The results show a gap of $24.4m between the Power and Water repex forecast of $89.2m for modelled repex categories and the AER threshold value of $64.7m (based on the Lives scenario).

56. A summary by RIN group is provided in the table below.

Table 4.1: Summary of Repex model output ($m real 2022)

Asset group	Power and Water proposal	AER scenarios			
		Historical	Cost scenario	Lives scenario	Combined scenario
Poles	10.4	33.5	7.4	33.0	16.1
Overhead conductors	0.3	4.5	2.7	1.4	1.4
Underground cables	37.1	36.5	23.4	8.2	6.8
Service lines	8.3	4.4	0.2	4.4	2.0
Transformers	13.6	14.7	10.7	10.6	7.5
Switchgear	19.4	11.6	5.6	7.1	4.2
Total	**89.2**	**105.2**	**50.1**	**64.7**	**38.0**

Source: EMCa analysis using AER Repex model

4.1.2 Summary of differences to threshold

57. The main sources of difference between Power and Water's repex forecast and the AER threshold are:

- Poles are lower than the threshold value. Care is required in making direct comparisons on the pole design and asset replacement lives with other DNSPs. For example, Power and Water generally achieves longer lives from its pole fleet, and which we understand follow different design and has adopted mid-life refurbishment options compared with the NEM. Power and Water has also adopted a lower cost pole refurbishment option to extend the life of poles, and which results in lower overall cost.
- Underground cables are higher than the threshold value. Power and Water has adopted a corrective replacement program to address early life failures associated with installation and design issues, and which forms part of a program that is continuing from the current period.
- Service lines are higher than the threshold value. Power and Water is proposing a new service line replacement program consistent with other DNSPs and in response to recent failures and safety incidents.
- Switchgear is higher than the threshold value. Power and Water has included a targeted replacement program for distribution switchgear.

58. We review each of the likely factors contributing to the differences in the following sections.

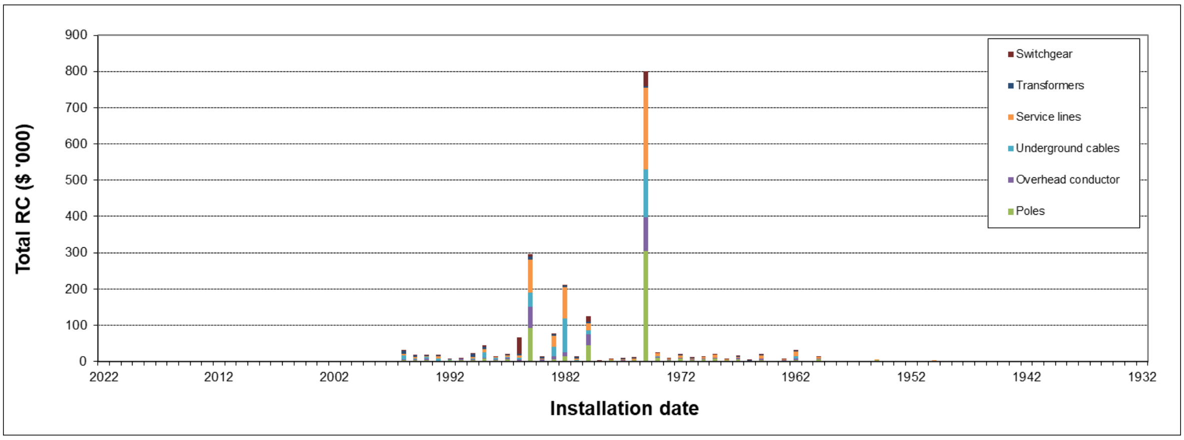
4.2 Key issues impacting results and which warrant further review

4.2.1 Overview

59. A major factor to take into consideration in applying the AER's Repex model in this instance, is that the method does not recognise the specifics of the age profile for Power and Water, that has a large cohort of assets installed in 1975 following cyclone Tracy (Dec 1974), and which are approaching end of life at the same time. As such, it is very likely that the threshold allowance, independent of the treatment of unit costs, will understate the long-term asset replacement needs of the Power and Water business.

60. As shown in the figure below, a significant amount of assets are identified as being installed in response to cyclone Tracy.

Figure 4.2: Age profile



Source: EMCa analysis using AER Repex model

61. Power and Water is subject to a range of factors, and which in our opinion reinforces the use of the AER Repex model as a tool to determine potential areas of further review using other assessment methods and not as a basis for a substitute estimate of repex requirements.

62. We summarise the issues resulting in a difference between Power and Water forecast and the threshold as comprising:

- Adjustment to asset category classification;
- Recognition of non-age-based replacement or unique asset replacement projects;
- Potential allowance for higher unit costs in the Territory than for the NEM; and
- Other systemic factors impacting repex modelling.

63. We review each of these factors below.

4.2.2 Adjustment to asset category classification

64. During our initial review, we identified a number of potential issues in the classification of asset groups, and to individual asset categories included in the repex forecast.

65. We considered these issues identified and made some changes to the classification such that it provides a reasonable application of asset groups and asset categories for application of the Repex model.

66. One of the more significant adjustments was the exclusion of the power transformer asset category. This has been made, in accordance with the AER guidance materials, largely due to the absence of historical replacement volumes in the calibration period. Its removal from the 'modelled' repex also removes the influence of major projects planned for completion in the early part of the next RCP and any distortions to the modelling outputs given the low volumes of replacements.

4.2.3 Recognition of non-age based replacement or unique asset replacement projects

67. Whilst not the primary purpose of this assessment, we note that Power and Water has included several programs in its forecast that are driven by type issues and not aligned with a predictive age-based model such as the Repex model. Where this is the case, there will be heightened focus on justification of these programs for inclusion into the repex forecast. This includes the HV underground replacement program and 11kV overhead switchgear replacement program.

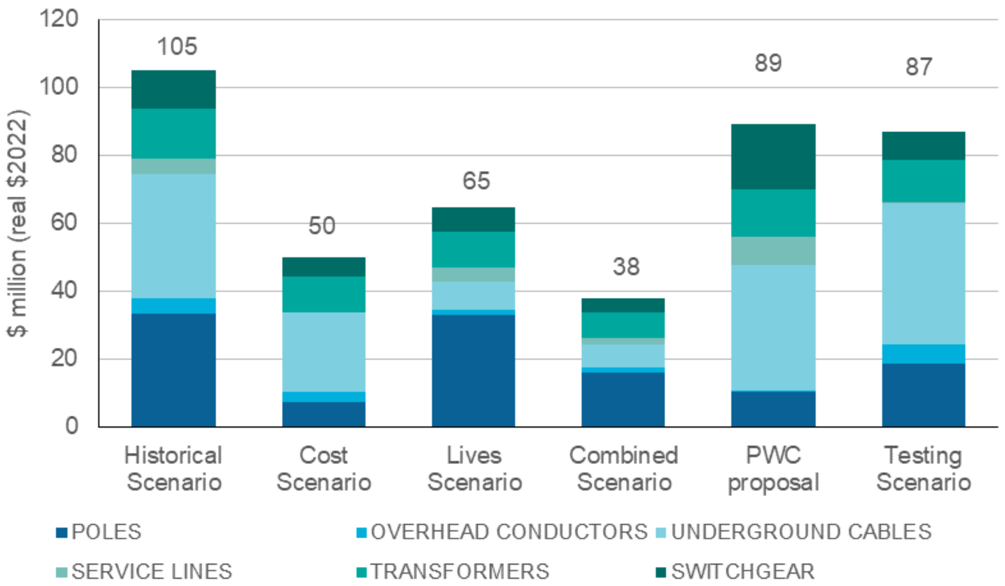
4.2.4 Potential allowance for higher unit costs in the Territory than for the NEM

68. The use of the cost scenario applies the minimum cost of the values indicated by the calibrated Repex model (historical), NEM median and forecast costs included in the Reset RIN. The NEM median is taken from the most recent AER determination as described earlier in the approach.

69. The NEM median unit costs reflect the combination of larger programs in the much larger DNSPs in the southern states, and which include economies of scale associated with a thick resources market, none of which are present in the Territory. Given the small scale and lumpy nature of distribution repex in the Territory, Power and Water is unlikely to realise the unit costs experienced elsewhere in the NEM.

70. We tested the influence of cost on the Repex model results by applying the NEM median costs to all asset categories and then included a 10% uplift as an indicative proxy for operational environment factors present in the Territory. The results are shown in the figure below, and which indicate an aggregate level of repex that approximates the Power and Water proposed repex with this adjustment. It may be argued that all other things being equal, Power and Water is subject to cost uplifts that exceed 10% compared with the NEM median.

Figure 4.3: Comparison of forecast repex by scenario – modelled repex including proxy allowance for higher NT costs $m real 2022)



Source: Source: EMCa analysis using AER Repex model

4.2.5 Other systemic factors impacting repex modelling

71. In its published guidance material, the AER also recognises several factors that impact the reliability of the repex modelling for DNSPs. We comment on the implications to Power and Water against these issues in the table below.

Table 4.2: Summary of other factors identified by AER

Issue	AER elaboration	Implication for Power and Water
Low-volume assets:	We consider that assessing concerns on a case-by-case basis is appropriate. This option is more pragmatic than defining when an asset volume is low enough to justify a different calibration period.	Power and Water has a small network compared with its NEM counterparts. It follows that the replacement program is also much smaller and does not provide a regular replacement volume of assets from all asset categories. The calibration period therefore is subject to the focus of replacement that exists at that time.
Smaller networks:	We consider that the option of extending the calibration period in response to further analysis is appropriate. This option is more pragmatic than explicitly defining which networks are small enough to justify a longer default period.	Power and Water has a small network compared with its NEM counterparts. It follows that the replacement program is also much smaller and does not provide a regular replacement volume of assets from all asset categories. The calibration period therefore is subject to the focus of replacement that exists at that time.
Locking in peaks and troughs:	We consider that the option of extending the calibration period in response to further analysis allows the flexibility to select a period that smooths any period of peaks and troughs. Setting a default calibration period of three years ensures that a distributor's most recent asset management replacement practices are captured for the forecast period. Trend analysis, which complements repex predictive modelling, takes a longer-term view and may rely on all the data before us to understand a distributor's replacement practices, and the replacement drivers over time.	The calibration period coincides with the downturn in economic conditions associated with COVID and delayed repex program. There is a risk that the repex modelling results, if relied upon, essentially lock in a lower level of repex than is sustainable or justified in normal conditions.

4.3 Review of repex modelling by RIN asset group

72. As noted above, where data was not available and/or not relied upon this has been left blank in the tables that follow.

4.3.1 Poles

Adjustments for calibration

73. The asset categories not modelled are summarised in the table below.

Table 4.3: Asset categories excluded from repex modelling - Poles

Excluded asset categories	Reason
> 66 kV & < = 132 kV; Steel	No historical data
> 132 kV; Steel	No historical data
Other	No historical data

Source: EMCa analysis using AER Repex model

Unit costs assumptions

74. The unit cost information is shown in the table below. In general, the calibrated unit costs are lower than the NEM median. The NEM median unit cost for 11kV steel has been assumed to be same as 22kV steel for the purpose of calibration.

75. A forecast unit cost was not available for 132kV steel and assumed to be the same as 66kV steel for comparison purposes.

Table 4.4: Summary of analysis of unit costs – Poles ($,000, 2022)

Asset category	Calibrated unit costs	NEM median	Forecast unit costs	Threshold
< = 1 kV; Steel	23.84	9.32	11.40	9.32
> 1 kV & < = 11 kV; Steel	54.11	10.43	17.80	10.43
> 11 kV & < = 22 kV; Steel	8.10	10.43	17.94	8.10
> 22 kV & < = 66 kV; Steel	4.59	21.28	101.43	4.59
> 66 kV & < = 132 kV; Steel	3.98	0.00	101.43	3.98

Source: EMCa analysis using AER Repex model

Replacement age assumptions

76. The replacement age information is shown in the table below. In general, Power and Water's calibrated asset lives are higher than the NEM median.

Table 4.5: Summary of analysis of replacement lives - Poles

Asset category	Calibrated repl life	NEM median	Threshold
< = 1 kV; Steel	70.96	66.27	70.96
> 1 kV & < = 11 kV; Steel	63.37		63.37
> 11 kV & < = 22 kV; Steel	67.27	47.80	67.27
> 22 kV & < = 66 kV; Steel	57.20	61.16	61.16
> 66 kV & < = 132 kV; Steel	60.04		60.04

Source: EMCa analysis using AER Repex model

Forecast expenditure

77. The proposed expenditure from each of the scenarios is shown in the table below.

Table 4.6: Summary of analysis of expenditure forecast – Poles ($,000, 2022)

Asset category	Power and Water forecast	AER's Repex model forecast results		
		Historical	Threshold	Variance
< = 1 kV; Steel	855	5,915	5,915	-5,060
> 1 kV & < = 11 kV; Steel	943	21,738	21,738	-20,794
> 11 kV & < = 22 kV; Steel	5,293	4,635	4,635	659
> 22 kV & < = 66 kV; Steel	0	940	529	-529
> 66 kV & < = 132 kV; Steel	0	229	229	-229
Total	**7,092**	**33,456**	**33,045**	**-25,954**

Source: EMCa analysis using AER Repex model

Observations

78. There is a general caution to the adoption of NEM median unit costs in the Northern Territory as they typically represent pole construction of a different standard and are unlikely to be supplied and fitted at a comparable cost due to the operating environment factors described previously.

79. For calibrated unit costs that result in a value lower than the NEM median, we suggest that this is the result of a blended unit rate between pole replacement and pole refurbishment and may not be directly comparable to other DNSPs. This may include the introduction of pole refurbishment that was included as pole replacement. Other factors may include the lower volume of poles in the higher voltage categories, and which may relate to programs running over multiple years and not have the full expenditure or accurate replacement volumes allocated. A closer approximation would be to compare with the forecast unit costs, as this more accurately represents the scope and cost of the pole replacement activity.

80. We expect the large variation for 11kV steel is likely associated with the change of classification of pole refurbishment using a new pole-rebutting technique to the ‘other’ assets category. As a result, a much lower forecast expenditure is included for this asset category. Given the blended nature of this scope and recent introduction of the pole refurbishment as a lower cost option, it may be difficult to separate the costs of these activities from the historical expenditure.

4.3.2 Overhead conductors

Adjustments for calibration

81. The asset categories not modelled are summarised in the table below.

Table 4.7: Asset categories excluded from repex modelling – Overhead conductors

Excluded asset categories	Reason
> 11 kV & < = 22 kV ; SWER	No historical data
> 11 kV & < = 22 kV ; Single-Phase	No historical data
> 66 kV & < = 132 kV	No historical data
> 132 kV	Insufficient historical data
Other	No historical data

Source: EMCa analysis using AER Repex model

82. For 11kV and 132kV overhead conductors, the CA RIN data included expenditure without asset replacement volumes. In accordance with these asset categories cannot be calibrated and have also been excluded from the model.

Unit cost assumptions

83. The unit cost information is shown in the table below.

Table 4.8: Summary of analysis of unit costs – Overhead conductors ($,000, 2022)

Asset category	Calibrated unit costs	NEM median	Forecast unit cost	Cost scenario
< = 1 kV	49.69	83.96	116.79	49.69
> 11 kV & < = 22 kV ; Multiple-Phase	67.68	78.01	5.66	5.66

Source: EMCa analysis using AER Repex model

Replacement age assumptions

84. The replacement age information is shown in the table below. For LV poles, Power and Water's calibrated asset lives are higher than the NEM median. However, others are not. We suspect this is linked to source data issues.

Table 4.9: Summary of analysis of replacement lives – Overhead conductors

Asset category	Calibrated repl life	NEM median	Lives scenario
< = 1 kV	86.68	72.67	86.68
> 11 kV & < = 22 kV ; Multiple-Phase	66.94	73.98	73.98

Source: EMCa analysis using AER Repex model

Forecast expenditure

85. The proposed expenditure from each of the scenarios is shown in the table below.

Table 4.10: Summary of analysis of expenditure forecast – Overhead conductors ($,000, 2022)

Asset category	Power and Water forecast	AER's Repex model forecast results		
		Historical	Threshold	Variance
< = 1 kV	68	57	57	11
> 11 kV & < = 22 kV ; Multiple-Phase	187	4,485	1,348	-1,160
Total	**256**	**4,543**	**1,405**	**-1,149**

Source: EMCa analysis using AER Repex model

Observations

86. The calibrated unit costs for LV conductor appear much lower than the NEM median costs and forecast unit costs and will likely under-state the expenditure for this asset category, albeit volumes are relatively low. The forecast unit cost looks in error.

87. Overall, the threshold scenario is higher than the repex forecast, albeit the replacement volumes are low.

4.3.3 Underground cables

Adjustments for calibration

88. Asset replacement lives and unit costs were available for all three modelled asset categories. The asset categories not modelled are summarised in the table below.

Table 4.11: Asset categories excluded from repex modelling – Underground cables

Excluded asset categories	Reason
> 22 kV & < = 33 kV	No historical data
> 33 kV & < = 66 kV	Insufficient historical data
> 66 kV & < = 132 kV	No historical data
> 132 kV	No historical data, recognised as an excluded asset category

Source: EMCa analysis using AER Repex model

Unit costs assumptions

89. The unit cost information is shown in the table below.

Table 4.12: Summary of analysis of unit costs – Underground cables ($,000, 2022)

Asset category	Calibrated unit costs	NEM median	Forecast unit cost	Cost scenario
< = 1 kV	383.09	332.04	845.49	332.04
> 1 kV & < = 11 kV	601.91	647.26	774.17	601.91
> 11 kV & < = 22 kV	798.74	648.41	3,401.94	648.41

Replacement age assumptions

90. The replacement age information is shown in the table below.

Table 4.13: Summary of analysis of replacement lives – Underground cables

Asset category	Calibrated repl life	NEM median	Lives scenario
< = 1 kV	64.75	64.70	64.75
> 1 kV & < = 11 kV	56.94	72.63	72.63
> 11 kV & < = 22 kV	61.36	61.11	61.36

Source: EMCa analysis using AER Repex model

Forecast expenditure

91. The proposed expenditure from each of the scenarios is shown in the table below.

Table 4.14: Summary of analysis of expenditure forecast – Underground cables ($,000, 2022)

Asset category	Power and Water forecast	AER's Repex model forecast results		
		Historical	Threshold	Variance
< = 1 kV	7,003	4,824	4,824	2,179
> 1 kV & < = 11 kV	29,886	30,200	1,947	27,938
> 11 kV & < = 22 kV	237	1,470	1,470	-1,233
Total	**37,126**	**36,494**	**8,241**	**28,885**

Source: EMCa analysis using AER Repex model

Observations

92. We understand that more recent cable contracts have reduced the cable unit costs from historical highs to market tested levels.

93. As discussed earlier, we understand that Power and Water has introduced a replacement program to address early life failures associated with installation and design issues, and which forms part of a program that is continuing from the current period. As a result, the replacement volumes are higher than would otherwise be indicated by age. The forecast repex is similar to the historical scenario.

4.3.4 Service lines

Adjustments for calibration

94. Only the residential and commercial simple type service lines were modelled.

95. Asset replacement lives and unit costs were not available for the commercial simple type asset categories. Unit cost and asset replacement lives were assumed to be the same for both asset categories.

Unit costs assumptions

96. The unit cost information is shown in the table below.

Table 4.15: Summary of analysis of unit costs – Service lines ($,000, 2022)

Asset category	Calibrated unit costs	NEM median	Forecast unit cost	Cost scenario
< = 11 kV ; Residential ; Simple Type	16.09	0.95	2.06	0.95
< = 11 kV ; Commercial & Industrial ; Simple Type	16.09	0.95	2.06	0.95

Source: EMCa analysis using AER Repex model

Replacement age assumptions

97. The replacement age information is shown in the table below. The calibrate asset lives are materially higher than the NEM median.

Table 4.16: Summary of analysis of replacement lives – Service lines

Asset category	Calibrated repl life	NEM median	Lives scenario
< = 11 kV ; Residential ; Simple Type	77.02	59.59	77.02
< = 11 kV ; Commercial & Industrial ; Simple Type	77.02		77.02

Source: EMCa analysis using AER Repex model

Forecast expenditure

98. The proposed expenditure from each of the scenarios is shown in the table below.

Table 4.17: Summary of analysis of expenditure forecast – Service lines ($,000, 2022)

Asset category	Power and Water forecast	AER's Repex model forecast results		
		Historical	Threshold	Variance
< = 11 kV ; Residential ; Simple Type		3,532	3,532	-3,532
< = 11 kV ; Commercial & Industrial ; Simple Type		845	845	-845
Total	**8,300**	**4,377**	**4,377**	**3,923**

Source: EMCa analysis using AER Repex model

Observations

99. Power and Water's forecast expenditure does not differentiate between residential and commercial service lines.

100. There is a significant difference between the calibrated unit costs and NEM median unit costs. Power and Water does not have the economies of scale afforded the other NEM businesses due to their thicker resource market and their volumes of service line replacements, and therefore will not be able to readily achieve the lower NEM median unit cost. Some improvement from the calibrated unit cost however would be required.

101. We understand that the forecast increase in expenditure is the result of a new targeted replacement program for service lines in response to a higher assessment of safety risk, and which is therefore to be justified on this basis rather than age. As a result the forecast replacement volumes will be higher than indicated by other scenarios.

4.3.5 Transformers

Adjustments for calibration

102. The asset categories not modelled are summarised in the table below.

Table 4.18: Asset categories excluded from repex modelling - Transformers

Excluded asset categories	Reason
Pole Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Single Phase	Insufficient historical data
Pole Mounted ; < = 22kV ; > 600 kVA ; Single Phase	Insufficient historical data
Pole Mounted ; < = 22kV ; > 600 kVA ; Multiple Phase	No historical data
Kiosk Mounted ; < = 22kV ; > 600 kVA ; Single Phase	No historical data
Kiosk Mounted ; < = 22kV ; < = 60 kVA ; Multiple Phase	No historical data
Ground Outdoor / Indoor Chamber Mounted; < 22 kV ; < = 60 kVA ; Single Phase	No historical data
Ground Outdoor / Indoor Chamber Mounted; < 22 kV ; > 60 kVA and < = 600 kVA ; Single Phase	No historical data
Ground Outdoor / Indoor Chamber Mounted; < 22 kV ; > 600 kVA ; Single Phase	No historical data
Ground Outdoor / Indoor Chamber Mounted; < 22 kV ; < = 60 kVA ; Multiple Phase	No historical data
Ground Outdoor / Indoor Chamber Mounted; > = 22 kV & < = 33 kV ; < = 15 MVA	Insufficient historical data
Ground Outdoor / Indoor Chamber Mounted; > = 22 kV & < = 33 kV ; > 15 MVA and < = 40 MVA	No historical data
Ground Outdoor / Indoor Chamber Mounted; > = 22 kV & < = 33 kV ; > 40 MVA	No historical data
Ground Outdoor / Indoor Chamber Mounted; > 33 kV & < = 66 kV ; > 40 MVA	No historical data
Ground Outdoor / Indoor Chamber Mounted; > 66 kV & < = 132 kV ; > 100 MVA	No historical data
Ground Outdoor / Indoor Chamber Mounted; > 132 kV ; < = 100 MVA	No historical data
Ground Outdoor / Indoor Chamber Mounted; > 132 kV ; > 100 MVA	No historical data

Source: EMCa analysis using AER Repex model

103. The calibration did not converge for *Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Single Phase*, as the historical average replacement volumes exceeded those in the asset population identified for replacement. A substitute asset replacement life was used for the equivalent multiphase transformer. Similarly, the unit cost was also substituted for the multiphase unit.

104. There were no historical replacement volumes for the larger transformers in the calibration period, being 22kV <=15MVA, 66kV >15MVA <+40MVA and 132kV <=100MVA. In

accordance with the AER guidance, these asset categories were removed from the modelled repex.

Unit costs assumptions

105. The unit cost information is shown in the table below. The following adjustments have been made in absence of known NEM median costs:

- The NEM median cost for a <600kVA single phase kiosk is assumed the same as a <600kVA multiphase.
- The NEM median cost for a 33kVA <15MVA transformer is assumed the same as a 66kV <15MVA transformer.

Table 4.19: Summary of analysis of unit costs – Transformers ($,000, 2022)

Asset category	Calibrated unit costs	NEM median	Forecast unit costs	Threshold
Pole Mounted ; < = 22kV ; < = 60 kVA ; Single Phase	3.04	8.85	10.87	3.04
Pole Mounted ; < = 22kV ; < = 60 kVA ; Multiple Phase	10.42	13.62	11.78	10.42
Pole Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Multiple Phase	16.26	21.38	25.14	16.26
Kiosk Mounted ; < = 22kV ; < = 60 kVA ; Single Phase	17.86	12.08	22.77	12.08
Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Single Phase	94.28	57.67	79.91	57.67
Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Multiple Phase	94.28	57.67	79.91	57.67
Kiosk Mounted ; < = 22kV ; > 600 kVA ; Multiple Phase	122.61	67.10	198.31	67.10
Ground Outdoor / Indoor Chamber Mounted; < 22 kV ; > 60 kVA and < = 600 kVA ; Multiple Phase	64.17	78.10	116.25	64.17
Ground Outdoor / Indoor Chamber Mounted; < 22 kV ; > 600 kVA ; Multiple Phase	83.15	64.41	116.25	64.41
Ground Outdoor / Indoor Chamber Mounted; > 33 kV & < = 66 kV ; < = 15 MVA	861.24	613.27	657.31	613.27

Source: EMCa analysis using AER Repex model

Replacement age analysis

106. The replacement age information is shown in the table below. Asset lives, in general, approximate those of the NEM median asset replacement lives.

Table 4.20: Summary of analysis of replacement lives - Transformers

Asset category	Calibrated repl life	NEM median	Lives scenario
Pole Mounted ; < = 22kV ; < = 60 kVA ; Single Phase	42.02	55.25	55.25
Pole Mounted ; < = 22kV ; < = 60 kVA ; Multiple Phase	47.41	57.38	57.38
Pole Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Multiple Phase	41.90	54.87	54.87
Kiosk Mounted ; < = 22kV ; < = 60 kVA ; Single Phase	45.95	36.52	45.95

Asset category	Calibrated repl life	NEM median	Lives scenario
Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Single Phase	48.70	0.00	48.70
Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Multiple Phase	48.70	51.56	51.56
Kiosk Mounted ; < = 22kV ; > 600 kVA ; Multiple Phase	44.47	46.46	46.46
Ground Outdoor / Indoor Chamber Mounted; < 22 kV ; > 60 kVA and < = 600 kVA ; Multiple Phase	58.08	66.55	66.55
Ground Outdoor / Indoor Chamber Mounted; < 22 kV ; > 600 kVA ; Multiple Phase	56.71	58.68	58.68
Ground Outdoor / Indoor Chamber Mounted; > 33 kV & < = 66 kV ; < = 15 MVA	63.97	65.07	65.07

Source: EMCa analysis using AER Repex model

Forecast expenditure

107. The proposed expenditure from each of the scenarios is shown in the table below.

Table 4.21: Summary of analysis of expenditure forecast – Transformers ($,000, 2022)

Asset category	Power and Water forecast	AER's Repex model forecast results		
		Historical	Threshold	Variance
Pole Mounted ; < = 22kV ; < = 60 kVA ; Single Phase	109	23	2	107
Pole Mounted ; < = 22kV ; < = 60 kVA ; Multiple Phase	565	384	150	416
Pole Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Multiple Phase	2,891	1,911	602	2,289
Kiosk Mounted ; < = 22kV ; < = 60 kVA ; Single Phase	3,301	1,797	1,797	1,505
Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Single Phase	99	2	7	92
Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Multiple Phase	2,877	7,186	5,280	-2,403
Kiosk Mounted ; < = 22kV ; > 600 kVA ; Multiple Phase	1,587	1,011	819	768
Ground Outdoor / Indoor Chamber Mounted; < 22 kV ; > 60 kVA and < = 600 kVA ; Multiple Phase	0	344	112	-112
Ground Outdoor / Indoor Chamber Mounted; < 22 kV ; > 600 kVA ; Multiple Phase	2,209	336	240	1,969
Ground Outdoor / Indoor Chamber Mounted; > 33 kV & < = 66 kV ; < = 15 MVA	-	1,692	1,564	-1,564
Total	**13,637**	**14,685**	**10,572**	**3,065**

Source: EMCa analysis using AER Repex model

Observations

108. The higher replacement volumes for some categories are likely associated with the volumetric program modelling and will require non age-based justification.

109. The threshold value is a reasonable approximation of the forecast.

4.3.6 Switchgear

Adjustments for calibration

110. The asset categories not modelled are summarised in the table below.

Table 4.22: Asset categories excluded from repex modelling – Switchgear

Excluded asset categories	Reason
< = 11 kV ; FUSE	No historical data
> 22 kV & < = 33 kV ; Switch	No historical data
> 22 kV & < = 33 kV ; Circuit Breaker	No historical data
> 66 kV & < = 132 kV ; Switch	No historical data
> 132 kV ; Switch	No historical data
> 132 kV ; Circuit Breaker	No historical data

Source: EMCa analysis using AER Repex model

111. Three asset categories did not have historical replacements to calibrate the model and were excluded:

- There were no historical replacement volumes for 66kV switch and 132kV switches.
- There were no historical replacement volumes for 66kV CBs.

112. Also, there was no historical expenditure was included for the 132kV switch, so the unit cost of the 66kV switch was assumed for calibration.

Unit costs assumptions

113. The unit cost information is shown in the table below. The following adjustments have been made in absence of known NEM median costs:

- The NEM median cost for a 132kV CB is assumed the same as a 66kV CB.

Table 4.23: Summary of analysis of unit costs – Switchgear ($,000, 2022)

Asset category	Calibrated unit costs	NEM median	Forecast unit costs	Threshold
< = 11 kV ; Switch	22.84	13.89	56.85	13.89
< = 11 kV ; Circuit Breaker	98.21	107.70	187.16	98.21
> 11 kV & < = 22 kV ; Switch	29.80	15.02	36.90	15.02
> 11 kV & < = 22 kV ; Circuit Breaker	64.77	81.20	62.35	62.35
> 66 kV & < = 132 kV ; Circuit Breaker	313.48	162.46	637.99	162.46

Source: EMCa analysis using AER Repex model

Replacement age analysis

114. The replacement age information is shown in the table below.

Table 4.24: Summary of analysis of replacement lives – Switchgear

Asset category	Calibrated repl life	NEM median	Lives scenario
< = 11 kV ; Switch	55.55	63.65	63.65

Asset category	Calibrated repl life	NEM median	Lives scenario
< = 11 kV ; Circuit Breaker	55.19	57.05	57.05
> 11 kV & < = 22 kV ; Switch	63.42	53.84	63.42
> 11 kV & < = 22 kV ; Circuit Breaker	32.56	53.17	53.17
> 66 kV & < = 132 kV ; Circuit Breaker	38.76		38.76

Source: EMCa analysis using AER Repex model

Forecast expenditure

115. The proposed expenditure from each of the scenarios is shown in the table below.

Table 4.25: Summary of analysis of expenditure forecast – Switchgear ($,000, 2022)

Asset category	Power and Water forecast	AER's Repex model forecast results		
		Historical	Threshold	Variance
< = 11 kV ; Switch	7,504	5,276	1,737	5,767
< = 11 kV ; Circuit Breaker	8,048	479	341	7,707
> 11 kV & < = 22 kV ; Switch	1,292	3,304	3,304	-2,013
> 11 kV & < = 22 kV ; Circuit Breaker	1,933	1,031	164	1,768
> 66 kV & < = 132 kV ; Circuit Breaker	638	1,536	1,536	-898
Total	**19,414**	**11,627**	**7,083**	**12,332**

Source: EMCa analysis using AER Repex model

Observations

116. We suspect that for the switchgear RIN group the reported replacement costs span multiple years, and therefore the expenditure and volumes are not resulting in a unit cost that is reflective of the incurred cost. As a consequence, we observe the unit costs vary materially from the NEM median.

117. Large variations compared to the Repex model for 11kV and 22kV switch and CB replacement will require additional justification and may point to a unique operating condition or type issue that may not be present in other DNSPs.

118. Whilst some of the volumes appear to relate to specific substation upgrades, a large proportion is associated with either:

- The volumetric replacement program, or
- Feeder upgrade programs.

119. We also note that the calibration did not converge for the historical replacement volumes for the 22kV CB. Subsequent to the re-calibration of asset lives, this increased to 32 years and which is on the low side for this asset category and would otherwise indicate higher than required historical replacement. This may point to targeted programs or a data issue.

5 SUMMARY

5.1 Introduction

120. The AER's Forecast Expenditure Assessment Guidelines note that it uses a Repex model as a 'top-down' assessment of a network's forecast replacement capex. This is a predictive model that uses asset age, unit costs, and previous levels of repex expenditure to provide a top-down forecast of repex. The AER also uses benchmark data of other networks to compare the results when peer data is used.

121. Power and Water engaged EMCa to apply the AER's Repex model and compare to the repex forecasts in Power and Water's capex proposal for 2024-29.

5.2 How we applied the repex modelling

122. EMCa applied the scenarios that the AER has most recently applied in assessing regulatory proposals including:

- The Historical scenario.
- The Costs and Lives scenarios.
- The Combined scenario.

123. Relevantly, the Repex model is only used for certain asset groups, and where there is sufficient information on similar assets used by peers. We have applied the asset categories to the Repex model consistent with the AER's guidance commencing with the following asset groups: poles, underground cables, overhead conductors, service lines, transformers and switchgear.

124. As a result of calibration of the repex model, we identified further asset categories that we then excluded from consideration in the repex modelling results.

125. The asset categories that comprised the modelled repex accounted for approximately 57% of the forecast total repex over the next RCP, or $89m (real 2022) within the scope of the Repex model as 'modelled' repex.

5.3 Findings

126. We suggest that some caution should be applied in assessing the results, and that there are likely to be some unique drivers in the analysis that when normalised would result in a prediction closer to Power and Water's proposal for modelled repex.

127. For example, we have included discussion of a range of factors to which Power and Water is likely to be subject to and which - in our opinion - reinforces the use of the AER Repex model as a tool to determine potential areas of further review using other assessment methods and not as a basis for a substitute estimate of repex requirements.

128. The threshold value is the Lives scenario, being the higher of the cost and lives scenario. Following application of the AER's repex model, and threshold scenario, the Power and Water repex forecast is lower than the historical scenario of $105m, by 15%, and higher than the threshold scenario of $65m by 38%.

129. We tested the influence of cost on the Repex model results by applying the NEM median costs to all asset categories and then included a 10% uplift to account for operational efficiency factors present in the Territory. The results indicate an aggregate level of modelled repex that approximates the Power and Water proposed repex with this adjustment.

130. We identified several drivers for the increase in proposed repex forecast compared with the AER's Repex model results, due primarily to the introduction of non-age-based replacement, to deal with identified type and safety risks. Several of these programs are continuing from the current period, having been included in the current period capex allowance.

131. We understand that Power and Water has reviewed the results of the AER Repex model in reviewing the scope and volume of replacement activities included in its forecast.

APPENDIX A – COMPARISON OF THRESHOLD VALUES BY RIN ASSET GROUP

132. The following figures how the results of the repex forecast compared with the AER threshold values by year.

Figure A.1: Modelled repex by year – Poles ($'000s 2022)

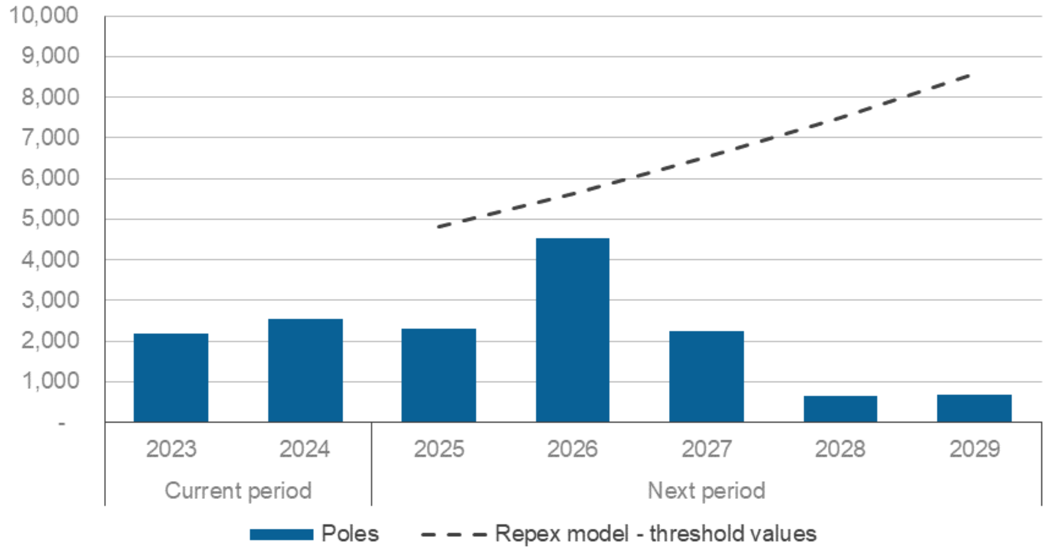


Figure A.2: Modelled repex by year – Conductor ($'000s 2022)

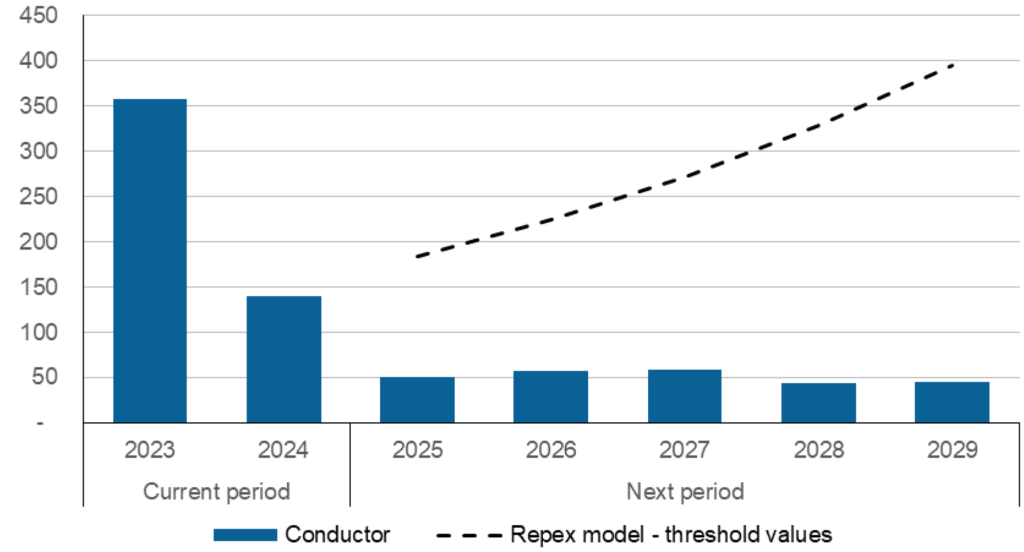


Figure A.3: Modelled repex by year – Cable ($'000s 2022)

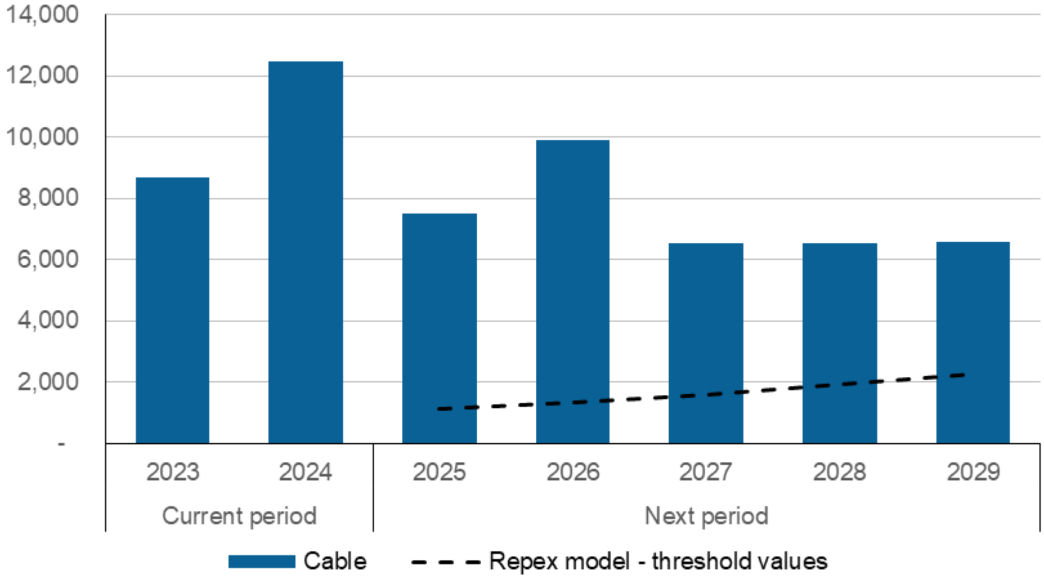


Figure A.4: Modelled repex by year – Service lines ($'000s 2022)

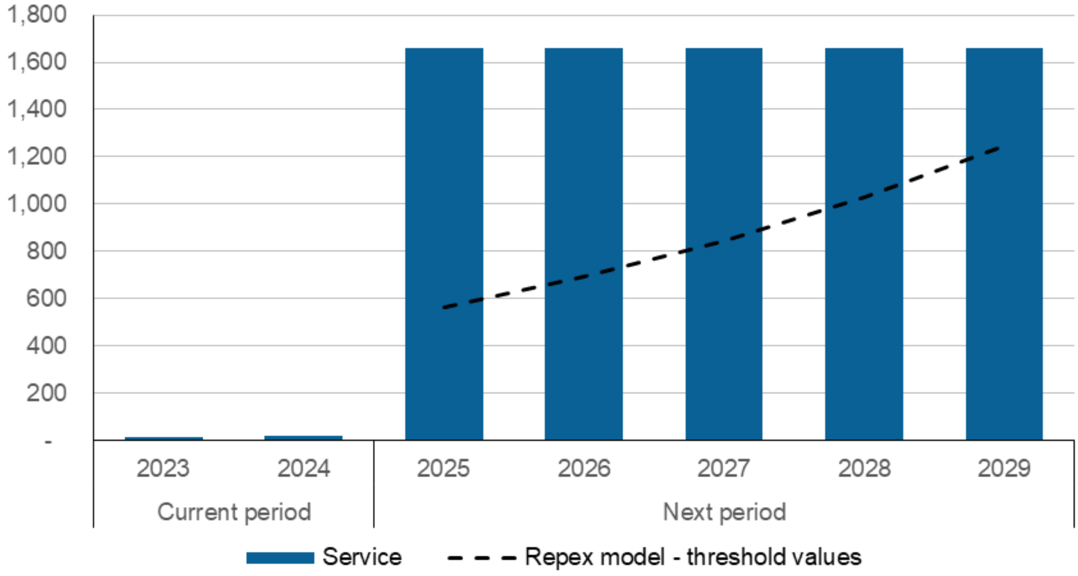


Figure A.5: Modelled repex by year – Transformers ($'000s 2022)

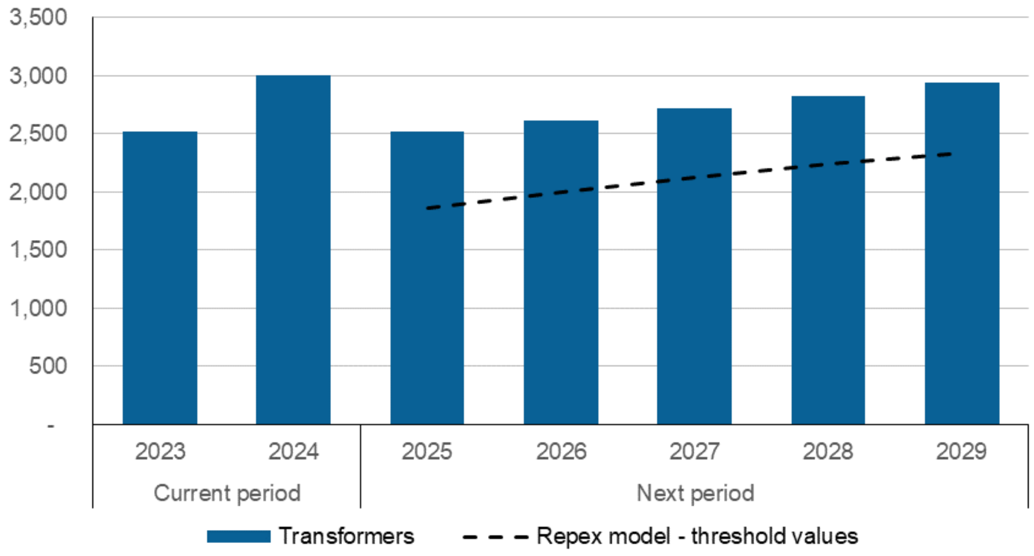


Figure A.6: Modelled repex by year – Switchgear ($'000s 2022)