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Jemena Services 2026 - 2031 Regulatory Proposal

REVIEW OF ASPECTS OF PROPOSED NETWORK RELATED EXPENDITURES

[redacted]

Public Version

Report prepared for:

AUSTRALIAN ENERGY REGULATOR (AER)

August 2025

Preface

This report has been prepared to assist the Australian Energy Regulator (AER) with its determination of the appropriate revenues to be allowed for the prescribed distribution services of Jemena from 1st July 2026 to 30th June 2031. The AER's determination is conducted in accordance with its responsibilities under the National Electricity Rules (NER).

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

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

Except where specifically noted, this report was prepared based on information provided to us prior to 1 June 2025 and any information provided subsequent to this time may not have been taken into account. Some numbers in this report may differ from those shown in Jemena's regulatory submission or other documents due to rounding.

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ABBREVIATIONS

Term	Definition
ACS	Alternate Control Service
AER	Australian Energy Regulator
AMI	Advanced Metering Infrastructure
augex	Augmentation expenditure
BD	Broadmeadows
BESS	Battery Energy Storage System
BLT	Brooklyn
BLTS	Brooklyn Terminal Station
CBA	Cost Benefit Analysis
CBAM	Cost and Benefit Analysis Model
CBN	Craigieburn
CBRM	Condition Based Risk Management
CER	Consumer Energy Resources
CI	Critical Infrastructure
CIRMP	Critical Infrastructure Risk Management Plan
CN	Coburg North
COO	Coolaroo
CTs	Current Transformers
DM	Demand management
DNSP	Distribution Network Service Provider
ENA	Energy Networks Australia
EP	East Preston
EPN	East Preston North
ESV	Energy Safety Victoria
EUE	Expected Unserved Energy
EV	Electric Vehicle
GIS	Geographic Information System
HBRA	High Bushfire Risk Area
HI	Health Index
HV	High Voltage
ICT	Information Communication Technology
IFT	Interfacial Tension

Term	Definition
IR	Information Request
IT	Information Technology
JEN	Jemena
LBRA	Low Bushfire Risk Area
LV	Low Voltage
MAT	Melbourne Airport
MEDs	Major Event Days
MPLS	Multiprotocol Label Switching
MUX	Multiplexer
MVA	Megavolt-Amperes
MW	Megawatt
NBN	National Broadband Network
NDS	Network Development Strategy
NEM	National Electricity Market
NER	National Electricity Rules
next RCP	2026-2031
NH	North Heidelburg
NPV	Net Present Value
NSP	Network Service Provider's
PQ	Power Quality
PV	Present Value
RCP	Regulatory Control Period
REFCL	Rapid Earth Fault Current Limiter
repex	Replacement expenditure
RIN	Regulatory Information Notice
RIT	Regulatory Investment Test
RP	Regulatory Proposal
RTU	Remote Terminal Unit
SAPS	Standalone Power System
SBY	Sunbury
SCADA	Supervisory Control and Data Acquisition
SCS	Standard Control Service
SGSPAA	SGSP (Australia) Assets Pty Ltd
SHM	Sydenham
SMTS	South Morang Terminal Station

Term	Definition
[redacted]	[redacted]
SRBP	Synthetic Resin Bonded Paper
SSS	Somerton Switching Station
ST	Somerton zone substation
STPIS	Service Target Performance Incentive Scheme
TNSP	Transmission Network Service Provider
TOTEX	Total Expenditure
VCR	Value of Customer Reliability
VMS	Vendor Management System
VT	Voltage Transformers
ZSS	Zone Substation

EXECUTIVE SUMMARY

Introduction and context

1. The AER has engaged EMCa to undertake a technical review of aspects of the replacement expenditure (repex), augmentation expenditure (augex) and opex step changes that Jemena has proposed in its regulatory proposal (RP) for the 2026-31 Regulatory Control Period (next RCP).
2. The assessment contained in this report is intended to assist the AER in its own analysis of the proposed capex and opex allowances as an input to its draft determination on Jemena's revenue requirements for the next RCP.

Expenditure under assessment

Proposed repex

3. Jemena has proposed $427.3 million for repex in the next RCP being materially higher than the $272.0 million it expects to incur in the current RCP. We have been asked to review projects and programs with aggregate proposed capex of $252.3 million, or approximately 59% of the proposed repex.

Proposed augex

4. Jemena has proposed $269.5 million for augex over the next RCP being materially higher than the $202.8 million it expects to incur in the current RCP, and includes significant expenditure on CER related activities.
5. In the current report, we review augex projects and programs with aggregate proposed capex of $66.0 million, comprising approximately 24% of the proposed augex. In a separate report, we review Jemena's proposed CER-related expenditure, which includes some augex, ICT capex and proposed opex step changes.

Proposed opex step change for hazard tree management

6. We have reviewed $2.6 million that Jemena proposes for a safety (LBRA Hazard trees) management program in the next RCP.

Assessment and findings

Assessment of governance, management and forecasting methods

7. In considering Jemena's expenditure governance, management and forecasting methodologies, we focus primarily on matters which we consider impact the forecast expenditure requirements that we have been asked to review, as detailed in the subsequent sections of this report.
8. We found that Victorian DNSPs' regulatory proposals, including Jemena, reflect changes impacting the industry; however, we found that the way in which each DNSP proposes to respond to these changes differs and which was a feature of our review.
9. In our review of the governance, management and forecasting methods that were applied by Jemena in determining its forecast expenditure, we found examples of the following issues:

- There was insufficient economic analysis presented for its proposed repex forecast
- Jemena has not modelled the risk in accordance with AER guidance or industry practice
- Cost estimates appeared reasonable
- Delivery of the proposed works program remains a challenge.

10. We saw evidence of many of these issues in the projects and programs that we were asked to review and have considered the implications of these findings in our determination of an alternate estimate of the forecast expenditure requirements. We understand that in determining an overall expenditure allowance for capex and opex, the AER will have regard to these matters more generally.

Assessment of proposed repex

Justification for the proposed expenditure was lacking detail and did not support the proposed increases

11. The information provided initially by Jemena was not conducive to a review in accordance with the capex assessment guidelines, as the models and supporting information provided were incomplete.

12. Jemena has placed significant emphasis on the materials included in its asset class strategies (Distribution, Primary plant and Secondary plant) to support the proposed projects and programs, including justification for the scope timing and efficient cost. Whilst these were useful summaries, they typically lacked analysis sufficient to justify the proposed expenditure, consistent with NER expenditure criteria.

13. For the volumetric and routine programs, we did not see compelling information that supported a change, including the proposed uplift in replacement volumes, from the historical level of replacement activity.

Modelling methods applied by Jemena are not consistent with its own documentation or industry practice

14. For the business cases and models that were provided, limited to the three major substation replacement projects and bushings replacement program, we found that the modelling methods and practice applied by Jemena did not fully align with the AER guidance materials or in all cases to its own governance documentation.

15. We made numerous requests for the models and supporting information that we considered that Jemena had relied upon in preparing its expenditure forecast. We received limited additional information to support the prudent scope and timing of the proposed expenditure or efficient cost and we were in cases redirected back to the materials originally submitted by Jemena with the regulatory proposal and which we had already found to be insufficient. We consider that we have provided Jemena with opportunity to substantiate its assumptions and the basis for the included projects in its proposed expenditure and have identified areas where we do not consider Jemena has met the regulatory burden in that regard.

A combination of modelling factors leads to an overstatement of risk

16. For the substation related programs, we consider that the issues that we identified has led to an overstatement of the risk and therefore benefits that Jemena has relied upon. Absent compelling information beyond that relied upon in the economic modelling that would lead to a reasonable conclusion that the proposed work should be undertaken in the next RCP, we consider that many of the proposed projects are not sufficiently justified.

Assessment of proposed augex

The three proposed augmentation projects are reasonable

17. Jemena has presented Network Development Strategy (NDS) documents and supporting cost-benefit analysis (CBA) models that provide foundational material to support assessment.

18. We consider that the analysis provided by Jemena supports the identified need and timing for the projects that we have been asked to review to be undertaken in the next RCP, and that the cost estimate for these projects is reasonable.

Assessment of proposed opex step change allowance

The step change does not meet the requirements of a step change

19. We are not satisfied that the costs proposed by Jemena for Hazard Tree Management meet the standard step change criteria. We consider that the proposed program is not driven by any specific new regulatory obligations or are driven by an efficient capex-opex trade off.

There is insufficient justification of the proposed costs being materially above current opex or that Jemena's estimate of benefits is reasonable

20. We consider that Jemena has not sufficiently demonstrated that the proposed costs are incremental to the trend growth inherent in its forecast opex.

21. We have not seen sufficient evidence of an increasing frequency or impact of vegetation related outages to which this program will benefit consumers, above that already provided by Jemena's existing programs.

Implications for expenditure allowances

Our approach

22. We were asked to consider an alternate expenditure forecast for the projects and programs that we reviewed based on the issues that we identified. Where a project was reasonably justified in accordance with the NER, we included this in our alternate expenditure forecast. In other cases, our proposed alternative expenditure forecast for the categories of expenditure we were asked to review involves one or more adjustments, to the extent that the adjustment factors formed the basis of Jemena's forecast and which we consider to be not justified or overstated.

23. Since the scope of our review did not in all cases comprise all projects within a 'category' of proposed expenditure, our alternative forecasts necessarily apply only to the aggregate of the projects within the scope of our review.

24. To the extent we found evidence of systemic issues in its application of governance, management and forecasting issues to the projects and programs that we reviewed, we have taken account of these in our proposed alternate forecast.

Alternative forecasts for reviewed projects

Jemena's proposed forecast for repex projects that we reviewed is higher than a prudent and efficient level

25. We consider that a reasonable alternative forecast for the repex categories that we reviewed, would be between 50% and 60% less than Jemena has proposed.

Jemena's proposed forecast for the augex projects that we reviewed, is reasonable

26. We consider that Jemena's proposed augex of $66 million for the projects within the augex category that we reviewed is reasonable.

Jemena's proposed opex step change for hazard tree management is not justified

27. We consider that Jemena's proposed opex step change for hazard tree management is not justified.

1 INTRODUCTION

The AER has asked us to review and provide advice on aspects of Jemena's proposed expenditures over the 2026-31 Regulatory Control Period (next RCP) relating to replacement expenditures (repex), augmentation expenditures (augex) and operating expenditures related to vegetation management. Our review is based on information that Jemena provided and on aspects of the NER relevant to assessment of expenditure allowances.

1.1 Purpose of this report

28. The purpose of this report is to provide the AER with a technical review of aspects of the expenditure that Jemena has proposed in its regulatory proposal (RP) for next RCP.

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

1.2 Scope of requested work

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

Figure 1.1: Scope of work covered by this report

Scope of work covered by this report

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

- Capex (ex-ante)
  - Repex (selected projects)
  - Augex (selected projects)
- Opex
  - Hazard tree reduction step change

31. Other aspect of Jemena's expenditures, including ICT, CER-related expenditure (including certain augex projects not included in the current report) and cybersecurity, are covered in other reports.

1.3 Our review approach

1.3.1 Approach overview

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

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

34. In conjunction with AER staff, our review team met with Jemena at its offices on 28th and 31st March 2025. Jemena presented to our team on the scoped topics, and we had the opportunity to engage with Jemena to consolidate our understanding of its proposal.

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

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

1.3.2 Conformance with NER requirements

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

Capex Objectives and Criteria

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

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

Figure 1.2: NER capital expenditure criteria

NER capital expenditure criteria

The *AER* must:

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

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

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

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

Source: NER 6.5.7(c) Forecast capital expenditure, v230

Figure 1.3: NER capital expenditure objectives

NER capital expenditure objectives

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

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

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

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

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

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

to the relevant extent:

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

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

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

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

Source: NER 6.5.7(a) Forecast capital expenditure, v230

Opex Objectives and Criteria

40. The most relevant aspects of the NER in this regard are the 'operating expenditure criteria' and the 'operating expenditure objectives.' The NER's opex criteria and opex objectives are reproduced below.

Figure 1.4: NER operating expenditure criteria

NER operating expenditure criteria

*(c) The AER must accept the forecast of required operating expenditure of a Distribution Network Service Provider that is included in a building block proposal if the AER is satisfied that the total of the forecast operating expenditure for the regulatory control period reasonably reflects each of the following (**the operating expenditure criteria**):*

(1) the efficient costs of achieving the operating expenditure objectives;

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

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

Source: NER 6.5.6(c) Forecast operating expenditure, v230

Figure 1.5: NER operating expenditure objectives

NER operating expenditure objectives

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

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

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

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

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

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

to the relevant extent:

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

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

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

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

Source: NER 6.5.6(a) Forecast operating expenditure, v230

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

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

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

expenditure as being required to reasonably maintain, as opposed to enhancing or diminishing, the aspects referred to in those objectives.

42. The DNSPs subject to our review have applied a Base Step Trend approach in forecasting their aggregate opex requirements. Since our review scope encompasses only proposed expenditure for certain purposes, we have sought to identify where the DNSP has proposed an opex step change that is relevant to a component that we have been asked to review. Where the DNSP has not proposed a relevant opex step change, then we assume that any opex referred to in documentation that the DNSP has provided is effectively absorbed and need not be considered in our assessment.

1.3.3 Technical review

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

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

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

1.4 This report

1.4.1 Report structure

46. In section 2 we provide our observations on Jemena's application of its governance framework and forecasting methodology to the expenditure category, along with the derived forecasting inputs.

47. In each subsequent assessment section 3 to 5 inclusive, we have presented our assessments for projects within our scope, respectively for:

- Proposed repex categories/projects
- Proposed augex projects
- Proposed vegetation management opex step change.

48. In each of the assessment sections we include:

- an overview of the proposed expenditure and a summary of Jemena's justification for that expenditure;
- our assessment of individual expenditure categories and/or projects; and
- our findings for each expenditure category and the implications of these findings for the expenditure allowances determined by the AER in its Draft Determination.

49. We also provide Appendix A in which we provide some information on historical performance.

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

1.4.2 Information sources

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

52. Except where specifically noted, this report was prepared based on information provided by AER staff prior to 1 June 2025 and any information provided subsequent to this time may not have been taken into account.

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

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

1.4.3 Presentation of expenditure amounts

55. Expenditure is presented in this report in $2025-26 real terms and includes real cost escalation, unless stated otherwise. In some cases, we have converted to this basis from information provided by the business in other terms.

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

2 REVIEW OF GOVERNANCE, MANAGEMENT AND FORECASTING METHODS

The focus of our assessment has been on the material changes to the governance and forecasting methods applied by Jemena in its determination of its expenditure requirements for the next RCP. Specifically, whether the changes made by Jemena are likely to have led to a higher or lower estimate of expenditure than would otherwise have been the case, for those items of expenditure we have been asked to review.

The extent to which the expenditure forecast requirements meet NER requirements is, in part, dependent on how its investment governance and management framework has been applied.

2.1 Introduction

57. In this section we provide some context from the historical performance of Jemena and make observations relating to the service performance and expenditure performance leading into the next RCP.

58. We then consider the materials provided by Jemena and how they align with the requirements as defined in the AER guidance materials. The extent to which we have a complete set of information to undertake our assessment is critical to a determination that the proposed expenditure is prudent and efficient.

59. We next consider whether Jemena has made any material changes to its governance arrangements during the current RCP, that have impacted its investment decision making and impacted either the nature or completeness of the information available to us. Following this we consider the governance, management and forecasting methods applied to the development of expenditure requirements for the next RCP, and whether these are likely to have led to a prudent and efficient forecast of requirements.

60. Our assessment of the governance, management and forecasting methods is not intended to be a comprehensive review, nor does it purport to represent all methods that Jemena has applied for the next RCP. Rather we focus primarily on matters which we consider impact the forecast expenditure requirements, detailed in the subsequent sections of this report.

2.2 Background and context

2.2.1 Summary

61. Common to our review of Victorian DNSPs, Jemena's expenditure incurred during the current RCP has differed from the allowance. Common drivers are delays to the onset of demand compared with the forecast prepared at the time of the previous determination and also uplifts in the price of goods and services incurred during the current period. We comment on key reasons for the changes in expenditure profile and composition of the projects and programs that make up the expenditure profile in our assessment of the corresponding expenditure.

62. For the next RCP, Victorian DNSPs like other NSPs across the NEM are responding to macro-economic changes including electrification and change in demand. In Victoria there are specific policy settings that impact demand and are embedded into the demand

forecasts that each of the NSPs have relied upon. By agreement with the AER, a separate review of the demand forecast is being undertaken by the AER. For this review, we rely on the demand forecast and assumptions prepared by and submitted with the DNSP regulatory proposal.

63. In Appendix A, we provide a summary of the historical trends in service delivery and expenditure as context for our review. The trends are based on published materials from the AER and ESV, which apply to each DNSP that we have been asked to review.

64. We have not been asked to consider the broader performance for each DNSP or take account of all factors that may be contributing to the service of expenditure performance indicated by these trends. We also recognise that the measures applied by the AER and ESV are not comprehensive or exhaustive, but act as context for our assessment of specific projects and programs.

2.2.2 General observations relating to service performance

65. We observe that Jemena's network performance has generally been improving, along with asset performance despite the impact of several major weather events across Victoria. For Jemena's network:

- Average reliability performance is generally improving, which suggest that Jemena's asset management process has improved service levels
- According to the safety regulator ESV, the number of all asset failure incidents and contact incidents are lower than the long-term average
- Rate of line clearance non-compliance has recently improved; however, the regulator is concerned by a worsening long-term trend
- Network utilisation has been flat over the last 10 years, and remains higher than the DNSP average,

2.2.3 General observations relating to expenditure performance

66. We observe that the actual expenditure has been consistently higher than the forecast expenditure. For Jemena's network:

- Capex delivery performance is subject to a range of factors, with actual capex exceeding forecast capex over the last 5 years
- Jemena expects the gross capex to exceed the capex allowance for the current RCP
- Over the last 5 years, actual opex is lower than forecast opex resulting in an underspend against the opex allowance.

2.3 Presentation of submission information

67. In this section we consider the degree to which Jemena has adhered to the expenditure assessment guidelines.

2.3.1 AER guidance on expectations

68. Drawing on the relevant parts of the Rules as detailed in section 1, and the guidance materials published by the AER, the AER has outlined 4 expectations of a network business' capital expenditure proposals in the Better Resets Handbook. These are:

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

69. In our technical review, we have regard to the first three of these expectations as they apply to the scope of our review and which target categories or sub-categories of capex. More specifically, expectation 2 includes demonstration of prudency and efficiency in its decision-making by

- Identification and evidence of the network's need
- Quantitative cost benefit analysis, and
- Where relevant, evidence of fully accounted for trade-offs.

70. These expectations are also accompanied by a range of guidelines to assist DNSPs, including the expenditure forecast assessment guidelines. With regard to the capital expenditure assessment approach, the expenditure forecast assessment guidelines emphasise the need for economic justification of the proposed expenditure:

> *'Where businesses do not provide sufficient economic justification for their proposed expenditure, we will determine what we consider to be the efficient and prudent level of forecast capex. In assessing forecasts and determining what we consider to be efficient and prudent forecasts we may use a variety of analysis techniques to reach our views.'*[1]

71. When considered together, and also drawing from relevant parts of other AER guidelines,[2] we interpret this to mean that the AER places material weight on demonstration of economic analysis to support the proposed expenditure. We have therefore sought evidence of the economic justification in our assessment.

2.3.2 AER guidance on information that is expected to support the regulatory proposal

72. This is further supported by the summary of information that is expected to accompany the regulatory proposal, whereby the guidelines state

> *'We will require a range of data to support our assessment of total forecast capex. We expect DNSPs to submit regulatory proposals that include:*
>
> – *economic analysis demonstrating the forecast expenditure is prudent and efficient. This should include documentation and underlying data sufficient to support the economic analysis*
> – *reasons for costs for given expenditure categories and types of work differing from their historical expenditure*
> – *explanations of trade-offs between capex and opex expenditure that show that the choices chosen (for example to undertake a capex IT program to reduce opex) are prudent and efficient. Firms will also need to demonstrate these choices are fully accounted for in capex and opex forecasts.'*[3]

2.3.3 Summary of information provided for its capex forecast

73. In terms of the scope of our review, we summarise the information that has been provided to support the forecast expenditure in Table 2.1 under the headings of evidence of need, and quantitative analysis.

1 AER Expenditure forecast assessment guidelines – Electricity distribution – October 2024

2 Including the asset replacement guidelines

3 AER Expenditure forecast assessment guidelines – Electricity distribution – October 2024

Table 2.1: Summary of information provided (within our scope of review)

Expenditure category	Sub-category	Evidence of need	Quantitative analysis
Replacement capex	Volumetric / routine	Included in asset class strategy documents: distribution, primary plant and secondary plant. No business cases provided	No model provided
Replacement capex	Discrete projects	Summary business case provided for five projects: NH, CN and CS replacement, 66kV bushing replacement and substation site security	Economic analysis model for each project
Augmentation capex	Discrete projects	Network development strategy (similar to summary business case) for each project summarising the need	Economic analysis model for each project
Opex step change	LBRA hazard tree management program	Summary business case	No model provided

74. The information provided initially by Jemena was not conducive to a review in accordance with the capex assessment guidelines, as the models and supporting information were incomplete, or the workings and assumptions relied upon by Jemena were not transparent. We made numerous requests for the models and supporting information that Jemena had relied upon in preparing its expenditure forecast.

75. Whilst Jemena responded to our questions, in many instances the responses did not provide additional models or analysis, or include information that explained the basis for need and timing of a change from the historical level of replacement activity. In some instances, we did not find that the justification documentation that was provided to us was robust, and that areas of expenditure were largely unexplained, or not sufficiently supported by evidence of observed performance.

76. Jemena has placed significant emphasis on the materials provided with its submission, and for repex, this included information in its asset class strategies (Distribution, Primary plant and Secondary plant) to support the proposed projects and programs, including justification for the scope timing and efficient cost. Whilst the asset class strategies were useful summaries, they typically lacked the analysis that we would expect to find and which is necessary to justify the forecast expenditure consistent with relevant NER expenditure criteria.

77. We also had some issues with reconciliation of the expenditure data provided with the SCS capex model with the individual projects and programs in Jemena's regulatory submission and to the RIN asset groups. As described in our assessment of repex, we have grouped the proposed projects to align with the scope areas for our review, based on the expenditure included in the SCS capex model.

2.4 Assessment of governance arrangements and forecasting methods for the next RCP

78. Consistent with the overarching purpose, we focus primarily on matters which we consider impact the forecast expenditure requirements, detailed in the subsequent sections of this report.

2.4.1 Summary of material changes to the governance arrangements in the current RCP

79. Given our focus on expenditure, we looked for key changes to the investment governance arrangements that Jemena had applied or will apply that may impact the prudent and efficient expenditure requirements for the next RCP.

80. Based on our reading of the final determination for the current period, we did not ascertain any systemic issues identified by the AER at that time, that we would need to review.

81. In the context of the investment governance framework, investment planning, forecasting methods and risk management approaches ('governance methods'), we provided an opportunity for Jemena to detail any changes to the governance methods applied by Jemena during the current period, and that impact the development of the expenditure forecast for the next period.

82. In its response, Jemena stated that:

> *'JEN has not had any significant changes to its governance methods; however, due to the substantial uptake of Data Centre customer-initiated projects, JEN has necessitated reshaping the organisation to meet this demand.'* [4]

83. This was confirmed during our onsite discussion.

2.4.2 Top-down review and portfolio optimisation

We did not see evidence of how Jemena had applied a top-down review and challenge process to its expenditure forecast

84. Jemena's regulatory proposal states:'

> *'Our forecast for each capital expenditure category under the 2026-31 Proposal is lower than what we have proposed in the Draft Plan. This is the result of progressive and various capital expenditure iterations informed by our customers' feedback, the AER's initial feedback on our key capital projects and the latest demand forecast.'*[5]

85. We asked Jemena to provide details of the process undertaken to determine the programs/projects that comprise the whole-of-business expenditure portfolio, including application of portfolio management and optimisation, review and challenge processes and potential iterations of its capex program. In its response,[6] Jemena referred us to Appendix C of its 05-01 capital expenditure attachment provided with its submission.

86. Appendix C provides a summary of the capital planning governance and forecasting process as follows:

> *'To ensure the efficient deployment of capital, JEN maintains a process to rank and prioritise projects proposed for inclusion in our program of capital works. The process provides a consistent approach to the evaluation of projects in relation to customer, risk mitigation, strategic and financial benefits, ensuring that all our investments are robustly evaluated to deliver a net customer benefit, to mitigate unacceptable risks and to deliver an expected return on investment that is acceptable to our shareholders. Given many of our investments are very long term in nature, this evaluation needs to account for long-term trends in customer demands and customer needs, growth in competing alternatives for customers and risk in future industry scenarios.'*[7]

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4 Jemena's response to IR006, Question 1

5 Jemena regulatory proposal page 61

6 Jemena's response to IR006, Question 2

7 Jemena Att 05-01 capital expenditure, Appendix C

87. The description of this process includes elements we had expected to see including identification of risks, ranking in order of customer benefit and prioritising the portfolio (including removing and/or deferring projects.) However, Jemena did not provide information that would evidence this process, or its implications for the forecast expenditure in the regulatory proposal that it submitted.

88. We asked a further question seeking evidence of application of the process that Jemena had described and if, at any stage in developing its capex forecast, Jemena produced a whole-of-business 'portfolio' prioritised stack of proposed projects. If so, we asked Jemena to advise that stack, the method by which it was prioritised and the criteria that were applied in determining projects to include or exclude from its regulatory proposal.

89. In response, Jemena stated:

> *In developing our capex forecast, we produce a capex model (refer to attachment JEN—Att 05-01 Capital expenditure—20250131—Confidential included in our initial proposal). This capex model includes all the projects that are assessed as being mandatory, prudent, or beneficial and will be required to develop our regulatory proposal."*[8]

90. We were not provided with an example of this portfolio stack, or other evidence of how this process had been applied. The description of its process suggested that this may be applied to its annual planning process and it remains unclear whether or how it was applied in developing a forecast of its requirements for the regulatory period.

Jemena states that its portfolio review process included three expenditure iterations, however the quantum of any changes are not visible to us

91. During the onsite discussion, we understood that Jemena had undertaken multiple iterations of its capex forecast, and applied criteria of mandatory, prudent and beneficial to each of its programs of a way of prioritising its portfolio and we sought evidence of this process in action. Jemena describes three expenditure iterations as follows:[9]

- *Iteration 1 October 2023, Model testing iteration not a solid 'stack'*
- *Iteration 2 June 2024 – Draft proposal, Approved program of capex with resilience projects not fully defined. Assumed JEN's prior period capex reopener is successful*
- *Iteration 3 November 2024, Initial proposal - Approved program of capex with resilience included, refined from the Draft Proposal version. Assumed JEN's prior period capex reopener is successful*.

92. We did not see any classification of expenditure against any applied criteria.

93. In a further request, we asked for details of the three iterations and evidence of the investments removed from the forecast. We were provided with a list of projects[10] and not project expenditure, so we were unable to determine how the capex program had changed in scale or scope. From iteration 2, there were 467 projects in the list. At iteration 3, six projects were removed and 21 projects added bringing the total to 482 projects.

94. We had expected to see demonstration of intermediate iterations, and evidence of the decision-making process being applied by the governance layers that would demonstrate the movement up or down of the expenditure forecast in response to changing inputs or output scenarios.

95. We consider that application of a top-down review and portfolio optimisation are two critical methods in determining a prudent and efficient expenditure forecast. We did not see evidence to support Jemena's description of its approach that it has balanced the top-down capex program with the bottom-up build from the investment requirements, or that the proposed expenditure is maximising customer benefit. Absent demonstration of this

8 Jemena response to IR009 question 2

9 Jemena response to IR009 question 2

10 JEN – IR009 – Capex stack iteration 2 and 3 – 20250502 – Public

process, we consider it more likely that the resulting forecast is higher than a prudent and efficient level.

2.4.3 Activity forecasting methods

General

Business cases were not provided for all proposed expenditure

96. Jemena states that it develops business cases '*to ensure that all capital investment decisions are prudent, efficient and best promote the long-term interests of our customers. Each business case uses a combination of technical, economic and financial analysis to determine the optimal solution and timing to address an identified need,*'[11] Each business case is purported to include:

- 1. The project need,
- 2. Options to address the project need, and
- 3. A recommended optimum solution that maximises net benefits to customers, including financial analysis.

97. As outlined in section 2.3.3 of this report, the information provided initially by Jemena was not conducive to a review in accordance with the capex assessment guidelines, as the models and supporting information were incomplete, or the workings and assumptions relied upon by Jemena were not transparent. For repex in particular, there was a distinct absence of business cases or similar documentation that supported the proposed expenditure.

There was also an absence of economic analysis

98. To demonstrate compliance against the AER expectations under the Better Resets Handbook, Jemena stated that it has provided business cases (or similar) and cost benefit analyses to support its forecast:

> *'Our forecast capital expenditure is supported by robust business cases, investment briefs and network development strategy documents for the projects/program underpinning our higher forecast. These supporting documents clearly explained the need within the context of the capital expenditure objectives under the NER.'* and
>
> *'Our business cases, investment briefs and network development strategy documents are supported by quantitative cost-benefit analyses, which demonstrate that our proposed projects/programs are based on the option that will give the highest net benefits to our customers.'*[12]

99. We did not find that this was the case for all of its proposed forecast, with the level of detail favouring larger projects, possibly considered as the key 'drivers' of the higher expenditure. However, this approach (without demonstrating this) assumes that the current programs and associated investment options are reasonable and provide a net benefit. Our concerns with Jemena's analysis and modelling assumptions cast doubt on its ability to draw meaningful conclusions from its analysis.

100. Nonetheless we reviewed the information that was provided to the extent that that information supported the proposed expenditure for the categories of expenditure we were asked to review.

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11 JEN - Att 05-01 Capital expenditure - 20250131 – Confidential, page C-5

12 JEN - Att 05-01 Capital expenditure - 20250131 – Confidential, Table 2-1, page 11

Repex activity forecasting is based on a combination of methods, with a distinct lack of financial models

101. Jemena has used a combination of forecasting methods for its repex requirements, including fault and inspection/defect-based replacement using historical trend, risk-based replacement making use of economic analysis for a small number of discrete projects only.

102. In our experience, consistent with the requirements of AER guidance, DNSPs make greater use of modelling than we were provided with the submission. We asked Jemena to provide a copy of all working models that have been relied upon in developing the forecast volumes and expenditure included in the regulatory proposal, including economic models, risk models and condition assessment models. We were advised that the only missing model was a fleet model, and which was beyond the scope of our assessment.

103. As we did not have models for a large proportion of the proposed repex, we sought copies of the methods that Jemena had applied to justify the proposed repex forecast including through the use of cost benefit analysis or similar techniques as outlined in the Better Resets Handbook and Asset replacement guideline. For some asset classes we have not been provided with evidence of how Jemena has determined the prudent replacement level or undertaken an economic assessment of the proposed program to determine the efficient cost and timing.

104. In its response we were provided with a summary spreadsheet that referred to the forecasting methodology that Jemena had applied.[13] No further models were provided in this response. We refer to this summary in our assessment of the proposed expenditure.

105. We also included specific requests for condition assessment information, particularly where condition information and CBRM models are purported to be used to estimate a future trend in the volume (or expenditure) of ongoing programs, and we refer to those responses in our assessment of the proposed expenditure also.

Augex activity forecasting responds to specific drivers with modelling to support the projects we have reviewed

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

107. Typically, augmentation of the network is required to respond to increases in locational peak demand, safety, regulatory compliance (e.g. quality of supply), and supply reliability. As Jemena advises, *'…other augmentation expenditure drivers are becoming increasingly prevalent, for example, providing sufficient hosting capacity to accommodate an increase in energy exports from small-scale CER as well as accommodating for forecast uptakes in electric vehicles and managing the effect of this on peak demand.'*[14]

108. For its HV network (sub-transmission lines, substations, HV feeders) Jemena applies demand forecasts, historical trend data, and direct consultation with large customers to understand whether customers will require extra network capacity in the future. Augmentation is based on a probabilistic analysis of the risk of unserved energy versus the cost to determine both the prudent solution and the optimal timing for implementing the solution.[15, 16]

109. For its distribution substations and LV circuit augmentation, Jemena advises that it applies proactive and reactive approaches:

- Proactive augmentation - analysis and load testing of the network to identify areas that require augmentation to mitigate imminent reliability and power quality issues, and
- Reactive augmentation - to resolve network issues typically identified during periods of peak demand.

13 IR#009 - Question 5 - Question 9 Forecast repex projects and programs

14 Jemena - Expenditure forecasting methodology - 2026-31 - June 2024, page 11

15 Jemena - Expenditure forecasting methodology - 2026-31 - June 2024, page 11

16 JEN – RIN – Support – Network Augmentation Planning Criteria – 20250131

110. Key inputs and assumptions in its augmentation expenditure forecasts include (but are not limited to):[17]

- *spatial peak demand forecasts*
- *customer demand assumptions*
- *embedded generation assumptions, including their impact on network power quality*
- *modelling of contingent events*
- *value of customer reliability.'*

111. Jemena provided its Network Augmentation Planning Criteria document and its Expenditure Forecasting methodology to explain its augmentation activity forecasting approaches. Jemena's description of its approach to augex activity forecasting is consistent with good industry practice. We received economic models (cost benefit analysis models, CBAM) to support its 'Network Development Strategy' documents, also provided with its Proposal.

112. As discussed below regarding the CBAMs, we needed to seek additional information to help ensure our understanding of Jemena's cost-benefit analyses.

The opex step change is based on a bottom-up build of opex requirements

113. Jemena has provided an estimate of its opex step change, based upon bottom-up build of its opex requirements. It concludes that as a new program, the proposed expenditure is in addition to its base year opex.

2.4.4 Economic assessment

114. We consider the application of the cost-benefit analysis (including risk-cost assessment) as a part of our review of specific projects and programs. For repex, as outlined above, this was limited in its application.

Jemena has not modelled risk in accordance with AER guidance or industry practice

115. We do not see evidence that Jemena has adequately applied the AER guidance materials, and that have been applied by other DNSPs since their inception, for forecasting repex requirements.

116. Common practice for asset replacement planning, consistent with AER guidance including the Asset Replacement guidance note, is to assume that the probability of failure for an asset increases with time, and the rate of increase is correlated with the condition of the asset. It is common to apply Weibull functions for this purpose. When applied to risk-cost analysis as outlined in the asset replacement guidance note, this results in an increasing cost function that can be compared with the cost of intervention to rescue the risk (modelled as a benefit).

117. Common Weibull functions and parameters are available from industry sources and other DNSPs, which can be applied to Jemena's network and compared with its own observed experience. We saw evidence of application of these methods in parts of Jemena's augex forecast, and also in historical RIT assessments. However, Jemena did not explain why this had not been applied in a similar way to forecast its proposed repex in the next RCP.

Jemena applies a common VCR which should be calibrated for the study area and based on the 2024 AER update

118. Jemena applies a common VCR of $47,905/MWh in monetising the EUE in each of the models we have reviewed which was derived by Jemena '*using the AER's value of customer reliability review and applying JEN's customer energy consumption composition, comprising an approximate 34% residential, 41% commercial and 25% industrial split.'*[18] We

[17] Jemena - Expenditure forecasting methodology - 2026-31 - June 2024, page 12

[18] JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, page 29

understand from discussions with Jemena that the AER final values were not ready in time for it to take into account in its modelling.

Issues with optimal timing analysis

119. To the extent that Jemena has undertaken assessment of optimum timing on an economic basis, we observe instances in which Jemena has calculated the annuitised cost incorrectly.

120. In Appendix A we provide information on this methodology, which is also described in the AER's 2019 Asset Replacement guideline, noting that the annuitised cost needs to take account of the asset life and is not solely the product of the capex and the discount rate. Correct application of the formula leads to a higher annuitised cost than Jemena has calculated; Jemena's calculation may incorrectly bias Jemena's assessment towards timing that is earlier than is justified.

Other input assumptions are reasonable

121. The following assumptions are considered to be reasonable:

- Average feeder outage rate is calculated based on recent years of Jemena's actual historic reliability data.
- Sub-transmission line outage frequency, which is 0.09 outages per kilometre of line length per year
- Sub-transmission line outage average duration of 4 hours per outage
- Power transformer outage frequency, which is 0.01 outages per year
- Power transformer outage average duration of 2.65 months per outage
- Regulatory discount rate
- Economic analysis period for cost-benefit analysis set at 20 years
- Distribution feeder EUE based on 7-year demand forecast, and
- Zone substation and sub-transmission EUE based on 10-year demand forecast.

2.4.5 Cost estimation and cost forecasting

Jemena has applied a standard cost estimation methodology

122. Jemena states that its cost estimates have been prepared by applying the principles set out in the JEN Cost Estimation Methodology.[19]

Unit rates are within a reasonable range of expected values

123. We understand that the unit rates and project cost estimates relied on in preparing the capex forecast are based on historical unit rates, and historical expenditure for projects of similar scope and scale. We asked for evidence of its cost estimation methods, estimation accuracy (and review methods) and derivation of unit rates.

124. Jemena states that:

> *'Jemena conducts a review of unit rates provided by Zinfra at the end of the financial year. The purpose of this review is to confirm that the actual cost of each unitised activity remains aligned with the unit rate that was used in estimates for that year. The process involves identifying any significant variances between actual costs and those used in the rates, and then investigating the reasons for these variances.'*[20]

125. We asked Jemena to provide a copy of unit rates. Based on our review of a sample of unit rates,[21] and of the understanding the unit rates are subject to the review processes as

[19] JEN-RIN-4.4 Jemena Electricity Networks Cost Estimation Methodology – 20250131

[20] Jemena response to IR006 Question 7c

[21] JEN - IR006 7b - unit rates applied – 07.04.2025 - confidential

described by Jemena, we consider that the unit rates are within a reasonable range of expected values.

A risk allowance has not been included in the cost estimates relied upon for the forecast capex

126. In terms of the treatment of risk allowance, contingency and uncertainty in unit rates and cost estimates, Jemena applies uncertainty factors as defined via a risk assessment:

> *'There is uncertainty associated with projects, as not all scope items or risks can be known or estimated, especially in the early stages of a project. Cost uncertainty is included in project estimates. By the time a cost estimate has been further developed, the scope and risks can be better defined and quantified, and the cost uncertainty factors are further refined.*
>
> *In determining the amount of contingency that is included in the estimate of the project, the prevailing methodology is to apply a percentage of the total estimate as a contingency based on experience with previous projects. Determining the amount of contingency as a proportion of the estimate for that project depends on the nature of the project and the extent to which there are uncertainties in relation to scope.'*[22]

127. Based on managing the projects across a capex portfolio we would expect that a P50 estimate does not include an additional risk allowance, such that there is a reasonable likelihood that a P50 estimate would result in costs that are both higher and lower than the estimate.

128. We were provided with cost estimates for a sample of projects that comprise direct labour, subcontract, prelim and plant, materials, risk allowance and overheads. The direct capex component was used as the input to the capex model, and which we understand excludes the risk allowance and overheads as we would expect.

2.4.6 Deliverability

Jemena relies on its current delivery mechanisms (and track record) to meet the proposed uplift in works program

129. Jemena state they have a strong track record of delivery and, based on this track record and strong governance processes, considers that the forecast works program is achievable.[23]

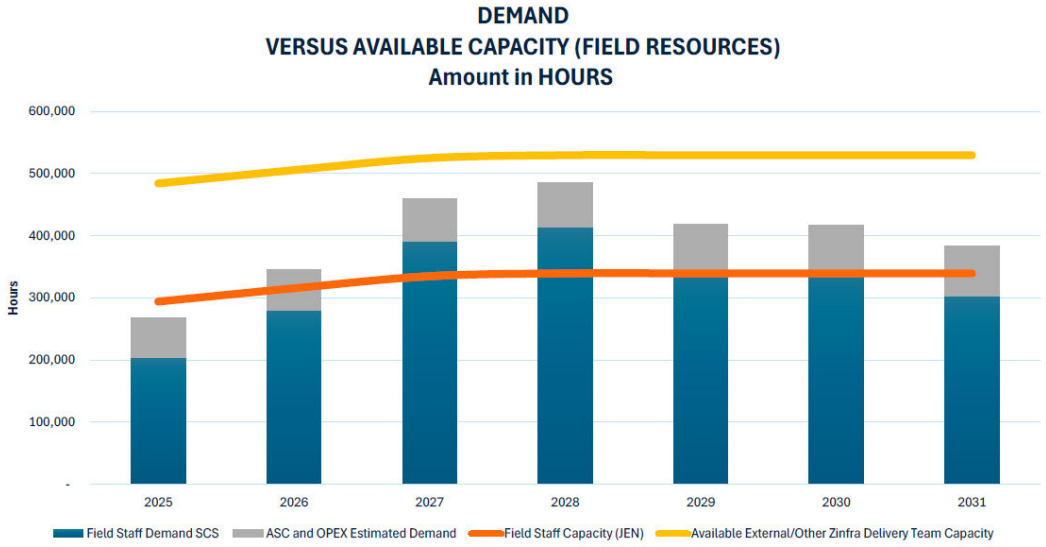
130. Jemena recognises the key challenges in meeting the needs of an increased capex program including that the increase is not unique to Jemena and is proposed by other Victorian DNSPs seeking similar resources. Also, that there has been a range of supply and capacity constraints that have led to shortages, delays and price increases. Jemena places significant emphasis on its delivery partner Zinfra, its ability to access additional capacity and to direct market engagement.

131. As shown in Figure 2.1, Jemena presents a base level of capacity to undertake the forecast works program, and an assessment that the works program will exceed capacity by a reasonable margin. However, Jemena expects to deliver the works program by drawing on its service providers, including Zinfra for peak work, and which exceeds the required capacity.

22 Jemena response to IR006 Question 7f

23 JEN – RIN – 4.4.3 - Asset Management Delivery Plan, page 2

Figure 2.1: Works program (SCS, ACS and opex) capacity versus demand expressed in hours



Source: JEN – RIN – 4.4.3 - Asset Management Delivery Plan, figure 5-1

132. In its delivery plan Jemena describes its works planning and scheduling systems, and governance framework. Jemena has identified resource demand against the forecast program of work, with a focus on particularly areas of constraint. In general, Jemena outlines a plan that is similar to many of the other DNSPs, competing in the same resource pool, and has the limitation of offering a much smaller program.

The uplift in works program exceeds its historical capacity at a total level, and which is a key determinant in its delivery capacity

133. In the current RCP Jemena has increased its works program delivery, including in response to increases in connections capex. For the next RCP, about half of the forecast gross capital expenditure is for major customer and data centre connections, with much of this work contributing to the expected capex uplift. We consider that this increase is an important consideration to the delivery capacity of Jemena to achieve, and which is beyond our scope of review.

2.5 Our findings and implications for our expenditure review

2.5.1 Summary of findings

Presentation of submission information

Lack of compelling information for our review

134. The Better Resets Handbook published by the AER nominates four expectations of a network business' capital expenditure proposal. [24]

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

[24] AER. Better Reset Handbook - December 2021.

135. Except for consumer engagement, which is beyond our scope of review, we find that Jemena's submission had not materially achieved the remaining three expectations.

Additional information was necessary to complete our review, and was not forthcoming

136. In some instances, we did not find that justification documentation that was provided to us was robust, and that areas of expenditure were largely unexplained, or not sufficiently supported by evidence of observed performance.

137. For example, a large proportion of expenditure (for repex) is not supported by economic analysis, rather relying on inspection- or condition-based methods. The absence of economic analysis does not assist with determining how the prudent and efficient replacement program has been determined.

Governance arrangements and forecasting methods

There was also an absence of economic analysis

138. We did not find that Jemena had met the requirements of the Better Resets Handbook in all cases, or with its own compliance statements in the provision of economic analysis. We found the economic analysis favoured larger projects, possibly considered as the key 'drivers' of the higher expenditure. However, this approach (without demonstrating this) assumes that the current programs and associated investment options are reasonable and provide a net benefit. Our concerns with Jemena's analysis and modelling assumptions cast doubt on its ability to draw meaningful conclusions from its analysis.

Jemena has not modelled the risk in accordance with AER guidance or industry practice

139. We do not see evidence that Jemena has applied the AER guidance materials in modelling risk, including methods that have been applied by other DNSPs since their inception, for forecasting repex requirements. This seems to deviate from practices that Jemena has applied to other capex forecasting methods applied for the next RCP without explanation.

140. As detailed in our assessment of the proposed expenditure, some of the risk modelling methods applied by Jemena are flawed.

141. Whilst many of the assumptions applied by Jemena appear to have ben developed on a reasonable basis, we consider that the VCR should be calibrated for the study area and based on the 2024 AER update.

Cost estimates appeared reasonable

The cost estimates that have been relied upon by Jemena appear within reasonable bounds.

Delivery of the works program remains a challenge

142. The uplift in works program exceeds its historical capacity at a total level, and which is a key determinant in its delivery capacity, with much of the uplift for connections capex is beyond the scope of our review. We consider that this increase is an important consideration to the delivery capacity of Jemena to achieve and which is beyond our scope of review.

143. We consider the extent to which Jemena has addressed the delivery risks in relation to the individual projects and programs as a part of our assessment of the associated expenditure.

144. The actual impact of the energy transition, and specifically increased pressure placed on the supply of key electricity sector resources across the state of Victoria remains uncertain. However, we consider that Jemena has taken reasonable steps to develop the required capacity to deliver its proposed works program.

2.5.2 Implications to the expenditure forecast

145. We consider the implications of these findings in our review of the specific projects and programs in the subsequent sections of this report.

3 REVIEW OF PROPOSED REPLACEMENT EXPENDITURE (REPEX)

Jemena has proposed a material uplift in repex activity relative to the repex that it expects to incur in the current period, and which is above that included in the AER's final determination capex allowance. Key changes relate to increases to zone substation-based replacement activity.

The AER has asked us to assess a subset of Jemena's proposed $427.3 million replacement capex for the next RCP, across most of its asset groups and totalling $252.3m. This therefore accounts for approximately 59% of Jemena's total proposed repex.

We have found issues with Jemena's modelling applied for its proposed asset replacement program that reflect estimates of volume and unit costs that are higher than a prudent and efficient level. Jemena has not sufficiently demonstrated the need for an uplift for the projects that it has proposed, based on either its economic modelling where it has been provided, or on the performance of its network.

We consider that the proposed repex of $252.3 million for the projects that we reviewed is materially overstated and that a reasonable alternative forecast for the projects within the repex categories that we reviewed would be between 50% and 60% less than Jemena has proposed.

3.1 Introduction

146. We reviewed the information provided by Jemena to support its proposed repex forecast, including a sample of projects and programs. We sought to establish the strategic basis for, and the reasonableness of the proposed repex for each of the identified projects and programs that we were asked to review. Forecast expenditure in the next RCP is reflective of a step increase from the historical expenditure that Jemena has incurred and is expected to incur in the remainder of the current RCP.

147. To the extent that Jemena has explained the dependencies across each of the projects and programs included in its forecast repex, we have referred to this in our assessment. We present our assessment using the asset groups included in the RIN. In many cases, our scope did not extend to all projects and programs included in the RIN asset group or take account of the apportionment of repex between projects and programs and the RIN asset groups. We refer to the information we have relied upon in our analysis in the sections that follow.

148. We found the initial submission material lacking in substantive justification of the proposed expenditure. It did not provide sufficient evidence of how Jemena has determined a prudent replacement level or the extent to which it had undertaken economic assessment of the proposed program to determine efficient cost and timing. To support our assessment, we requested a summary table referencing key information for each asset class and program included in the repex forecast and referencing the models and methods that Jemena had relied upon in developing its forecast repex. In response to our requests, we were provided with the requested summary of information, however Jemena did not provide further business case documents or models than Jemena had provided in its initial submission. For the reasons we set out below in our assessment of repex, we consider that the information provided by Jemena was not sufficient for a reasonable assessment of the proposed expenditure.

149. We first summarise and compare Jemena's proposed expenditure for the next RCP with its historical actual and estimated expenditure in the prior and current RCPs and relate our scope of review to the proposed repex by RIN asset group.

3.2 What Jemena has proposed

3.2.1 Proposed repex

Summary of proposed repex

150. Jemena has proposed a repex forecast of $427.3 million for the next RCP as shown in Table 3.1, being materially higher than the $272.0 million it expects to incur in the current RCP.

Table 3.1: Jemena proposed and current actual/estimate repex by RIN asset group- $m, real FY2026[25]

Asset Group	*Total Current RP*	2026-27	2027-28	2028-29	2029-30	2030-31	Total next RCP
Poles	*40.4*	9.1	12.0	12.1	12.2	12.3	**57.7**
Pole top structure	*24.6*	7.1	9.3	9.3	9.4	9.5	**44.6**
Overhead conductor	*12.6*	3.8	0.9	2.8	3.7	1.3	**12.5**
Underground cable	*14.1*	1.3	11.6	6.5	7.7	4.6	**31.8**
Service lines	*17.6*	7.4	6.9	6.0	6.0	6.1	**32.4**
Transformers	*29.3*	6.6	18.0	15.9	12.2	9.7	**62.4**
Switchgear	*42.0*	8.4	13.4	12.0	11.2	12.5	**57.5**
SCADA, protection and control	*9.9*	12.5	17.0	9.5	8.3	4.1	**51.5**
Other	*81.5*	13.1	13.9	16.8	17.5	15.6	**76.9**
Total	*272.0*	**69.4**	**103.0**	**90.9**	**88.3**	**75.6**	**427.3**

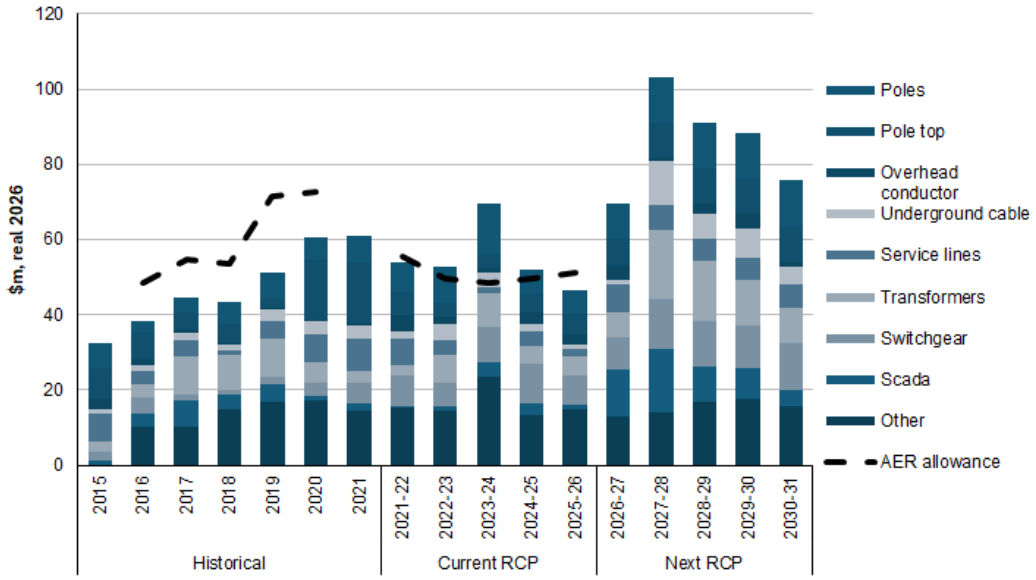
Source: EMCa table derived from Jemena RIN Workbook 1 – forecast 31 Jan 2025 and Jemena annual RIN

Historical trend

151. In Figure 3.1, we show the historical and forecast repex by RIN asset group reported in the RIN. We also include the AER repex allowance excluding approved cost-pass through amounts.

[25] This is a gross repex, excluding $16.53m of capital contributions forecasted by Jemena on its SCS capex model.

Figure 3.1: Jemena proposed repex compared with current and historical - $m, real FY2026[26]

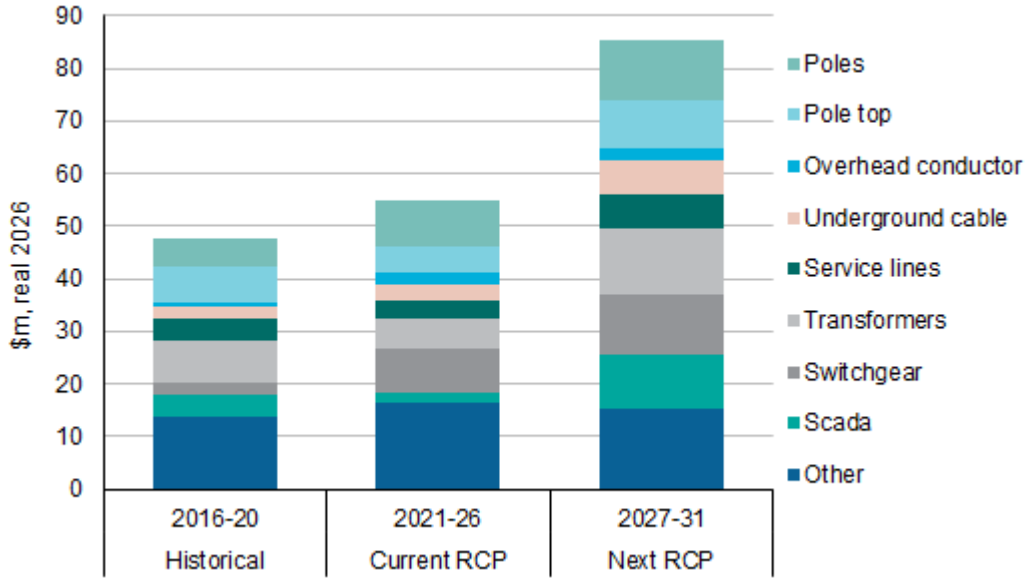


Source: EMCa table derived from Jemena RIN Workbook 1 – forecast 31 Jan 2025 and Jemena annual RIN

Comparison of regulatory periods

152. In Figure 3.2 we show the average annual repex by asset group for the last three five-year periods. We observe that the annual average repex has been steadily increasing over this period, with the largest increase proposed for the next RCP of approximately $30 million per year, spread across multiple asset groups.

Figure 3.2: Comparison of average annual repex across regulatory periods - $m, real FY2026



Source: EMCa table derived from Jemena RIN Workbook 1 – forecast 31 Jan 2025 and Jemena annual RIN

[26] The repex data for next RCP is a gross repex, excludes $16.53m of capital contributions forecasted by Jemena on its SCS capex model.

3.2.2 Summary observations

153. Jemena has proposed large increases associated with SCADA followed by transformer replacement, pole top structures and underground cables for the next RCP, relative to a declining trend of repex in the current period.

154. Jemena refers to the declining condition of its assets (indicating risk of failure in the next RCP) as drivers of the need for an increase in the forecast repex, including the commencement of three substation redevelopment projects at CN, CS and NH.

155. Jemena expects to incur a similar level of repex than was included in the AER's FD (within 10%) for the current period. This included major spending for the first three years on replacements of primary assets in four zone substations, pole interventions and crossarm replacements.[27]

3.2.3 EMCa's scope of repex Review

156. Of the $427.3 million repex that Jemena has proposed in the next RCP, our scope relates to $252.3 million or approximately 59%, as shown in Table 3.2.

Table 3.2: EMCa's scope of Jemena repex - $m, real FY2026

Asset group	2026-27	2027-28	2028-29	2029-30	2030-31	Total
Poles	9.1	12.0	12.1	12.2	12.3	**57.7**
Pole top structure	7.1	9.3	9.3	9.4	9.5	**44.6**
Overhead Conductor	0.1	0.3	0.3	0.3	0.3	**1.4**
Transformers	0.3	9.6	9.1	4.6	2.0	**25.5**
Switchgear	21.6	29.7	11.8	11.0	11.7	**85.8**
SCADA, protection and control	0.0	3.2	9.7	8.9	5.4	**27.1**
Other	1.1	2.2	2.3	2.3	2.3	**10.2**
Total	**39.2**	**66.2**	**54.6**	**48.7**	**43.5**	**252.3**

Source: EMCa table derived Jemena SCS capex model

157. We have assigned projects in Jemena's capex model to the RIN asset groups shown in Table 3.2 to assist with our review, based on the dominant driver of expenditure. The allocation from the capex model to RIN was not provided by Jemena. The expenditure reported in each of the asset groups in the RIN will differ from the project-based expenditure, as major plant replacement works (such as transformer replacements) are allocated across multiple RIN asset categories to reflect the nature of the work undertaken.[28]

158. We consider the projects and programs that comprise this expenditure in the sections that follow.

[27] Capital expenditure attachment 5-01, page 8

[28] For example, we have included our assessment of the transformer replacements included in the substation redevelopment projects in our assessment of the corresponding switchgear assets

3.3 Assessment of repex

3.3.1 Poles

What Jemena has proposed

159. Jemena has included a pole replacement and reinforcement program with a forecast cost of $57.7m for the next RCP, as shown in Table 3.3.

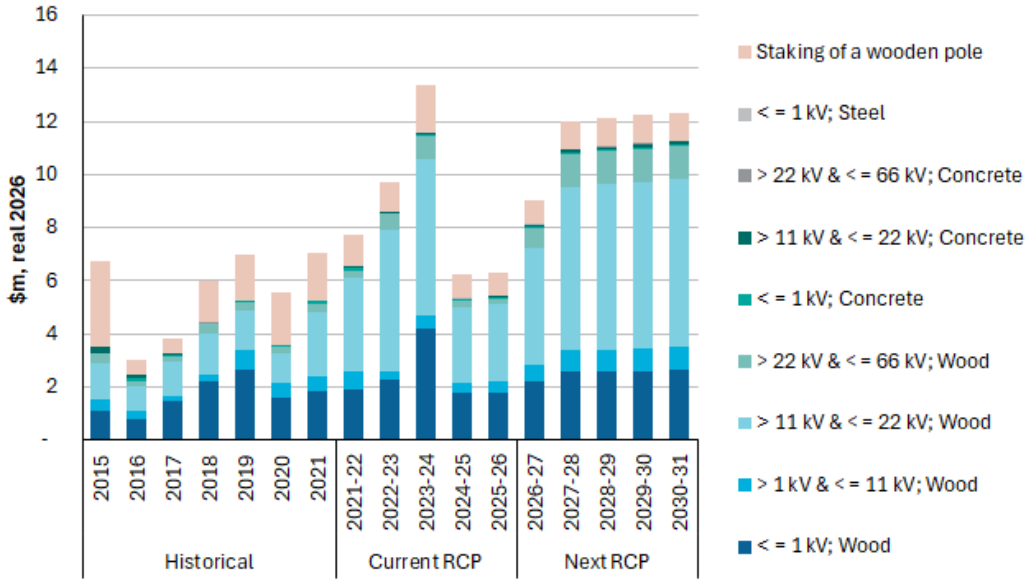
Table 3.3: EMCa scope of Jemena proposed poles repex - $m, real FY2026

Pole	2026-27	2027-28	2028-29	2029-30	2030-31	Total
Pole reinforcement						
Pole Reinforcement - HV	0.3	0.3	0.3	0.3	0.3	**1.5**
Pole Reinforcement - LV	0.5	0.5	0.5	0.5	0.5	**2.7**
Pole Reinforcement - ST	0.0	0.0	0.0	0.0	0.0	**0.2**
Pole replacement						
Pole Replacement (Incl. Pole Top) - HV	3.5	3.5	3.5	3.6	3.6	**17.7**
Pole Replacement (Incl. Pole Top) - LV	2.0	2.0	2.0	2.0	2.1	**10.1**
Pole Replacement (Incl. Pole Top) - ST	0.4	0.4	0.4	0.4	0.4	**2.0**
Replacement of limited life poles unsuitable for staking - HV	0.5	1.1	1.1	1.2	1.2	**5.1**
Replacement of limited life poles unsuitable for staking - LV	0.3	0.6	0.7	0.7	0.7	**2.9**
Replacement of limited life poles unsuitable for staking - ST	0.1	0.1	0.1	0.1	0.1	**0.6**
Replacement of staked poles - HV	0.9	2.0	2.0	2.0	2.0	**8.9**
Replacement of staked poles - ST	0.3	0.7	0.7	0.7	0.7	**3.2**
Undersize Pole Reinforcement	0.1	0.1	0.1	0.1	0.2	**0.7**
Undersize Pole Replacement	0.2	0.5	0.5	0.5	0.5	**2.1**
Total	**9.1**	**12.0**	**12.1**	**12.2**	**12.3**	**57.7**

Source: EMCa table derived Jemena SCS capex model

160. The historical and forecast repex for poles is shown in Figure 3.3.

Figure 3.3: Historical and forecast Pole intervention repex - $m FY2026

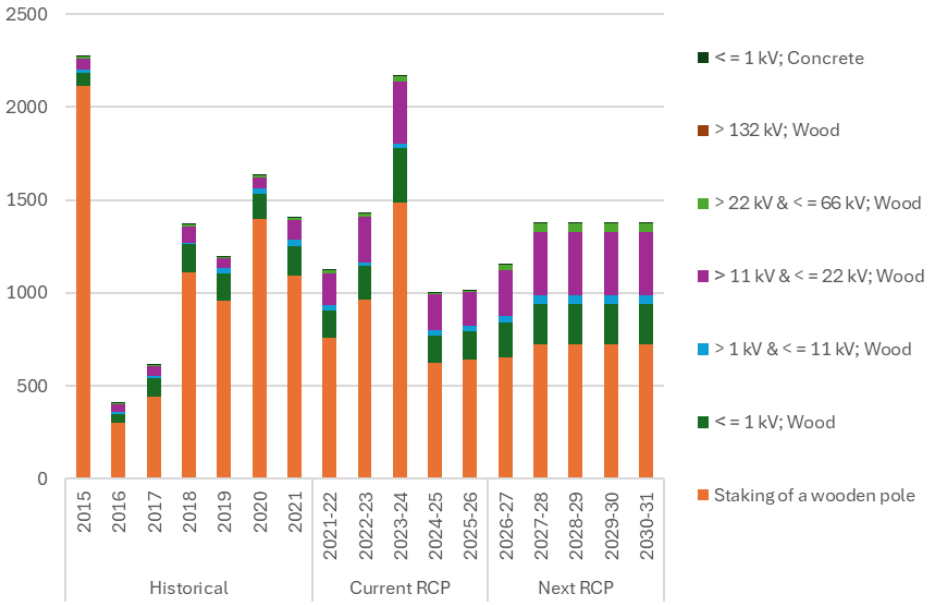


Source: EMCa derived from RIN data

161. Based on our analysis of RIN data, the proposed repex in the next RCP represents an increase of approximately $14.4 million over the current RCP. In Figure 3.3, we observe an increasing trend in expenditure to 2023-24, before forecast reductions in the final two years of the current RCP. We have not been provided with an explanation for the reduced pole intervention repex in the final two years of the current period.

162. The expenditure profile aligns with the volume of interventions shown in Figure 3.4 and which is the key driver of the proposed increase in the next RCP.

Figure 3.4: Historical and forecast Pole intervention volume



Source: EMCa derived from RIN data

Assessment

Forecasting methods were described as based on historical levels

163. In response to our information request, Jemena provided a summary of its forecasting methods, which we have reproduced in Table 3.4.

Table 3.4: Summary of forecasting methods for pole interventions

Type	Program	Key driver	Forecasting method
Routine	Condition-based pole replacement	Condition Faults Compliance (ESMS)	For recurrent program such as the conditioned based replacement & reinforcement of poles, JEN used historical trends (either volume or expenditure) as it is not appropriate to develop more complex forecasting models for this asset class. Forecast volumes for FY27-FY31 are lower than historical replacement volumes to accommodate the proactive programs discussed below.
Routine	Condition-based pole reinforcement	Condition Compliance (ESMS)	
Non-Routine	Replacement of staked poles	Condition Compliance (ESMS)	For this proactive program, the population of staked poles reaching end of life was used to determine the replacement volumes for this program.
Non-Routine	Replacement of undersized poles	Condition Compliance (ESMS)	For this proactive program, the historical volume of undersized pole replacements volumes for this program.
Non-Routine	Replacement of limited life poles unsuitable for staking	Condition Compliance (ESMS)	For this proactive program, the historical trend of inspection results of staking suitability for limited life poles was used to determine the replacement volumes for this program. These values were adjusted to align with policy to replace LL poles in HBRA.

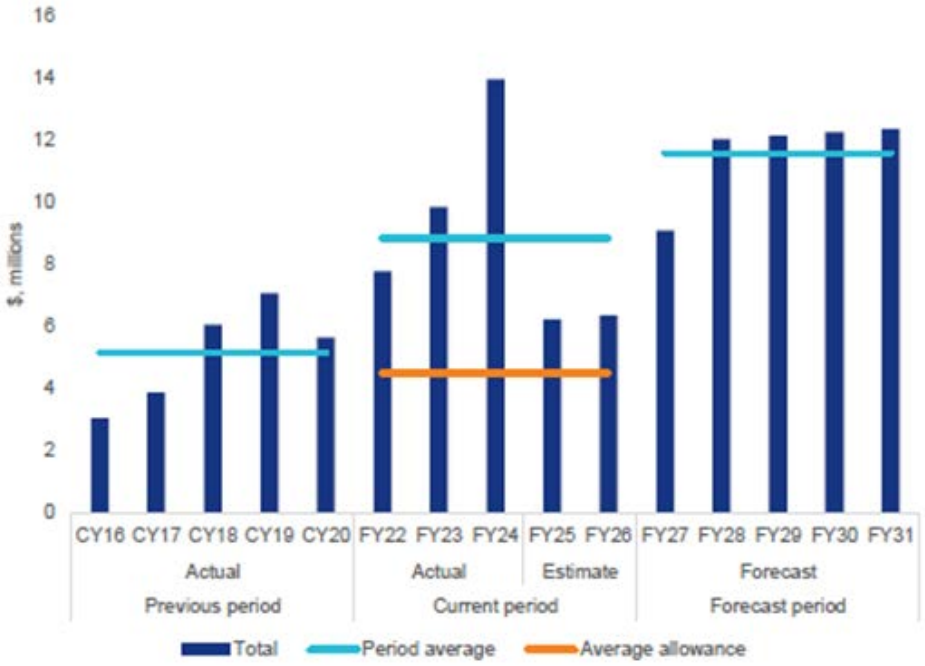
Source: IR#009 - Question 5 - Question 9 Forecast repex projects and programs

No modelling was provided to support the proposed intervention volumes or expenditure

164. The summary provided in the distribution asset class strategy[29] aligns with the information provided in the RIN and indicates that Jemena had been replacing a larger number of poles than it is included in its capex allowance.

[29] JEN – RIN – Support – Electricity Distribution Asset Class Strategy – 20250131 – Public

Figure 3.5: Historical and forecast expenditure for pole interventions



Source: Electricity Distribution Asset Class Strategy, Figure 6-5

165. We requested the model(s) that supports the forecast expenditure (or replacement volumes) and other means that demonstrate how Jemena has justified the proposed repex including through the use of cost benefit analysis or similar techniques as outlined in the Better Resets Handbook and Asset Replacement guideline. In its response we were provided with a summary spreadsheet[30] that included the key drivers, forecasting method and reference to the justification documents that we had already been provided. A further column was added to describe its modelling, which for poles stated:

- Condition-based pole replacement and reinforcement – Forecast is based on historic replacement and reinforcement volumes as submitted in annual RIN reporting.
- Replacement of staked poles – Refer to age profile for staked poles in life cycle strategy.

166. We were not provided with a forecasting model or economic model to demonstrate whether the proposed pole intervention program is prudent and efficient.

New programs have been introduced , and which we consider are more likely reflective of changes to the nature of poles interventions that have already occurred

167. The reasons for the increase in pole interventions are not clear to us from reading Jemena's material. We postulated that the step increase in the next RCP may be associated with the introduction of proactive programs in the first year of the next RCP. These include replacement of limited life and undersized poles, as shown in Table 3.3.

168. During our onsite discussion, Jemena referred to a decision that all undersized distribution poles that demonstrate signs of external decay will be either reinforced or replaced. In addition, a specific program is now in place to replace or reinforce all undersized poles on its network. However, the timing for the introduction of these programs was not clear to us and may have already occurred, in the current RCP. Jemena also made reference to having made reductions to its routine programs to allow for the newly introduced proactive programs.

169. Absent a better explanation, we consider that Jemena has already made these changes and is not proposing an increased pole intervention volume based on the introduction of 'new'

[30] IR#009 - Question 5 - Question 9 Forecast repex projects and programs

programs for the next RCP, as was first indicated in its asset class strategy.[31] If, the programs were new for the next RCP, we would have expected this to be made clear in the justification for the proposed repex, and it was not. We therefore consider that these programs are more likely reflective on ongoing interventions and not new.

170. This appears to be supported by comments in the asset class strategy that refer to similar programs being introduced during the period 2013 to 2021:

> *'• In recent years (2013 to 2021) several additional or extended criteria have been applied to the pole inspection and testing criteria to address identified performance issues. This has included the undersized pole program, changes to the testing criteria for class 3 poles, changes to the management and treatment of limited life poles and changes to the policies around pole reinforcement and pole types in the HBRA. This has resulted in elevated pole replacement and reinforcement rates during this period.*
>
> *• The above changes have now been in place for a complete 4-year cycle of pole testing and inspection and the associated surge in pole replacement and reinforcement activity driven by the new criteria and programs has passed.'*[32]

Jemena states that it considered alternate replacement volumes, however none were provided to us to support the proposed volumes

171. In its asset class strategy, Jemena states:

> *'In developing our forecast, we also considered options such as reducing pole replacement expenditure from current levels, undertaking age-based (rather than condition-based) replacement, performing replacements instead of life-extending reinforcements, and running assets to failure. However, we consider that replacement based on asset condition is the most efficient use of resources as it focuses more on assets that require attention.'*[33]

172. This exploration of the options discussed in its response was not presented for our review.

The key change for the next RCP relates to a change in the composition of its pole interventions

173. In Table 3.5 the total pole interventions have not materially changed between the current RCP and next RCP, with the proposed volume for the next RCP around 1% lower. However, Jemena is proposing a higher number of pole replacements, particularly for HV poles.

Table 3.5: Comparison of current and next RCP wood pole intervention volumes

	Current RCP	Next RCP	
	RIN	RIN	Asset class strategy
Pole reinforcement	4,472	3,555	3,556
LV pole replacement	943	1,085	1,081
HV pole replacement	1,277	1,852	1,852
ST pole replacement	79	216	216
Total	**6,771**	**6,708**	**6,705**

Source: EMCa derived from RIN and Electricity distribution asset class strategy, Table 4-10

174. We also observe this in a slight reduction to the proposed staking rate, as indicated in Figure 3.6. This trend appears to be directionally consistent with comments made by

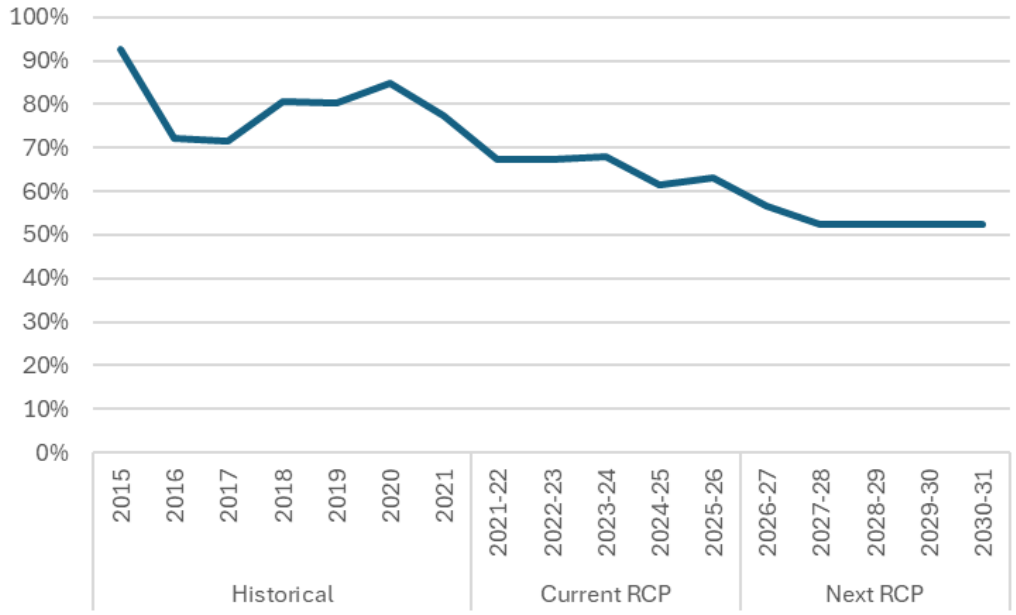
[31] As indicated by the data in Electricity Distribution Asset Class Strategy, Table 4-10

[32] JEN – RIN – Support – Electricity Distribution Asset Class Strategy – 20250131 – Public, page 34-35

[33] JEN – RIN – Support – Electricity Distribution Asset Class Strategy – 20250131 – Public

Jemena that its experience has been that a higher number of small diameter poles and already staked poles require replacement as they cannot be re-staked.

Figure 3.6: Comparison of forecast and historical pole staking rate



Source: EMCa derived from RIN

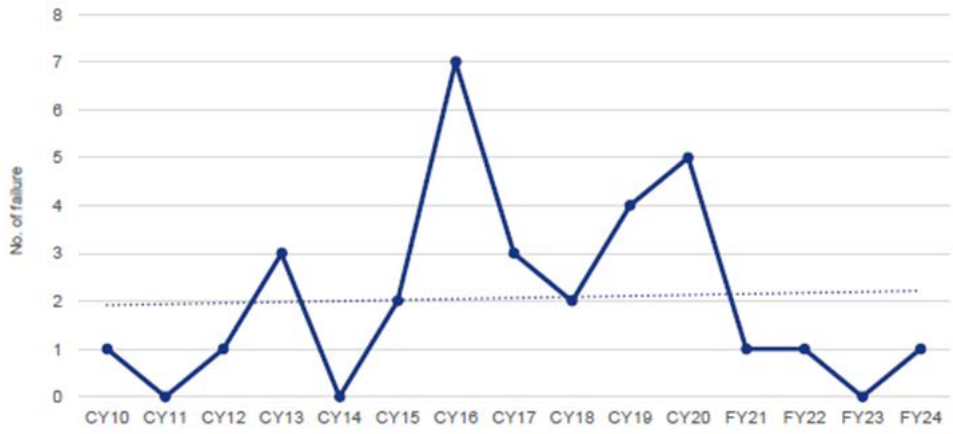
CBRM results present a materially lower intervention volume, which is not explained

175. The asset class strategy presents CBRM modelling that results in a replacement forecast of approximately 635 poles p.a. (excluding public lighting) which results in a forecast materially below what Jemena has proposed for the next RCP, and raises questions on the robustness of the CBRM outputs.

Asset failure and condemnation rates are low, and indicate that performance has been maintained

176. We reviewed the asset class strategy for drivers of a potential increase in pole interventions and found that the number of asset failures was flat over the long term, and decreasing over the last five years.

Figure 3.7: Number of in-service pole failures



Source: Electricity Distribution Asset Class Strategy, Figure 6-5

177. Further, that Jemena considers that the condemnation rates are expected to reduce by approximately 1.0% over the next few years and further trend down over the next 5 years. This trend is reflected in the small overall reduction to intervention volumes that Jemena has proposed.

Findings

178. Whist the intervention volumes that Jemena has proposed are similar, at a total level, when compared with the current RCP, we observe a change in composition of interventions that is contributing to the increase in forecast repex. We had expected to see, and did not see, evidence of a forecasting process and model that had been applied to justify the proposed intervention volumes, and specifically the change in composition.

179. However, we consider that the changes that Jemena has made are directionally consistent with Jemena's asset strategy for poles, specifically programs targeting undersized poles, replacement of staked poles and limited life poles not suitable for staking.

180. Jemena's unit rate is reasonable, albeit a small uplift from the current period, and it has maintained a reasonable staking rate, reflecting a lower cost intervention technique, that is above its peers.

181. On balance, we consider that the proposed intervention volumes and composition are reasonable, and given the other factors, that the proposed poles repex is reasonable.

3.3.2 Pole top structures

What Jemena has proposed

182. Jemena has proposed a pole top structure replacement program at an estimated cost of $44.6m for the next RCP, as shown in Table 3.6.

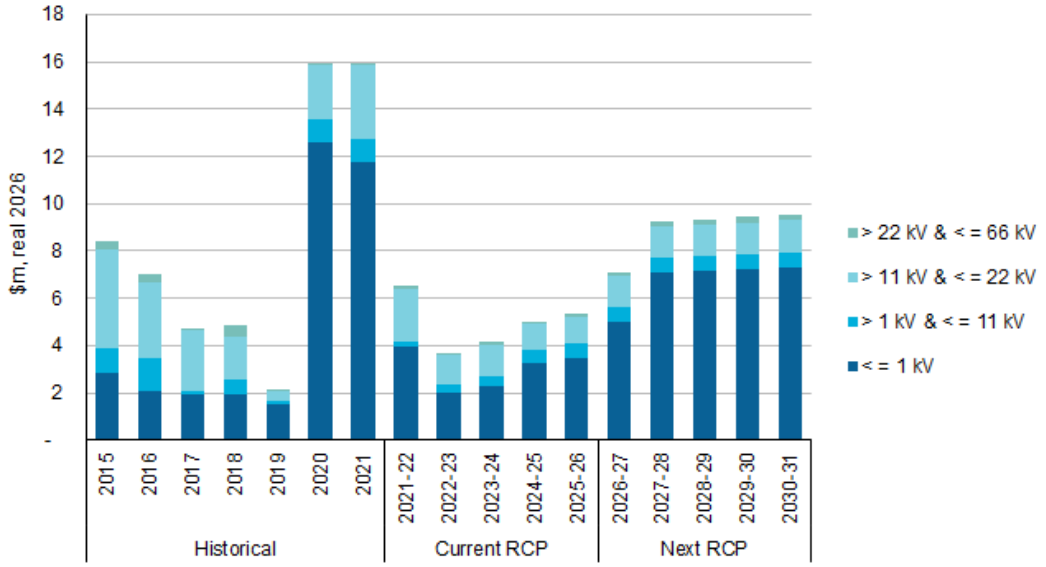
Table 3.6: EMCa scope of Jemena proposed pole top repex - $m, real FY2026

Pole top	2026-27	2027-28	2028-29	2029-30	2030-31	Total
HV Crossarms Replacement	1.8	1.8	1.8	1.9	1.9	**9.2**
LV Crossarm Replacement	5.0	7.1	7.1	7.2	7.3	**33.7**
ST Crossarm Replacement	0.1	0.2	0.2	0.2	0.2	**0.9**
HV Insulators Replacement	0.1	0.1	0.1	0.1	0.1	**0.7**
ST Insulators Replacement	0.0	0.0	0.0	0.0	0.0	**0.2**
Total	**7.1**	**9.3**	**9.3**	**9.4**	**9.5**	**44.6**

Source: EMCa table derived Jemena SCS capex model

183. The historical and forecast repex for pole top structures is shown in Figure 3.8.

Figure 3.8: Historical and forecast pole top structure repex - $m, FY2026



Source: EMCa derived from RIN data

184. Based on our analysis of RIN data, the proposed repex in the next RCP represents an increase of $20 million from the current RCP, driven by increased volume of replacement.

Assessment

Large increase in replacement volumes not adequately explained

185. In its capital expenditure attachment 5-01, Jemena proposes to replace 11,903 pole top structures (crossarms) in the next RCP. Jemena states that this volume is higher than its estimated number of pole top structures to be replaced in the current RCP of 6,784 but not significantly higher than the actual pole top structures replacement of 9,307 in the previous RCP.

186. The increases predominantly relate to 1kV pole top replacement (LV).

Forecasting methods were described as based on historical levels which does not explain the proposed increase

187. In response to our information request, Jemena provided a summary of its forecasting methods, which we have reproduced in Table 3.4.

Table 3.7: Summary of forecasting methods for pole top structures

Type	Program	Key driver	Forecasting method
Routine	Condition-based pole top structure replacement	Condition Faults Compliance (ESMS)	For recurrent program such as the conditioned based replacement of pole top structures JEN used CBRM, to estimate the future trend in the volume of ongoing programs based on asset information such as age and distribution of failure. For HV and ST crossarms forecast volumes from CBRM were reduced to align with historical replacement volumes, this was necessitated due to the conclusion of proactive replacement programs i.e. Pole Top Fire Mitigation. For LV crossarms forecast volumes from CBRM were reduced to align with historical replacement volumes and adjusted due to increasing risk from LV insulators.

Source: IR#009 - Question 5 - Question 9 Forecast repex projects and programs

Forecasting model was not provided

188. Jemena did not submit a forecasting model, or an economic model to demonstrate that the proposed pole intervention program was prudent and efficient.

Output of CBRM modelling was not relied upon in developing the forecast

189. The description of the forecasting methods applied by Jemena in Table 3.4 indicates that Jemena had reduced the volumes derived from its CBRM models. However, we were not provided with a description of the nature of the reductions, or explanation of the criteria applied.

190. In its asset class strategy, Jemena presents the outputs of its CBRM models which are the health index (HI) profile for crossarms and insulators, indicating the need to replace 18,450 pole-top structures in the next RCP:

- ST and HV crossarms and insulators – a total of 430 HV and SV crossarms and associated insulators are said to need replacement annually, and
- LV crossarms and insulators – a total of 3,260 LV crossarms and associated insulators are said to need to be replaced annually.

191. Despite this, Jemena is proposing a lower forecast of 11,903 pole-top structure replacements, which it describes as resulting from its condition monitoring assessment, including inspections (and not its CBRM models).

Limited reliance can be placed on CBRM outputs for forecasting

192. We observed that the proposed pole intervention forecast exceeds the output of its CBRM forecast. However, for pole top structures, Jemena describes the intervention volumes as being materially lower than its CBRM models outputs. We consider that these trends raise doubts over the robustness of the CBRM models, and the reliance that can be placed on them for the purposes of forecasting the required interventions.

Jemena indicate that recent investments has reduced failure rates

193. In its documentation, Jemena states that failures of HV and ST crossarms are decreasing:

'The number of in-service crossarm failures of ST and HV crossarms is on a downward trend assisted by the pole top fire mitigation program. This program targets at risk timber ST and HV crossarms and replaces them with new steel crossarms. This trend is expected to continue into the future as the population of timber ST and HV crossarms

diminishes with time. It is anticipated that over the next decade all timber ST and HV crossarms will be all replaced with steel crossarms.'[34]

194. However, failures of LV crossarms are increasing:

'Recent investment in reducing the backlog of maintenance notifications related to LV crossarms has resulted in a decrease in failure rates, however, the trend shows that in-service failures for LV crossarms have been significantly increasing. In order to maintain

the current level of in-service failures continued investment in LV crossarm replacement will be required.'[35]

Findings

195. We consider that the proposed pole top structure repex is overstated, specifically that Jemena has not sufficiently justified the proposed increase. The information provided by Jemena does not support an increase in pole top structure volumes above what Jemena has been undertaking to maintain service levels.

3.3.3 Overhead conductor

What Jemena has proposed

196. Jemena has included an undersized neutral replacement project in its conductor program at an estimated cost of $1.4 million for the next RCP, as shown in Table 3.8.

Table 3.8: EMCa scope of Jemena proposed overhead conductor repex - $m, real FY2026

Overhead conductor	2026-27	2027-28	2028-29	2029-30	2030-31	Total
Undersized Neutral Replacement	0.1	0.3	0.3	0.3	0.3	**1.4**

Source: EMCa table derived Jemena SCS capex model

197. Jemena has proposed a total of $12.5 million for conductor repex which includes additional conductor replacement programs. Given (i) the small size of the program we have been asked to review, and (ii) to our knowledge it is a new program for the next RCP, there is limited value in reviewing the long-term trend in expenditure for this RIN asset group.

Assessment of undersized Neutral Replacement program

Program appears to be reactive in nature

198. The summary information included with the regulatory proposal did not include a description of this program. We asked Jemena to provide details of its proposed undersized neutral program, which to us appeared as a newly introduced program for the next RCP. Jemena stated that:

'An Undersized Neutral is any neutral in JEN that is not appropriately rated for the electrical conditions in which it operates, all asset types containing a neutral can be subject to an undersized neutral.'[36]

199. In its description of asset replacement strategies included in the asset class strategy, Jemena states that for undersized neutrals:

'Customarily neutrals were designed for typical 3 phase balanced loads. However, with the evolution of electronically switched power supplies and exported energy, neutral

34 Jemena Electricity Distribution Asset class strategy, page 59

35 Jemena Electricity Distribution Asset class strategy, page 59

36 Q9 - DRAFT Explanatory note - Undersized Neutral (15042025) - Confidential

currents have appreciably increased resulting in some overloaded neutrals. Undersized neutrals can cause poor supply quality, unsafe stray neutral/earth currents, and ultimately significant electrical and safety events upon failure.

When an undersized neutral is identified it shall be referred to the Network Assets team for assessment.'[37]

200. Based on the description of its purpose, this appears to be a reactive program, and we consider that it is more likely to form part of a response to quality of supply investigations (or complaints). This also appears to be supported by comments from Jemena in response to our information request, where Jemena describes the existing controls for issues arising from undersized neutrals as follows:

'The existing controls to mitigate the risk associated with undersized neutrals are:

1. Quality of Supply investigations.

2. Augmentation of the LV network to reduce current levels and/or rebalance the LV reticulation through JEN analytics.

Additional controls are:

1. To expand the AMI neutral integrity regime to circuit mains neutrals.

2. Replacement of smaller gauge conductors when identified in QoS investigations.'[38]

201. As a reactive program, it is therefore more likely to be included as opex (through phase balancing) or in the augex program allowance for the purpose of network reinforcement or upgrades arising from the outcome of its quality of supply investigations, and not as a new repex program.

Forecasting methods do not indicate the basis of the forecast for the next RCP

202. In response to our information request, Jemena provided a summary of its forecasting methods, which we have reproduced in Table 3.9.

Table 3.9: Summary of forecasting methods for undersized neutral conductor

Type	Program	Key driver	Forecasting method
Non-Routine	Undersized neutral replacement	Health & Safety (General Public) Compliance (ESV Audit)	For this proactive program, the population of undersized neutrals known in GIS was used. This is a new program submitted for FY27-31.

Source: IR#009 - Question 5 - Question 9 Forecast repex projects and programs

203. However, the above description did not provide details of how Jemena determined the replacement volumes, or the proposed expenditure.

Forecasting methods for the conductor replacement program do not appear to apply

204. We also considered whether the forecasting method for the broader conductor replacement program may apply to this program. The asset class strategy outlined that Jemena makes use of historical trends (either volume or expenditure) for its condition-based conductor replacement, however as a new project, this would not apply to undersized neutrals.

37 Jemena Electricity Distribution Asset class strategy, page 95

38 Q9 - DRAFT Explanatory note - Undersized Neutral (15042025) - Confidential

Findings

205. We consider that Jemena has not justified its proposed undersized neutral replacement project. Jemena has not provided sufficient information to determine whether the basis of this program is prudent and efficient, or that it is not already included in its reactive power quality program.

3.3.4 Transformers

What Jemena has proposed

206. The scope for our assessment for the Transformer asset group is shown by asset category in Table 3.10.

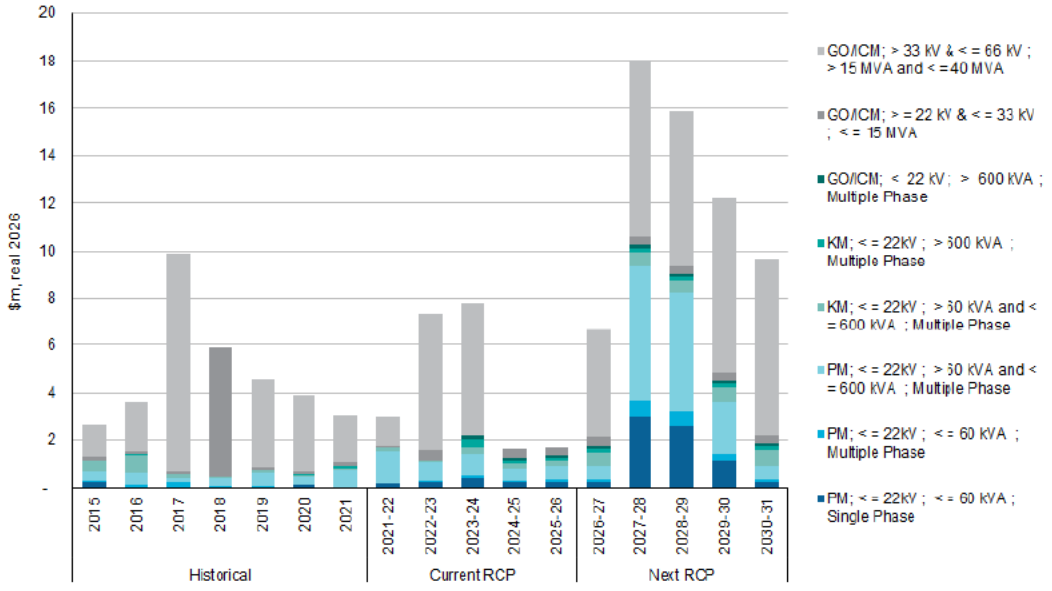
Table 3.10: EMCa scope of Jemena proposed transformer repex - $m, real FY2026[39]

Transformers	2026-27	2027-28	2028-29	2029-30	2030-31	Total
Relocating assets that are in high-flood risk zones	-	8.4	7.3	2.7	-	18.4
Replace all 66kV EE SRBP bushings	-	0.6	1.2	0.6	-	2.4
Replace GOB bushings	-	-	-	0.7	1.4	2.1
Replace GSA transformer bushings	0.3	0.6	0.6	0.6	0.6	2.7
Total	**0.3**	**9.6**	**9.1**	**4.6**	**2.0**	**25.5**

Source: EMCa table derived Jemena SCS capex model

207. In Figure 3.9 we present the historical and forecast expenditure for the transformer asset group in the RIN. Expenditure reported in the transformer asset group in the RIN will differ from the project-based expenditure, as major plant replacement works (such as transformer replacements) are allocated across multiple RIN asset categories to reflect the nature of the work undertaken.

Figure 3.9: Historical and forecast transformer repex - $m, real FY2026



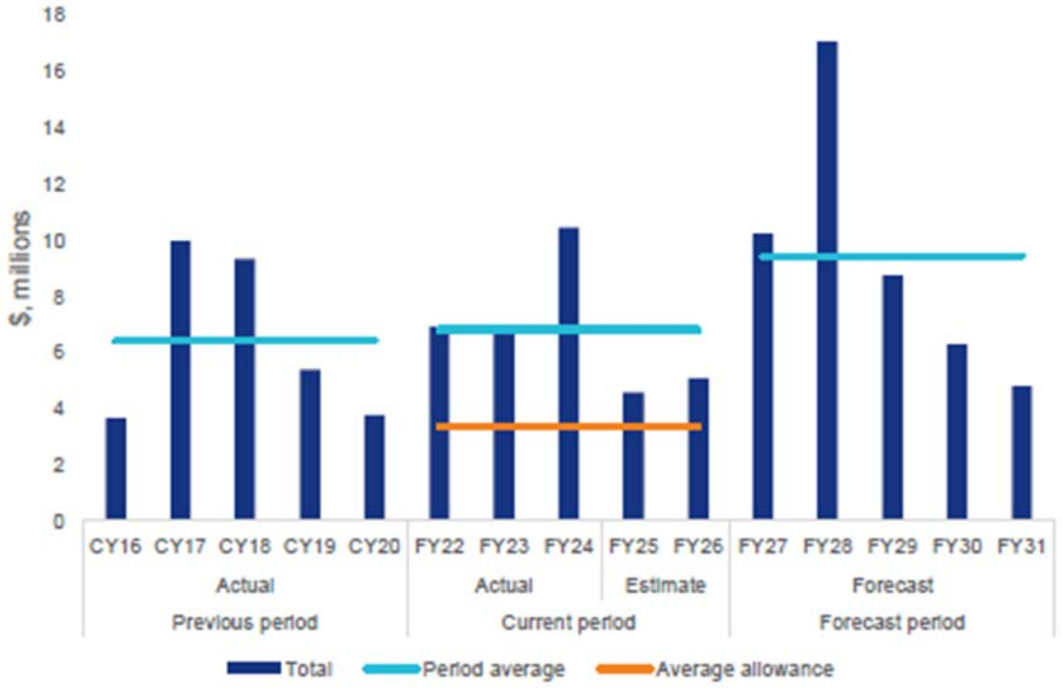
Source: EMCa derived from RIN data

[39] Jemena has proposed additional transformer replacements included in its substation redevelopment projects of CS, CN and NH, and which we assess within the switchgear section

208. We observe an increase in transformer repex for pole-mounted and ground-mounted transformers.

209. In its capital expenditure attachment,[40] Jemena states that historically, it has been spending $6M - $7M p.a. on average for the replacement of substation and distribution transformers. This is based on its calculation of an average across the current RCP including estimated repex for the remaining years. The profile relied upon by Jemena in generating this figure is shown in Figure 3.9 and does not align with the RIN data.

Figure 3.10: Historical and forecast transformer repex - $m, real FY2026



Source: Att 05-01 capital expenditure, Figure 6-23

210. Similarly, Jemena summarises its forecast as being an annual average of $9 million in the next RCP made up of specific projects, including

- Replacing transformers at the CN zone substation and transformer bushings at CS and NH zone substations,
- 66kV bushing replacement program,
- Relocation of distribution transformers and related assets that are in high flood risk zones, and
- Continue routine distribution transformer replacements.

211. Our review focusses on substation transformers and therefore does not extend to identifying all projects that make up the forecast repex, or reasons why the data presented by Jemena does not align with the RIN data.

Transformer replacements included as a part of the proposed substation redevelopment projects are include din our assessment of the switchgear assets

212. Jemena has included expenditure associated with the transformers and transformer bushing replacement at the Coburg North (CN), Coburg South (CS) and North Heidelburg (NH) zone substations in the next RCP as a part of broader substation redevelopment projects. This includes:

[40] JEN - Att 05-01 Capital expenditure - 20250131 - Confidential

- replacement of transformers No.1 and No.2 in the CN zone substation due to condition, and replace all transformer bushings
- replacement of transformer HV bushings in the CS and NH zone substations due to historic failure and catastrophic consequences, such as fires destroying the total transformer. Replacing the bushings will also warrant HV current transformer replacement, affecting the turrets and transformers and requiring extensive testing before returning to service.

213. As discussed in section 3.2.3, we include our assessment of these projects in our assessment of the associated switchgear replacement in section 3.3.5, so as to review the redevelopment project in its entirety. In that section, we conclude that the transformer replacement projects are not sufficiently justified.

Assessment of relocating assets that are in high-flood risk zones

The project targets a single area impacted by the Maribyrnong River floods

214. This project is also referred to as the Maribyrnong project. Jemena describes the project arising from modelling activities undertaken by Melbourne Water that resulted in reclassifying certain communities that Jemena serves as being 'high-flood risk zones.'

215. Following the 2022 Maribyrnong River floods, Melbourne Water updated its flood risk modelling in line with Australian Rainfall and Runoff (ARR) guidelines, which is the industry standard for flood modelling.

216. The project is intended to move the assets from flood susceptible locations to new locations out of the flood plain onto higher ground as a way to negate the impact on the assets from a flood event. This involves relocating assets that are in high-flood risk zones within the Flemington area.

217. Jemena proposed the Maribyrnong project to reduce the risk of assets in the Flemington area suffering flood damage, which could in turn cause an outage, inconveniencing customers and hindering restoration efforts.

218. Jemena has identified 23 distribution pillars, pits and cabinets, 19 distribution substations and 3 sub-transmission cables for relocation. Whilst the program is included in our review of transformer repex, we understand the expenditure has been allocated to the individual asset categories to which it relates in the RIN. We have not been provided with the allocation model. Based on the capital expenditure attachment 5-01, only $1 million of the proposed project costs is included in the transformer forecast expenditure, with the remaining costs captured under underground cables repex.

The driver is avoidance of long-duration outages caused by the potential outcome of an extreme weather event

219. Based on discussions with Jemena, the project driver appears to be in response to the increase in risk of a major weather event leading to flooding of the Maribyrnong River. However, this risk has not been quantified.

220. The increasing risk of a major weather event has typically been considered to form part of resilience expenditure. In the capital expenditure attachment 5-01, Jemena had initially presented this project to customers as being resilience expenditure given that the driver of this project is the avoidance of long-duration outages caused by an extreme weather event:

> *'During the development of the Draft Plan, we have considered the Maribyrnong project to be one of our Network Resilience projects and have consulted our customers on that basis. Our customers have supported the implementation of this project during the next regulatory period. We explain in section 7 our customers' support for this project, including our reasons for treating it as a network replacement project instead of network resilience.'*[41]

41 Capital expenditure attachment 5-01, page 92

221. We reviewed the information provided in section 7 of Jemena's capital expenditure attachment, and which provides the argument for recognising the expenditure as replacement based on the following:

> *'…while we are confident our customers support this expenditure and climate impact modelling suggests the risk of a flood (and associated long-duration outage) will continue to increase into 2050, JEN does not believe the current level risk of a long-duration outage, as evidenced by newly published Melbourne Water flood risk modelling is tolerable. This is incompatible with the AER's resilience assessment criteria which requires networks to maintain current service levels in the face of increasing climate risk.'*[42]

222. Jemena goes on to conclude that:

> *'JEN has chosen to categorise this expenditure as part of our 'modelled repex'. Although we are bringing forward the replacement of some of these assets (in order to relocate the asset outside the flood risk plane) we believe this is prudent and efficient asset management …'*[43]

223. Whilst the classification of expenditure is a matter for consideration by the AER, repex is typically incurred to address deterioration of assets based on an assessment of condition or obsolescence, including works driven by reliability deterioration or an assessment of increasing risk.

224. We consider that the statements relied upon by Jemena reinforce consideration of the proposed expenditure in accordance with the resilience assessment criteria.

Jemena has not provided sufficient risk assessment to justify this project

225. We understand that Melbourne Water considered a number of areas where the flood risk had been modified along the Maribyrnong River, and that these areas were within Jemena's network service area. We did not see a risk assessment by Jemena that considered each of these areas and assessed the risk to the assets located in each of these areas and risk to customers arising from the changes in flood risk as determined by Melbourne Water.

226. Jemena has proposed a single project only in response, and it is not possible from the information provided to determine whether this project is a reasonable and prudent response to the identified risk. Nor have we seen evidence of an asset-based risk assessment, that assists identify prudent solutions. For example, we have not seen demonstration that the increase in flood risk results in an intolerable risk for operation of the sub-transmission cable such that the only credible and reasonable control for the identified risk is replacement of the sub-transmission cable.

227. On the basis that this project addresses an increase in risk, we would expect to see and have not seen an assessment of the risk, and economic benefit of the project including bringing forward the replacement of the identified assets. Nor have we seen an estimate of prudent timing or costs associated with this project, that would support proceeding with this project in the next RCP.

228. We have not been asked to review the resilience program proposed by Jemena, or the response from customers. The program may provide some insight into how Jemena has selected and/or prioritised this location over others, and the selection of the included assets.

Assessment of transformer bushings replacement

229. Jemena has included a targeted transformer bushings replacement program which involves testing of approximately 60% of 66kV transformer bushings (covering 17 substations) and assessing their condition prior to conducting any bushing replacement. A total of 36 sets of 66kV transformer bushings have been included in the forecast.

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42 Capital expenditure attachment 5-01, page 118

43 Capital expenditure attachment 5-01, page 118

230. This program has been recorded as three separately identifiable projects in the SCS capex model:

- Replace all 66kV EE SRBP bushings, Synthetic Resin Bonded Paper (SRBP)
- Replace GOB bushings, Oil Impregnated Paper (OIP) of ABB type GOB, and
- Replace GSA transformer bushings, Resin Impregnated Paper (RIP) of Hitachi/ABB GSA – RIP design.

231. We understand that the results of the proposed bushing condition monitoring program will directly feed into the bushing replacement program.

232. Jemena has identified potential issues with its population of transformer bushings. Adoption of a bushing replacement program has been shown in other DNSPs as an effective strategy to mitigate against a key cause of transformer failure. Jemena has undertaken an economic assessment of its preferred option with a positive NPV. We consider that the targeted nature of this program is prudent.

Findings

233. We consider that the proposed transformer repex is overstated.

234. For the proposed program to relocate assets in a particular high-flood risk zone, Jemena has not provided sufficient evidence of a risk assessment undertaken for network assets that justifies proceeding with this project, over other projects in the next RCP. When we look at the driver of the project, it more naturally aligns to the avoidance of long-duration outages caused by the potential of an extreme weather event, which is more typically considered as part of a network resilience package which we have not been asked to review.

235. We consider that the bushing replacement that Jemena has proposed is reasonable.

3.3.5 Switchgear

What Jemena has proposed

236. The scope for our assessment for the switchgear asset group is shown in Table 3.11.

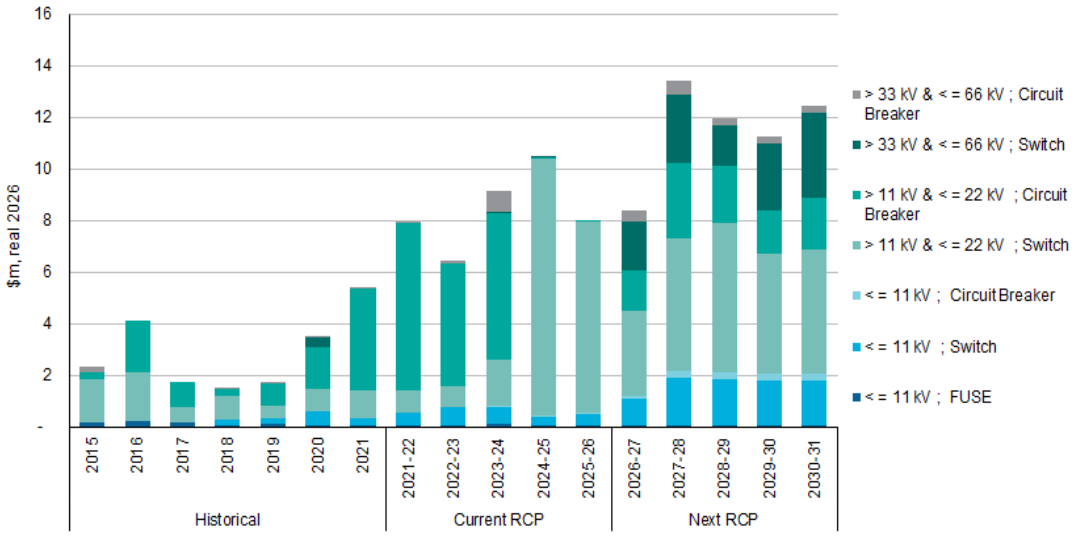
Table 3.11: EMCa scope of Jemena proposed switchgear repex - $m, real FY2026

Switchgear	2026-27	2027-28	2028-29	2029-30	2030-31	Total
CN zone substation redevelopment	21.6	23.9	0.0	0.0	0.0	**45.5**
Replace CS 22kV switchgear (arc flash risk), 66kV isolators, 66kV CB, earth switch and transformer bushings	0.0	2.8	8.5	6.0	0.0	**17.3**
Replace NH 22kV switchgear, 66kV CB, 66kV isolator and earth switch	0.0	0.0	0.0	4.2	10.6	**14.8**
Replace BLTS 22kV switchgear	0.0	2.9	3.4	0.0	0.0	**6.3**
Replace MAT 66kV busbar and isolator	0.0	0.0	0.0	0.7	1.1	**1.8**
Total	**21.6**	**29.7**	**11.8**	**11.0**	**11.7**	**85.8**

Source: EMCa table derived Jemena SCS capex model

237. In Figure 3.11 we present the historical and forecast expenditure for the switchgear asset group in the RIN. Expenditure reported in the asset group in the RIN will differ from the project-based expenditure, as major plant replacement works (such as transformer and switchgear replacements) are allocated across multiple RIN asset categories to reflect the nature of the work undertaken.

Figure 3.11: Historical and forecast switchgear repex $m FY2026



Source: EMCa derived from RIN data

238. We observe an increase in 22kV and 66kV switchgear replacement relative to historical trends.

Assessment

Two targeted asset replacement projects are included without supporting justification

239. Jemena has included two projects for the replacement of 22kV switchgear at BLTS and 66kV busbar and isolator at MAT substations.[44] We identified these projects from its capex model. Jemena did not provide any further supporting information on these projects.

240. We asked for a business case and economic model to support the proposed expenditure and were directed to the Primary Plant Asset Class Strategy.[45] Jemena did not provide a business case or an economic model, nor did it provide a description of scope or cost estimate. We therefore relied on the contents of the asset class strategy document.

241. On review of the Primary Plant Asset Class Strategy, we did not find sufficient justification for the inclusion of these projects in the next RCP. Whilst there was a reference to potential 22kV switchgear replacements at BLTS, the strategy indicated that the work referred to was planned for completion in the current RCP as described in Table 3.12. On the basis of the HI and identified issues, the switchgear replacement was a candidate for replacement, however we have no means to determine if the scope is what Jemena has proposed for the next RCP, or that the scope and timing is prudent. There is no mention of MAT 66kV busbar and isolator planned replacement, or reference to issues at this site that may give an insight into the rationale for this project.

44 BLTS and MAT are HV customer substations with JEN assets installed.

45 JEN – RIN – Support – Electricity Primary Plant Asset Class Strategy – 20250131 - Public

Table 3.12: References to proposed switchgear replacement in asset class strategy

Substation	Switchgear	Proposed replacement notes	*Additional comments*
BLT (BLTS), Melbourne Water	22kV switchgear (qty of 2) Email/WR 345GV type with elevated HI @ year 0.	22kV MB FDR CBs future planned replacement 2026 (also reference in table 4-33 of Replace MB feeder CBs (2 off), isolators and surge diverters Aged asset. Failure history, deteriorated bushings and mechanism problems.)	*The 22kV Email 345GC circuit breaker is an outdoor oil-filled CB. The CBs have been undergoing a bushing refurbishment program due to a history of compound leaks from the bushings. The remaining 345GC CBs at zone subs AW, BD and BLTS will be considered for replacement during the next price review period*
BLT (BLTS), Melbourne Water	22kV disconnectors /isolators /earth switches (qty of 2) with elevated HI @ year 0	To be replaced with CB planned replacement.	*Further scenario analysis will be undertaken to determine optimal replacement schedules however the assets identified at AW, BD, CN, BLT(MB feeders), EP, FW and HB as being in poor condition at Year 0 will take priority.*
Melbourne Airport (MAT)	No references found		

Source: EMCa derived from Electricity Primary Plant Asset Class Strategy

242. We conclude that Jemena has not demonstrated that proceeding with these projects in the next RCP is prudent.

Large increase in repex is driven by three substation redevelopment projects at CN, CS and NH

243. According to its regulatory proposal, the higher forecast expenditure for switchgear is driven by the proposed redevelopment of CN, CS and NH zone substations.

244. Jemena has provided a business case for each of these projects. Each business case includes a summary of the current issues with the substation assets, and which supports a case that the identified condition issues require action. Jemena has also included an economic model for these projects.

Options considered for the substation redevelopment are reasonable

245. Jemena has considered five options for its three proposed substation redevelopment projects; however, Jemena had already determined that asset strategies were no longer effective and that it would treat the identified issues at a substation level:

1. Do nothing.
2. Increased maintenance and monitoring.
3. Redevelop the zone substation.
4. Staged replacement of assets, and
5. Non-network solution.

246. Jemena provide cost estimates for these sites that comprise direct labour, subcontract, prelim and plant, materials, risk allowance and overheads. The direct capex component was used as the input to the capex model.

Jemena has not provided compelling information to support the identified risk at the substation sites which requires replacement in the next RCP

247. Jemena states that a network asset risk assessment had been completed for assets installed at the substations targeted for the next RCP, concluding that the risk assessment results highlighted that the current condition of assets and controls implemented exceed JEN's risk appetite and require further treatment. We were not provided with a copy of the risk assessment.

248. We asked for additional information to support the proposed substation replacement projects and were provided with copies of the information already provided with Jemena's submission. In respect to our request for condition reports on the target assets, we were provided with three reports for CN substation which we have taken account of in our review.

249. Jemena makes use of CBRM, which was introduced for JEN disconnectors and buses in 2014, to predict conditions in the future (Health Indices) and to estimate the Probability of Failure. Jemena states that these tools are utilised, amongst other things to determine when end-of-life replacement will be required. Assets with a higher health index score are targeted for further analysis before imminent replacement.

Transformer condition

250. Section 1.7 of the asset class strategy covers zone substation power transformers. The strategy includes CBRM results and indicates that transformers at two substations have the highest HI indicating that the transformers are in poor condition. However, the strategy indicates that these will be replaced in the current RCP, and are not installed at CN, CS or NH.

251. The CBRM results show 5 transformers (as of 2024) in the red zone with Health Indices (HI) of >7. This increases to 13 transformers in the red zone, (HI>7) in 5 years, and at the 5-year level include No.1 and No.2 transformers at CN substation. Jemena also include EP substation, which is the focus of proposed augex associated with the ongoing network conversion in the area. We provide a summary of the findings in Table 3.13.

Table 3.13: Transformer CBRM results

ZSS	Estimated replacement timeframe	Reasons for replacement	*Comments*
CN No.1 and No. 2	2029	Poor DP, fair oil quality, high moisture	*Paper sample and full transformer testing to continue. Prediction using CBRM.* *Consider replacement to line up with switchgear replacement, modular switchroom. Scheduled aligned to 22kV CB replacement.*
EP			*Retirement to occur during voltage conversion.*

Source: Electricity Primary Plant Asset Class Strategy

252. The condition of the CN transformers is described as follows:

- *Monitoring of the No.2 transformer diverter switch oil leaks is continuing. Remedial work will be undertaken as required. It is anticipated that gasket replacement will be necessary, and*
- *No.1 & No.2 transformers moisture in paper is high, and Interfacial Tension (IFT) is poor.*

253. In response to our information request, Jemena has provided a sample of condition reports for CN substation only, and in relation to the transformers only:[46]

- CN Tx Insulation Condition Assessment

[46] In response to IR006 question 11

- CN Tx Test Report
- ZSS CN NO.2 TRANSFORMER CONDITION REPORT, and
- ZSS CN Transformer Condition Health Index.

254. Based on our reading of the oil analysis test report, the independent test results deemed the oil analysis results as acceptable for all three transformers, despite poor IFT for No. 1 and No. 2 transformers. The insulation condition assessment for transformer No. 1 indicated a lower Degree of Polymerisation (DP) value, indicating that the transformer is in high aging and that the paper insulation moisture content was 5.1%, which is very high. The report had a recommendation to dry out the transformer.

255. The transformer condition health index workbook recorded the values of paper moisture content and IFT values as 'red' corresponding with a rating of 'Initiate Life Extension Program or Replacement' corresponding with poor oil test results. The workbook was limited to the CN and CS transformer test results and did not extend to a calculation of HI for the transformers.

256. Based on the business case, the current average HI for the transformers is 7.05, predicted to increase to 8.21, and therefore a candidate for further investigation rather than immediate replacement. It is not clear whether life extension options had been assessed and rejected, prior to considering replacement.

257. We were not provided with the list of transformers to review. Given that 13 transformers were identified in the 'red' zone and only two transformers are planned for replacement (and a further two for retirement) this cast doubt on the level of reliance that Jemena has placed on the CBRM model outcomes, or 'red' zone as a trigger for replacement.

Switchgear condition

258. Section 1.8 of the asset class strategy[47] covers zone substation circuit breakers. The strategy includes current CBRM results which indicate that a total of 92 circuit breakers are in poor condition (HI > 7) with a higher probability of failure (as at 2024). Later in the document, it states that 150 circuit breakers (as at 2024) are in the 'red zone' with health indices of 7 or above.

259. The document includes planned / future CB replacement projects for the next RCP for CBs located at BLT, CN, CS and NH.[48]

260. Jemena has included the results of its CBRM modelling at year 5 (2028) and year 10 (2033), which increases the number of circuit breakers with a HI > 7 to 203 and 214 respectively. Based on the descriptions provided in the asset class strategy, Jemena has proposed the circuit breaker replacement in the next RCP as shown in Table 3.14.

47 JEN – RIN – Support – Electricity Primary Plant Asset Class Strategy – 20250131 – Confidential

48 JEN – RIN – Support – Electricity Primary Plant Asset Class Strategy – 20250131 – Confidential, Table 4-24

Table 3.14: Proposed switchgear replacement at BLT, CS, CN and NH

ZSS	Qty	Type	Estimated replacement timeframe	Reasons for replacement	*Comments*
BLT	2	Email / WR 345GC	2026	Condition	*Replace MB feeder CBs, isolators and surge diverters* *Aged asset. Failure history, deteriorated bushings and mechanism problems.*
CN	1 6 12 1 1	Crompton Greaves Siemens 3AF Email / WR 345GCASEA HLC AEI LG4C	2028	Condition	*Replace 22kV switchgear with 3 new 22kV modular switchrooms & new control room* *Aged asset. Failure history, deteriorated bushings and mechanism problems.*
CS	1 11	AEI LG4C Sprecher & Schuh	2029	Condition	*22 kV switchboard showing evidence of partial discharge (Not rated for arc fault containment) & 66 kV LG4C* *Aged asset. Failure history, deteriorated bushings and mechanism problems.*
NH	1 13	AEI LG4C Sprecher & Schuh	2031	Condition	*22 kV switchboard showing signs of partial discharge (Not rated for arc fault containment) & 66 kV LG4C CB*

Source: Electricity Primary Plant Asset Class Strategy

261. In addition, circuit breakers at EP are identified for retirement as a part of the network augmentation project and redeveloped as EPN. The list of substations aligns with Jemena's proposal.

262. We also asked Jemena for a copy of its CBRM model for circuit breakers. For the sample we reviewed, we consider the HI values at year 0 (2024) from its model[49] are broadly aligned with those published in the business case.

Disconnector and busbar condition

263. Similar to CBs, the asset class strategy identifies a total of 296 disconnector and busbar assets have been identified to be in poor condition with a higher probability of failure. As for CBs this is forecast to increase to 403 and 405 assets respectively.

264. The forecast replacement volume data only extends to 2026 and therefore concludes prior to the next RCP. Accordingly, we were not able to determine if Jemena had identified works at MAT or to ascertain the driver of these works.

265. We also asked Jemena for a copy of its CBRM model for disconnectors. Based on this model,[50] the MAT isolators and bus were installed in approximately 2002, with an extension (bus 3) in 2016. The current HI values at year 5 range from 1.8 to 4.1 and therefore would be considered in good condition during the next RCP.

266. Absent compelling evidence to replace these assets, we do not consider that Jemena has demonstrated that this project meets the requirements of the NER.

267. We were able to confirm that the HI values for isolators installed at CS, CN and NH substations had, in general, HI values that exceeded 7 which is indicative of deteriorated condition. However, on closer inspection, we found (i) the 66kV isolators to have a

[49] JEN - IR009 - Q15 - Zone Substation Circuit Breakers CBRM - Confidential

[50] JEN - IR009 - Q15 - Zone Substation Isolators CBRM - Confidential

materially lower HI for CS than for NH, installed in 1978 and 1974 respectively, and (ii) HIs lower than an asset considered to be at mid-life (which typically has a HI of around 5.5).

268. These differences appear to be a function of the formulas used in the CBRM model whereby the increase in HI is discontinuous around the service age, meaning that an asset which has not reached its service life may have a much lower HI than one that has exceeded its service life. The CBRM model is developed as follows:

- an aging factor is applied from a minimum HI up to its service life
- at its service life (e.g. 50 years) the asset is given a HI of 7
- a different aging factor is applied to the HI.

269. Despite the discontinuity around the service life, the assets are reasonable candidates for consideration of replacement options.

Calculation methods for PoF lead to an inflated risk of failure

270. Jemena has assumed a constant probability of failure for its transformers, expressed as a Probability of Asset Failure (Annual) for CS of 38.47% and CN of 69.7% and which materially overstates the annual probability of failure. The model appears to base this on the assumed bushing failure rate of 10% and then calculates the chance of a transformer bushing failing within a 20-year period as a constant probability of failure. This is not the same as determining the annual probability of failure of the transformer or transformer bushing.

271. We asked for an explanation of the formulas and input assumptions applied by Jemena to ensure that we had understood the method that it had applied. During our onsite discussions we referred to the methods being applied by Jemena differing from the AER guidance materials. In response to our request, Jemena reproduced the formulas included in its model.

272. As a further example, Jemena has included a different method for the unplanned failure risk which shows a probability of failure decreasing over time in the estimate of its base case risk, and therefore the costs of an unplanned asset failure decrease to zero which is not credible.

Jemena has not modelled the risk in accordance with AER guidance or industry practice

273. Included in each of the business case documents for the substation redevelopment projects, Jemena states that:

> *'In preparing this business case, JEN have considered and closely followed relevant AER assessment guidelines. This includes, but is not limited to, the Better Resets Guideline and Expenditure Forecast Assessment Guideline.'*[51]

274. We don't see evidence that Jemena has applied the AER guidance materials, which have been applied by other DNSPs since their inception.

275. We consider that common practice for asset replacement planning, consistent with AER guidance including the Asset replacement guidance note, is to assume that the probability of failure for an asset increases with time, and the rate of increase is correlated with the condition of the asset. It is common to apply Weibull functions for this purpose. When applied to risk-cost analysis as outlined in the asset replacement guidance note, this results in an increasing cost function that can be compared with the cost of intervention to rescue the risk (modelled as a benefit).

276. Common Weibull functions and parameters are available from industry sources and other DNSPs, which can be applied to Jemena's network and compared with its own observed experience.

[51] For example, JEN – RIN – Support – Coburg North ZSS Redevelopment – Business Case – 20250131 – Public, page 4

CBRM model appears to calculate probabilities of failure, however these are not relied upon for asset replacement

277. Inspection of the CB CBRM model shows calculation of failure rates and risk monetisation. Jemena has also established a relationship between the health index and Probability of failure for several scenarios, to undertake similar analysis at an asset level.

278. This is supported by the description of how Jemena uses its CBRM models both in its business case for nominated projects and supporting documents. The process described by Jemena includes the following at steps 2 and 3:

> *'2. Link current condition to performance. Health indices are calibrated against relative probability of failure (PoF). The health index/PoF relationship for an asset group is determined by matching the health index profile with the recent failure rate.*
>
> *3. Estimate future condition and performance. Knowledge of degradation processes are used to 'age' health indices. The ageing rate for an individual asset is dependent on its initial health index and rates can then be calculated from aged health index profiles and the previously defined health index/PoF relationship.'* [52]

279. However, Jemena has not applied this method for the substation replacement projects it has proposed for the next RCP, noting also that substation rebuilds typically require consideration of conditional and joint probability as they include multiple assets within a single location. This is also inconsistent with other statements made by Jemena that describe its approach, including in its CBRM methodology.[53]

Consequence costs are similarly overstated

280. As a consequence of the overstated probability of failure, the consequence cost that Jemena has modelled is also materially overstated.

281. We identified further issues with the calculation of consequence which lead to consequence costs that are higher than we consider reasonable:

- reliability cost is based on a cost derived from STPIS and not VCR as is generally accepted, both across industry and from AER guidance, and
- it assumes peak load exists at the time of outage and extends for 12 hours. Firstly, we would expect that some partial transfer or restoration would be possible within 12 hours, and secondly that the energy at risk is more reasonably determined from an estimate of average load or by using a load duration curve, rather than to assume the event occurs at time of peak load.

We found no assessment of optimal timing of the proposed projects

282. In addition to the issues we identified with the risk monetisation methods applied by Jemena, we did not see evidence of an assessment of optimal timing. We asked Jemena to explain how the timing of the projects was determined, and in response it stated:

> *'The start of the analysis period was based on the proposed start date of the project as per the EDPR Program of works forecast. The redevelopment project were staggered in order to ensure adequate resources are available to delivery the projects. The analysis period for all redevelopment projects was taken over a 20 year period and despite this period being less than the typical expected asset life (of new primary plant assets) the results are positive and would only further improve if the typical asset life or analysis period was extended.'*[54]

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52 Included in the description of the CBRM model process in the CS, CN and NH business case

53 JEN – RIN – Support – Condition Based Risk Management (CBRM) Guideline – 20250131 - Public

54 Jemena response to IR009 Question 13

283. As outlined earlier, the economic analysis is flawed and cannot be relied upon, neither does its methodology allow for the determination of economic timing by assuming all proposed projects will commence at the beginning of the next RCP.[55]

We reviewed other potential sources of information and were not able to ascertain the need and prudent timing for these projects as Jemena has proposed

284. In accordance with the NER, Jemena has identified that the CS, CN and NH substation redevelopment projects are subject to RIT-D assessments.[56]

285. We summarise the status of the RIT-D assessments as we have understood them in Table 3.15. This differs from Jemena's statement in relation to CS, CN and NH substation redevelopment projects that the projects have already satisfied the RIT-D assessment:

> *'JEN's forecast capital expenditure for the next regulatory period includes capital expenditure that is for an option that has satisfied the regulatory investment test for distribution.'*[57]

Table 3.15: Summary of RIT-D

Substation	Driver	RIT-D status
CN	switchgear and relay condition	Planned June 2025
CS	switchgear and relay condition	Planned June 2026

Source: EMCa derived from Jemena website

286. The 2024 DAPR and digital DAPR included reference to the CN and CS replacement projects. However, these are limited to summary-level information.

287. We found reference to a 66kV Protection project at North Heidelberg Zone Substation (NH) in the latest DAPR and digital DAPR, however this was planned to be undertaken in 2026 and varies in scope to the proposed project, and therefore we expect that this is in progress.

288. The NH project proposed for the next RCP totals $35.8 million ($2024) including use of modular GIS 66kV switchgear and replacement of transformer bushings. The project is undertaken from FY30 to FY32 spanning two regulatory periods. The latest business case identified the 22kV switchgear as at high risk of failure (within 5 years) and a priority for replacement. It refers to the secondary plant across the site as being at end of life.

289. Our review of these records indicate that Jemena's assessment of risk and replacement options have changed. To us, this underscores the need for clear justification of the scope and timing of the replacement options being proposed, and which should form part of the RIT-D assessment.

290. Notwithstanding the identification of condition issues with the installed switchgear and protection relays identified by Jemena at CN, CS and NH substations, we consider that insufficient justification of the risk and the costs together with issues concerning the modelling methods applied by Jemena mean that the prudent option and timing have not been adequately justified.

Findings

291. We consider that Jemena's proposed substation switchgear repex is materially overstated.

292. Jemena has proposed a large increase in repex driven by three substation redevelopment projects of CN, CS and NH zone substations. Jemena has not provided compelling information to support the identified risk at the substation sites which requires replacement

55 We summarise and illustrate the optimal economic timing methodology In Appendix A

56 Appendix A1.5 of Attachment JEN Att 05-01 Capital expenditure

57 Appendix A1.5 of Attachment JEN Att 05-01 Capital expenditure

in the next RCP. The modelling that Jemena has relied upon has errors and does not align with AER guidance or industry practice.

293. Of the additional switchgear projects proposed by Jemena, we did not find sufficient information to support proceeding with these projects in the next RCP.

3.3.6 SCADA, network control and protection

What Jemena has proposed

294. Jemena has proposed $27.1 million within our scope of review, and which represents a portion of the $51.5 million it has proposed for this asset group.

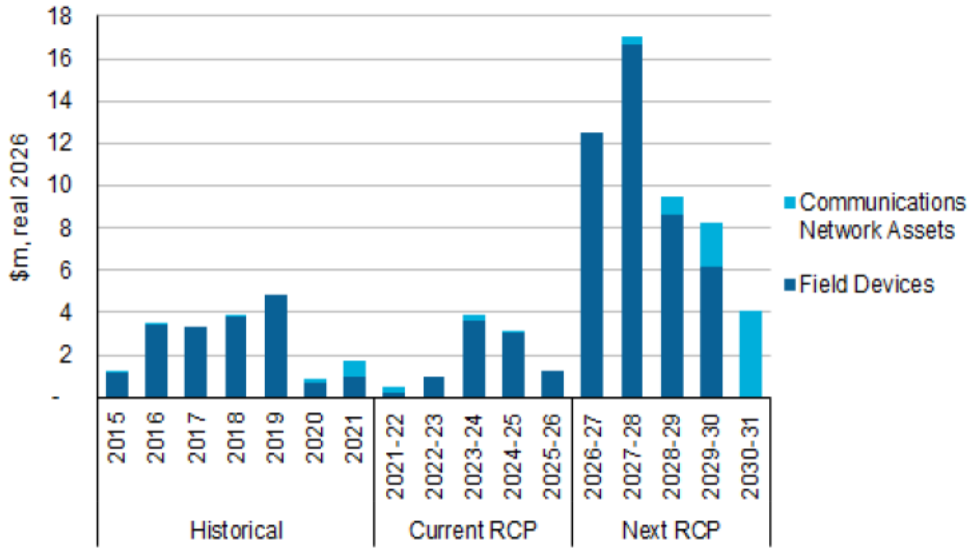
Table 3.16: EMCa scope of Jemena proposed SCADA, protection and control repex - $m, real FY2026

SCADA, protection and control	2026-27	2027-28	2028-29	2029-30	2030-31	Total
Replace CS relays	0.0	2.8	8.4	5.9	0.0	**17.2**
Supervisory cable and fibre optic cable replacement programme	0.0	0.0	0.0	0.8	2.2	**3.1**
Replace zone substation battery banks and chargers	0.0	0.0	0.4	1.0	1.5	**2.8**
MPLS installation programme	0.0	0.4	0.9	0.8	0.8	**2.8**
RTU replacement programme	0.0	0.0	0.0	0.3	0.9	**1.3**
Subtotal	**0.0**	**3.2**	**9.7**	**8.9**	**5.4**	**27.1**

Source: EMCa table derived Jemena SCS capex model

295. In Figure 3.12 we present the historical and forecast expenditure for the SCADA, network control and protection asset group in the RIN. Expenditure reported in the asset group in the RIN will differ from the project-based expenditure, as major plant replacement works are allocated across multiple RIN asset categories to reflect the nature of the work undertaken.

Figure 3.12: Historical and forecast SCADA, network control and protection repex $m FY2026

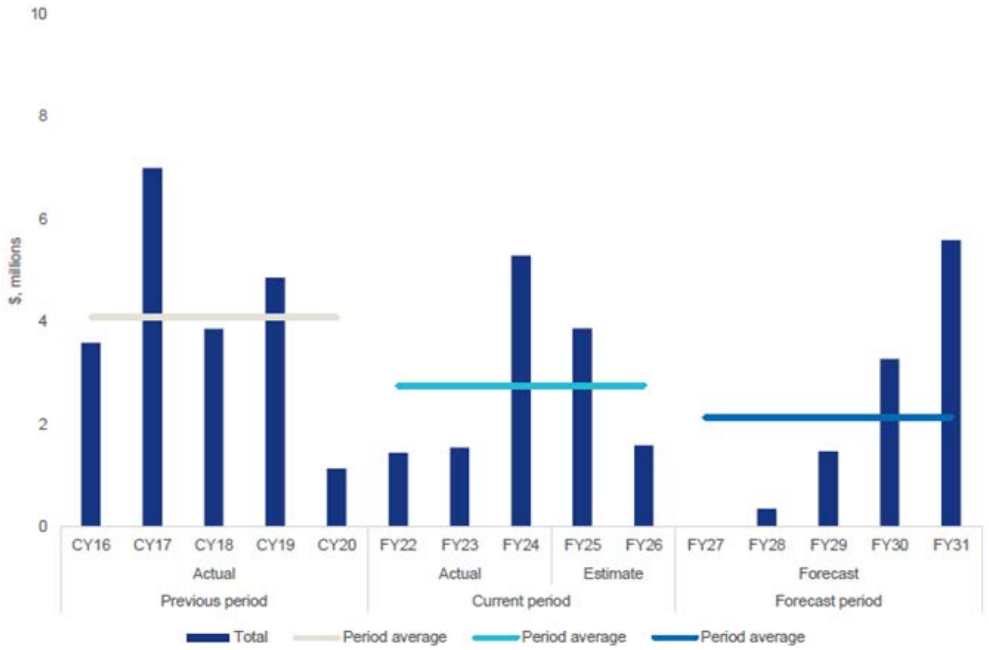


Source: EMCa derived from RIN data

296. Jemena has proposed a significant increase from the estimated repex in the current RCP. Jemena states that the inclusion of major substation rebuild projects of CN and CS and NH are the drivers of the increase, and had these projects been excluded the total would be lower than the expenditure incurred in the current RCP. In Figure 3.13 we show Jemena's

representation of the historical and forecast expenditure without the CN, CS and NH substation projects.

Figure 3.13: Historical and forecast SCADA, network control and protection repex – without CS, CN and NH ($2026)



Source: Response to IR09, question 19 Figure 1-2[58]

297. Whilst the profile is similar, the total expenditure does not align with the RIN. For the next RCP, the major redevelopment projects are a significant influence on the total repex for this RIN asset group.

Assessment of substation redevelopment projects

Secondary system replacement linked to substation redevelopment projects

298. For the next regulatory period, Jemena has proposed replacement of the protection systems as a part of the CS, CN and NH zone substation redevelopments. Jemena describes the protection relays as legacy electromechanical and are 50 years old, with a design life of 40 years. Without monitoring, failure of these relays can remain undetected, exposing the network to reliability and safety risks. Additionally, analogue electronic and digital relays at the three zone substations are also operating at end-of-life, increasing the risk of asset failure.

299. In its capex model Jemena has included a specific CS relay replacement project. We assume that the costs associated with CN and NH substations are included in the substation redevelopment projects and subsequently allocated to the SCDA network control and protection RIN asset group.

300. Jemena has not provided specific justification for the scope of the secondary systems proposed to be replaced at these substations. We understand that there are efficiencies to the replacement of secondary systems when the primary plant is replaced, and also to undertake further secondary system works to coincide with mobilisation of resources and shared outage planning which we expect that Jemena has taken into account.

301. Accordingly, as the scope of the secondary systems replacement is tied directly to the primary plant replacement, our findings on the justification of the scope and timing of the

[58] *JEN – Response to Q19 of IR 009 – MPLS-RTU-Supervisory cables – 20250502 – Public.*

primary plant similarly apply to the secondary plant replacement. That is, we consider that Jemena has not sufficiently demonstrated the prudency of these projects.

Additional evidence to confirm how the secondary systems assets had been identified for replacement was not provided

302. We asked for a copy of the CBRM model used for secondary equipment to review how Jemena had identified the priority relays for replacement. In its response, Jemena stated:

> *'The costs for the secondary equipment are built into the primary plant's business cases, so there is no separate CBRM for secondary equipment. We do not have any business cases where we replace secondary equipment without replacing primary equipment.'*[59]

303. Also, we requested a copy of the justification including modelling for the volumes included in the asset class strategy. Jemena did not provide any modelling, stating that:

> *'As described in Q17 above, due to the nature of the technology utilised in secondary system equipment, all proposed secondary asset replacements are driven by the replacement of the primary assets that they support.*
>
> *The volume of equipment is taken from the Asset Management System data, more specifically, SAP. SAP contains the register of all installed assets and field works completed regarding the asset (notifications). Field works can include the activities that support a CBRM approach as previously described and can also include fault investigation or troubleshooting.'* [60]

304. We were not provided with justification of the included volume of protection relays that Jemena has proposed to replace, or for the remaining secondary equipment in this asset group. In the secondary plant asset class strategy, there is a description of technical and obsolescence issues with its secondary plant, but no clear link as to the scope or timing of the secondary plant proposed to be completed as a part of its substation redevelopment projects. Nor have we seen how these projects have been prioritised across the substation fleet, and to be undertaken within the next RCP.

Assessment of replacement of zone substation battery banks and chargers

305. In its capital expenditure attachment 5-01, the only reference to SCADA projects is the zone substation battery banks and charger replacement, which Jemena states have reached the end of their technical life or are otherwise exhibiting performance issues which would prevent them from accurately monitoring network performance and faults.

306. Based on our reading of the secondary plant asset class strategy, Jemena has proposed routine replacement at end of life (to which this project relates) and replacement as a part of its substation redevelopment projects.[61] The strategy appears reasonable.

Assessment of additional projects proposed by Jemena

Supporting information for the balance of programs was not provided with the submission

307. Jemena included a program for MPLS installation, RTU replacement and Supervisory cable and fibre optic cable replacement in its capex model. We did not find any description of these programs.

308. We found comments in the secondary plant asset strategy that devices would be replaced as a part of the substation redevelopment projects, and which are included in the costs of these same projects.

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59 Jemena response to IR009, Question 17

60 Jemena response to IR009, Question 18

61 Secondary plant asset class strategy, Table 4-11

309. We asked Jemena to provide a justification statement identifying the need, scope, and timing and provide the supporting economic analysis for the three projects. Jemena provided an overview of the projects in its response to our question[62] that we have taken into account in our assessment, as summarised in Table 3.17.

Table 3.17: Summary of additional secondary systems projects

Project	Description
MPLS installation programme	Jemena state its proposed MPLS installation programme has two main components: • replacement of the existing MUX with MPLS technology - replace the MUX (2 each) currently installed in 19 zone substations and terminal stations with MPLS in the next RCP. The 19 substations include MUX devices which will reach end of life (15 years) between 2017 and 2034) • installation of MPLS equipment in all major substation redevelopment projects or new substation projects in the next regulatory period. These installations will be implemented as part of the redevelopment of these substations, hence their MPLS implementation costs are not captured under the proposed MPLS installation program. The MPLS installation program is driven by aging MUX devices, obsolescence of and dwindling support for MUX technology and compatibility with newer technology and assessed as significant criticality due to the communications functions that they provide.
RTU replacement programme	Jemena state that its proposed RTU replacement programme includes the replacement of existing C50 RTUs with a modern equivalent at Braybrook (BY) substation in 2030-31. Replacement of existing RTUs is included in the scope and costs of the CN, CS and NH substation redevelopment projects at these sites. The C50 RTU at BY has been in-service for over 25 years and it is out of vendor support.
Supervisory cable and fibre optic cable replacement programme	Jemena state that its proposed program has two components: • Replacement of aging fibre optic cables and copper supervisory cables • Removal of redundant copper supervisory cabling. The copper supervisory cables have been in-service in JEN for close to or over 50 years, with the current in-service copper supervisory cables have a total length of about 48 km. Jemena has proposed replacement of 120km, however does not provide a breakdown of this length which we assume includes some fibre optic cables that have exceeded the technical design life of 20-25 years.

Balance of works appears reasonable

310. The projects identified by Jemena are projects that we have observed being undertaken in other DNSPs, and Jemena is seeking an efficient approach by combining routine replacement works to minimise the number of outages or disruptions needed, and reduce labour, testing and access costs.

Findings

311. We consider that the proposed SCADA, network control and protection repex is overstated.

312. As the scope of the secondary systems replacement is tied directly to the primary plant replacement, our findings on the justification of the scope and timing of the primary plant similarly apply to the secondary plant replacement. That is, we consider that Jemena has not sufficiently demonstrated the prudent timing of the proposed projects.

[62] JEN – Response to Q19 of IR 009 – MPLS-RTU-Supervisory cables – 20250502 – Public.

3.3.7 [redacted]

313. [redacted]

314. [redacted]

315. [redacted]

316. [redacted]

317. [redacted]

318. [redacted]

319. [redacted]

320. [redacted]

63 SGSP (Australia) Assets Pty Ltd (SGSPAA) Critical Infrastructure Risk Management Plan (CIRMP)

64 JEN – RIN – Support – ZSS Site Security Systems and Locks Upgrade – BC – 20250131 - Confidential

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3.4 Findings and implications

3.4.1 Summary of findings

Jemena's proposal and our review scope

327. Jemena has proposed a repex forecast that is 68% above the repex included in the capex allowance for the current RCP and 55% above the repex that it expects to incur in the current RCP. Jemena refers to declining asset condition as the key driver for the increase in repex in the next RCP.

328. We have been asked by the AER to consider approximately 59% of the proposed repex by Jemena across a range of asset groups, split between distribution lines related expenditure (poles, crossarms and conductor) and substation related expenditure (transformers, switchgear, SCADA and Other). The AER nominated specific projects and programs from Jemena's capex model for our review. Our findings relate to the projects and programs included in our review.

Findings

Justification for the proposed expenditure was lacking detail and did not support the proposed increases

329. The information provided initially by Jemena was not conducive to a review in accordance with the capex assessment guidelines, as the models and supporting information provided were incomplete.

330. Jemena has placed significant emphasis on the materials included in its asset class strategies (Distribution, Primary plant and Secondary plant) to support the proposed projects and programs, including justification for the scope timing and efficient cost. Whilst these were useful summaries, they typically lacked the analysis that we would expect to find that justify the forecast expenditure.

331. For the volumetric and routine programs, we did not see compelling information that supported an increase, including the proposed uplift in replacement volumes, from the historical level of replacement activity.

Modelling methods applied by Jemena are not consistent with its own documentation or industry practice

332. For the business cases and models that were provided, limited to the three major substation replacement projects and bushings replacement program, we found that the modelling methods and practice applied by Jemena did not always align with the AER guidance materials or with its own governance documentation.

333. We made numerous requests for the models and supporting information that we considered that Jemena had relied upon in preparing its expenditure forecast. We received limited additional information to support the prudent scope and timing of the proposed expenditure or efficient cost but were in most cases redirected back to the materials originally submitted by Jemena with the regulatory proposal. We consider that we have provided Jemena with opportunity substantiate its assumptions and the basis for the included projects in its proposed expenditure and have identified areas where we do not consider Jemena has met the regulatory burden in that regard.

A combination of modelling factors leads to an overstatement of risk

334. For the substation related programs, we consider that the issues that we identified have led to an overstatement of the risk and therefore benefits that Jemena had relied upon. Absent compelling information beyond that relied upon in the economic modelling, we consider that many of the proposed projects are not sufficiently justified.

Repex for some categories is justified, some not justified and some overstated

335. For the projects that we reviewed included in the category of Poles and Other repex (security), we consider Jemena's proposed capex is reasonable.

336. We consider that the projects that we reviewed included in the switchgear and conductor categories are not justified.

337. For the projects that we reviewed in the remainder of the categories, we consider that some work is justified but that the proposed expenditure is overstated.

3.4.2 Implications for proposed capex allowance

Expenditure reviewed

338. We have been asked to review projects with aggregate proposed capex of $252 million. These projects comprise part of Jemena's aggregate proposed repex of $427 million.

Alternative forecast methodology

339. Our proposed alternative forecast involves one or more of the following adjustments, to the extent that it formed the basis of Jemena's forecast and which we consider to be not justified or overstated:

- Adjustment to the volume of work
- Adjustments to correct modelling issues and/or unsupported or incorrect model input assumptions
- Adjustment to align the forecast with historical spend, where an ongoing level of expenditure represents a reasonable default assumption and where the proposed increase was not otherwise justified.

Alternative forecast of expenditure

340. We consider that a reasonable alternative forecast for the projects in the repex categories that we reviewed, would be between 50% and 60% less than Jemena has proposed.

341. We stress that our advice on an alternative forecast relates only to the categories of expenditure within the scope of our review and does not necessarily have any implication for repex that was not within the scope of our review.

4 REVIEW OF PROPOSED AUGMENTATION EXPENDITURE (AUGEX)

Jemena has proposed a material uplift in augex activity relative to the augex that it expects to incur in the current period.

The AER has asked us to assess a subset of Jemena's proposed $270 million augmentation capex for the next RCP. Within the current report, we review three demand-driven projects and one safety, reliability and customer connection project, comprising approximately 24% of the proposed augex.[65]

Overall, we consider that Jemena's proposed augex of $66 million for the projects within the augex categories that we reviewed is reasonable.

4.1 Introduction

342. The AER has asked us to assess a subset of Jemena's proposed $269.5 million augmentation expenditure for the next RCP. In aggregate, the proposed expenditure within our scope for assessment and included in this report is $66.0 million, or 24% of the total.

343. The proposed augex within our scope of assessment also includes $25.6 million for CER voltage and power quality that we have included in a companion report to the AER.

4.2 What Jemena has proposed

4.2.1 Proposed augex

344. Table 4.1 shows that Jemena proposes $269.5 million augmentation capex in the next RCP.

Table 4.1: Jemena proposed augex - $m, real 2026

Augmentation	2026-27	2027-28	2028-29	2029-30	2030-31	Total
Demand	47.8	41.0	15.4	11.8	8.6	**124.6**
Communication and remote control	0.9	0.0	1.3	3.2	3.3	**8.8**
CER - Grid stability & FS	0.3	0.7	1.3	1.9	1.0	**5.2**
CER - V&PQ	9.0	10.8	9.0	5.0	6.7	**40.5**
Safety, reliability, customer connection	8.8	13.3	6.5	11.9	5.5	**46.0**
Other	20.4	10.8	4.6	4.7	4.0	**44.5**
Total	**87.2**	**76.5**	**38.2**	**38.5**	**29.0**	**269.5**

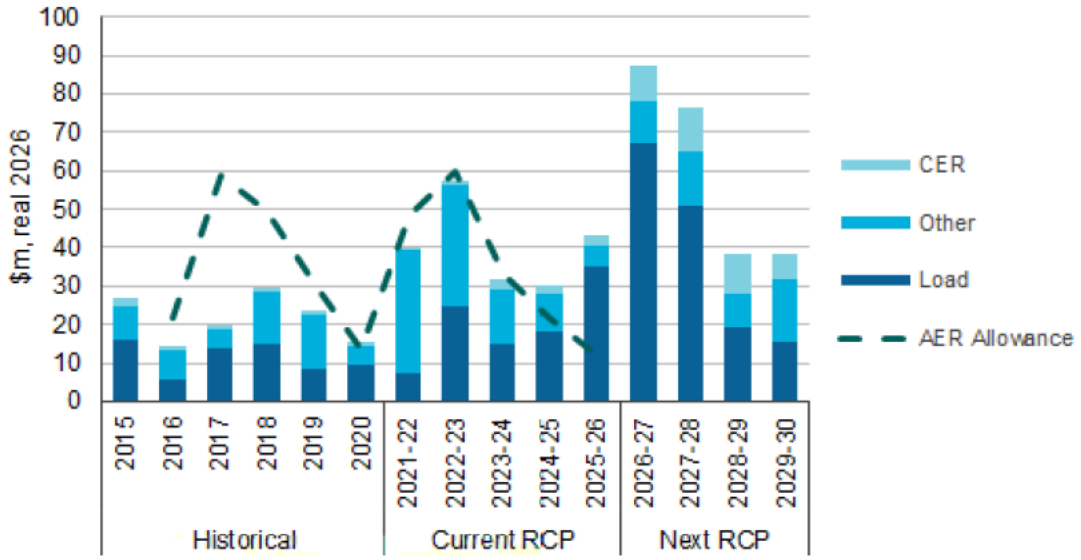
Source: EMCa table, derived from Jemena SCS capex model, Att. 05

345. Figure 4.1 shows that there is a material uplift in demand-driven augex over the next RCP, and with more expenditure on CER related activities proposed. Jemena expects peak demand over the next 10 years to double and given that it advises that it already has a

[65] We also review Jemena's proposed CER-related augex in a separate report. Our assessment and findings in the current report on augex refer only to the three projects reviewed within the current report.

heavily utilised network, this is responsible for the step increase in load-driven investment proposed. New data centres are cited as a source of significant strain on the network, for example. Jemena states that it is not forecasting material expenditure in the next RCP to respond to the electrification of transport and gas, relying instead on its CER Strategy and innovation fund to make the best use of its existing network.[66]

Figure 4.1: Jemena augex by driver - $m, real 2026



Source: EMCa graph derived from Jemena response to IR004

4.2.2 EMCa's scope of augex Review

346. Table 4.2 shows the scope of proposed augex that the AER has designated for our assessment, comprising $66.0 million within the current report. We were also asked to review Jemena's CER-related expenditure, which includes augex (as shown in Table 4.1), and we do so in a separate report.[67]

Table 4.2: Jemena augex within EMCa scope - $m, real 2026

Augex within scope	2026-27	2027-28	2028-29	2029-30	2030-31	Total
Demand:						
Establish new Craigieburn (CBN) zone substation - zone substation works	15.1	9.9	-	-	-	**25.0**
Establish new Craigieburn (CBN) zone substation - HV feeder works	2.7	3.1	-	-	-	**5.9**
New feeder SBY-031	3.0	3.5	-	-	-	**6.5**
subtotal	**20.9**	**16.5**	**-**	**-**	**-**	**37.4**
Safety, reliability, customer connection:						
EP conversion stage 7	8.8	13.3	6.5	-	-	**28.6**
Total	**29.7**	**29.8**	**6.5**	**-**	**-**	**66.0**

Source: EMCa table, derived from Jemena SCS capex model, Att. 05

66 JEN - Att 05-01 Capital expenditure - 20250131 – Confidential, page 31

67 EMCa report to AER on Jemena proposed ICT and CER expenditure

4.3 Assessment of expenditure

4.3.1 Northern Growth Corridor – Craigieburn substation and feeder works

What Jemena has proposed

347. The AER has asked us to focus on the establishment of the Craigieburn substation and HV feeder works at a total cost of [redacted] the next RCP as shown in Table 4.2.[68]

348. Jemena proposes implementing its 'Craigieburn Plan' to address network thermal constraints. The Craigieburn Plan among other things involves:

- Construction of a new Craigieburn zone substation (CBN) at an estimated cost of [redacted] million capex, and
- Associated feeder works from CBN at an estimated cost of [redacted] capex.

349. We also discuss for context only aspects of the balance of the Craigieburn Plan, which is summarised in Table 4.3 drawn from the relevant network Development Strategy (NDS). We note that the combined total for establishing the new CBN substation, line extension and feeder works shown in the table is higher than the aggregate from the SCS capex model.

Table 4.3: Summary of the Craigieburn Plan cost components[69] ($m, 2024)

Timing	Projects	Capital Cost ($m)
2026	Augment feeder BDO-008	[redacted]
2026	New feeder KLO-023	[redacted]
2027	Coolaroo No. 1 bus cable transfers	[redacted]
2027	Coolaroo No. 2 bus feeders	[redacted]
2027	**Establish new CBN – zone substation works** **66kV sub-transmission line extension** **Establish new CBN – HV feeder works**	[redacted]
2033	Third 66/22kV transformer at CBN	[redacted]
Total		**$49.2**

Source: JEN – RIN – Support – Northern Growth Corridor – Network Development Strategy – 20250131 – Confidential, Table ES-2

Assessment

Somerton substation is likely to be overloaded beyond its N capacity within the next RCP

350. Figure 4.2 shows the South Morang Terminal Station (SMTS) – Somerton zone substation (ST) – Somerton Switching Station (SSS) 66kV loop. ST supplies a mixture of residential, commercial and industrial customers. SSS does not supply Jemena customers as it is a switching station for the Somerton Power Station.

68 Sum of $25.0m + $5.9m

69 The Craigieburn Plan also includes no-cost load transfers

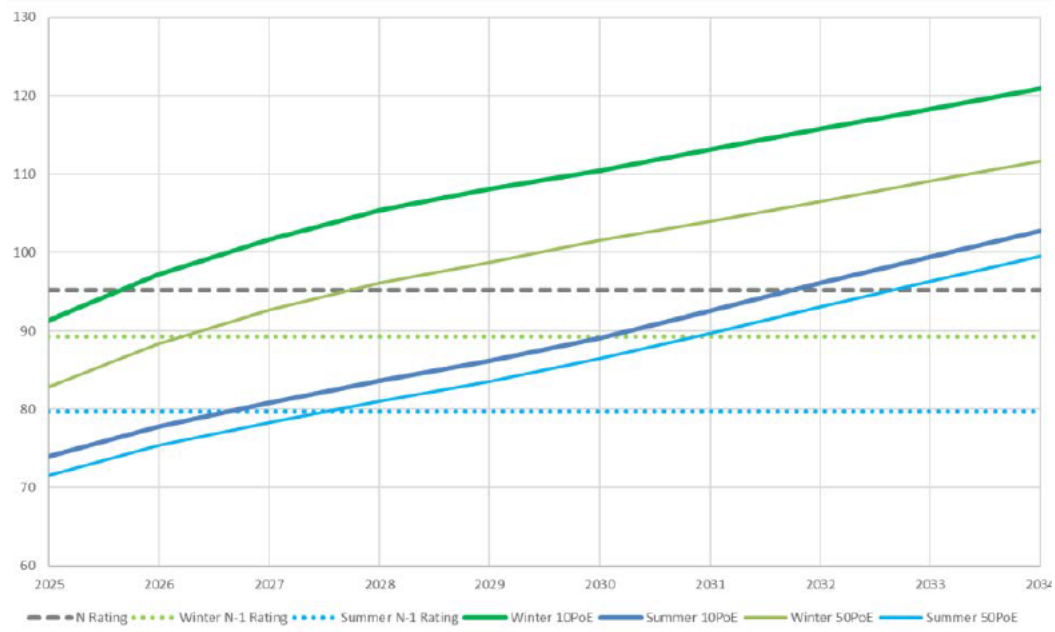
70 We note that the amount from this source differs from Jemena's actual proposal, as above.

Figure 4.2: SMTS-ST-SSS 66kV sub-transmission loop

351. Jemena forecasts maximum demand growth in the supply area of 4% p.a. on average over the ten years through to 2034.[71] As a consequence, Jemena's analysis shows that both substations Coolaroo (COO, which is in another 66kV loop supplied from SMTS), and ST will be overloaded within the next RCP (if not in the current RCP, depending on assumptions). A contiguous zone substation, Broadmeadows (BD) is also forecast to be heavily loaded by the end of the next RCP.

352. As shown in Figure 4.3, under the 50% PoE forecast demand will exceed the N-1 capacity in 2026, and under the 10%PoE forecast, the N capacity will be exceeded in 2029.

Figure 4.3: ST maximum demand forecast and ratings (MVA)



Source: Jemena RIT-D DPAR – Somerton Zone Substation (ST) Supply Area Capacity Constraint, Figure 3-1

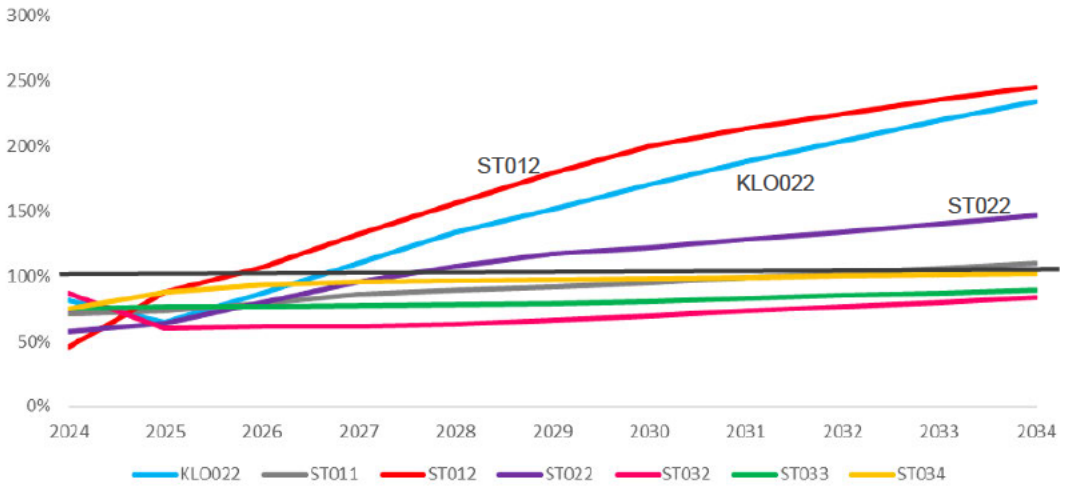
Distribution feeders in the Northern Growth Corridor are also forecast to be overloaded within the next RCP

353. As shown in Figure 4.4, Jemena's load forecasts also show that three 22kV feeders will also be overloaded in the next RCP under 50%PoE demand forecast.[72] In the wider Northern Growth Corridor there are another five 22kV feeders that are expected to be overloaded under 10% PoE conditions within the next RCP, including ST011 (in 2031) and ST034 (in 2028).

[71] The expected increase in maximum demand is mainly driven by population growth from residential infill and greenfield estate development, and electric vehicle usage and electrification of gas across the area, with some major customer developments (JEN – RIN – Support – Northern Growth Corridor – Network Development Strategy – 20250131 – Confidential, section 2.1

[72] The KLO022 feeder supplied from Kalkallo zone substation (owned and operated by AusNet)

Figure 4.4: Northern growth corridor - HV feeder utilisation – 50% PoE



Source: Based on JEN - EMCa initial proposal workshop – 20250328, slide 115

354. Jemena's risk assessment of the 'do nothing' option is that an overall 'High' risk rating would apply for safety (conductor clearance breaches), supply security (inability to restore supplies), customer (unable to connect new customers), and a 'Significant' operational risk rating (increased risk of equipment failure).

355. Based on the information presented in the Northern Growth Corridor Network Development Strategy (NDS),[73] we consider there is a case for Jemena to evaluate means of offloading the feeders to mitigate the identified risks.

Jemena's range of options is reasonable, and Option 2 is the prudent selection

356. Jemena identified five options in its business case with results of its comparative analysis shown in Table 4.4.

Table 4.4: Northern growth corridor – summary of comparative options analysis ($m, 2024)

Option	Capital cost	PV cost	PV benefit	NPV
1. Do nothing	0	0.0	0.0	0.0
2. Craigieburn Plan (preferred)	49.2	51.6	489.1	437.5
3. Greenvale Plan	61.7	64.7	490.9	426.3
4. BESS Plan	0	255.3	489.1	233.8
5. DM Plan	0	106.0	489.1	383.1

Source: JEN–RIN–Support–Northern Growth Corridor–Network Development Strategy – 20250131 – Confidential, Table 6-1

357. Jemena selected Option 2, which has the highest estimated NPV, due to having the lowest capex to provide essentially the same benefit as the other options.

358. The non-network Options 4 and 5 are clearly considerably more expensive than Options 2 and 3 and with lower NPVs of $233.8 million and $383.1 million,[74] respectively. Jemena reports that no non-network submissions, nor any proposals for alternative non-network or SAPS solutions were offered during the stage 1 RIT-D consultation period (i.e. in response to the Options Screening Report).

359. The Craigieburn Plan components within scope are shown in bold in Table 4.3 and:

[73] JEN – RIN – Support – Northern Growth Corridor – Network Development Strategy – 20250131 – Confidential

[74] JEN – RIN – Support – Northern Growth Corridor – Network Development Strategy – 20250131 – Confidential, Table 6-1

- Fully address N and N-1 overload risk at ST
- Fully address N overload risk at COO, and
- Make no material change to the overload risk on the SMTS-ST-SSS loop (or any other loop out of SMTS).

360. We conclude from Jemena's options analysis that it has considered the appropriate solution.

Scope of CBN establishment and feeder works is sufficiently detailed to underpin a reasonable cost estimate

361. Figure 4.5 shows the proposed location of CBN, which geographically will be approximately at the mid-point of the ST-SSS line.

Figure 4.5: Proposed establishment of CBN in 2027 (including extension of the ST-SSS line)

362. The project scope includes:[75]

- Establishing CBN as a two-transformer substation with provision for a third transformer and multiple feeder circuits - sufficient detail is provided to underpin a reasonable cost estimate. The cut-in for CBN from the ST-SSS 66kV line will include an extension of that circuit by 5.0 km to and back from CBN with some of the cost offset by a contribution from a customer-initiated connection project in the current RCP, and
- Establishing six new feeders CBN11, CBN12, CBN13, CBN21, CBN22 and CBN23. For each new feeder, there is evidence of a reasonable degree of planning and design detail, which we would expect given the project is scheduled to be completed in 2027.

363. Given the design detail, and the familiarity Jemena should have with building block costs for what is relatively routine work, we consider that the cost estimate is likely to be representative of an efficient cost.

Load transfer capacity has been taken into account in Jemena's analysis

364. The load transfer capacity from ST is currently 9.5 MVA. With the forecast high growth in the area, it is expected to deteriorate by 1 MVA per annum.[76] We looked for evidence of inclusion of load transfer capacity in the EUE calculations, and we are satisfied that feeder transfer capability has been taken into account, including 'permanent' transfers.[77]

Jemena's derivation of optimal timing includes 2024 actual demand

365. We asked Jemena to confirm that its derivation of the optimal timing for the two Craigieburn projects that we were asked to review was based on weather-corrected 2024 summer peak data. Jemena confirmed this is the case.[78]

366. The actual demand versus the 50PoE and 10PoE forecasts for the summer of 2024 are shown in Table 4.5, which in turn shows that the actual demand is closer to the 50PoE

[75] JEN – RIN – Support – Northern Growth Corridor – Network Development Strategy – 20250131 – Confidential, Sections 8.2.1 and 8.2.2

[76] Jemena RIT-D DPAR – Somerton Zone Substation (ST) Supply Area Capacity Constraint, page 9

[77] Northern Growth Corridor NDS FDR EUE Option 2; Northern Growth Corridor NDS ZSS EUE Option 2

[78] JEN - IR006 - Initial Proposal Q & A Response - Capex opex governance compliance - Stage 4 - 20250404 – Public, question 14

forecasts, with the exception of ST012, which we assume was impacted by a block load or a load transfer. Among other things, this led us to consider the sensitivity of the optimal timing of the new CBN to 100% PoE50 demand.

Table 4.5: Comparison of actual (weather-corrected) and forecast demand for summer 2024 – ST and ST feeders (MW)

Substation or feeder	Actual	50PoE	10PoE
ST	71.9	72.1	73.9
ST011	13.9	13.9	13.9
ST012	6.6	2.0	2.2
ST022	13.0	13.0	13.4
ST032	10.8	11.9	12.7
ST034	10.4	10.4	10.4

Source: JEN - IR006 - Initial Proposal Q & A Response - Capex opex governance compliance - Stage 4 - 20250404 – Public, answer to question 17

Applying the 100% PoE50 demand forecast (summer and winter) would lead to a 1-year deferral of the optimum timing

367. We asked Jemena to advise the impact on the optimal timing of a sensitivity analysis not considered in its NDS, namely the application of 100% 50 PoE. Jemena's response is that it would lead to a one-year deferral of the proposed new two-transformer CBN (to 2028), with the proposed third CBN transformer being delayed by 2-years (from 2033 to 2025). Conversely applying 100% 10PoE would not change the timing of the new CBN substation from 2027 but would advance the third transformer by one-year. Whilst the actual demand growth could well be less than PoE50, it shows that it is reasonable for Jemena to plan for establishing CBN in the next RCP on this basis.

368. Jemena provided its own sensitivity analysis in which it varied the VCR (±10%), discount rate (±1%), capital costs (±30%), and demand (no EV charging during peak electricity demand periods). In each case, Option 2 has a strongly positive NPV each of which remain higher than Option 3 NPVs under the same scenarios. However, Jemena did not include changes to the optimal timing with its sensitivity studies.

The optimal timing is not particularly sensitive to the VCR

369. Jemena assumes a VCR of $47,905/MWh in monetising the EUE and which does not recognise the different VCRs for different customer segments, nor does it reflect the latest AER VCRs for those segments.

370. We sought to overcome these limitations and determine the sensitivity of the optimal timing to lower (weighted) VCR over a wider range than Jemena's -10% study. Whilst Jemena's model did not provide a simple means of undertaking the analysis, we were able to see that the forecast overloads of the feeders, particularly ST012 lead to a very high value of EUE very early in the next RCP, driving the optimal timing of the CBN projects to 2027. We conclude that the optimal timing is not very sensitive to the VCR.

Findings

371. We consider that the proposed augex for establishment of the Craigieburn substation and associated HV feeder works totalling $30.9 million is reasonable.

372. Given the forecast overloading of Somerton zone substation (ST), overloading of five ST feeders, and high utilisation of contiguous zone substations Broadmeadows (BD) and Coolaroo (COO), there is a credible case for Jemena to evaluate remedial action.

373. Jemena's proposal to build a new Craigieburn substation in 2027 and six new 22kV feeders is the lowest cost and highest NPV solution of those considered. The projects will alleviate the N and N-1 overload risk at ST and the N overload risk at COO.

4.3.2 Northwestern Growth Corridor – new SBY013 feeder

What Jemena has proposed

374. The AER has asked us to focus on the establishment of new feeder SBY013 a total cost of [redacted] for the next RCP as shown in Table 4.2.

375. Jemena proposes implementing its 'Sunbury Plan' (one of six options considered) to address network thermal constraints in the Northwester Growth Corridor. The Sunbury Plan is summarised in Table 4.6. We note that the capex shown in this table drawn from the relevant NDS differs from the capex model amount. The AER has asked us to focus on assessment of the justification for the new SBY013 feeder only (shown in bold).

Table 4.6: Summary of the Sunbury Plan cost components[79] ($m, 2024)

Timing	Projects	Cost ($m)
2026	Install regulator - SBY013	[redacted]
2026	New feeder SHM013	[redacted]
2026	New feeder SBY022	[redacted]
2026	New feeder SBY014	[redacted]
2027	New feeder SBY015	[redacted]
2027	Upgrade SBY No. 1 transformer to 20/33MVA	[redacted]
2027	Upgrade SBY No. 3 transformer to 20/33MVA	
2027	**New feeder SBY013**	[redacted]
2029	Augment steel section – SBY024	[redacted]
2030	Install regulator – SBY023	[redacted]
Total		**$36.8**

Source: JEN – RIN – Support – North-Western Growth Corridor – Net Development Strategy – 20250131 – Confidential, Table 7-1

Assessment

Forecast peak demand growth in the Northwestern Growth Corridor will exacerbate the loading beyond the N-1 capacity on two zone substations in the next RCP

376. Jemena reports that maximum demand for the supply area is expected to grow on average by 3.8% per annum during the next 10-year period (2025-34).[81] Two zone substations, Sydenham (SHM) and Sunbury (SBY) are loaded above their respective N-1 capacities, as shown in Figure 4.6. Whilst the N capacity is not expected to be exceeded in the next RCP,

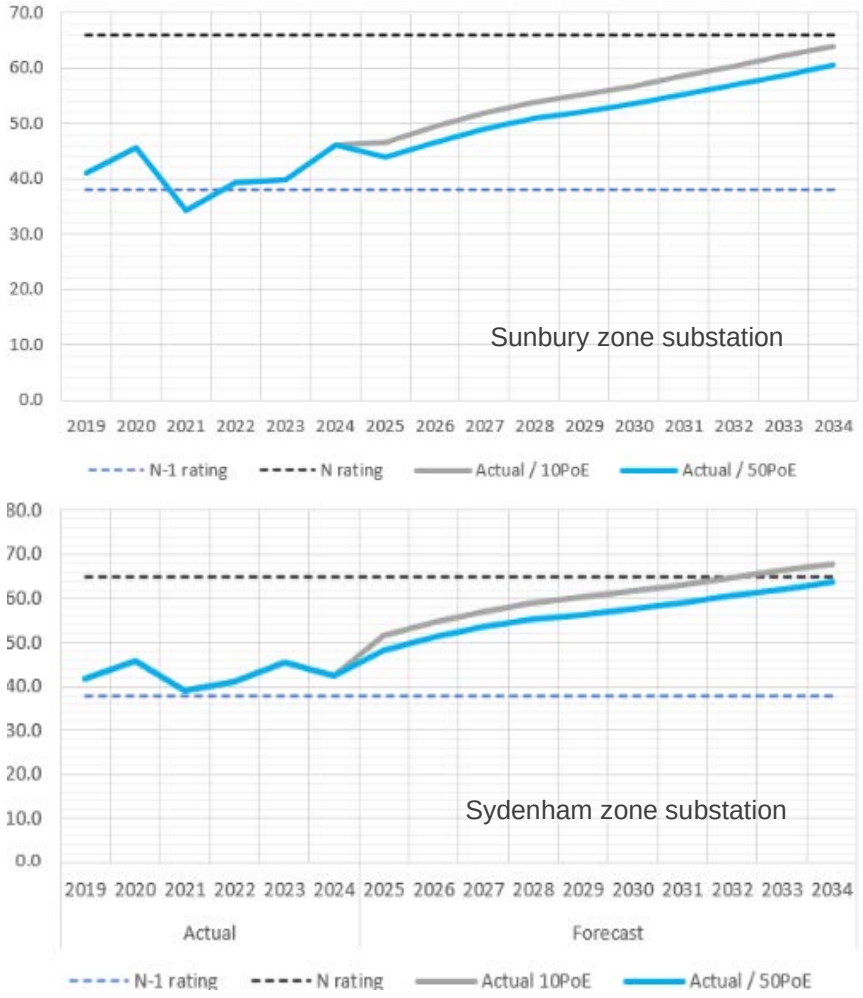
79 The Sunbury Plan also includes a no-cost load transfer SBY024 to SBY035

80 We note that this amount also slightly higher than in Jemena SCS model which is $6.5 (real 2026).

81 The expected increase in maximum demand is mainly driven by population growth from residential infill and high-rise apartment development and increased electric vehicle usage and electrification of gas across the area.

both substations would be overloaded during worst-case single contingency events with a growing margin.[82]

Figure 4.6: SBY and SHM demand forecast vs N and N-1 ratings



Source: JEN – RIN – Support – North-Western Growth Corridor – CBAM – 20250131 – Public

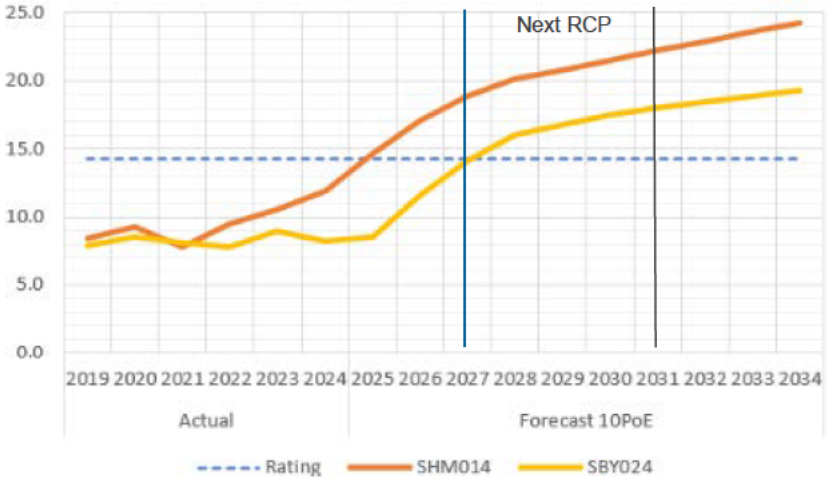
Forecast peak demand growth leads to overloading of feeders in the Northwestern Corridor next RCP

377. A number of 22kV feeders from SBY and SHM are also forecast to be overloaded during the next RCP. Figure 4.7 shows the actual and forecast PoE10 demand versus the continuous rating for two of the more critical feeders in the context of the concentration of expected residential (and other) developments in the corridor. By the start of the next RCP, SHM014 will be 32% overloaded at the forecast peak demand and SBY024 will be about to exceed the line's thermal rating.[83]

82 Noting that the forecasts take into account load transfer capability and the substation transformer ratings account for cyclic ratings, but not emergency overload capacity.

83 Noting that short-term overload capacity of the feeders is not accounted for here or in JEN's analysis

Figure 4.7: Forecast 10PoE demand versus rating – two 22kV feeders



Source: EMCa analysis using JEN – RIN – Support – North-Western Growth Corridor – CBAM – 20250131 – Public

378. Jemena's risk assessment led it to rate safety, supply security and regulatory risks as 'High', and Operational and Customer risks as 'Significant.' We consider these to be reasonable assessments.

379. Overall, Jemena has provided a solid case for evaluating means of reducing the forecast overloads in the Northwestern growth corridor.

Jemena's range of options is reasonable, and Option 4 is the prudent selection

380. Jemena considered the options shown in Table 4.7 to meet the identified constraints.[84]

Table 4.7: Northwestern Growth Corridor – summary of options analysis ($m, 2024)

Option	Capital cost	PV of cost	PV of benefit	NPV
1. Do nothing	0.0	0.0	0.0	0.0
2. Plumpton Plan	74.0	64.9	129	64.3
3. Sydenham Plan	52.0	50.9	140	88.9
4. Sunbury Plan (recommended)	**36.8**	**40.8**	**139**	**98.1**
5. BESS Plan	0.0	72.5	75	2.5
6. DM Plan	0.0	33.0	75	42.0

Source: JEN–RIN –Support–North-Western Growth Corridor – Net Development Strategy – 20250131 – Confidential, Table 6-1

381. The proposed new feeder SBY-031 project is part of the preferred Sunbury Plan, as shown in Table 4.6, and is required to address the SHM and SHM014 constraints.

382. Option 4 has the lowest PV cost (capex + O&M) of the three network solutions and at $98.1 million, it has the highest NPV of the five options and the equal highest PV reliability benefit.[85] Option 4:[86]

- *Partially addresses overload risk at SHM* – with further material overloading not expected until 2034
- *Partially addresses overload risk at SBY* – with further material overloading not expected until well into the following RCP

84 JEN – RIN – Support – North-Western Growth Corridor – Net Development Strategy – 20250131 –Confidential, Table 5-4

85 JEN – RIN – Support – North-Western Growth Corridor – Net Development Strategy – 20250131 –Confidential, Table 6-1

86 JEN – RIN – Support – North-Western Growth Corridor – Net Development Strategy – 20250131 –Confidential, Table 5-1 and Table 5-14

- *[Does not] change [the] overload risk on KTS-SBY-SHM loop*[87] - however the overloading is not material, and
- *Fully addresses all feeders overload and voltage risk.*

383. Jemena advises that it intends to commence the RIT-D process to address the Sydenham and Sunbury area capacity constraints and the SBY-031 feeder in June 2025,[88] which will provide opportunities for non-network solutions to be submitted. Whether or not any are submitted and whether they are competitive with the network solutions will not be known until later in 2025 but may be able to be taken into account in Jemena's Revised Proposal (should it submit one).

384. Given the extent of the overloading, the relatively low cost of the feeder, and the optimal timing (2027), it is unlikely that a NNS will be able to economically defer the need for SBY-031 (or the relatively low cost subsequent works denoted in Table 4.3) into the following RCP.

Jemena's evaluation of the need for feeder SBY-031 suggests it is a prudent component of the Sunbury Plan

385. Jemena advises that the Sunbury Plan requires the new SBY-031 feeder if both the No.1 and No.3 transformers at SBY are upgraded to 20/33 MVA to utilise the capacity of the replaced transformers and alleviate loading levels on SHM and its feeders. This is logical. The following steps of relevance to the proposed new feeder SBY-031 are:[89]

- Establishing the new feeder to offload feeder SHM011.
- Reconfigure SHM011 to offload the heavily loaded feeder SHM014 to enable supply to new developments in the area.

386. This option also reduces the load at risk at SHM. Compared to the approach that would be required to achieve the same overall outcome under Option 2 (Plumpton Plan) or Option 3 (Sydenham Plan), the Sunbury Plan requires less expenditure to offload SHM014 and SHM.[90]

Scope of the feeder works is sufficiently detailed to underpin a reasonably robust cost estimate for the SBY-031 feeder

387. The NDS includes a reasonably detailed scope of work for the establishment of the feeder in section 8.4.3 of the NDS. Given the design detail, and the familiarity Jemena should have with building block costs for what is relatively routine work, we consider that the cost estimate of [redacted] is likely to be representative of an efficient cost.

Optimal timing is reasonably determined with a minor exception

388. We noted that in the model for this project, Jemena applies a method for determining the annualised cost of capital (as part of the process for determining the optimal timing) which we consider to be inappropriate:

- Jemena: annualised cost = Capital cost * discount rate
- EMCa: using Excel's PMT function (discount rate, asset life, capex).

389. We used the corrected values in our sensitivity studies - the corrected annualised costs do not materially affect the optimal timing because of the large EUE.

87 Because it is not economically prudent to do so – none of the options are designed to increase the capacity or offload this sub-transmission loop

88 https://www.jemena.com.au/electricity/jemena-electricity-network/network-information/ritds/

89 JEN - EMCa initial proposal workshop – 20250328, slides 132

90 JEN - EMCa initial proposal workshop – 20250328, slides 129-132

Jemena's sensitivity analysis does not consider the impact on optimal timing with one exception

390. Jemena varies a number of inputs to the economic analysis for the network options 2-4, including the VCR (±10%), discount rate (±1%), capital costs (±30%), and demand (no EV charging at peak demand). Option 4 remains the preferred option measured by NPV in each case. However, the impact of unfavourable variances on the optimal timing was not provided in the NDS except for the EV scenario.

Impact of unfavourable demand variation

391. We asked Jemena to provide the optimum timing with 100% 50PoE to test the sensitivity of the optimal timing to lower demand (i.e. than the base case of 70/30 weighting of 50PoE/10PoE). The response shows that the timing of proposed new feeder SBY-031 does not change (and is advanced by one-year for the 100% PoE10 case).[91] On this basis, we are satisfied that the optimal timing for the new feeder is likely to be in the next RCP.

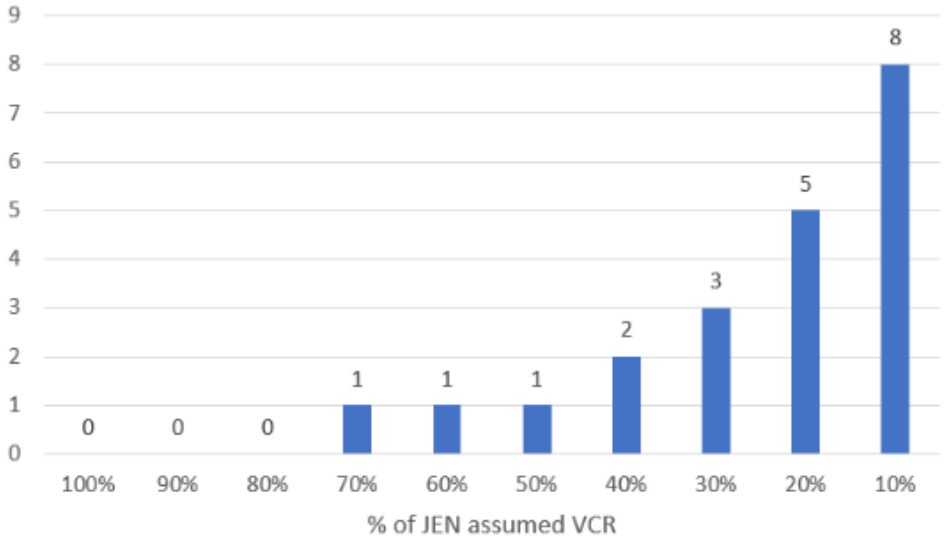
Impact of application of weighted and updated VCRs

392. As discussed in section 2.4.4, Jemena assumes a VCR of $47,905/MWh in monetising the EUE and which does not appear to recognise the different VCRs for different customer segments, nor does it reflect the latest AER VCRs for those segments.

393. We sought to overcome these limitations by looking at the sensitivity of the optimal timing to lower (weighted) VCR over a wider range than Jemena's -10% study. This was possible from Jemena's CBA model.

394. Figure 4.8 shows the deferral of the optimum timing from the base case of 2027 with progressively lower VCR. Our conclusions are that (i) the VCR would need to be about 25% or lower than assumed to defer the SBY31 feeder until the next RCP, all other things being equal, and (ii) the optimal timing is not very sensitive to the VCR for this project given the MWh quanta of the feeder overloads.

Figure 4.8: Years of deferral of SBY-031 feeder with varying VCR (100% = $47,905/MWh)



Source: EMCa analysis using JEN – RIN – Support – Northern Growth Corridor NDS – CBAM – 20250131 – Public

Findings

395. We consider that the proposed augex for establishment of the new feeder SBY-031 is reasonable.

[91] JEN response to IR006, question 15

396. The analysis provided by Jemena forms a part of a much larger Sunbury Plan, and which supports the need for the new SBY-031 feeder within the next RCP and at a cost that is reasonably formed.

4.3.3 East Preston Conversion stage 7

What Jemena has proposed

397. Jemena has proposed stage 7 of the East Preston (EP) conversion at a cost of $28.6 million with the project scheduled to be completed in 2029, following completion of Stage 6 (noting that the five previous stages have been completed). EP Stage 7 continues the strategy of converting from 6.6kV operating voltage and assets to 22kV in the EP supply area, by: [92]

- Establishing two new 22 kV feeders from East Preston North zone substation (EPN) zone substation from the new No.2 22 kV bus to transfer and convert eight 6.6 kV feeders from EP 'B' to 22 kV, and
- In addition to the conversion of the feeders themselves, 6.6kV distribution substations will be replaced by 22kV units.

Assessment

EP Stages 1-5 have been completed, and Stage 6 is underway following RIT-Ds[93]

398. EP stages 1-2 involved transferring as much load as possible away from Preston zone substation (P) and EP to contiguous substations.

399. EP stage 3 involved establishing 22 kV supply capacity within the P/EP area by building a new East Preston North 66/22kV zone substation (EPN) to enable conversion of P and transferring load from P to continue.

400. EP stage 4 included transferring all load off P and retiring P 6.6kV assets. EP stages 5-8 involve transfer of all loads from EP, retiring EP zone substation 6.6 kV assets and converting an isolated portion of a Fairfield feeder from 6.6 kV to 22 kV.

401. Jemena further states that:

- EP Stage 5 was completed in June 2022, and
- EP Stage 6 is in delivery phase and is scheduled to be completed by September 2025

Jemena has revisited the scope and timing of Stage 7 with updated information[94]

402. The EP conversion strategy reflects the following updated information:

- 2024 load demand forecasts
- Latest CBRM results
- Cost estimates based on most recent EP conversion work
- Reviewed and updated options analysis
- Lessons regarding non-network options incorporated from the Stage 6 RIT-D process, and
- Reviewed and updated economic cost-benefit analysis, based on the above latest information and inputs.

403. We consider these to all be prudent steps that increase confidence in the recommended option.

92 JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, page 31

93 JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, pages 9, 31

94 JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, pages 8

Jemena identifies five drivers for continuation of the EP 6.6kV conversion strategy[95]

404. Jemena has identified the present Preston distribution network as a priority for investment based on five factors contributing to the drivers for the upgrade to 22kV:

- Limited transfer capacity under contingency conditions
  - P and EP are 66/6.6kV substations with EP comprising switch-houses, EP 'A' and EP 'B'; the surrounding zone substations operate at 22 kV; the lower voltage level in the Preston area limits the ability to provide adequate emergency feeder load transfer during outage conditions, particularly during peak demand
  - feeder EP033 is forecast to exceed its thermal capacity during system normal conditions from 2027 onwards[96]
- Poor asset condition posing reliability and safety risk; P and EP assets are generally in poor condition, with a high probability of failure and risk of step and touch potentials
- No room for new 6.6kV overhead feeders; 6.6 kV has much lower transfer capacity than 22 kV feeders, so more feeders are required; there is little room in road reserves for more overhead feeders to meet forecast demand growth, meaning new feeders would need to be underground cables which '*restricts supply options and increases connection costs for new customer developments*'
- Contiguous circuits on poles increase reliability risk - several poles support up to three high voltage feeder circuits, meaning that if damaged, more loss of supply occurs, and
- High electrical losses – 6.6kV distribution incurs much greater electrical losses than 22kV.

405. EP 'B' has three transformers however two of the transformers are assessed by Jemena as suffering 'extensive deterioration.' Jemena considers that '*this means that EP 'B' will effectively has [sic] one transformer No. 2 that can supply it reliably under N. This is problematic for a reliable supply because EP 'B' has no transfer capacity to adjacent zone substations to back it up under N-1 through the 6.6kV network.*[97]

406. Jemena intends to retire EP 'B' transformers 3 and 4 after EP is retired (planned for 2028, per the stage 7 plan) and retain transformer No 2 as an emergency spare for the network. In our view, deferring retirement of transformers 3 and 4 despite their deteriorated condition is prudent and mitigates the risk of supply interruption under N-1 conditions at EP 'B' but not entirely.[98]

407. Jemena's risk assessment led it to rate safety and supply security risks as 'High', and Operational and Customer risks as 'Significant.' We consider these to be reasonable assessments given the information in the NDS.

408. In short, these are all reasonable factors to support Jemena re-evaluating the merits of progressing the EP conversion program in the next RCP.

Jemena considered six options to respond to the identified need and has selected the option with the lowest capex and highest NPV

409. Table 4.8 shows a summary of the options evaluated by Jemena. Figure 4.9 shows EP, EPN and the contiguous substations. We note that the cost for stage 7 is higher in this table, drawn from the relevant NDS than in the SCS capex model.

95 JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, pages 8, 9

96 JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, Table 2-2

97 JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, page 21

98 Health index of 7.6, 7.3 respectively now, forecast to deteriorate further through to 2028 (8.5/8.1), per Table 3-1

Table 4.8: Summary of Jemena's option economic analysis ($m 2024)

Option	Cost stage 7	Cost stage 8	PV cost	NPV
1. Do nothing	0.0	0.0	0.0	0.0
2. Continue with final 2 stages of the 6.6kV to 22kV EP conversion from EPN (recommended)	30.0	18.4	40.0	232.0
3. Continue with final 2 stages of the 6.6kV to 22kV EP conversion from Preston (PTN)	38.6	18.4	47.0	209.0
4. Complete EP stage 7 of the 6.6kV to 22kV EP conversion and transfer the remaining EP load to Fairfield substation (FF)	30.0	14.9	47.0*	217.0
5. Undertake like-for-like replacement of the remaining EP 6.6kV distribution assets	68.7		67.0**	178.0

Source: JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, Tables ES-1-1, 4-3, 4-4, 4-5, 4-6

** On-going distribution replacement works and retire EP in the period FY31-FY35 at $16.8 million per Table 4-5*

*** On-going distribution replacement works in the period 2032-2038 at $33.6 million*

[redacted]

410. Jemena has selected Option 2 because (i) it has the lowest capital cost and the highest NPV of the options considered, and (ii) it will (with the proposed Stage 8, not under consideration here):

- Address the physical asset risks posed by primary plant at EP zone substation to supply and personnel safety, and
- Improve the transfer capability for the East Preston area and provide more effective supply restoration.

411. Our understanding is that each of options 3-5 will also address the supply and safety risks posed by EP as a 66/6.6kV substation, but over a longer period and at a higher cost. Therefore Option 2 is the logical technical choice from the options considered.

Costs are reasonably derived although with an estimate accuracy range of ±30%

412. Jemena advises that its Front-End Engineering Design team developed the cost estimates drawing on '*recent similar and past projects and expected costs based on site-pro specific construction complexities and industry experience…[with] an estimate range of ±30%.*'[99]

413. The scopes of work are detailed in the appendices of the NDS. We consider the costs to be representative of the efficient cost of undertaking the proposed scopes of work given the stage of the project lifecycle. However, more accurate forecasts should be available for submission in a revised proposal as an outcome of the RIT-D process.

Jemena's economic assessment is sound for this project

414. Jemena has provided its CBA model, in which it undertakes probabilistic risk-cost analysis focussing on three failure causes concerning EP 'B':

- Transformer failure
- Switchboard failure, and
- Bus failure.

415. In addition to the poor EP transformer condition referred to above, Jemena also highlights the poor condition of other primary plant (switchgear) and secondary plant (protection relays, CTs, VTs). According to Jemena's analysis the switchgear at EP 'B' is in worse condition than the power transformers, with current health indices of

- 7.0 for the two bus tie circuit breaker CB,
- 9.0 for the 11 feeder and capacitor bank CBs,
- 8.4 for the four transformer CBs and
- 9.2 for the three buses themselves, with conditions forecast to continue to deteriorate.[100]

416. Jemena has considered the potential failure of transformer, bus and circuit breaker in its assessment of the options (i.e. not secondary equipment failure): [101]

- EP transformer and switchgear failure rates – Jemena describes the derivation of the failure curves for both, and we are satisfied that the selected failure curves (revised normal and revised Weibull, respectively) are reasonable, and
- Probability of EP bus unavailability – Jemena's probability of failure of an EP bus is based on historical data collected from the Jemena network and other electricity networks with the same or similar equipment type; again, we consider the methodology to be sound and the 1.15% probability of bus unavailability to be reasonably derived.

417. The CBA spreadsheets provided include hard-coded information only, however we observe that the largest contribution to the value of EUE is by far from an N-1 bus failure event. This is a function of the lack of redundancy for bus failure and the failure probability.

418. Given the importance of the bus failure probability to the value of EUE, Jemena included a lower failure probability in one of its sensitivity scenarios, which we discuss below.

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99 JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, page 29

100 JEN - EMCa initial proposal workshop – 20250328, slide 137, noting that a health index above 7 is considered 'bad'/ high probability of failure, and end-of-life within five years

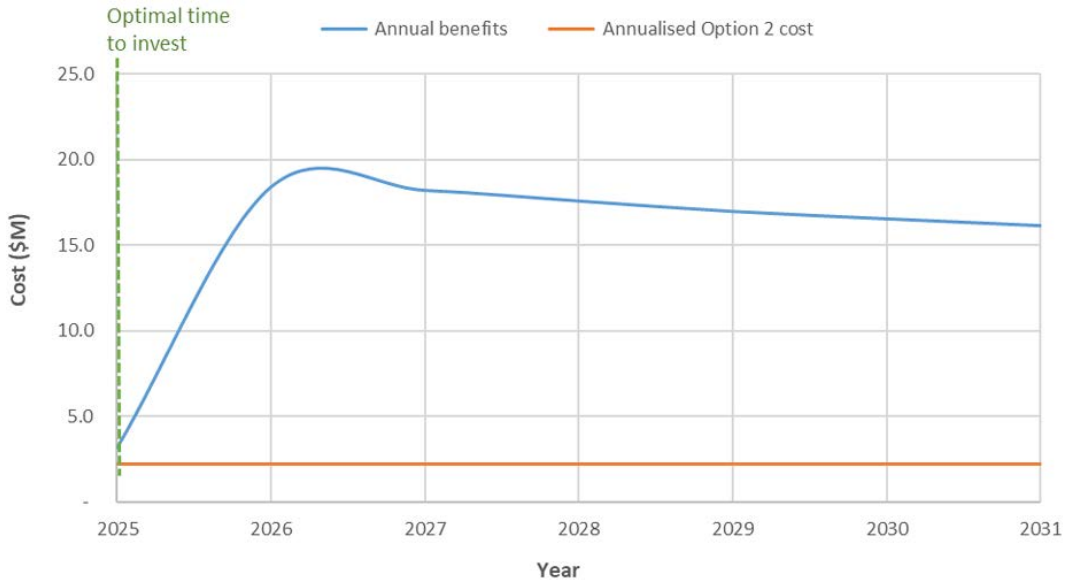
101 JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, page 23-28

Optimal timing and the sensitivity analysis

419. Figure 4.10 illustrates that the economically optimum timing with Jemena's base case assumptions is 'now' or, pragmatically, as soon as possible. Jemena's conclusion is reasonably stated as:[102]

> *'the proposed remaining program provides the most optimal mix of maximum expected annual benefits ($3.2M) and the lowest annualised costs ($2.2M) and, therefore, any deferral of the project will erode the annualised net benefit by at a minimum of ($1.0M) to JEN's customers for the first year the project is delayed and increasing to ($13.9M) by 2031.'*

Figure 4.10: Jemena's economically optimum timing for preferred Option 2



Source: JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential. Figure ES-1-1

420. Jemena considered the impact of three scenarios on the NPV and, as a byproduct, on the optimal timing:

1. Higher than expected costs (+30%), lower than expected VCR (-10%)
2. Lower than expected costs (-30%), higher than expected VCR (+10%), and
3. 1 in 50-year probability of bus failure (rather than 1:30 year)

421. Of most interest are the first and third scenarios, which show strongly positive NPVs and no deferment of the optimal timing:

- Scenario 1: NPV = $177 million, down from $232 million for the base case[103]
- Scenario 3: NPV = $123 million.[104]

422. As the spreadsheets provided all incorporated hard-coded numbers (no variables, no formulae) we could not readily undertake further sensitivity analyses – for example of the impacts of even lower VCR and lower demand. However, given the scenarios presented, we consider that it would take unreasonably unfavourable assumptions to defer Stage 7 works to the following RCP (or to change the preferred option).

Findings

423. We consider that the proposed augex for East Preston stage 7 conversion is reasonable.

102 JEN – RIN – Support – East Preston Area Network Development Strategy – 20250131 – Confidential, page 23-28

103 JEN – RIN – Support – East Preston Area NDS – CBAM – Table 6-3 – 20250131 - Public

104 JEN – RIN – Support – East Preston Area NDS – CBAM – Table 6-5 – 20250131 - Public

424. We are satisfied that the proposed option of continuing with the staged replacement of 6.6 kV equipment in the Preston area by converting 6.6kV to 22kV from the East Preston supply area to EPN and eventually decommissioning EP is prudent and that the forecast cost for the next RCP is reasonable.

4.4 Findings and implications for proposed augex

4.4.1 Summary of findings

We consider that collectively and individually the projects and programs that we have reviewed present reasonable estimates of the augmentation capex required in the next RCP.

Context

425. We have assessed only three augmentation projects/programs submitted with Jemena's Proposal for the next RCP. Therefore, our findings may not necessarily be applicable to the balance of the program.

426. We have not commented on demand forecasts. The AER has advised us that it will assess Jemena's demand forecast separately and will consider our findings accordingly. However, we have, for demand-driven projects, commented on the sensitivity of the proposed projects' optimal timing to negative variance in the demand forecast. Our 'low demand case scenario' is a demand forecast of 100% 50PoE rather than the 70%:30% weighted 50PoE/10PoE forecast used by Jemena for planning purposes.

General

427. Jemena has presented Network Development Strategy (NDS) documents and supporting cost-benefit analysis (CBA) models that provide foundational material to support assessment. However, we needed to ask a number of clarifying questions, primarily because the CBA models provided were not fully transparent, containing hard-coded data at an aggregated level.

428. Jemena responded to our clarifying questions, and this enhanced our understanding of each project and program.

429. The NDS documents provided to support the projects/programs (together with the CBA models) present a reasonable range of options to respond to generally well-articulated needs.

430. Jemena has selected the highest NPV option in each case and the models derive both the optimal timing and sensitivity analyses focussed on the NPV.

431. Sensitivity analyses are presented in each case with the emphasis on demonstrating the robustness of the NPV of the selected option against negative variances (i.e. NPV remains positive) and superiority to the other options. This is good practice, however in two of the projects the sensitivity analyses did not encompass changes to the optimal timing. We have sought to do so, either by asking Jemena to undertake studies or by doing them ourselves if Jemena's models readily support the analysis.

Northern Growth Corridor – Craigieburn Plan

432. We consider both the proposed establishment of the new Craigieburn substation and the associated feeders because they are complementary parts of the Craigieburn Plan, which in turn is to address expected overloads in the Northern Growth Corridor.

433. Jemena's proposal to build a new Craigieburn substation in 2027 and six new 22kV feeders will alleviate overload risks at contiguous substations. We consider it to be the prudent approach, and we are satisfied that the expenditure is reasonable and needs to be incurred in the next RCP.

Northwestern Growth Corridor - new SBY-031 feeder

434. The proposed new feeder SBY-031 is part of the much larger Sunbury Plan to address demand growth in the Northwestern Growth Corridor. We consider that the analysis supports the need for the new SBY-031 feeder within the next RCP and that the cost estimate is reasonable.

East Preston Stage 7

435. The proposed East Preston Stage 7 project is a continuation of six previous stages to progressively convert the 6.6kV equipment in the Preston supply area to 22kV. We consider that it is prudent to continue with the proposed stage 7 which will enable retirement of the old East Preston substation, after voltage conversion and supply from East Preston North substation at 22kV. We also consider that the forecast cost is reasonable.

4.4.2 Implications for proposed capex allowance

436. We have been asked to review projects with aggregate proposed capex of $66 million. These projects comprise part of Jemena's aggregate proposed augex of $270 million.

Alternative forecast of expenditure

437. We consider that Jemena's forecast of its expenditure requirements for the projects within the augex category that we reviewed is reasonable.

438. We stress that our advice on an alternative forecast relates only to the projects within the category of expenditure within the scope of our review and does not necessarily have any implication for augex that was not within the scope of our review.

5 REVIEW OF PROPOSED OPEX – HAZARD TREE REDUCTION

Jemena has proposed nine step changes totalling $41.4 million for the next RCP. In this section, we consider one of the nine opex step changes proposed by Jemena for the introduction of a hazard tree management program in LBRA at a cost of $2.6 million.

For the hazard tree management program, we consider Jemena's proposal does not satisfy the relevant NER criteria for an opex step change.

5.1 Introduction

439. In this section, we describe Jemena's rationale for the opex step changes that we have been asked to review and assess the proposed opex step change in the context of the requirements of the NER.

AER guidance materials

440. As outlined in the AER's Better Resets Handbook, the AER assesses the efficiency of a business's proposed opex forecast at a total level, using the top-down 'base-step-trend approach described in the AER's Expenditure assessment guideline.

441. In the Better Resets Handbook, the forecasting of the step change component of the base-step-trend approach is described as follows

> *'Forecasting step changes in costs that are not compensated by base operating expenditure and trend, and are required to ensure the operating expenditure forecast meets the criteria in the Rules. Examples include cost increases associated with new regulatory obligations and trade-offs between capital expenditure and operating expenditure.'*[105]

442. The AER has set out its expectations for forecasting step changes, being they are limited to a few in number, or none at all. Our understanding is that step changes should present material additional efficient costs to the business that are not provided for in the base or trend component of the opex forecast. Specifically, that

> *'New regulatory obligation step change*
>
> – *It is clearly linked to the new regulatory obligation and represents a major upward step to comply with it.*
> – *It will have an impact on the costs of providing prescribed network services and it can be demonstrated that it is not capable of being managed otherwise under forecast opex through in-built provisions under output, price and productivity growth.*
> – *No double counting of costs.*
>
> *Capex/opex substitution step change*
>
> – *It is supported by thorough cost-benefit analysis.*
> – *The avoided capex is estimated accurately and it more than offsets the increase in opex in net present value terms (that is, efficient substitution).*
> – *No double counting of costs.*

[105] AER Better Resets Handbook July 2024, page 23

Step change driven by major external factor(s) outside the control of a business

- *It will have an impact on the costs of providing prescribed network services and it can be demonstrated that it is not capable of being managed otherwise under forecast opex, including through inbuilt provisions under output, price and productivity growth.*
- *Where it involves incurring costs in complex areas or markets, it is accompanied by an expert report (including analysis of options, market outlook and opinion on the reasonableness of the proposed step change).*
- *No double counting of costs.'*[106]

443. The AER expenditure assessment guidelines outline the approach for assessment of step changes.[107] We consider the AER guidance in our assessment of the proposed opex step changes.

Consideration of materiality

444. To our knowledge the AER has not established a materiality threshold for opex step changes, other than the principle that it will have an impact on the business' ability to deliver network services, and it can be demonstrated that it is not capable of being managed otherwise under forecast opex, including through inbuilt provisions under output, price and productivity growth.

445. These provisions reflect the different circumstances, and operating environments of each of the businesses. The AER has also provided guidance that step changes should not double count the cost of increased regulatory burden over time, which forecast productivity growth may already account for. Also, that:

> *'We will consider what might constitute a compensable step change at resets, but our starting position is that only exceptional events are likely to require explicit compensation as step changes. Similarly, forecast productivity growth may also account for the cost increases associated with good industry practice.'*[108]

446. In our assessment of the specific opex step changes that AER has asked us to review, we have not considered matters of materiality which, in any case, would be better dealt with at the aggregate level. We therefore consider only whether the proposed expenditure is required on technical grounds and whether it is incremental to expenditure currently incurred.

5.2 What Jemena has proposed

5.2.1 Proposed opex step changes

447. Jemena has nominated the estimated 2025 regulatory year as the base year for forecasting opex, with the adjusted base year total expenditure set at $100.31 million in $2026.

448. For the next RCP, Jemena has proposed nine step changes totalling $41.4 million as shown in Table 5.1.

106 AER Better Resets Handbook, July 2024, page 26

107 AER Expenditure assessment guidelines – Electricity Distribution, October 2024, page 9-10

108 AER Expenditure assessment guidelines – Electricity Distribution, October 2024, page 24

Table 5.1: Jemena proposed opex step changes - $m, real FY2026

Step change	2026-27	2027-28	2028-29	2029-30	2030-31	Total
ICT Services	1.5	3.7	5.3	6.0	5.1	**21.6**
CER Integration - Grid stability and flexible services	0.0	0.0	0.1	0.2	0.2	**0.5**
CER Integration - Voltage and PQ management	0.2	0.2	0.2	0.2	0.2	**1.1**
CER Integration - Data Visibility and analytics	0.0	0.4	0.4	0.4	0.4	**1.5**
New REFCL obligations	1.0	1.0	1.0	1.0	1.0	**4.9**
Resilience – Outage preparation and response	0.9	0.9	0.9	0.9	0.9	**4.5**
Safety - LBRA Hazard trees management program	0.5	0.5	0.5	0.5	0.5	**2.6**
Resilience - Deploying mobile response vehicle	0.2	0.2	0.0	0.0	0.0	**0.4**
Customer systems and education	0.9	0.8	0.9	0.9	0.8	**4.3**
Total step changes	**5.2**	**7.7**	**9.3**	**10.1**	**9.1**	**41.4**

Source: EMCa table derived from Jemena SCS opex model

5.3 EMCa's scope of review for proposed opex step changes

449. The scope of review included in this report is outlined in Table 5.2.

Table 5.2: EMCa's scope of Jemena proposed opex step changes - $m, real FY2026

Step change	2026-27	2027-28	2028-29	2029-30	2030-31	Total
Safety - LBRA Hazard trees management program	0.5	0.5	0.5	0.5	0.5	**2.6**

Source: EMCa table derived from Jemena SCS opex model

450. We assess other opex step changes associated with CER and the Digital program (ICT and cyber security) in separate reports to the AER.

5.4 Assessment

Jemena has an existing hazard tree program

451. Jemena manages hazard trees both in the cyclic programs (HBRA and LBRA) also referred to as its routine hazard tree management program and a dedicated hazard tree management program. [109]

- The routine hazard tree management program identifies hazard trees in the LBRA and HBRA. If a person or assessor during the routine vegetation management program identifies a hazard tree, a Suitably Qualified Arborist will conduct an assessment of the tree
- The dedicated hazard tree management program allows for identification of hazard trees in HBRA only and is completed on a two-year inspection cycle by an experienced

[109] electric-line-clearance-management-plan-2021-2026-v2.1

arborist. The assessment will register these trees in the VMS database and allow for targeted implementation of measures to mitigate the likelihood of tree related fire starts in the HBRA.

What Jemena has proposed

452. Jemena proposes that the program is to be implemented in the LBRA, in addition to, and based upon the existing dedicated hazard tree management program in HBRA. In its description of the program Jemena refers to the dedicated hazard tree management program in HBRA having delivered a 70% decrease in the number of incidents due to vegetation contact and a reduction in the number of fire starts.

453. The first year of expenditure is proposed to be 2025-26.

454. The proposed opex step change of $2.6 million for the next RCP is shown in Table 5.2. Jemena proposes that the expenditure to implement the program is above that included in its base year, and necessary to meet the operating expenditure objective (cl. 6.5.6(a) of the NER) to reasonably reflect the operating expenditure criteria in cl. 6.5.6(c) of the NER.

455. In support of its proposed opex step change, Jemena has provided a business case. Jemena states that its preferred option offers a high NPV, however no NPV analysis has been provided.

Estimated cost is based on a combination of inspection and treatment costs, and management of the proposed program

456. The business case includes a total operating expenditure for this project as $500k per annum, including treatment costs based on 120 spans and resource costs of an arborist to manage the program.

457. Jemena has considered options to underground the network, network augmentation and its preferred option to undertake a LBRA Hazard tree management program, with costs as shown in Table 5.3.

Table 5.3: Summary of costs of recommended option - thousands $2024

Assessment	Cost per year	Cost over 5 years
Full time arborist	140	700
Cutting costs ($3,000 per span x 120 spans)	360	1,800
Total (excluding faults)	**500**	**2,500**
Faults ($5,000 x 24 faults per year)	120k (+7.5%)	697
Total (including faults)	**-**	**3,197**

Source: EMCa derived from LBRA Hazard Tree Management Program – Business Case

458. The estimate of 120 spans per year for its proposed LBRA program as shown in Table 5.4.

Table 5.4: Derivation of cutting volume and treatment for preferred option

Assessment	Assumption	Total
Number of HV and ST spans	-	36,133
Number of HV and ST spans that are vegetated spans	-	16,508
Estimated number of Hazard Trees (Rating 1-5) per vegetated span (based upon field observations by the Vegetation Management Program Leader and HBRA Hazard Tree Program Arborist)	20%	3,309
Estimated percentage of spans that are Jemena's responsibility for management	70% (with the remaining 30% of Hazard Tree management being a Council responsibility to manage)	2,317
Percentage of Hazard Trees found requiring action (Rating 4-5) by Jemena	25%	579
Spans identified per year (based on 5-year cycle)	20%	Rounded to 120

Source: EMCa derived from LBRA Hazard Tree Management Program – Business Case, Table 4-1

459. Jemena considers four options by varying its assumptions in Table 5.4 as a sensitivity analysis, from which it concludes that the annual forecasted Hazard Tree treatments would not change materially from the 120 forecasted spans per year.

Jemena has not sufficiently considered whether the proposed step change is incremental to its base opex forecast

460. The business case considers two risks:

- the risk of contact by Hazard Trees resulting in live bare conductors on the ground and
- the risk of fire starts occurring through contact of assets with trees or other assets.

461. This has informed a qualitative assessment of the risks as significant and high respectively, and leads to Jemena's assessment of a need for action to be taken to minimise risk as far as practicable.

462. The business case includes an estimate of the costs to manage the risk, however no quantitative assessment of the risk was provided. The do nothing (base case) is based on an estimate of 80 faults per year and $5k average cost of remediation per span, resulting in an annual cost of $400k per year. In addition, Jemena has included a year-on-year increase of 7.5% based on increasing likelihood and consequence, increasing the total to $2.3 million over 5 years ($2024).

463. In its cost build-up, Jemena has not taken into account the ongoing costs of faults, either in its total cost analysis or in determining the proposed opex step change. Accepting that a reduction of faults is possible from this program, we would expect that the 70% reduction would similarly apply to a proportionate reduction in the opex. Assuming this cost is avoided, the cost can be removed from the base year, or alternatively the incremental opex can be reduced by this amount, being approximately $1.6 million. Reducing the opex step change by this amount materially reduces the materiality of the proposed step change.

464. Jemena has not demonstrated that the costs to implement the LBRA program are additional to the forecast trend growth of its forecast opex.

Estimation of benefits is not adequately supported, and likely overstated

465. Jemena provided the input data relied upon for the assessment of faults included in Figure 5.1.[110]

Figure 5.1: Number of outages caused by fallen vegetation per year (FY21-FY24)

	FY21	FY22	FY23	FY24	Total
LBRA – No. of outages caused by fallen vegetation	88	152	37	51	328

Source: JEN's Regulatory Information Notice (RIN) submission data, *however:*
- includes outages due to 'Vegetation – 'Blow Ins/Fall Ins'' – *these are considered Hazard Trees*
- includes outages caused by both NSP responsible and Other Responsible Party (Council) trees
- excludes outages due to Vegetation – 'Grow Ins' – *these are considered an ELC obligation*

Source: JEN – RIN – Support – LBRA Hazard Tree Management Program – Business Case – 20250131 – Confidential, Table 2-1

466. We note Jemena's comments that this is substantially contributed to be weather events:

> *'Historically it has been observed that the number of outages due to vegetation is proportionate to the number of significant weather events experienced in that particular year where, in particular, in October 2021 (FY22) JEN experienced a succession of significant weather events contributing to an additional 84 incidents in that month alone. Comparatively, in FY23 & FY24 there were significantly less weather events resulting in vegetation contact with assets leading to outages.'*[111]

467. We queried the basis of the estimated 80 faults per year from vegetation in LBRA, assuming that this was the simple average of the last four years of data. Jemena stated that this includes the contribution of major weather events, and also outages from responsible parties other than the NSP (e.g. Councils). In addition, for the remaining data we consider that whilst vegetation blow-ins are considered outside of the clearance zone, they do not necessarily originate from a hazard tree, and therefore may not be the target of the program. The addition of this data is likely to overstate the benefits of this program, as it is not the target of the program.

468. We removed the impact of MEDs and also outages from responsible parties other than the NSPs, however we did not change the classification of vegetation blow-in events. This reduced the number of relevant outages from 328 to 38 over the same four-year period, with 5 outages per year in the last two years. The impact of MEDs increased the number of historical outages to 47 due to a single event in 2021.

Insufficient evidence of an increase in incidents, or risk to the network or customers that justifies this program

469. Jemena states that the program is aimed at enhancing the safety of its network against increasingly frequent and damaging weather events, primarily strong winds and storms:

> *'A greater frequency of incidents where an increased volume of vegetation is brought down poses risks to the operational safety of JEN's network and the safety of the communities we serve. The risk is prevalent due to the increase of incidents occurring in line with more frequent and severe weather events. An increase in hazard is observed when more established trees that are in poor health become Hazard Trees, and due to their large mass and height, they have the potential to cause significant damage.'*[112]

470. Also, that:

110 JEN – IR006 – Q38- RIN C - All Veg Outages – 20250401 - Public

111 JEN – RIN – Support – LBRA Hazard Tree Management Program – Business Case – 20250131 – Confidential, Page 7

112 LBRA Hazard Tree Management Program – Business Case, page 2

'The number of vegetation line contact and damage incidents caused by vegetation contacting and damaging electrical lines from outside of the clearance space is increasing. Additionally, management of Hazard Trees that would otherwise be likely to contact electric lines will help to retain current levels of network reliability even with increased weather events. During weather events that impact large areas and cause widespread damage, restoration times are expected to be substantially improved due to reduced work volumes.'[113]

471. Based on our assessment of the data that Jemena has relied upon, Jemena has not demonstrated sufficient evidence of an increase in incidents, or risk to the network or customers that justifies this program.

472. We also considered whether this program may address the impact of extreme weather events, including from changes to the climate, in which case may be considered as network resilience expenditure. We note that the AER has published guidance on how to assess resilience expenditure, and that Jemena does not appear to have addressed this directly in its regulatory proposal. We have not been asked to consider Jemena's resilience expenditure.

5.5 Findings and implications

5.5.1 Summary of findings

Assessment against step change criteria

473. Jemena has proposed an opex step change for its proposed dedicated hazard tree management program in LBRAs totalling $2.6 million for the next RCP. This is in addition to the routine hazard tree management that Jemena is undertaking in both HBRA and LBRAs, and its dedicated hazard tree management program in HBRAs.

474. We are not satisfied that the costs proposed by Jemena meet the required step change criteria. We do not consider the proposed program is driven by any specific new regulatory obligations or is driven by an efficient capex-opex trade off.

Assessment of prudent and efficient costs

Insufficient justification of the proposed costs being materially above the opex forecast

475. Jemena has outlined the method it has applied to estimate the costs of its proposed LBRA hazard tree management program. We consider that Jemena has not sufficiently demonstrated that the proposed costs are reasonable estimates and incremental to the trend growth of its forecast opex.

Benefits of the program are overstated

476. Based on our assessment of the data provided by Jemena, we consider that the benefits are overstated given that the historical incidents on the network in LBRA that are relevant to consideration of the proposed program, are materially lower than Jemena has described.

477. We have not seen sufficient evidence of an increasing frequency or impact of vegetation related outages to which this program will benefit consumers, above that already provided by Jemena's existing programs.

478. We have not been asked to consider this program as part of a package of network resilience expenditure.

113 LBRA Hazard Tree Management Program – Business Case

5.5.2 Implications for proposed opex step change allowances

479. We consider that the proposed opex step change for the LBRA hazard tree management program is not justified.

APPENDIX A – ECONOMIC TIMING FOR ASSET REPLACEMENT

A.1 Introduction

480. AER published a guideline in 2019 on Asset replacement, which includes an appropriate methodology for determining the economically optimal timing for a replacement. In this appendix, we provide a recap on this method.

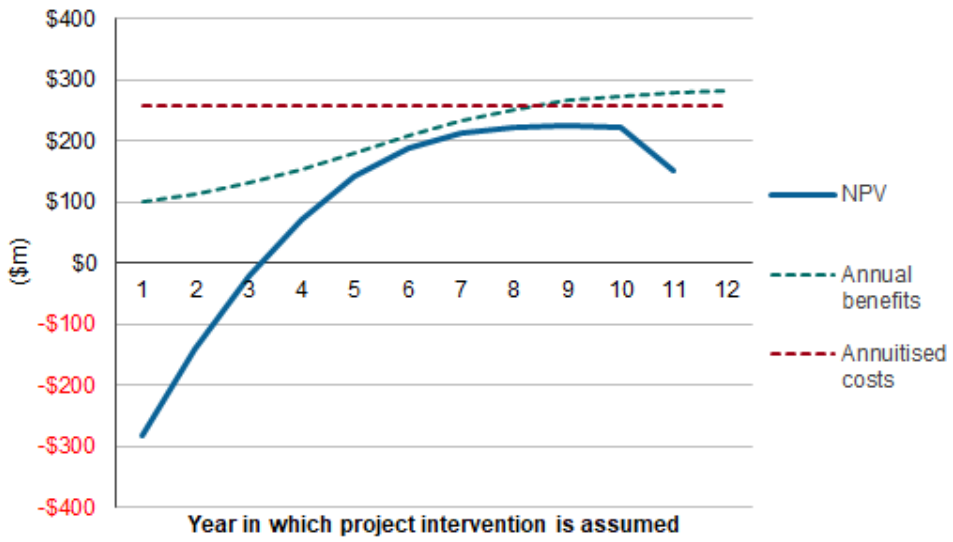
A.2 Economic timing

481. It is frequently the case in economic assessments in support of electricity infrastructure investments, that there is an escalating counterfactual economic cost (including an escalating risk-cost), and which the proposed investment is intended to address. This increasing cost for the counterfactual therefore defines the benefit that can be achieved by the proposed solution.

482. The question of identifying the optimum economic timing for the solution was addressed by AER in an industry practice application note.[114] In short, under microeconomic theory, it can be shown the optimum timing occurs when the annual benefits exceed the annuitised cost.

483. The illustration in figure A.1 shows a project for which benefits (green) increase over time. The annuitised cost of the project is shown in red. The blue NPV line shows the NPV for this project as a function of when the project is assumed to be undertaken – that is, it reflects a series of timing options for the project, if undertaken in any year up to the eleventh year.

Figure A.1: Illustration that defines the optimum timing for an investment[115]



Source: EMCa (illustrative example only)

114 AER, Industry practice application note; Asset replacement planning, January 2019. See Figure 1 (page 37)

115 Analysis in this worked example is based on an asset that is assumed to last, and therefore provide benefits for, 20 years from the date that it is commissioned. Benefits therefore continue beyond year 12 but are shown only to that year in order to focus on the timing decision.

484. As can be seen from the graph:

- If undertaken prior to year 3, the project would have a negative NPV.
- If the project was undertaken in any year from year 3 to year 7, the annual benefits are less than the annuitised cost and it would therefore not be economic to undertake the project.
  - This is the case despite the project having a positive NPV if undertaken after year 3. This result occurs because the net benefits beyond year 7 in this example more than offset the net costs before that (in the NPV calculation). But it remains the case that the project is not economic if undertaken in the period up to year 7 because the benefits do not exceed the cost ***in that period***.
- From around year 8, the example shows that the annual benefits exceed the annuitised cost, demonstrating that the project is then justified. The graph shows that this timing also provides the highest NPV of the timing options considered.
- If the project was deferred beyond year 8, the NPV declines, because the net benefit of undertaking the project (as evidenced by the green benefits line exceeding the red annuitised cost line) is lost.

485. We provide this refresher on economic timing as we observed in the course of our assessments numerous instances in which a positive NPV was presented as evidence that a proposed project was justified within the next regulatory period, without having tested optimum timing in accordance with the AER practice note.

486. We consider this especially problematic where economic modelling of hundreds or thousands of potential interventions is simulated to determine a scope of work by applying a logic goal that progressively tests each potential intervention year-by-year for a positive NPV. If the modelled goal is set only to identify when each potential intervention would first have a positive NPV, and then to include each such intervention in the proposed work program, then the modelling will almost certainly be biased towards including such interventions prematurely and therefore over-estimating the extent to which such interventions are economically justified within the period.

APPENDIX B - REVIEW OF HISTORICAL PERFORMANCE

B.1 Summary

487. We observe that the network performance has generally been improving, along with asset performance despite the impact of several major weather events across Victoria. For Jemena's network:

- Average reliability performance is generally improving, which suggest that Jemena's asset management process has improved service levels
- According to the safety regulator ESV, the number of all asset failure incidents and contact incidents are lower than the long-term average
- Rate of line clearance non-compliance has recently improved, however the regulator is concerned by a worsening long-term trend
- Network utilisation has been flat over the last 10 years, and remains higher than the DNSP average

488. We observe that the actual expenditure has been consistently higher than the forecast expenditure. For Jemena's network:

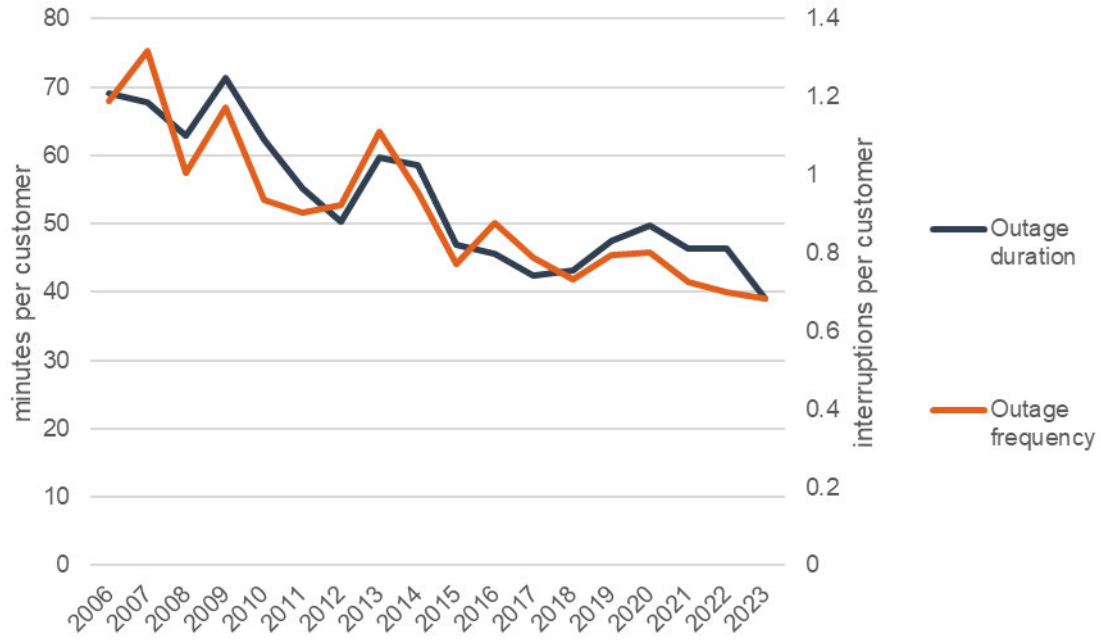
- Capex delivery performance is subject to a range of factors, with actual capex exceeding forecast capex over the last 5 years
- Jemena expects the gross capex to exceed the capex allowance for the current RCP
- Over the last 5 years, actual opex is lower than the forecast opex resulting in an underspend against the opex allowance

B.2 Current period service performance

Average reliability performance is generally improving

489. The AER noted that, on average, reliability had been improving for customers. Figure B.1 shows average outage duration and outage frequency data for Jemena based on the AER network performance report data. This indicates an improving (decreasing trend) of outage duration and outage frequency.

Figure B.1: Comparison of Jemena historical outage duration and outage frequency



Source: AER Network performance report

490. Outage frequency may be considered an indicator of the effectiveness of asset management, to the degree that the trend is linked to preventable events and not actions of extreme weather or third parties. We make further observations as it relates to the scope of our assessment of the expenditure as relevant.

According to the safety regulator ESV, the number of all asset failure incidents and contact incidents are lower than the long-term average

491. ESV publish the number of serious electrical incidents reported to Energy Safe by Jemena during the 2022–23 period, in its 2023 safety performance report on Victorian Electricity networks. The 2024 report was not available at the time of our review.

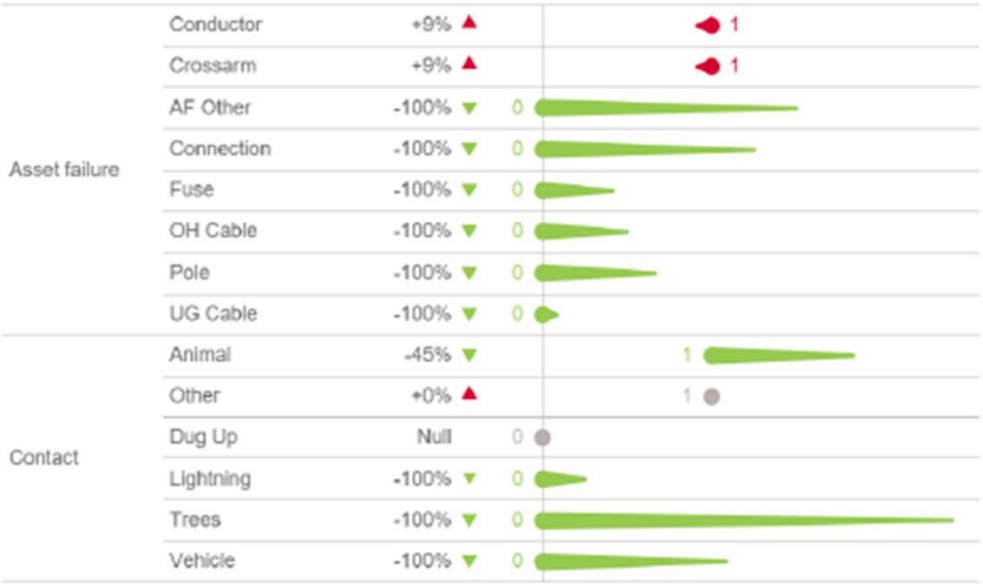
492. The most common incidents on the Jemena network in 2022–23 were HV fuse failures, tree contact, animal contact and connection failures. The numbers of all asset failure incidents were lower in 2022–23 than the long-term average, except for fuse failures which were 16 per cent above the average. (page 38)

493. Tree contact, HV fuse failures, animal contact and conductor and connection faults were the most common causes of network-related fires. The numbers of fires from asset failure incidents were lower in 2022–23 than the long-term average in all categories, except for HV fuse failures and conductor failures. The numbers of fires from contact incidents were higher than the long-term average in two categories (other contact events and lightning strike), lower in three categories (tree contact, animal contact and vehicle contact) and stable in one (dug-up cables).

Figure B.2: Incidents on the Jemena network

Source: ESV report, Figure 36

Figure B.3: Incidents on the Jemena network resulting in ground fires

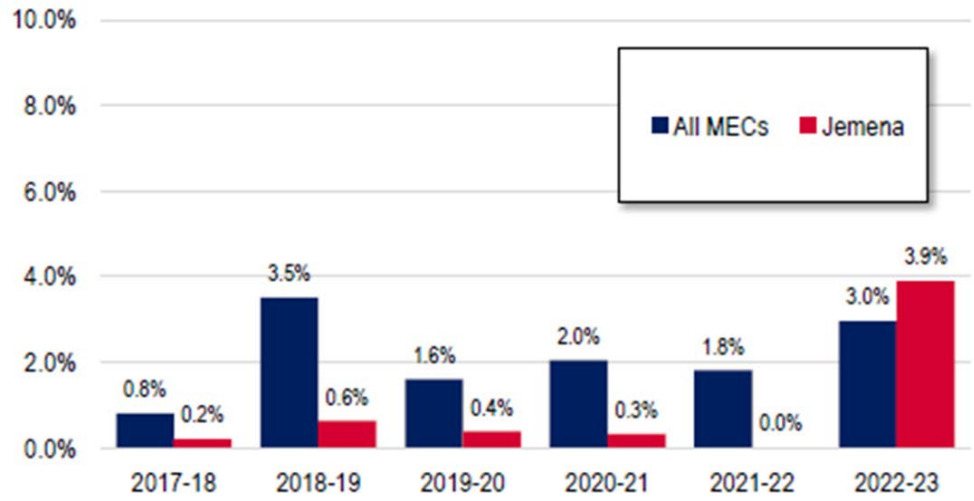


Source: ESV report, Figure 37

Rate of line clearance non-compliance has flattened

494. ESV also undertake inspections of the network to determine any spans that may not be compliant with the electricity line clearance regulations. The trend in major non-compliances is shown in Figure B.4. A major non-compliance is regarded as a high-risk situation where vegetation is touching, is growing through, or could soon touch, uninsulated conductors. This has resulted in greater use of ESV's enforcement option to issue infringement notices and fines.

Figure B.4: Rate of Jemena major non-compliances (HBRA and LBRA)



Source: ESV report, Figure 35

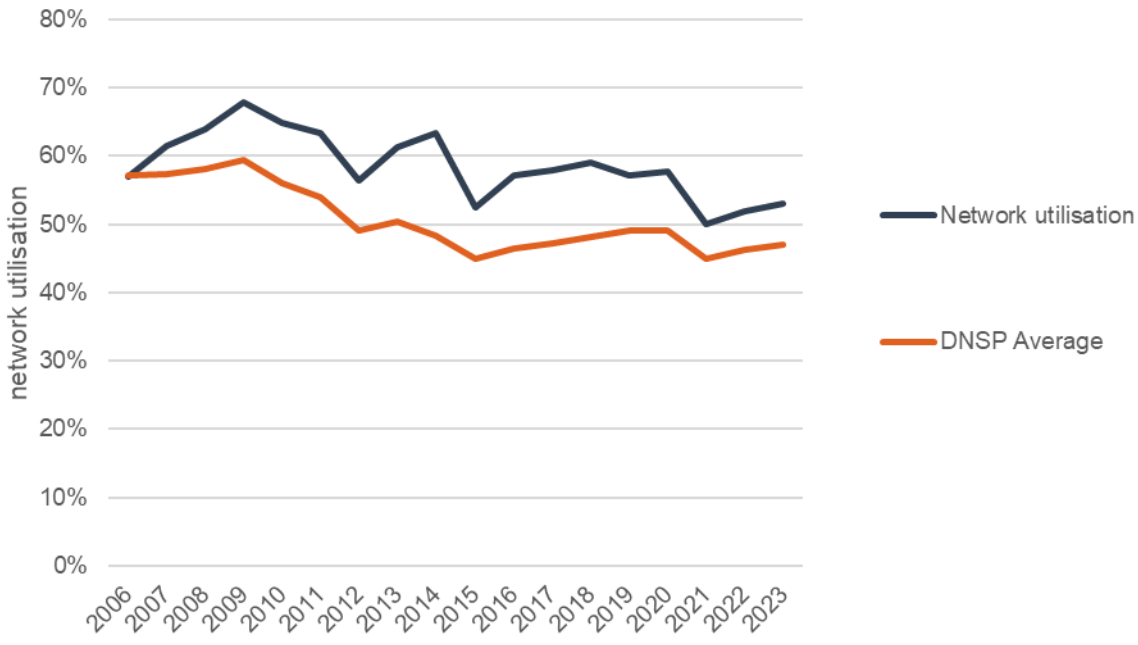
495. We observe a marked increase in the trend in major non-compliances in Jemena's network relative to previous years, and when compared with the total across Victorian DNSPs.

Network utilisation is higher than the DNSP average

496. Network utilisation is an indicator of the capacity of the electricity network, and whilst does not account for localised constraints or complexities associated with the two-way flow of energy, is a coarse measure of the ability for networks to make greater use of the network assets.

497. Figure B.5 shows that Jemena's network utilisation has been declining, and continues to have a network utilisation above the DNSP average.

Figure B.5: Comparison of Jemena historical network utilisation versus DNSP average



Source: AER Network performance report

B.3 Current period expenditure performance

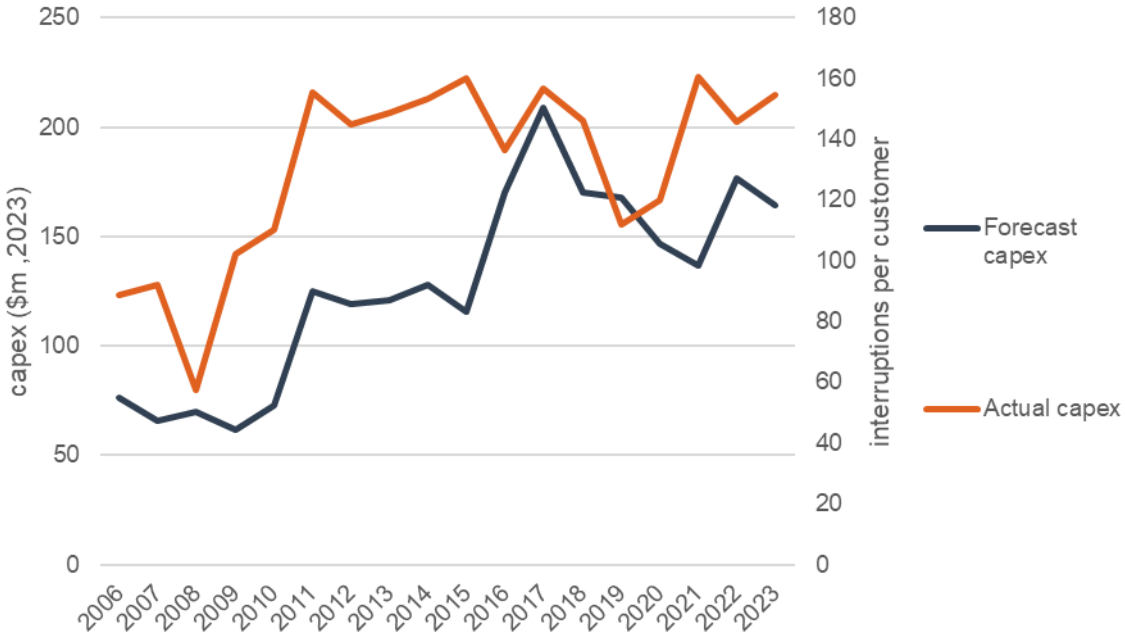
Capex delivery performance is subject to a range of factors, with actual capex exceeding forecast capex over the last 5 years

498. In its 2024 network performance report,[116] the AER considered the aggregate over/under-spend and the timing of capex across the regulatory period. Whilst the over/under spend in any one year may not be instructive, the AER concluded from its analysis that

> *'Our first report looked at the timing of capex and concluded that NSPs tend to:*
> *• underspend by a greater extent early in regulatory periods*
> *• spend closer to, or above capex forecasts later in regulatory periods*
> *In our analysis we noted that there are different factors that can determine patterns of capex, and that one of the issues may be that capex incentives, financial or otherwise, vary through the course of the regulatory period.'*[117]

499. Figure B.6 shows the forecast vs actual capex for Jemena based on the AER network performance report data. Closer analysis is required of the drivers of the capex delivery performance in any regulatory period and year to year. We make further observations as it relates to the scope of our assessment of the expenditure as relevant.

Figure B.6: Comparison of Jemena historical actual with forecast capex



Source: AER Network performance report

Jemena expects the gross capex to exceed the capex allowance for the current RCP

500. Jemena state that it expects to overspend the capex allowance in the current period:

> *'Our estimated total Gross capital expenditure for the current regulatory period is $1.4B. This is 9% higher than our estimated allowance of $1.3B. As shown in Figure 1–3, our estimated expenditure for replacement, augmentation and non-network are generally consistent with our allowance for the current regulatory period.9 Major spending for the first three years of the current regulatory period is on replacements of primary assets in*

116 AER, 2024 Electricity and gas network performance report

117 AER, 2024 Electricity and gas network performance report, page 29

four of our major zone substations, pole reinforcements and replacements, high voltage (HV) and low voltage (LV) crossarm replacements and feeder augmentation.'[118]

501. Jemena is expecting to slightly exceed the component of the allowance allocated to augex and also for repex in the current RCP.

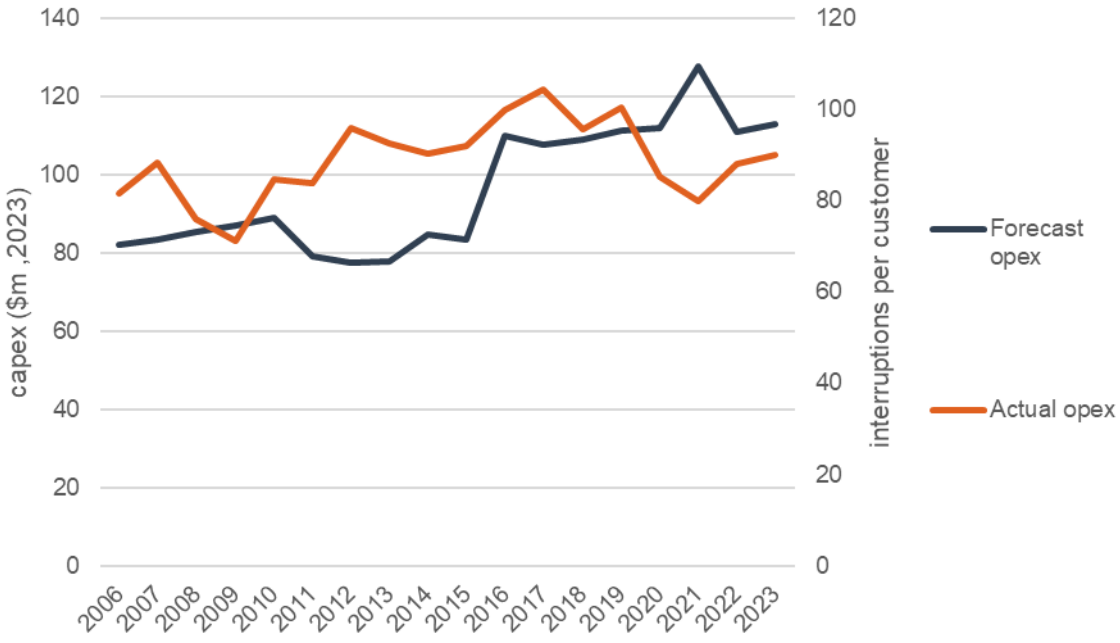
Over the last 5 years, actual opex is lower than the forecast opex resulting in an underspend against the opex allowance

502. In its 2024 network performance report,[119] the AER also considered totex and opex each year and across the regulatory periods:

'There has been a cumulative underspend by NSPs of their opex allowance for 6 consecutive regulatory years, with both DNSPs and TNSPs underspending their allowance. Opex efficiency by NSPs will contribute to outperformance against their allowed returns, though it will benefit consumers through lower opex expenditure forecasts in future regulatory determinations. This is a key feature of our incentive based regulatory framework and enhances the propensity for continual improvement by NSPs in delivering better outcomes for consumers.' [120]

503. Figure B.7 shows a comparison of historical actual with forecast opex for Jemena. Whilst we have not been asked to consider overall opex, we observe that there has been a recent underspend of opex by Jemena consistent with the observations by the AER across NSPs.

Figure B.7: Comparison of Jemena historical actual and forecast opex



Source: AER Network performance report

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119 AER, 2024 Electricity and gas network performance report

120 AER, 2024 Electricity and gas network performance report, page 29