EMCª

energy market consulting associates

SA Power Networks 2025/26 to 2029/30 Regulatory Proposal

REVIEW OF ASPECTS OF PROPOSED EXPENDITURE

Public Version

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 SAPN Energy from 1st July 2025 to 30th June 2030. 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 SAPN Energy. EMCa disclaims liability for any errors or omissions, for the validity of information provided to EMCa by other parties, for the use of any information in this report by any party other than the AER and for the use of this report for any purpose other than the intended purpose. In particular, this report is not intended to be used to support business cases or business investment decisions nor is this report intended to be read as an interpretation of the application of the NER or other legal instruments.

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

Except where specifically noted, this report was prepared based on information provided to us prior to 21 June 2024 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 SAPN Energy's regulatory submission or other documents due to rounding.

Enquiries about this report should be directed to:

Paul Sell
Managing Director
████████████

Prepared by
Mark de Laeter, Gavin Forrest and Paul Sell with input from Cesare Tizi, Eddie Syadan and Scott Wallace

Date saved
12/09/2024 2:11 PM

Version
Final v2

Energy Market Consulting associates
ABN 75 102 418 020

Sydney Office
L25, 100 Mount Street, North Sydney NSW 2060
PO Box 592, North Sydney NSW 2059
contact@emca.com.au
www.emca.com.au

Perth Office
contact@emca.com.au
www.emca.com.au

EMCa energy market consulting associates

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

Term	Definition
10 PoE	10% Probability of Exceedance
50 PoE	50% Probability of Exceedance
ABC	Aerial Bundled Cable
ALARP	As Low As Reasonably Practicable
BAU	Business As Usual
BCR	Benefit to Cost Ratio
BST	Base-Step-Trend
CAIDI	Customer Average Interruption Duration Index
CBA	Cost Benefit Analysis
CER	Customer Energy Resources
EDC	Electricity Distribution Code
EOL	End Of Life
ESCoSA	Essential Services Commission of South Australia
ETC	Electricity Transmission Contract
G&M	Governance and Management
HBFRA	High Bushfire Risk Areas
HV	High Voltage
LT-LRF	Long Term Low Reliability Feeders
LV	Low Voltage
MBFRA	Medium Bushfire Risk Areas
MED	Major Event Days
N, N-1	All elements in service; one element out of service
NER	National Electricity Rules
next RCP	2025-20 Regulatory Control Period
NPV	Net Present Value
NSP	Network Service Provider
PILC	Paper Insulated Lead Covered
PoE	Probability of Exceedance
PoF	Probability of Failure
PQ	Power Quality
PSPS	Public Safety Power Shutoff
RCP	Regulatory Control Period

Term	Definition
RIT-D	Regulatory Investment Test - Distribution
SaaS	Software as a Service
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SAP	Enterprise Resource Planning Software
SAPN	SA Power Networks
SFARP	So Far As Is Reasonably Practicable
STPIS	Service Target Performance Incentive Scheme
SWER	Single Wire Earth Return
TCA	Transmission Connection Agreement
USAIDIn	Unplanned SAIDI normalised
USAIFIn	Unplanned SAIFI normalised
VCR	Value of Customer Reliability

EXECUTIVE SUMMARY

Introduction

1. The AER has asked us to review and provide advice on SA Power Network's (SAPN) proposed allowances over the 2025-30 Regulatory Control Period (next RCP) relating to aspects of repex, augex, ICT and its proposed network visibility program expenditure. Our review is based on information that SAPN provided and on aspects of the National Electricity Rules (NER) relevant to assessment of expenditure allowances.

2. The assessment contained in this report is intended to assist the AER in its own analysis of the proposed capex allowance as an input to its draft determination on SAPN's revenue requirements for the next RCP.

Expenditure under assessment

Proposed repex

Our scope of work was to review two categories of repex

3. The AER asked us to review SAPN's proposed repex for the 2025-2030 RCP for

    - overhead conductors ($77.7 million) and

    - repex for underground cables (other than for the CBD reliability program), which we calculate to be $33 million.

Proposed augex

Our scope of work was to review three categories of augex

4. The AER asked us to review SAPN's proposed augex for the 2025-2030 RCP for:

    - Network capacity ($240.9 million),

    - Reliability management programs ($103.1 million), and

    - Bushfire risk management programs ($25.6 million).

5. In aggregate the included programs amount to proposed capex of $369.6 million or 73% of total proposed augex.

Proposed ICT opex and non-recurrent capex

Our scope of work was to review non-recurrent ICT capex together with both non-recurrent and recurrent ICT opex step changes and base year adjustments

6. The AER asked us to review the following components of SAPN's proposed ICT expenditure for the 2025-2030 RCP:

    - Non-recurrent ICT comprising $132.5 million capex and $70 million opex (step changes and base year adjustments)

    - Recurrent ICT opex of $29.4 million (step changes and base year adjustments).

7. Our assessment does not include capex for recurrent ICT projects. The assessment within the current report also does not include SAPN's proposed expenditure on cyber security, and we have provided our assessment of this in a separate confidential report.

Proposed network visibility opex step change

8.   The AER asked us to review SAPN's proposed opex step change of $6.8 million for a network visibility program.

Alternative estimates

9.   To the extent that we consider that SAPN's proposed expenditure for augex, ICT and network visibility are not reasonable forecasts of prudent and efficient expenditure, AER has asked us to provide alternative estimates. AER has not asked us to provide alternative estimates for the two categories of repex that we have been asked to review.

Our assessment and findings

Repex

Basis for the forecast of overhead conductor replacement is not formed on a reasonable basis, nor does it adequately consider the replacement that SAPN will likely address

10.   SAPN has relied on its risk-cost modelling for its planned replacement programs and historical trend for unplanned programs.

11.   We have identified several issues with SAPN's risk-cost modelling to support the proposed expenditure for planned overhead conductor replacement. The issues relate to calibration of the risk models, justification of the input assumptions, and alignment of the modelling to observed asset performance. The implication is that the risk models, without moderation indicate a higher level of replacement than is required to maintain the level of risk.

For overhead conductors, the risk cost modelling that SAPN has relied upon results in an overstatement of required replacement

12.   Whilst an increase in replacement rates may be necessary, we consider that SAPN's risk-cost modelling, to the extent that it has relied on it for the forecast expenditure for these categories, does not support the levels of expenditure that it has proposed.

For underground cables, we consider that the replacement levels are reasonable

13.   For cable replacement we considered other factors such as the historical expenditure / replacement levels and failure rates that SAPN had provided, in addition to the specific forecasting methods that SAPN had applied to each part of its forecast. We consider that on balance, the resultant forecast replacement is reasonable.

Augex

Governance, management and forecasting methods are relatively mature, but there are some deficiencies in SAPN's consideration of optimal timing and of non-network options

14.   SAPN presents as having a relatively mature expenditure governance and management approach and sound processes for establishing the expenditure forecasts that it has proposed for the augex within our scope.

15.   SAPN has introduced risk-cost probabilistic planning criteria to aspects of its augex forecasting for the next RCP, reducing the conservatism inherent in a purely deterministic planning approach for demand-driven projects, which it previously used exclusively. However, SAPN does not transparently determine the optimal timing of projects, nor adequately consider option value, including non-network options, as required in the AER's expenditure guideline. Deferral of projects may lead to a higher NPV than the proposed timing and may provide 'option value' to the extent that it allows a range of uncertainties to

resolve or reduce and consideration of the use of overload capacity and/or non-network solutions.

SAPN does not explicitly consider the economic timing of capacity driven projects nor adequately consider methods for prudently deferring projects

16.   We consider that several demand-driven projects could prudently be deferred until the 2030-35 RCP. We reached this position by deriving the economic timing of all projects proposed by SAPN and through closer inspection of several projects for which the selection rationale was marginal. The projects we have identified as candidates for deferral have economic timing well into the 2030-35 RCP and exhibit either a negative NPV or a low positive NPV (low benefit to cost ratio). In each of these cases, the (notional) unserved energy that is avoided by implementation of SAPN's proposed network solution is relatively small for several years and we consider the small incremental risk of deferral is likely to be able to be managed operationally in each case.

The balance of projects proposed for the capacity driven augex, including for compliance, are reasonable

17.   We consider that SAPN's proposed compliance programs and other programs/projects within its Capacity Augex program that it deems to be mandatory, are reasonable.

SAPN has not provided sufficient evidence to justify the increased level of expenditure that it proposes for its maintaining reliability programs

18.   Having spent 59% more than the AER allowance for reliability management capex in the current period, SAPN proposes an 18.6% increase to $103.1 million in the next RCP. $72.1 million of the proposed expenditure comprises two 'maintaining reliability' programs. The balance of $31.0 million is allocated to reliability improvement programs.

19.   SAPN has provided evidence of increased lightning strikes and fruit bat population as sources of increasing unreliability, and which we conclude need to be addressed in the next RCP. However, SAPN has not provided sufficient evidence to demonstrate that it requires the elevated and increasing level of expenditure proposed for the next RCP. We consider that SAPN has not justified the level of augex it proposes for its 'maintaining reliability' programs, however we consider that its proposed 'improving reliability' programs are reasonable.

SAPN's proposed bushfire management programs are reasonable

20.   SAPN proposes two bushfire risk management programs for the next RCP:

- Bushfire Risk Mitigation ($21.6 million) and
- Public Safety Power Shutoff Mitigation ($4.0 million).

21.   The proposed bushfire risk mitigation augex is significantly higher than in the current RCP because SAPN has identified many feeders in Medium Bushfire Risk Areas (in addition to some feeders in High Bushfire Risk Areas) for which the avoided cost of modelled consequences results in a positive NPV. SAPN also undertook a process to identify candidate feeders for investment to mitigate the impact of its Public Safety Power Shutoff program to the widest number of customers possible, provided the work could be demonstrated to be NPV positive.

22.   We consider that SAPN has provided adequate justification for both programs.

Information and Communication Technology

We consider SAPN has sufficiently demonstrated the need to proceed with the majority of its proposed non-recurrent ICT program

23.   The two main ICT programs that SAPN proposes for the next RCP comprise:

- A Customer Technology Program that comprises five upgrade projects ($19.5 million capex and $26.0 million opex) and a new Personalised On Demand customer project ($1.4 million capex and $8.3 million opex)

- Phase three of its Asset and Works program ($34.9 million capex and $11.4 million opex).

24. We consider that SAPN has provided sufficient evidence of the application of its governance, management and forecasting methods that justify inclusion of the majority of its proposed projects. From completion of its Asset and Works program, SAPN has also accounted for the realisation of expected works program capex benefits of $45 million, which it has deducted from its proposed capex allowance.

SAPN did not include sufficient justification for two projects to proceed within the next RCP

25. We found two examples of projects (ESB AEMO Post 2025 Roadmap Changes and Legacy Metering Transition) for which SAPN had acknowledged that the compliance requirements will not be finalised until later in 2024. SAPN stated that it will submit justification for this expenditure in its revised proposal. As such we did not have sufficient information to assess these projects, and suggest, as SAPN has proposed, that these two projects are re-considered once the supporting justification is available.

SAPN has provided adequate information to support its proposed recurrent ICT opex

26. SAPN has proposed $29.4 million of recurrent opex with one item to be included as a step change, and two others by way of base year adjustments in its BST opex forecast.

27. SAPN has provided business cases for each of the three expenditure items. These provide adequate evidence of consideration of options, selection of a prudent option in each case and for the reasonableness of the proposed expenditure.

Network visibility

We consider SAPN's proposed network visibility program is justified

28. SAPN proposes to enhance its data analytical framework and storage and processing capability to utilise the 'basic' smart meter data that, under an expected AEMC rule change, is expected to become available at no cost and which, by 2030, will be available from 100% of customer connections.

29. SAPN's analysis is based on use cases that will provide enhanced customer safety from service line neutral integrity detection, improved DER hosting capacity, and energy conservation savings and shows a net benefit on the proposed expenditure. We consider the proposed network visibility program is justified.

Implications of our findings

Repex

Overhead conductor repex is overstated, but proposed non-CBD cable repex is reasonable

30. We consider that

- the $77.1 million that SAPN proposes for overhead conductor replacement is overstated

- the $33 million that SAPN proposes for non-CBD underground cable replacement, is reasonable.

Augex

Proposed augex for capacity and reliability is overstated, but proposed augex for bushfire management is reasonable

31. The implications of our findings for the components of SAPN's proposed augex that AER asked us to review, and for which AER has asked us to provide alternative estimates where required, are as follows:

- SAPN's proposed expenditure of $240.9 million for capacity is overstated, and that a reasonable alternative allowance would be $204.0 million.

- SAPN's proposed expenditure of $103.1 million for reliability programs is overstated, and a reasonable alternative allowance would be $81.0 million.

- SAPN's proposed expenditure of $25.6 million for bushfire management and mitigation is reasonable.

Information and Communication Technology

Non-recurrent ICT capex and opex are overstated, but recurrent ICT opex is reasonable

32. The implications of our findings for the components of SAPN's proposed ICT capex and opex that AER asked us to review, and for which AER has asked us to provide alternative estimates where required, are as follows:

- SAPN's proposed expenditure for non-recurrent ICT is slightly overstated and we consider that:

  – For capex, a reasonable allowance is $130.4 million, compared with the $132.7 million that SAPN has proposed

  – For opex step changes and base year adjustments, a reasonable allowance is $65.2 million, compared with $70.0 million that SAPN proposed

- SAPN's proposed recurrent opex step changes and base year adjustments of $29.4 million, are reasonable.

Network Visibility

33. We consider that SAPN's proposed opex step change of $6.8 million is reasonable.

1 INTRODUCTION

The AER has asked us to review and provide advice on SA Power Network's (SAPN) proposed allowances over the 2025-30 Regulatory Control Period (next RCP) relating to aspects of repex, augex, ICT and its proposed network visibility program expenditure. Our review is based on information that SAPN provided and on aspects of the National Electricity Rules (NER) relevant to assessment of expenditure allowances.

1.1 Purpose of this report

34. The purpose of this report is to provide the AER with a technical review of aspects of the expenditure that SAPN has proposed in its revenue proposal for the next RCP.

35. 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 SAPN's revenue requirements for the next RCP.

1.2 Scope of requested work

36. 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

– Repex (overhead conductors, underground cable - other than CBD cable replacement)

– Augex (capacity, reliability and bushfire mitigation programs)

– ICT (non-recurrent ICT projects)

Opex

– ICT step changes and base year adjustments (recurrent and non-recurrent)

– Network Visibility opex step change

Scope in this report excludes cyber-security related ICT, and ADMS, which we cover in a separate report

1.3 Our review approach

1.3.1 Approach overview

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

38. We next collated some information requests. The AER combined these with information request topics from its own review and sent these to SAPN.

39. In conjunction with AER staff, our review team met with SAPN at its offices on 23-24 May 2024. SAPN presented to our team on the scoped topics and we had the opportunity to engage with SAPN to consolidate our understanding of its proposal.

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

41. 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.

42. The limited nature of our review does not extend to advising on all options and alternatives that may be reasonably considered by SAPN, or on all parts of the proposed forecast. We have included additional observations in some areas that we trust may assist the AER with its own assessment.

1.3.2   Conformance with NER requirements

43. 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.

Capex Objectives and Criteria

44. 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.

45. 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), v211

Figure 1.3:   NER capital expenditure objectives

NER capital expenditure objectives

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), v211

Opex Objectives and Criteria

46. The most relevant aspects of the NER in this regard are the 'operating expenditure criteria' and the 'operating expenditure objectives.' The NER's operating expenditure criteria and operating expenditure objectives are reproduced in Figure 1.4 and Figure 1.5.

Figure 1.4: NER operating expenditure criteria

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*; and

  (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. v211.

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*;

  (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). v211

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

47. 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 efficient means for meeting that need.

- The criteria require that the forecast '*reasonably reflects'* (emphasis added) the expenditure criteria and in the third criterion, we note the wording of a '*realistic expectation'*. 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.

- 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.

48. SAPN has applied a Base-Step-Trend (BST) approach in forecasting its aggregate opex requirements. Since our review scope encompasses only proposed expenditure for certain purposes, we have sought to identify where SAPN has proposed an opex step change or base year adjustment that is relevant to a component that we have been asked to review. Where SAPN has not proposed a relevant opex step change or base year adjustment, 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

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

50. We have sought to assess SAPN's expenditure proposal based on SAPN's analysis and SAPN'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 SAPN may subsequently provide additional information or a varied proposal, our assessment may differ from the findings presented in the current report.

51. We have been provided with a range of reports, internal documents, responses to information requests and modelling in support of what SAPN 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 SAPN's regulatory proposal 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

52.   This report covers our review of aspects of proposed repex, augex and ICT and CER expenditure for the next RCP.

53.   In each section, we have presented:

- an overview of the proposed expenditure, and a summary of SAPN's justification for that expenditure;

- our observations on SAPN's application of its governance framework and forecasting methodology to the expenditure category, along with the derived forecasting inputs;

- 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.

54.   We have taken as read the considerable volume of material and analysis that SAPN 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

55.   We have examined relevant documents that SAPN 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.

56.   Except where specifically noted, this report was prepared based on information provided by AER staff prior to 21 June 2024 and any information provided subsequent to this time may not have been taken into account.

57.   Unless otherwise stated, documents that we reference in this report are SAPN documents comprising its regulatory proposal and including the various appendices and annexures to that proposal.

58.   We also reference information responses, using the format IRXX being the reference numbering applied by AER. Noting the wider scope of AER's determination, AER has provided us with IR documents that it considered to be relevant to our review.

1.4.3   Presentation of expenditure amounts

59.   Expenditure is presented in this report in $FY25 real terms, unless stated otherwise. In some cases, we have converted to this basis from information provided by the business in other terms.

60.   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

SAPN's governance frameworks are aligned to good industry practice, with evidence of documented elements we would expect to see in a well-run DNSP with mature systems and processes.

SAPN applies risk-cost (probabilistic) modelling to help determine its repex program with comparison against benchmarks such as the AER's repex model. However, we see evidence of some issues with its modelling input assumptions and calibration leading to overstated benefits and a higher level of replacement than is required to maintain the level of risk.

SAPN has also introduced risk-cost probabilistic planning criteria to aspects of its augex forecasting for the next RCP, which is a positive step, reducing the conservatism inherent in a purely deterministic planning approach for demand-driven projects. However, SAPN does not explicitly consider the economic timing of projects nor adequately consider methods for prudently deferring projects. For example, there is no explicit consideration of non-network solutions nor utilising the short-term overload capacity of equipment. We note however that for projects subject to the RIT- D process SAPN will need to work with the market to test the viability of non-network solutions.

Some projects with very low positive NPV or which otherwise only marginally meet 'selection criteria' are highly susceptible to unfavourable variances, such as to longer-term demand forecasts, to cost and to emergence of alternative options including operational solutions and warrant more focused consideration than was evident.

2.1   Introduction

61.   In this section, we provide an overview of SAPN's Business as Usual (BAU) investment governance and management processes. This includes the following:

- Overview of how SAPN determines the work it considers to be prudently required

- How SAPN determines what it considers to be efficient costs for such work

- Plans from which it has concluded that the proposed work is deliverable

- The demand forecasts and assumptions regarding future external drivers and needs that SAPN has accounted for in determining its proposed investments over the next RCP.

2.2   Investment governance

2.2.1   Overview

62.   SAPN's governance model shown in Figure 2.1 outlines how the SAPN Partnership (the owner/operator) directs, administers and controls SAPN the business. The Board has

delegated responsibility for overall corporate governance with a supporting structure of Board sub-committees.[1]

Figure 2.1:   SAPN corporate governance policy and governance model
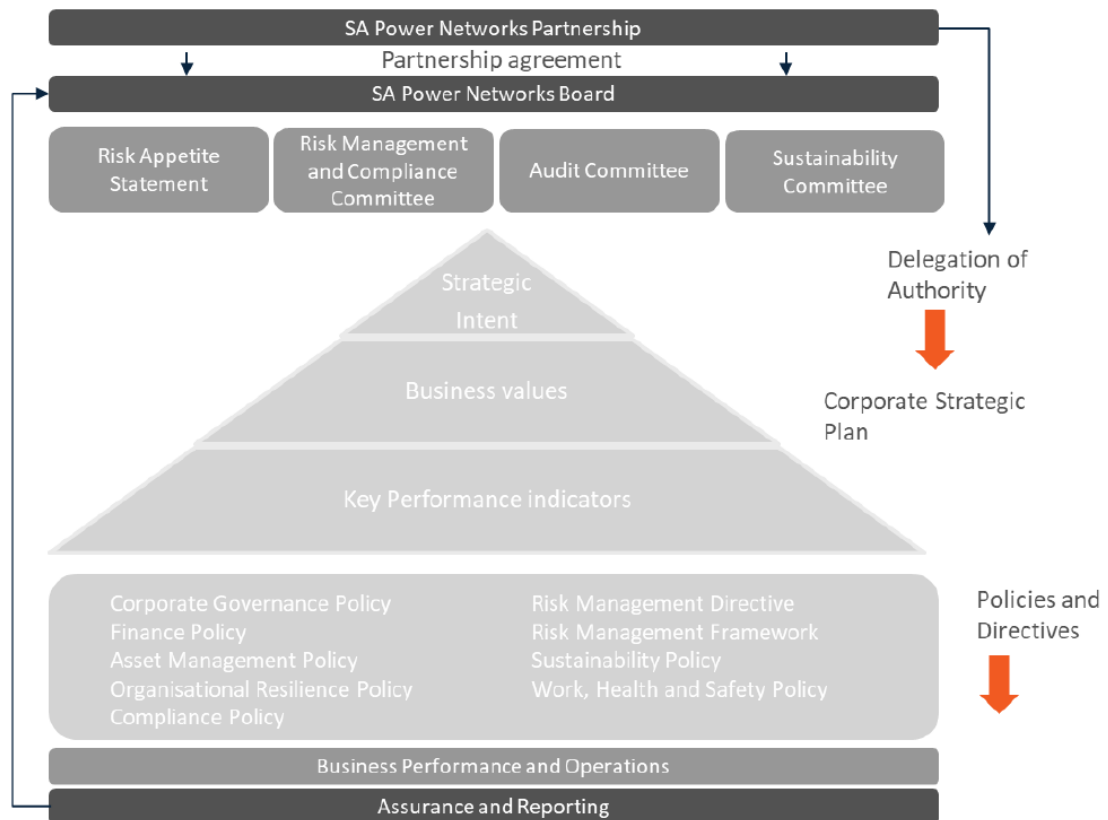
Source: SAPN - 5.1.2 - SAPN Expenditure governance procedures - January 2024 – Public, Page 5

2.2.2   Assessment

SAPN's governance framework is aligned to good practice

63. The governance framework summarised in Figure 2.1 reveals the features that we would expect to see in a well-run NSP. We have seen evidence of the policies, frameworks and directives underpinning the development of the forecast expenditure for the next RCP and evidence of the results of the application of them to business operations. We have also seen evidence of the assurance and reporting that the Board relies upon to ensure the operations and controls align to deliver the strategic intent in accordance with the key performance indicators.[2]

SAPN's strategy has been developed cognisant of the changing energy landscape, regulatory obligations, and underlying performance trends

64. We have seen evidence that SAPN's governance and management approach has led it to adequately consider the challenges to its services and obligations posed by the transition to renewable energy and the progressive electrification of households and transport. We also see considerable evidence of the incorporation of consumer preferences on service outcomes.[3]

---

[1]   SAPN - 5.1.2 - SAPN Expenditure governance procedures - January 2024 – Public. Pages 4-7.

[2]   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public; Workshop presentation: Day 1 Governance & Forecasting.

[3]   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public.

65. We also note evidence SAPN has provided that indicates deterioration of some network assets is leading to increasing failure rates. SAPN identifies its network as 'the oldest asset fleet in the NEM' with a growing number of assets reaching end of life.[4] We consider the conversion of this challenge into asset investment plans in our assessments.

SAPN 's historical performance is indicative of good governance and management

66. SAPN's evidence of its good performance against its own objectives, the regulatory allowance, and its peers is provided in several RP documents, including:

- Improving unplanned SAIDI cognisant of the 'implied jurisdictional target'[5]
- Multilateral total factor productivity index – SAPN is superior to its peer DNSPs[6]
- Capital multilateral partial productivity index – SAPN is superior to its peer DNSPs[7]
- 2020-25 delivery performance within 1% of the AER allowance.[8]

2.3 Planning & delivery

2.3.1 Overview

Business Planning

67. Figure 2.2 shows the steps in SAPN's capex process which commences with the executive reviewing and assessing performance against the corporate objectives and refreshing the goals and strategies, and broad targets established for a five-year rolling program.

---

4   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Page 14.
5   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Figure 5.
6   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Figure 2.
7   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Figure 3.
8   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Table 1.

Figure 2.2: *SAPN's Capital expenditure process*

Business planning and budgeting

Responsibility – Executive Leadership Team
- Set strategy and targets
- Decide on strategic and major program investments
- Review risk and regulatory outcomes

Capital project evaluation and approval

Responsibility – Department Heads
- Endorses forecasts and budgets
- Informs ELT on program performance and escalates issues and risks
- Updating the Capital Project Monitoring and Completion with strategic targets

Capital project monitoring and completion

Responsibility – Finance, Regulation, SPMO and Responsible Project Delivery Managers
- Deliver the capital program
- Relay updated forecasts and actuals
- Escalate issues and risks
- Recommend program substitution as required
- Lessons learnt register to ensure continual improvement

Source: SAPN - 5.1.2 - SAPN Expenditure governance procedures - January 2024 – Public, Figure 5

2.3.2   Our assessment

Planning approach is consistent with good industry practice

68.   The iterative approach indicated in Figure 2.2 is consistent with good industry practice with evidence provided by SAPN that there is a sound approach to development of its expenditure plans and resources to deliver the program of work.

SAPN has developed a network program resourcing plan

69.   What is not explicit in Figure 2.2 is where in the process SAPN assures itself that its program is deliverable – that is, that it has resourcing strategy and acquisition plans that are based on a sound understanding of its portfolio of work over the 12 months (in detail) and over the next five years to deliver the program on time and on budget. However, SAPN has developed a resourcing plan for delivering the network program, which we consider to be a comprehensive document, and which provides confidence that the resources are likely to be available at or about the estimated cost.

2.4   Risk management

Overview

70.   SAPN has a risk management framework comprising principles, policies, rules, practices and processes. The Risk Management Directive outlines the principles, structure, and

approach to risk management and is aligned to AS/NZS ISO 31000:2018. Risks are identified, managed, mitigated, and monitored.[9]

Our assessment

71. SAPN incudes statements regarding its risk appetite which provided useful insight into the positioning of programs within its portfolio.

72. Application of SAPN's risk management framework involves a combination of risk analysis of uncertainties, risk sources, consequences, likelihood, events, scenarios, controls and their effectiveness.

73. In our assessment of SAPN's proposed expenditure allowances in subsequent sections, we comment extensively on the application of SAPN's quantitative risk analysis. We largely consider to be an improvement on its previous practices, but we consider that there are nevertheless some aspects of SAPN's risk assessment processes which have led it to overestimate its requirements.

2.5 Demand forecast assumptions

2.5.1 Overview

74. SAPN has adopted AEMO's 2022 ESOO demand forecast, shown in Figure 2.3. It comments on the link between aspects of its augex forecast and the increasing (forecast) demand:

> *This is driven by a material resurgence in forecast demand growth as Figure 21 shows, resulting from macro factors such as electrification in business, transport and residential sectors, EV up-take, renewable targets, and localised factors such as in-fill housing, residential developments and commercial and industrial loads.[10]*

Figure 2.3: SA operational demand forecast (summer 50% PoE central, step change scenario)
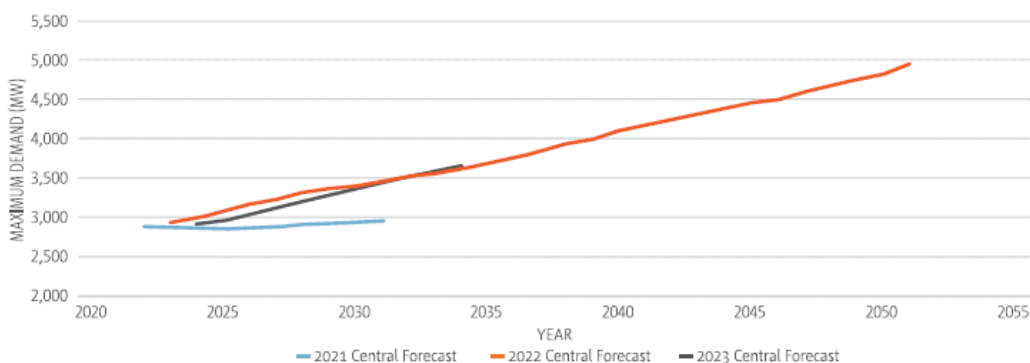
Source: SAPN Attachment 5, Figure 21

Our observations

75. It is not within our scope to review SAPN's demand forecast, however it is common practice for DNSP's to adopt AEMO's latest central forecast and then translate it to forecast impacts on its distribution network elements. SAPN describes the reconciliation process as follows:[11]

- Connection point forecasts - reconciled to the SA demand forecasts
- Zone substations forecasts - reconciled to their correlating connection points

---

9 SAPN - 5.1.2 - SAPN Expenditure governance procedures - January 2024 – Public. Page 9.

10 SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Page 35.

11 Day 1 Augex session. Slide 18.

- The reconciliation process accounts for macro-economic factors (population growth, AEMO assumptions on pricing, etc.).

76. SAPN provides a description of the process,[12] which appears to align with common industry practice. SAPN notes that it did not have time to apply the ESOO 2023 forecasts[13] to its augex process because of time restrictions but that there would be no material difference to its investment outcomes if the ESOO 2023 forecast was used.[14]

2.6 Expenditure forecasting methods

2.6.1 Network capex forecasting

Overview of SAPN's network expenditure forecasting process

77. Figure 2.4 shows an overview of SAPN's network expenditure forecasting process which it states it has tested with the AER through its early signal pathway process over two years. Workshops were held with the AER to test the methodology (via 14 workshops), expenditure forecasts, and draft business cases, among other things.[15]

78. We discuss the various aspects of SAPN's forecasting process below.

Figure 2.4:   SAPN's overview of expenditure forecasting process
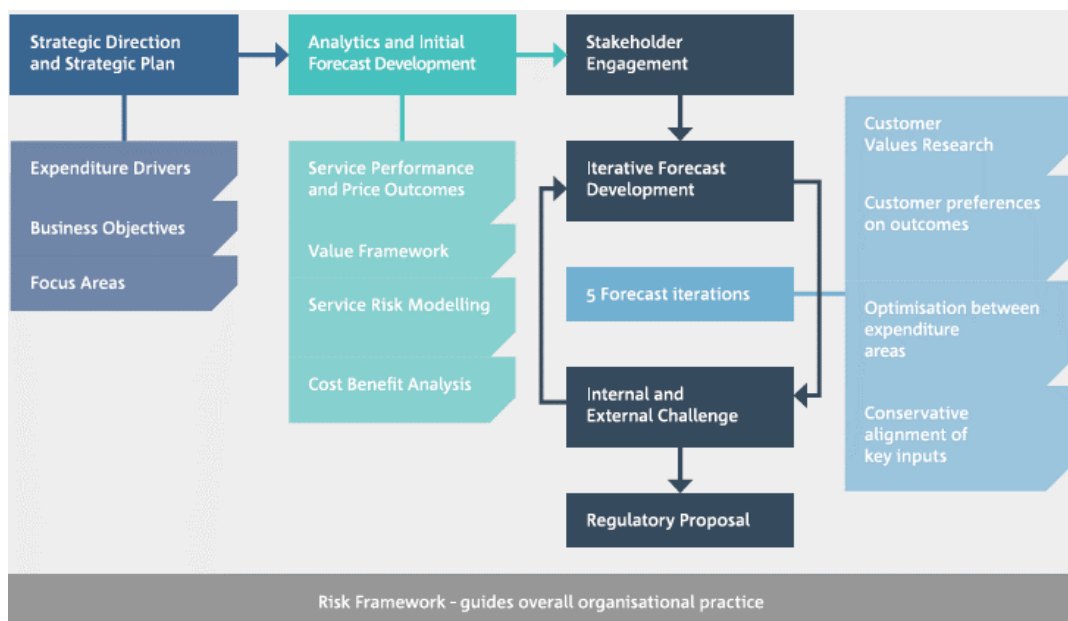
Source: Attachment 5 – Capital Expenditure, Figure 9

Our assessment of SAPN's network forecasting process

Internal and external challenges

79. Figure 2.2 and Figure 2.4 indicate an iterative process to developing the forecast. In its documents, SAPN refers to refinement over five iterations undertaken together with its

---

12   Day 1 Augex session. Slide 26.

13   Although, we subsequently noted that page 17 of RP Attachment 6 says ESOO 2023 used.

14   Day 1 Augex session. Slide 23.

15   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Page 16.

customers, as customer preferences were progressively obtained. The process of internal and external challenge as part of this process is described in detail in terms of four tiers:[16]

- Customer expectations – customer-shaped service and price outcomes

- Internal challenge – multiple expenditure forecast iterations

- Forecast selection (e.g. demand scenarios, sensitivity to climate change expectations) and options testing (including sensitivities)

- Customer service value analysis (e.g. appetite for new or improved service vs willingness to pay) and optimisation (between asset classes and expenditure categories).

80.   The result of the challenge process was a reduction from the first forecast presented to customers of $5,147 million over the next RCP to $4,372 million by iteration 5.[17]

81.   From the description of the process, we consider the methodology to be reasonable, however as discussed in our assessment of individual programs and projects in the capex categories within our scope, we consider that in some cases more rigorous consideration from the top-down process would have resulted in further reductions.

Business cases include identification of the relationship of the proposed expenditure with other programs

82.   A section in the business cases within our scope of review includes statements regarding the steps SAPN has taken to help ensure no double counting or overlap of expenditure with other programs. This approach draws from the forecasting structure documents and considers the inter-relationship between augex and repex projects, and to a lesser extent, network and non-network projects.

83.   This is a very helpful starting point for assessment of the potential for overstatement of capex requirements. We have considered the provided information in our reviews of projects within our scope.

SAPN's strategic framework is aligned to regulatory periods

84.   SAPN's strategic framework cascades from a 15-year outlook (strategic direction) to an annually refreshed strategic plan (with a 5-7 year outlook), through to individual performance plans.

85.   We are concerned that this provides a strong bias to planning around RCPs rather than taking a longer term perspective and undertaking the work when it is prudent to do so, rather than responding to the RCP timing. However, we are satisfied that the process SAPN describes in developing/refreshing the elements within the strategic framework is consistent with good industry practice.[18]

Explicit methodology documents underpin the forecasting methodology

86.   The 'methodology documents' include SAPN's Value Framework, forecasting reports ('structures') for various investment categories (e.g. augex, repex, bushfire risk management) and model frameworks (or templates) for cost-benefit analyses.

87.   As an example, the Value Framework is a useful reference document for cost-benefit analyses, which defines the economic impacts (i.e. costs and benefits) to the community that are expected to arise from the occurrence of events (e.g. asset condition related failures, weather events, bushfires, security breaches, import and export constraints, etc) across different value dimensions.[19]

---

[16]   SAPN Attachment 5. Figure 10.

[17]   SAPN Attachment 5. Figure 11.

[18]   SAPN - 5.1.2 - SAPN Expenditure governance procedures - January 2024 – Public. Pages 7-8.

[19]   SAPN - 5.1.5 - Value framework - January 2024 – Public. Page 5.

88. The key advantage of this document is the transparency of the assumptions and the increased likelihood that SAPN's SMEs have developed business cases and the supporting cost-benefit analyses by consistently applying the assumptions in the Value Framework.

89. In Figure 2.5 we show the dimensions of SAPN's Value Framework, which informs the business cases and cost-benefit analyses. We consider the input assumptions, including those from the Value Framework, as part of our assessment of aspects of SAPN's 2025-30 expenditure forecast.

Figure 2.5: SAPN's 'approach to justifying prudency & efficiency of projects/programs
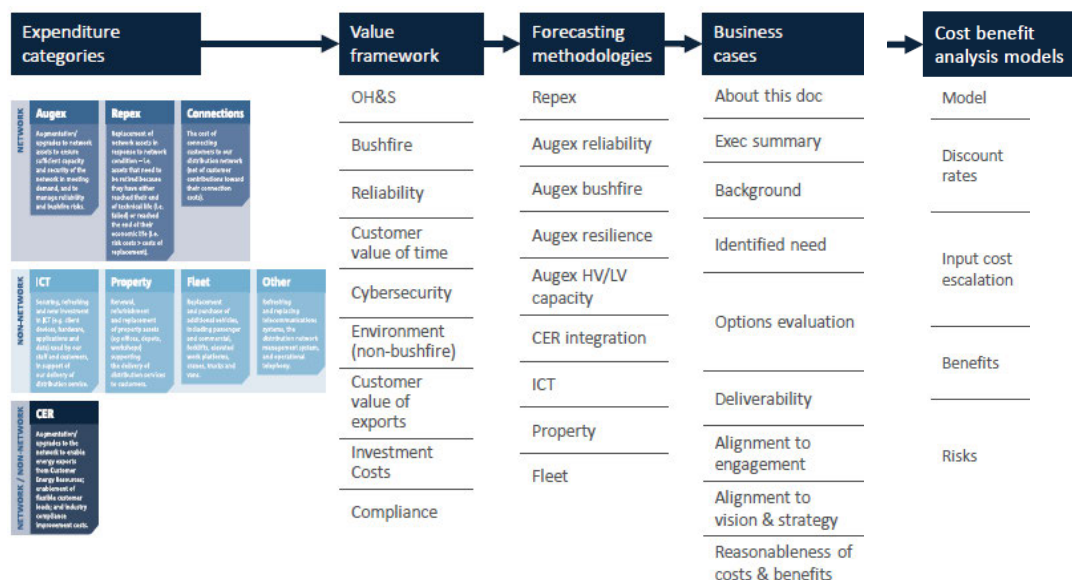
Source: Based on SAPN Day 1 Governance & Forecasting Methodology, Slide 33

Alignment with the AER's Better Resets Handbook but there are issues in application

90. SAPN has provided evidence of alignment of its expenditure forecasting methodology with the AER Better Resets Handbook's framework for top-down testing, prudent and efficient decision-making, alignment with standards, and customer engagement.

91. However, as always, the key to reasonable expenditure forecasts is the quality of application of the inputs and the completeness of the models, which we have examined in our assessment of the various in-scope expenditure forecasts.

92. SAPN outlines its forecasting improvements in the current RCP that should benefit customers. Its repex forecasting methodology is summarised in Figure 2.6, by way of example, noting that SAPN has provided similar diagrams for multiple aspects of its capex forecast and which we refer to in our assessment of the in-scope expenditure forecasts. From these improvements, SAPN contends that:

> *Our visibility of risk in 2020-25 vastly improved via analytics in quantifying in monetary terms, customer service risk posed by our assets, capitalising on enabling investments such as our Assets and Work ICT program from our 2020-25 Regulatory Proposal. With this information, we reprioritised expenditure within our repex asset classes, to reasonably endeavour to manage overall service performance within our total capex allowance.[20]*

---

[20]   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Page 29.

Figure 2.6: Summary of SAPN's repex forecasting methodology

Analyse asset data	› Determined if asset class has data maturity level required to model probability of failure and consequences. › If not, based proposed expenditure on historic expenditure.
Probability of failure	› Probability of failure (PoF) calculated for each individual asset, for asset condition based failures. › Analysed failure, attribute and geographical data for each asset class, where available, to dictate approach to calcuating PoF.
Consequence	› Reliability consequences quantified using feeder loads, customer types and AER published VCRs. › Bushfire consequences quanitified by using modelling from CSIRO and local geographical data. › Future risk determined by multiplying with the probability of failure data. › Avoided risk quanitified as benefits in the investment options.
Benefit Cost ratio	› Renewal (replacement/ refurbishment) costs estimated based on historical unit rates and subject matter expert analysis. › Total avoided risk quantified as a benefit against cost of renewal to calculate risk/cost of all asset investments.
Investment scenario	› Investment scenario modelled to optimise investments required to meet defined service outcomes. › Proposed investment scenario ensures reliability is maintained for each geographic region and safety maintained state-wide. › Model optimises between many asset classes, where appropriate, to best meet investment scenario constraints.
Collate expenditure	› Repex determined by modelling combined with asset replacement due to unmodelled investments (based on historic expenditure), to form total repex program.

Source: SAPN Attachment 5, Figure 19

93. SAPN has provided business cases that cover most of its forecast expenditure, with the contents aligned to the structure included in Figure 2.6 The structure of the business cases provides an adequate basis for assessment. Similarly, SAPN's CBA models typically provide the information required to understand the approach, however supplementary information was required to ensure our understanding. We sought the information through a combination of workshops and written information requests.

94. SAPN's forecasting methodologies for the major expenditure categories reveals a variety of methods for determining risk and risk thresholds and as a means of establishing scope and timing. For example:

• Repex – probability of failure is calculated for individual assets and linked to consequence of failure, typically to calculate the avoided risk of treatment options as an input into cost-benefit comparisons

• Augex capacity – considers deterministic and probabilistic criteria for establishing the scope and timing of projects

• Bushfire risk is established by the CSIRO for individual feeders, which SAPN uses as a key input to its cost-benefit analysis.

95. We consider that SAPN's extension of its probabilistic approach to selecting augex projects to be a positive enhancement, aided by the continued refinement of its Value Framework.

96. We assess the quality of the application of the forecasting methodologies to the various expenditure categories in Sections 3 and 4. In summary, we have found that a combination of input assumptions and project selection criteria issues has led to an overstatement of the required capex in some instances, including from the following issues:

• For repex (aspects within our scope):

– Calibration of risk-cost models used in repex forecasting appears to be based on probability of failure rates that differ from observed failures

– Input assumptions to risk-cost models used in repex models appear to overstate benefits

• For augex (aspects within our scope):

> – The hybrid expenditure forecasting methodology applied to its augex CBA includes selection criteria that we consider may lead to an overestimate of the prudent level of investment

> – Accepting projects selected by application of the N / 10PoE deterministic criterion without adequate further challenge[21]

> – More generally, accepting projects for the next RCP as long as the NPV > 0 does not appropriately consider the uncertainty of the claimed net benefit

> – SAPN does not consider the economic timing of augex projects selected via probabilistic NPV analysis

> – SAPN does not include explicit consideration of non-network solutions in its options analyses for augex HV/LV capacity projects, although we note for larger proposed projects that will be subject to the RIT-D process, SAPN will be required to engage with the market to explore the viability of non-network solutions.

97. Further to the latter issue in the list above, SAPN's expenditure forecasting approach for network capacity[22] does not explicitly reference non-network solutions as part of the options selection process, although a separate augex forecasting document does identify the need to consider non-network options.[23]

2.6.2 Cost estimation methodology

Overview

98. SAPN applies a combination of cost estimation methods, as shown in Figure 2.7. Many of the projects within the scope of our augex and ICT review are based predominantly on bottom-up forecasts, whereas repex cost estimates are typically based on averages of relevant historical costs.

Figure 2.7: SAPN's overall approach to cost estimation

	Revealed costs	Project specific	Market Testing
Internal forecasts	**Average Historical Unit Costs** • Typically used for high-volume works. • An average of revealed historical costs escalated to account for inflation • Applicable when past work is reflective of future tasks. • Provides a reliable cost estimate based on historical revealed costs. Examples: repex, reliability improvement programs; bushfire mitigation, CER integration; recurrent ICT	**Bottom-Up Unit Costs** • Typically used for unique works • Involves detailed cost estimation from the ground up referencing unique historical cost examples adjusted to account for the specific circumstances • Applied when program works face additional challenges. Examples: CBD reliability, Hindley Street Substation, Northfield GIS	**External Quotes** • Used where historical costs references are unavailable or may not reflect current or future market conditions. • Competitive prices are obtained, or expert opinion is used, to provide a reasonable cost estimate. • Applicable for obtaining current market rates. Examples: Fleet forward purchases, ICT software, property builder quotes (via KPMG advice), demand flexibility vendor pricing
Independent Forecasts	**Labour** – Standard regulatory approach Average of BISOE forecast with AER consultant forecast		
	Materials – No real escalators applied A conservative approach in the current macro-economic environment		

Source: Day 1 Governance & Forecasting, Slide 37

Assessment

99. We have not identified any material issues with SAPN's cost estimation methodologies.

---

21. Noting that SAPN has undertaken a further challenge in one case, which we refer to in our assessment of the capacity forecast

22. SAPN - Attachment 5 - Capital expenditure - January 2024 – Public, Figure 22

23. SAPN - 5.4.1 - Augex forecasting approach - January 2024 – Public, Figure 2

2.6.3 IT expenditure forecasting

Overview

ICT forecasting development process

100. Non-network ICT expenditure forecasting is managed under a similar framework to network forecasting. A feature is alignment of forecast and justification with the AER's guidance note on how it assesses ICT expenditure and its expectations of DNSPs in this regard. SAPN's ICT forecasting approach is shown in Figure 2.8.

Figure 2.8: SAPN's ICT proposal development approach
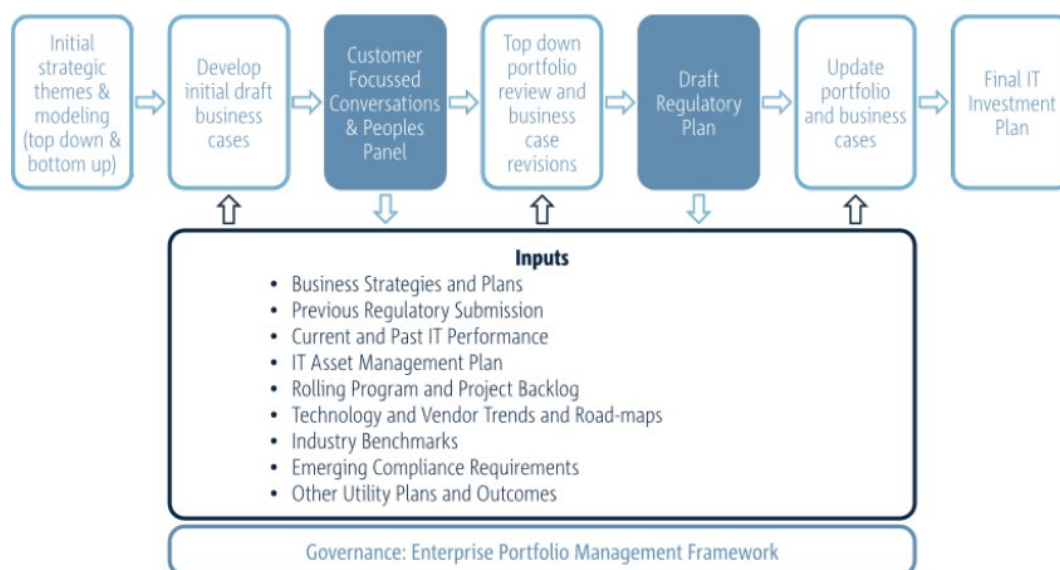
Source: Day 2 ICT and ADMS on-site presentation, Slide 27

ICT non-recurrent proposal is linked to customers, efficiency and cyber security

101. ICT objectives and strategic themes are derived in a similar way to the network equivalent but are necessarily different, with such issues as cyber security, customer technology, and using data and technology to drive operational efficiency as examples.[24]

102. SAPN provided evidence that customer feedback had influenced the ICT proposal[25].

Assessment

SAPN's ICT proposal development approach is consistent with good industry practice

103. We consider that SAPN's development process for its ICT expenditure forecast as summarised in Figure 2.8 is consistent with good industry practice. It has presented its submission with projects and programs categorised according to the AER's definition of recurrent and non-recurrent expenditure. SAPN has further identified its non-recurrent projects in accordance with the AER's sub-categories[26] and has presented business cases and supporting information aligned to the AER's framework for assessment.[27] This, among other things, assists with determining whether the expenditure is likely to satisfy the NER capex and opex criteria.

---

[24]   Day 2 ICT and ADMS.

[25]   SAPN - 5.12.1 - IT Investment Plan 2025-30 - January 2024 – Public. Figure 15.

[26]   Maintaining services, functionalities, capability and/or market benefits; Compliance with new / altered regulatory obligations / requirements; New or expanded ICT capability, functions and services.

[27]   AER - Guidance Note - Non-network ICT capex assessment approach, 2019.

SAPN's ICT forecasting methodology is consistent with good industry practice

104. Figure 2.9 shows the steps SAPN follows to develop projects and its overall ICT portfolio. The initial business case content and supporting information (particularly the NPV models) are also commensurate with good regulatory proposal practice, noting that many of the projects are very early in their development lifecycle. The business cases provide an adequate range of options, options assessment, and rationale for selecting the preferred option.

Figure 2.9: ICT expenditure forecasting methodology
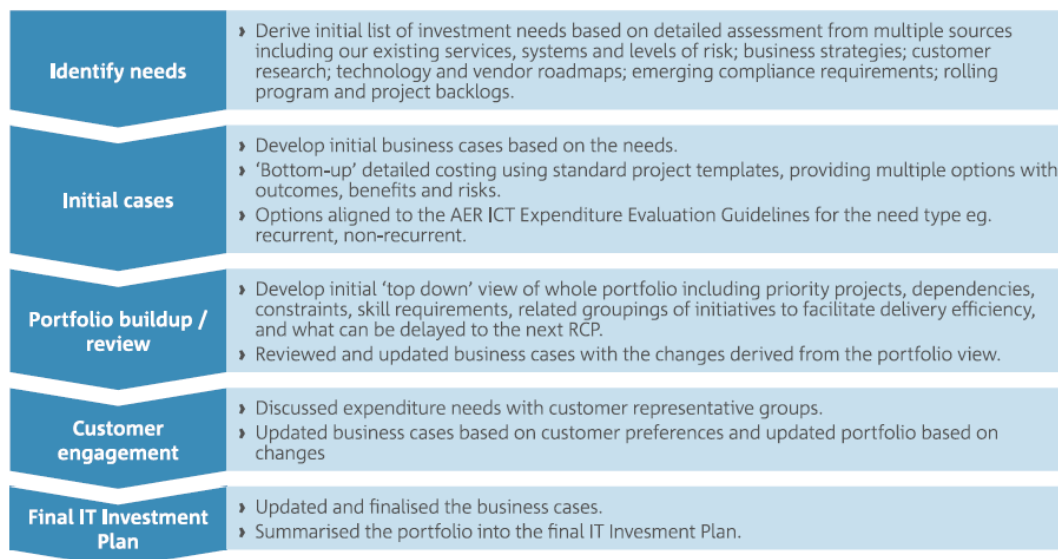
Source: SAPN - Attachment 5 - Capital expenditure - January 2024 – Public, Figure 42

Top down / customer led challenge of the bottom up portfolio led to a reduced forecast

105. SAPN has described its customer engagement process in detail, and we are satisfied that customer feedback was a key reason for reducing the initial 'bottom up' non-recurrent ICT portfolio by 18% (from $270.4 million to $220.9 million, $June 2022).

SAPN's delivery performance is sound

106. SAPN states that it will incur a total cost overrun of less than 1% across all its projects, with 50% being completed on time and the remainder on average one month (11%) later than planned.[28] ICT portfolio benefits for the current RCP were forecast to be $108.1 million and the current forecast is $116.0 million or 7% above target.

107. We consider that this level of performance is commensurate with a well-run IT 'department', that is one that has good systems, processes, and human resources (internal and external) and that does not over-commit itself.

108. For the next RCP, SAPN has developed a roadmap for its non-recurrent ICT, which we consider in more detail in Section 5.

2.6.4 Opex forecasting

SAPN's approach

109. SAPN has developed its opex forecast using a BST method. To the extent that SAPN considers that certain factors will drive increases that are not driven by 'trend' factors, SAPN has proposed base year adjustments and step changes.

---

[28] IT Investment Plan, 2025-30. Page 21.

110. SAPN has selected FY24 as its base year. Although the results are not yet audited, SAPN advises that they will be by the time of the AER's final decision.[29]

Our scope

111. As an input to the AER's overall assessment of SAPN's proposed opex, we have been asked to advise on some specific base year adjustments and step changes that SAPN has proposed, nearly all of which are ICT-related. We have not been asked to assess SAPN's overall opex forecast or forecast methodology. With regard to SAPN's proposed base year adjustments and step changes, we have been asked to provide advice on the quantum of the amounts proposed.

Assessment

Appropriate recognition of what constitutes a base year adjustment or step change

112. SAPN's identification of items that qualify as base year adjustments or step changes refers to AER guidelines, and includes:

- Base year adjustments reflecting expenditure movements from capex to opex, principally ICT treatment of SaaS expenditure based on a 2021 accounting rule clarification[30]

- Step changes, based on new regulatory obligations, capex/opex trade-offs and major external factors.[31]

113. The major external factors that SAPN has considered include cyber security requirements, CER requirements, demand visibility and increases to insurance premiums.

114. SAPN has also made two negative base year adjustments.[32]

115. At a principles level, we consider that SAPN has identified appropriate definitions and described appropriate calculation methods for its proposed base year adjustments and step changes. In subsequent sections of this report, we consider how SAPN has applied these methods in determining each such element of its proposed expenditure.

2.7 Implications for our review

116. Overall, SAPN presents as having a relatively mature expenditure governance and management approach and sound processes for establishing the expenditure forecasts that it has proposed. It has used multiple inputs in seeking to balance service and price outcomes, and we see evidence that the inputs have resulted in moderation of SAPN's forecast expenditure within the scope of our assessment.

117. We have some concerns from the application of SAPN's forecasting methodology to the aspects of repex that we have assessed:

- Calibration of risk-cost models used in repex forecasting appears to be based on probability of failure rates that differ from observed failures

- Input assumptions to risk-cost models used in repex models appear to overstate benefits

118. The three concerns that arise from its governance and management processes applicable to augex within our scope are:

---

29 SAPN - Attachment 6 - Operating expenditure - January 2024 – Public. Page 17.

30 SAPN - Attachment 6. Section 6.1.

31 SAPN – Attachment 6. Section 6.3.

32 SAPN – Attachment 6. Section 6.3.4.

- We do not see recognition of methods required to determine the optimal timing of projects, or option value.[33] If insufficient consideration has been given to timing or to option value, then it may be that some projects are being proposed in advance of when they are required.

- For the same reasons, CBA methods that rely strictly on selecting projects in cases where 10 PoE demand exceeds N capacity or where the NPV>0.0 may tend to overstate requirements for a given period. Deferral may lead to a higher NPV than the proposed timing and may provide 'option value' to the extent that it allows a range of uncertainties to resolve or reduce and consideration of the use of overload capacity may suggest the ability to defer projects that are selected solely on demand exceeding N capacity, no matter how small.

- We do not see any consideration of non-network solutions in SAPN's options analyses for capacity projects.

119. In the assessments that follow, we have paid particular attention to SAPN's application of these aspects of its Governance and Management (G&M) processes and forecasting methods to assess whether or to what extent SAPN's proposed expenditures may not entirely meet the requirements of the NER as a result.

---

[33] For example, methods for this are described in sections 4.4.2 and 4.6 of AER's Industry Practice Application Note on Asset Replacement Planning (January 2029).

3 REVIEW OF ASPECTS OF FORECAST REPEX

Our review has considered the proposed repex for overhead conductors and a proportion of the proposed repex for underground cables. In these areas, SAPN has relied upon its risk-cost modelling to develop the majority of its forecast expenditure for the next RCP, and historical trends for the balance. The proposed expenditure for the areas we have reviewed is $77.7 million for overhead conductor and approximately $33 million for underground cables (after removal of the CBD reliability improvement program).

We consider that the SAPN's forecast of overhead conductor replacement is not formed on a reasonable basis, nor does it adequately consider the replacement that SAPN will likely address. We arrive at this position having considered the risk-cost modelling that SAPN has relied upon in developing its repex forecast.

For underground cables, we consider that the proposed replacement program is reasonable.

3.1 Introduction

120. The AER has asked us to review SAPN's proposed overhead conductor repex and its proposed repex for underground cables (other than the cable replacement proposed in the CBD reliability improvement program). We reviewed the information provided by SAPN to support these elements of its proposed repex forecast, including a sample of projects. Our focus was to ascertain the extent to which the issues identified in Section 2 are evident at the activity level, and from this to assess the extent to which the proposed expenditure is a reasonable forecast of prudent and efficient expenditure.

121. We sought to establish the strategic basis for, and the reasonableness of, SAPN's proposed repex for overhead conductor and the aspects of underground cable repex that we have been asked to review. Forecast expenditure in the next RCP represents a step increase from the historical expenditure that SAPN has incurred and is expected to incur in the remainder of the current RCP.

122. SAPN has provided its bottom-up forecast and how this forecast has been apportioned to each of the RIN groups. We have referred to this in our assessment.

123. We first summarise and compare SAPN's proposed expenditure for the next RCP with its historical actual and estimated expenditure in the prior and current RCP's. We subsequently provide our review of SAPN's forecast for each repex RIN group.

3.2 Overview of SAPN's proposed repex

3.2.1 Overview

124. SAPN has proposed $909.4 million for repex for the next RCP as shown in Table 3.1. We present this for context, noting that we have been asked to review only the proposed overhead conductor repex ($77.7 million) and the underground cable replacement program excluding the proposed CBD cable replacements. For the underground cable replacement program, this results in us reviewing approximately $33 million of the total underground replacement program of $94.0 million shown in this table.

Table 3.1:   Repex by asset group ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	**Total**
Pole Top Structures	32.0	31.3	31.2	31.3	31.4	**157.0**
Overhead Conductors	8.5	11.9	15.4	19.1	22.8	**77.7**
Underground Cables	12.3	15.4	18.7	22.1	25.5	**94.0**
Service Lines	9.9	9.7	9.6	9.7	9.7	**48.6**
Transformers	12.6	12.7	13.0	13.4	13.8	**65.5**
Switchgear	27.7	18.2	16.2	16.3	16.3	**94.7**
Scada	17.3	16.4	14.7	14.7	14.5	**77.5**
Other	50.6	61.0	76.0	54.9	51.9	**294.3**
Total	**170.8**	**176.5**	**194.8**	**181.5**	**185.9**	**909.4**

Source: SAPN RIN workbook

3.2.2   Repex trend

125.   Repex trends over time, by RIN asset group, are shown in Figure 3.1. All expenditure has been inflated to real 2025 dollars, and for the purposes of allowing comparison to the historical RIN also includes SAPN's proposed real cost escalation for the next RCP.

Figure 3.1:   Historical and forecast SAPN repex by asset group ($m, FY25)
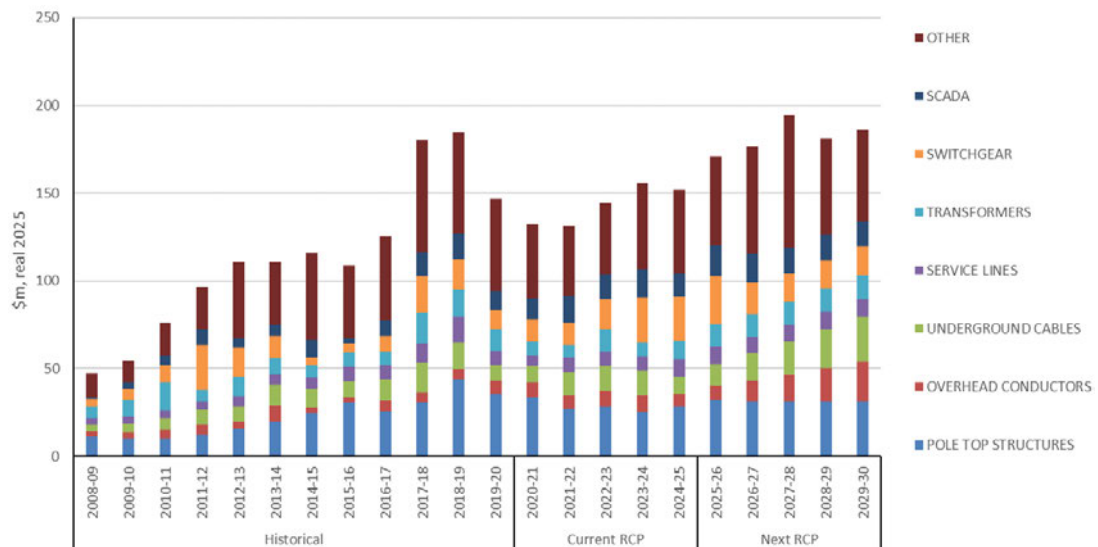
Source: EMCa analysis of historical and forecast RIN

126.   There is a general upward trend across total repex from the commencement of the current RCP and continuing at a similar rate of increase in the next RCP. For the next RCP, whilst some asset categories are flat to declining there is an upward trend for others including the overhead conductor and underground cable.

3.2.3   Treatment of capex efficiency

127.   In its capex model, SAPN includes its list of repex projects and reduces this forecast by a capex efficiency amount as shown in Table 3.2. The capex efficiency deduction totals $45 million in aggregate, with $27.1 million allocated to repex SAPN's reduction reflects its estimate of the realisation of benefits to be delivered by its Asset and Works Phase 3 ICT program, which we review in section 5.4.

Table 3.2: Allocation of capex efficiency to proposed repex for next RCP ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	Total
Sum of repex projects	171.8	181.9	202.0	188.1	192.6	**936.4**
Reset 2025-30 Capex Efficiency Repex	(1.0)	(5.4)	(7.3)	(6.6)	(6.7)	**(27.1)**
Total repex	**170.8**	**176.5**	**194.8**	**181.5**	**185.9**	**909.4**

Source: EMCa analysis of SAPN 5.1.1 Capex model

128. The capex efficiency is allocated at the repex category level and is not attributable to individual projects. Consequently, there are differences between the total expenditure proposed between sources, and these differences are explained by the application of the capex efficiency deduction.

3.3 Assessment of factors impacting the forecast for overhead conductor and underground cable repex

129. In this section we present factors that are common to our assessment of overhead conductor and underground cable repex.

SAPN describes that reliability performance is deteriorating, in part due to increasing failure rates

130. SAPN states that despite increasing repex and augex, overall distribution reliability has declined. SAPN refers to the historical and forecast failures of overhead conductors as:

demonstrating a material worsening of asset condition, and supporting anecdotal feedback from our staff that condition related asset failures are significantly increasing. This actual failure data has also been used to ground and validate our view of forecast risk underpinning our proposed repex, by back-casting our forecasts against actual failures where data permits.[34]

131. However, we do not consider that SAPN has adequately demonstrated an increasing failure rate which is negatively impacting service levels for the assets we have been asked to review:

- As we discuss in our assessment of overhead conductors, the forecast repex is directed to High Voltage (HV) conductor replacement. The data relied upon to demonstrate a worsening failure rate of overhead conductors is driven by Low Voltage (LV) conductors, whereas for HV conductors the trend is flat.

- In our discussion of current reliability performance in Section 4, the trend for average reliability appears relatively flat. In SAPN's own assessment of interruption causes impacting normalised SAIDI, the trend in equipment failure is also flat.

- We acknowledge that the reliability performance of the CBD network is outside jurisdictional targets. However, review of the CBD Reliability Improvement Program, including the aspect of repex included in that program, is beyond our scope of review.

SAPN's objective is to maintain service levels, at a geographic region level

132. In its RP, SAPN describes its forecast selection and options testing. For the repex forecast scenario:

choosing a Repex forecast scenario that, while efficient (with benefits of risk avoidance outweighing Repex costs), requires less expenditure than alternative scenarios our analysis deemed economic. We opted against higher cost scenarios, as they did not

---

[34] SAPN - Attachment 5 - Capital expenditure - January 2024. Page 15.

deliver the service level outcome (maintaining historic reliability by geographic region) and price balance (mindful of general affordability concerns) our customers told us they prefer under the current circumstances.[35]

133. In its final step of its challenge process SAPN undertook 'customer service value analysis and expenditure optimisation' including application of its network asset risk analysis, as support for its objective to maintain average reliability at a geographic region level.

134. For its repex forecast, SAPN states:

the need to increase repex rates to levels commensurate with the risk posed by our network age profile and asset condition in order to maintain overall reliability by geographic region, improve reliability in the Adelaide CBD to meet jurisdictional service standards, and to maintain safety in aggregate.[36]

135. We reviewed how SAPN has established the baseline service levels, from which it has proposed repex to maintain service levels. We review the augex related to improving reliability and bushfire safety in targeted areas in Section 4.

Service levels determined from SAPN's risk-cost modelling

136. The definition of its current and target service levels were not obvious from SAPN's documentation, and which we had originally understood were directly linked to reliability performance, as measured by SAIFI and SAIDI, at a geographical region level. However, SAPN states:

The service levels we propose to achieve were shaped by engaging consumer representatives and stakeholders as well as everyday citizens. Each of the service levels are efficient for customers, with quantified (monetised) benefits exceeding investment costs.[37]

137. This is supported by our review of its modelling, which indicates that the current and target service levels are based on the output of its risk-cost modelling, and application of investment scenarios. Specifically, we reviewed how it has modelled emergent risks for these asset classes in its risk-cost modelling.

138. In application of its risk-cost modelling and its Value Framework we understand that SAPN has relied on technical advice from external advisers. SAPN states that its input assumptions are based on observed conditions, including average outage times and feeder loads by the following methods:[38]

- Probability of failure (PoF) –
  – PoF calculated for each individual asset, for asset condition failures
  – Analysed failure, attribute and geographical data for each asset class, where application, to dictate approach to calculating PoF
- Consequence –
  – Reliability consequences quantified using feeder loads, customer types and AER published Value of Customer Reliability (VCR)
  – Bushfire consequences quantified by using modelling from CSIRO and local geographical data
  – Future risk determined by multiplying with the probability of failure data
  – Avoided risk quantified as benefits in the investment options.

---

[35] SAPN 2025-30 Regulatory Proposal Overview – January 2024. Page 68.

[36] SAPN - Attachment 5 - Capital expenditure - January 2024. Page 23.

[37] SAPN - Attachment 5 - Capital expenditure - January 2024. Page 25.

[38] SAPN - Attachment 5 - Capital expenditure - January 2024. Page 30.

139. SAPN has advised that its risk and replacement expenditure forecasting model is integrated with its enterprise resource planning system (SAP) and developed using a cloud data platform (Azure Databricks). SAPN has provided the data from these models in Excel, and examples of formulas used, however it was not possible to provide the models themselves.

140. SAPN describes its process as depicted in Figure 3.2.

Figure 3.2: Repex expenditure proposal logic
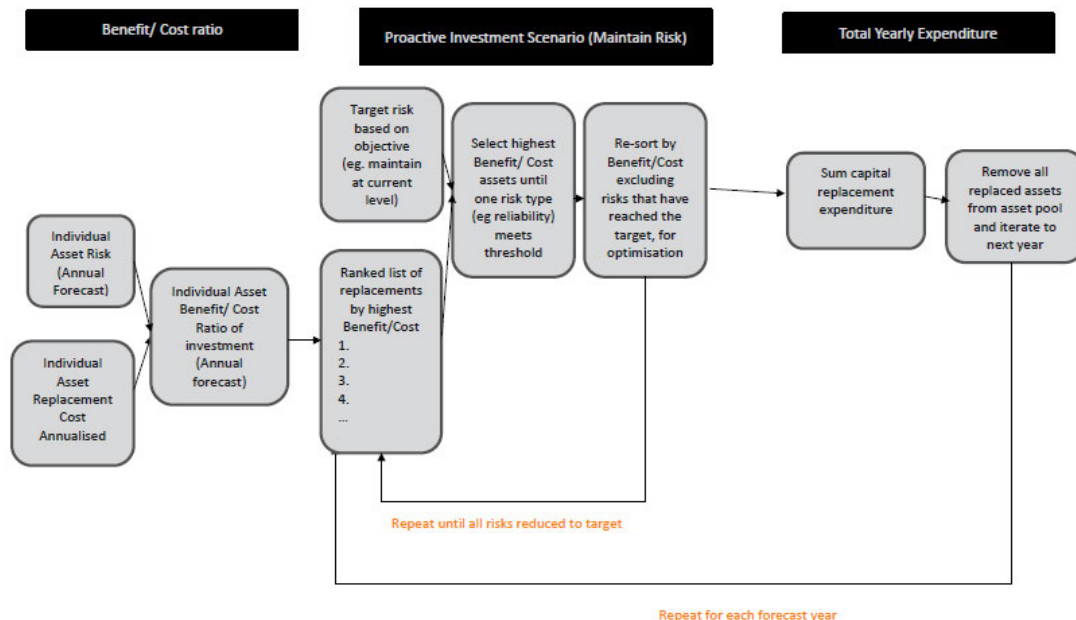
Source: AER SAPN repex query, provided by the AER

141. In general, the methodology described by SAPN is sound. However, we find issues with the application of the methodology. Many of the values were hard-coded in the models we reviewed, which made tracing through the models difficult. For example, we were not able to review the derivation of VCR values, based on feeder loads and customer types. We observed a large variation of VCR values calculated by feeder, without sufficient explanation of the variation.

142. For outage duration SAPN applied outage duration by voltage level ranging from 232.9 minutes (LV conductor) to 389.7 minutes (66kV conductor).[39] We accept that average outage times are likely to increase with increasing voltage, however we were surprised that the average LV conductor outages were approaching 4 hours (on average), and the use of average duration by voltage is unlikely to reflect the actual outage experience.

143. At our onsite meeting, SAPN described calibrating its outage duration against observed experience. This is inconsistent with standard outage times that we observe in its model, by voltage level. Also, we did not discern a clear relationship between the outage duration and feeder reliability category (urban, rural short, etc.) where we would expect to see a difference in outage times, on average, between customers in rural areas and urban areas, and as SAPN has claimed.

144. We therefore tested the alignment of the assumed outage times with observed experience using the data provided by SAPN. We present this in our assessment of the proposed expenditure in section 3.4.2.

Overall, reliability risk is the dominant driver of the increase

145. SAPN states that the proposed level of investment is to maintain service outcomes and explains that the investment decision is being driven by the benefit to cost ratio (BCR) in the

---

[39] As included in the Conductor and Cable Asset plan documents (specifically table of reliability consequence values), and reflected in the input worksheets of SAPN's risk models.

risk-cost model where the highest BCR is being replaced until the desired service level is being reached.

146.   The AER requested that SAPN explains what service level was used to determine the proposed level of investment and how this has been incorporated into the risk-cost model. In response, SAPN states that:

> *The proposed level of investment was selected to maintain service levels to current levels as modelled (as at end 2021-22).*
>
> *High level steps to achieve this in practice is described below:*
>
> - *The risk/performance of the network is modelled using available historic performance data to calibrate (using historic data up to and including 2021-22).*
>
> - *The model takes a snapshot of the modelled network risk/performance prior to investment selection. This snapshot forms the basis for the service level that the next RCP is aiming to maintain*
>
> - *The investment selection for the next period then operates by selecting assets for replacement in each year (in descending BCR order) until remaining risk in that year is at or below the target service level.[40]*

147.   We further understand from SAPN's response that current service level is not easily identified for any single asset category, such as conductors. SAPN states that the target service level it had determined was across all modelled distribution (non-support structure) assets.

148.   SAPN provides a summary of its risk-cost modelling as shown in Figure 3.3. We observe that:

- The reliability risk is the dominant component of risk-cost

- The counterfactual ('base-case') scenario described by SAPN as maintaining current spend results in an increasing risk-cost, from 2023 to 2030

- The proposed repex maintains a risk-cost of approximately $30 million by 2030, being similar to the risk cost in 2025

- The 'economic' scenario is described by SAPN as undertaking repex solely where total benefits outweigh costs irrespective of the service level effect, and results in a declining risk-cost to less than $30 million by 2030.

149.   The service level for customers is contributed to by a number of asset categories, and as SAPN has indicated, would be difficult to isolate for a single asset category. However, we consider that selection of a single reference year (as the snapshot of the modelled target risk) may be similarly problematic, as this too would be subject to a number of variables that may overstate (or understate) the level of risk. We did not see adequate consideration of alternate methods to determine the level of service level risk, including adequate consideration of historical service level trends to determine the optimal level or optimal timing of the proposed expenditure. Nor did we observe the direct impact to reliability performance using indicators such as SAIDI and SAIFI of the proposed expenditure, to demonstrate the impact to service levels.

150.   In our assessment of the proposed expenditure, we identified issues with SAPN's application of its risk cost methodology that has led it to overstate the level of reliability risk that it has assumed.

---

[40]   SAPN's response to IR021. Question 4

Figure 3.3:   Historical versus forecast risk-cost scenarios for repex ($m, FY25)
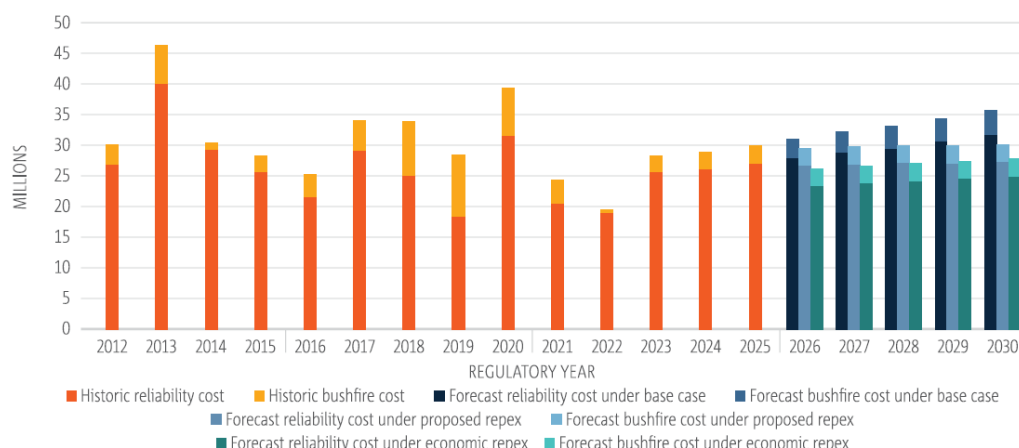
Forecast reliability risk is improved by programs other than overhead conductor replacement

151. We were also provided a representation of reliability risk by region, shown in Figure 3.4 as the aggregate of all regions. The forecast risk (dark blue line) is the post-investment risk level at the end of each year, assuming a FY22 start point and basis for the target risk, and including the risk removed by investments in each year. For example, in FY23 SAPN included $1.9 million risk reduction in its recloser asset category.

Figure 3.4:   Target and forecast reliability risk – All regions, all assets ($m, FY25)
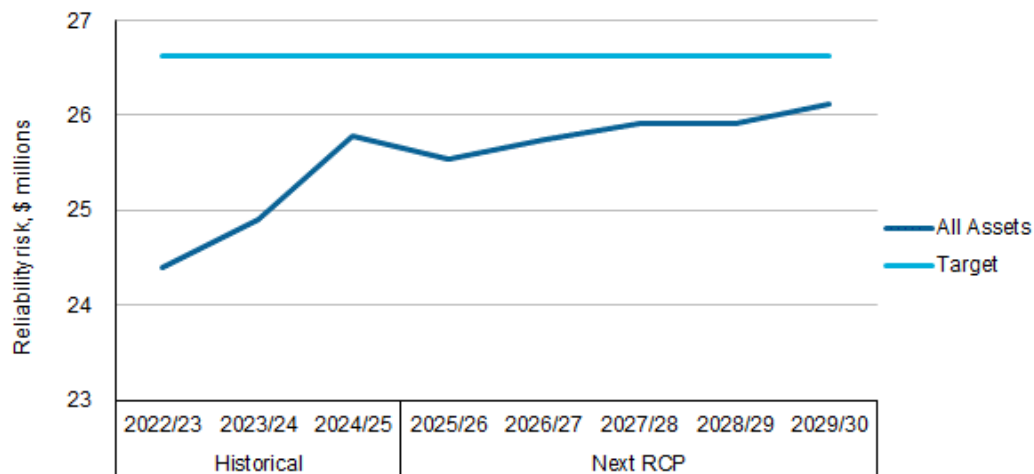
152. SAPN describes the residual risk (being the post-investment risk) as sitting below the target risk. SAPN further explains that other investment drivers result in reduction to reliability risk e.g., bushfire programs, which are added at the aggregate level as depicted in Figure 3.4. This highlights that the relationship between multiple programs on the level of reliability risk needs to be considered, to ensure the contribution of each program is recognised and that each program reflects an optimal scope and optimal timing across the portfolio.

153. The counterfactual is not clearly outlined in the provided risk model, nor is the estimated impact of historical replacement volumes on current/forecast reliability risk. SAPN describes

the target performance level by each region as 'the risk/performance as at the beginning of 2022/23, prior to investments.'[41] However, the derivation of this value is not provided.

Forecast failure rate information does not align with SAPN's stated condition of its assets

154. Information provided by SAPN indicates the actual failures avoided (reduced) relative to the base case is relatively small in percentage terms, for both conductor and underground cables[42] and was much lower than the values stated in the RIN. SAPN did not offer an explanation of this difference. We have therefore considered the failure rates presented in the RIN and supported by SAPN's risk cost modelling as the source of record for our assessment of the proposed expenditure in Section 3.4.

Safety risk reduction is not a key determinant of the proposed program

155. Based on our understanding that SAPN is seeking to avoid the most risk at lowest cost, we asked SAPN to describe how ALARP/SFAIRP[43] has been assessed and achieved in practice, including by reference to any qualitative or quantitative assessment of ALARP/SFAIRP for the proposed conductor and cable repex. SAPN described its application of disproportionality factors to the consequence in its risk modelling, as a way to demonstrate how it addresses safety risk. However, we interpret SAPN's response as implying that despite the use of disproportionality factors, the proportion of investment based on safety risk is low:

> *SA Power Networks has not considered the additional inclusion (beyond that required to maintain current levels of service) of individual replacements that have a benefit/cost ratio >1 where the safety risk removed is greater than the cost. This could be added to our modelling (potentially resulting in a higher expenditure forecast) to ensure that safety risks are reduced to ALARP.*[44]

156. This is consistent with our observation that the majority of risk being addressed is associated with reliability, and then bushfire risk reduction.

For conductors and cable, SAPN has not provided sufficient information to support its prediction of a decline in performance

157. SAPN is forecasting a further deterioration of reliability and safety over the next RCP by continuing current spend levels for underground cables and overhead conductors.[45] In our assessment of the proposed expenditure, we find insufficient basis for this assumption.

Increasing replacement rate over time reflects outcome of its deliverability assessment

158. From our discussions with SAPN, we understand that the output of SAPN's forecasting practices is used as an input to SAPN's work program planning. The increasing replacement volume year on year reflects the need to increase work delivery capacity for conductor and cable replacement, rather than adopt a step increase in a single year.

Repair related expenditure has not been included in forecast repex

159. SAPN has confirmed in response to a request for information that repairs for conductor and underground cable continue to be expensed and are not included in the capex forecast (or historical capex). We have not reviewed this further.

---

[41] SAPN's response to IR021. Question 4a.

[42] SAPN's response to IR004, SAPN – Response table data workbook, worksheet 'Table 4 Hist. Fail. Rates'.

[43] As Low As Reasonably Practicable (ALARP), or So Far As Is Reasonably Practicable (SFAIRP).

[44] SAPN's response to IR014. Question 30.

[45] SAPN - Attachment 5 - Capital expenditure - January 2024. Page 31.

3.4 Assessment of capex forecast for overhead conductor asset category

3.4.1 SAPN's capex forecast for overhead conductor

What SAPN has proposed

160. SAPN has forecast a capex requirement of $77.7 million for replacement of overhead conductors for the next RCP. SAPN has included a single program in its forecast repex, shown in Table 3.3, for overhead conductors (REP002) planned at a total cost of $80.2 million.[46] SAPN has not included unplanned conductor replacement.

Table 3.3: Repex forecast for overhead conductors ($m, FY25)

Program	FY26	FY27	FY28	FY29	FY30	Total
REP002 conductor planned	8.5	12.3	16.0	19.8	23.6	**80.2**
Total	**8.5**	**12.3**	**16.0**	**19.8**	**23.6**	**80.2**

Source: SAPN capex model

SAPN's proposed overhead conductor replacement shows an increasing trend

161. Figure 3.5 shows a steady increase in proposed repex for the next RCP commencing in FY26.[47] Based on information provided in the RIN, the proposed expenditure is for HV conductor replacement only, and is associated with increases in 11kV and 22kV Single Wire Earth Return (SWER) conductor types.

Figure 3.5: Historical and forecast overhead conductor repex ($m, FY25)
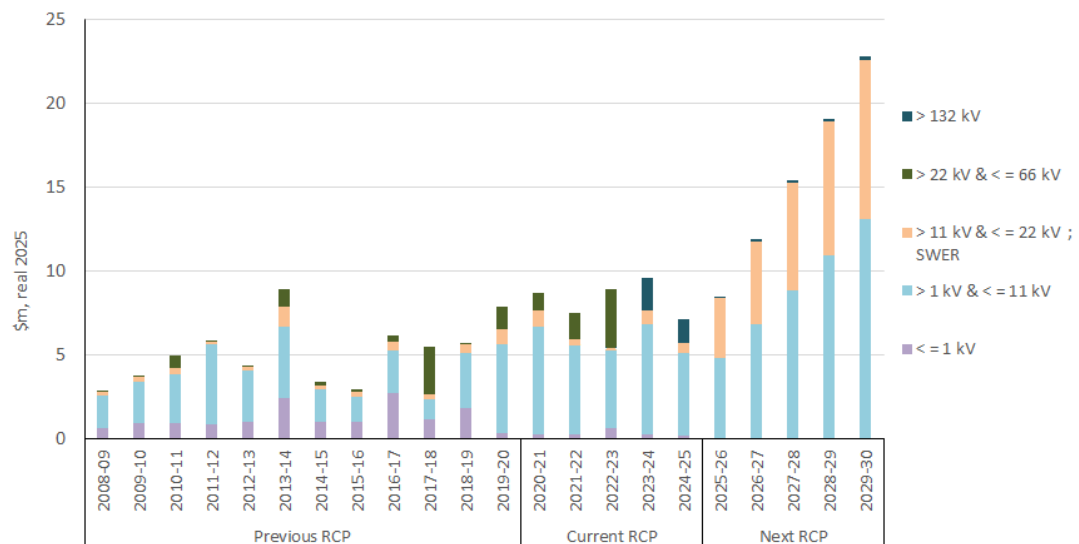
Source: EMCa analysis of historical and forecast RIN

---

[46] The project value of $80.2 million in the capex model is reduced by the capex efficiency for repex, to arrive at the RIN value of $77.7 million.

[47] Based on SAPN's application of unit rates, the increase in replacement volume is proportional to the increase in proposed repex

3.4.2   Our assessment of capex forecast for overhead conductor

Forecast repex is directed to HV conductor replacement

162.   SAPN describes the focus of its overhead conductor repex as being the replacement of poor condition HV conductors, which are exhibiting an increasing failure rate as shown in Figure 3.6. As discussed in Section 3.3, this increasing failure rate is also presented as being a key determinant for worsening reliability performance.

Figure 3.6:   Historical and forecast overhead conductor failures
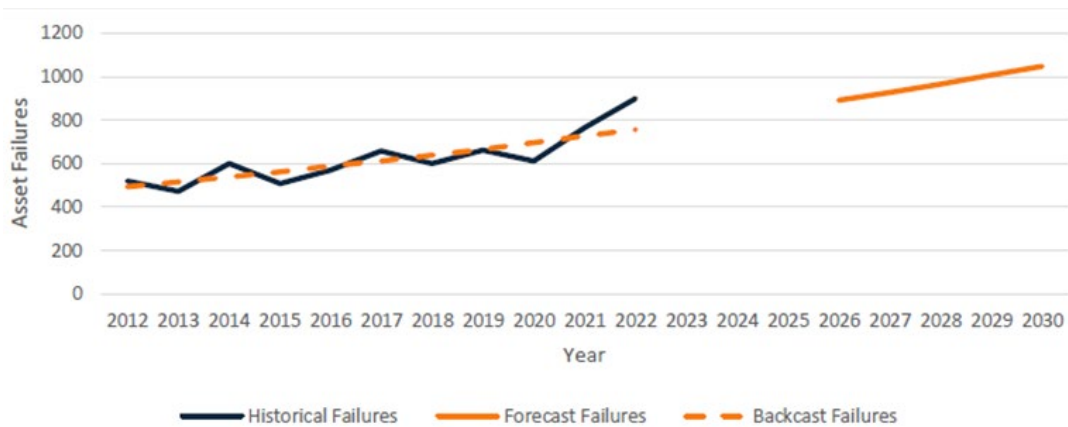
Source: 5.3.1 Network asset replacement, Figure 55

Increase in failures claimed by SAPN is not due to HV conductors

163.   We asked SAPN to provide the underlying data behind the increase in conductor failure to identify the likely cause(s) and to assist with isolating the affected conductors. Our review of the data provided by SAPN[48] indicates that the failures are attributable to LV conductors, and once removed, the failure trend for HV conductors is decreasing over the last three years.

164.   In Figure 3.7 we show the composition of HV unassisted conductor failures by voltage level, compared with the total unassisted conductor failure for all voltages. The trend of the HV conductor failures is clearly decreasing from a peak in FY20, whereas at a total level the number of failures follows the same curve as provided by SAPN in Figure 3.6. We find this insight curious, given the focus of the proposed expenditure is on the treatment, including replacement, of HV conductors and not LV conductors.

---

[48]   SAPN response to IR014. Question 26.

Figure 3.7: Historical and forecast overhead conductor failures – by voltage level
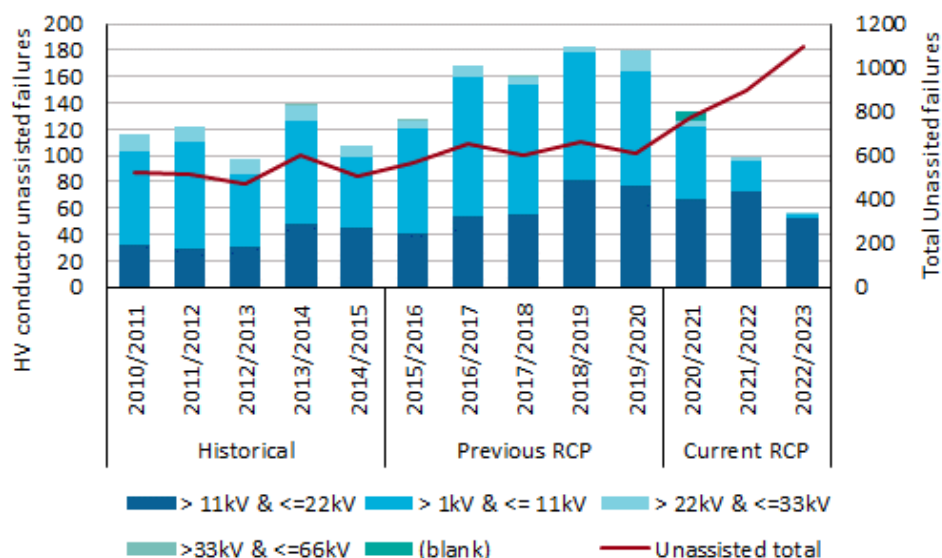
Source: EMCa analysis of SAPN response to IR014 Question 26

165. We also reviewed the defect data provided by SAPN which indicated an increasing trend and spike in defects in calendar year 2023. However, we were not able to discern if there is a relationship to voltage level as a large number of defect records did not include voltage level. SAPN explains this spike in defects as the result of a change in inspection practice where *'additional defects (or 'conditional failures') are now being raised by inspectors for the existence of joints or splices in our overhead conductor.'*[49] SAPN states that only functional failures are included in its risk-cost modelling and development of the forecast expenditure.

166. Our initial hypothesis was that SAPN had used a single generic failure rate for the population of overhead conductors. However, SAPN subsequently confirmed that it had used failure rates determined by voltage sub-population and not overall. We reviewed these assumptions included as a part of the advice from SAPN's advisor, Fraser Nash.

Increasing failure rate of LV conductor is not included in the forecast

167. SAPN's data indicates an elevated and increasing number of failures occurring on LV conductor, however SAPN has not included LV conductor in its modelling for forecast repex. We asked SAPN to explain why this was the case. We were advised that the failure of LV was much lower in consequence than HV and therefore was not prioritised using its risk-cost modelling:

> *Our current practice is expected to continue into the next RCP. Our risk cost model forecasts no proactive replacement expenditure in LV conductor given the relatively low value/impact on service levels.*[50]

168. Whilst LV conductors do have a lower reliability consequence than HV conductor, the safety consequence and ALARP need also to be considered when assessing asset failure. We consider that the increasing failure rate of LV conductors will likely be addressed by SAPN, and which will require capex to be directed to LV conductor replacement, which SAPN has not done.

169. We show the forecast repex by asset category in Table 3.4.

---

[49]   SAPN response to IR014. Question 26.

[50]   SAPN response to IR014. Question 28.

Table 3.4:   Repex forecast for overhead conductors by asset category ($m, FY25)

Asset category	Previous RCP	Current RCP	Next RCP
< = 1 kV	7.0	1.6	-
> 1 kV & < = 11 kV	13.8	27.8	44.6
> 11 kV & < = 22 kV ; SWER	2.6	2.9	32.4
> 22 kV & < = 66 kV	4.7	6.1	-
> 132 kV	-	3.4	0.7
Total	**28.0**	**41.9**	**77.7**

Source: SAPN RIN workbook 1 forecast data

170. We consider that SAPN will likely incur expenditure to mitigate the increasing number of failures in its LV conductor population. As SAPN also undertakes repair works as opex, other than by reference to historical trends, the level of capex for LV conductor replacement is not able to be easily determined.

171. This signals to us a serious misalignment between the forecasting models that SAPN has developed and the actual work that SAPN will undertake to manage risk on its network.

Increase in HV conductor replacement directed to SWER asset class

172. In Figure 3.5 and Table 3.4, we observe that the increase in proposed overhead conductor replacement for 11kV and SWER asset categories, with the largest increase for SWER. SAPN does not explain the reason for this, and we expect this is a direct outcome of the input assumptions used in its risk-cost modelling.

173. We find that this outcome does not align with SAPN's experience of decreasing failure rates for 11kV and relatively stable failure rates for its SWER assets.

The PoF modelling has been calibrated to an increasing failure rate

174. The PoF failure modelling developed by Fraser Nash assumes an increasing failure trend, consistent with Figure 3.6 and which is not consistent with more recent data that shows a flat to declining trend of failures for HV conductor, based on voltage level.

175. We asked SAPN to explain the failure data used for calibration purposes. SAPN confirmed that the analysis was calibrated to a single average of failures over five years, and which we consider is higher than the failures that have occurred over the last two years.

176. SAPN has drawn from advice from its consultant Frazer Nash to develop its PoF model, and which has been calibrated to historical observations as shown in Figure 3.8. The level of 'current failures' used in this report is 287 and which exceeds the data we were provided by SAPN, and we were concerned this had led to a higher failure rate than SAPN had observed. However, review of the PoF models SAPN provided showed that its model had been calibrated to a lower value of 145.8 failures per year.

Figure 3.8: Predicted versus observed HV conductor failure rate
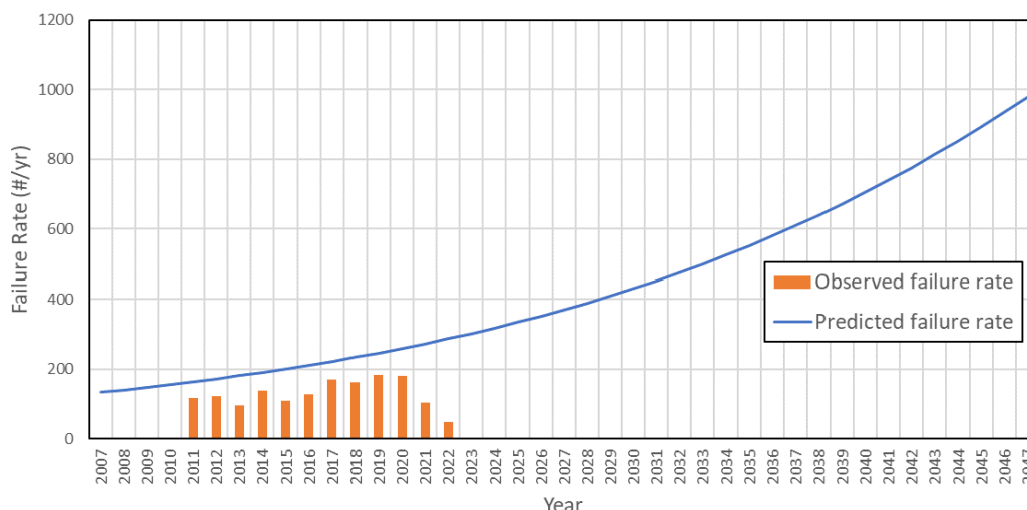
Source: Frazer Nash OH Conductor Mgt Strategy = Ph 2 report Issue 1 – Confidential provided with IR004, Figure 13

177. Based on our own analysis of the source data, and as indicated by Figure 3.8, the observed failure rate of HV conductors has been decreasing, and any interpretation of this is therefore sensitive to the averaging period that has been selected, to take account of the impact of other preventative replacement strategies.

178. We understand that SAPN has undertaken back-casting of its conductor failures, to verify the rate of change in probability of failure over time, using the same probability of failure modelling methods over ten years. We consider this is a useful indicator of the robustness of the model. We have not been provided the modelling that provided the back-cast data in Figure 3.6. SAPN states that:

> *The sum of these values across the asset base compared to the count of observed failures. The comparison of the 'backcast' of modelled probabilities and count of observed failures was deemed to provide further confidence in the methodology used to forecast probability of failure of these assets.*[51]

179. However, the values provided to us appear to be dominated by the increasing LV conductor failure rate, and which does not reflect the observed failures of HV conductors.

Selection of input parameters likely to overstate reliability risk

180. As discussed in Section 3.3, SAPN's modelling is dominated by reliability risk, and therefore to the input assumptions that SAPN has applied. We therefore looked at the basis of the input assumptions applied by SAPN, being: (i) failure rate, (ii) outage duration, and (iii) likelihood of outage. We present the results in the tables below.

181. We found discrepancies in the data set provided by SAPN. We present the 12-year average and five-year average according to SAPN's response in IR014 Question 32, and our calculated values for the three-year averages based on SAPN's response to Question 26, and also data provided in response to IR014. Values highlighted are those that align with the parameters applied by SAPN.

---

[51]   SAPN response to IR014. Question 31.

Table 3.5:   Annual failures

Annual failures	SAPN parameter	12 yr avg	5 yr avg	3 yr avg	Updated 3 yr avg
LV	556.6	n/a	556.6	622.7	825.7
1kV < V <= 11kV	71.8	n/a	71.8	55.0	27.0
11kV < V <= 22kV	71.0	n/a	71.0	72.3	64.0
22kV < V <= 66kV	7.0	n/a	7.0	7.7	2.7

Source: EMCa analysis of IR014 Q26 and Q32, and IR026 Q1

182.   Firstly, SAPN has applied a five-year average to determine its annual failure rate to calibrate its modelling to. However, as stated earlier in our report, the annual failure rates are less if the three-year average is applied (FY20 to FY22), and lower still if the three-year average is calculated to FY23. This has a material impact on the PoF calculation.

183.   Next, we considered the number of outages in Table 3.6.

Table 3.6:   Annual number of outages

Annual outages	SAPN parameter	12 yr avg	5 yr avg	3 yr avg	Updated 3 yr avg
LV	133.8	133.8	154.6	n/a	n/a
1kV < V <= 11kV	59.8	59.8	62.0	44.7	49.0
11kV < V <= 22kV	40.9	40.9	43.8	35.0	44.0
22kV < V <= 66kV	4.2	4.2	4.4	3.7	5.3

Source: EMCa analysis of IR014 Q26 and Q32, and IR026 Q1

184.   Similar to the number of failures, determination of annual outages in Table 3.6 is sensitive to the sampling period selected, and in this case SAPN has used a 12-year average. This is similar for the annual outage duration in Table 3.7.

Table 3.7:   Annual outage duration - minutes

Annual outage duration	SAPN parameter	12 yr avg	5 yr avg	3 yr avg	Updated 3 yr avg
LV	233	207	233	n/a	n/a
1kV < V <= 11kV	235	235	249	247	197
11kV < V <= 22kV	344	344	392	436	418
22kV < V <= 66kV	390	390	397	414	203

Source: EMCa analysis of IR014 Q26 and Q32, and IR026 Q1

185.   Using averages of extended periods (e.g. 12 years) as SAPN has done, does not sufficiently consider the impacts of repex and augex programs that SAPN has undertaken, nor will it adequately reflect any changes to the asset condition or response practices that may impact the frequency or duration of events impacting customers. Selection of shorter and more recent sampling periods is likely to be more reflective of the reliability of the network and would result in lower values than SAPN has applied.

186.   Assigning input parameters by operating voltage may be pragmatic, however may not capture the impact of other operating environment factors. We would expect that additional environmental factors may have an impact on inputs to the risk model such as failure rates and duration times, and that this could be addressed in sensitivity analysis of the inputs undertaken by SAPN, which we did not see.

187. When we interrogated the data further, there were a small number of events that resulted in large duration outages in the last two years. The timing of these events was adjacent to large weather-based events in South Australia, and it was not clear whether the duration of outages for the unassisted conductor failures recorded might have been related to these specific weather events, to then conclude the magnitude of their impact to SAPN's analysis. More recently, increases to rural SAIDI from unassisted failures were evident in the data provided by SAPN[52] at the same time as large weather events were recorded, such as in June and November of 2022 and January 2023.[53]

SAPN has made adjustments to reduce the proposed replacement volumes as a result of proceeding with its bushfire safety program

188. We provide our assessment of the bushfire safety program in Section 4. During our onsite meeting SAPN demonstrated that it has reduced the likelihood of bushfire risk by 70% for those sections of conductor that are included in its bushfire safety program, ensuring that the same risk reduction was not being claimed by both programs. We consider this method represents a reasonable approach to assist prioritise the conductor replacement program, where it responds to bushfire risk.

189. However, we would expect that the treatment of risk is first considered by the requirements of the existing asset, consistent with the asset replacement guidance before being considered to form part of a broader augex program aimed at increasing the capacity or function of the network. That said, the principal of not double counting benefits attributed to the respective programs appears sound.

Historical and forecast conductor replacement rates are below SAPN's economic modelling

190. SAPN states that its long-term replacement rate is below that indicated from the AER repex model and below a sustainable level. SAPN provides analysis of the replacement age at the current replacement level compared with its peers, concluding that the average age at time of replacement was the highest in the NEM.

191. In shown in Figure 3.9, in its options analysis SAPN concludes that the proposed expenditure represents a level below its repex modelling, and below its economic model. The economic model is made up of sub-projects that each present a positive NPV from its risk-cost modelling, indicated by a BCR >1.

Figure 3.9:   Overhead conductor expenditure comparison

Source: 5.3.1 Network asset replacement, Figure 57

192. Based on our experience reviewing other DNSPs, SAPN's historical level of conductor replacement is low compared to its peers. We have not reviewed the results of the application of the repex model by SAPN, or the impact of historical repex and augex programs that may be targeting the same or similar risks. Whilst there may be an argument for an increase in replacement volumes above historical practice, SAPN has not

---

[52]   Review of HV conductor failure data provided in response to IR026

[53]   Record of extreme weather events reviewed at https://soe.epa.sa.gov.au/environmental-themes/climate/climate-change-impact/extreme-weather

demonstrated that the volume or focus of the investment that it proposes in the next RCP, is reasonable and prudent.

3.5 Assessment of capex forecast for underground cable asset category

3.5.1 SAPN's capex forecast for underground cables

What SAPN has proposed

193. SAPN has forecast capex of $94.0 million for underground cable replacement for the next RCP. As shown in Table 3.8, SAPN has included five programs in its forecast repex for underground cables at a total cost of $97.1 million for the next RCP.[54]

Table 3.8: Capex forecast for underground cable ($m, FY25)

Program	FY26	FY27	FY28	FY29	FY30	Total
REP001 cable planned	6.2	9.7	13.2	16.7	20.3	**66.2**
REP013 CBD ducts	0.6	0.6	0.6	0.6	0.6	**3.2**
REP014 11kV PILC	-	-	-	-	-	**-**
REP016 cable unplanned	5.5	5.5	5.5	5.5	5.5	**27.6**
REP038 other sub-transmission cables	0.0	0.0	0.0	0.0	0.0	**0.2**
Total	**12.4**	**15.9**	**19.4**	**22.9**	**26.5**	**97.1**

Source: SAPN capex model

SAPN's proposed cable replacement shows an increasing trend

194. Figure 3.10 shows a steady increase in proposed repex for the next RCP commencing in the FY26. Based on information provided in the RIN, this is associated with increases in 11kV underground cable, and reducing expenditure in LV cable replacement.

---

[54] The project value of $97.1 million in the capex model is reduced by the capex efficiency for repex to arrive at the RIN value of $94.0 million.

Figure 3.10: Historical and forecast underground cable repex ($m, FY25)
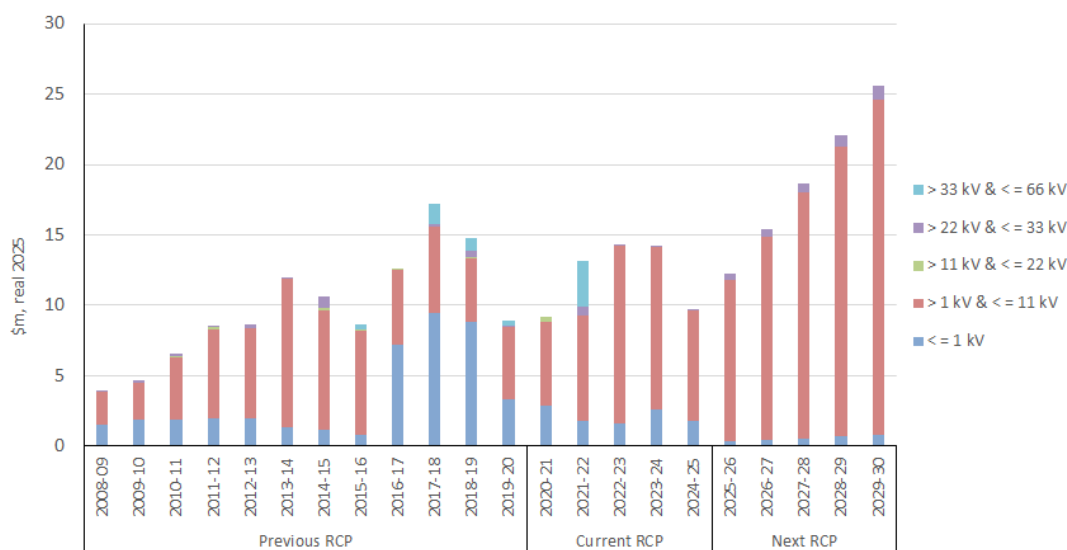
Source: EMCa analysis of historical and forecast RIN

SAPN has included the CBD Reliability Program expenditure in the forecast cable repex, and once removed reduces the repex to below historical levels

195. In developing the forecast for its planned underground cable capex, SAPN made use of its risk-cost model for both the CBD and non-CBD cables. During our onsite meeting, SAPN confirmed that the cable replacement associated with its proposed CBD reliability improvement project was included in the underground cable planned replacement program.

196. We understand that the underground cable replacement for the CBD project includes provision for CBD duct and manholes, and planned CBD underground cable replacement. After removing the CBD reliability business case (approximately $63.8 million)[55] from the proposed capex for the next RCP, we estimated that the capex included in our scope of review for non-CBD cable replacement was approximately $33 million. Based on this total, the cable replacement is further split based on the projects and programs shown in Table 3.8 as planned ($5.8 million) and unplanned ($27.6 million). At this level, the planned underground cable replacement is below historical levels.

197. We were not provided with historical expenditure separated between CBD and non-CBD cable replacement. However, based on SAPN's response to an information request,[56] we understand approximately 3.9km of underground cable has been or is planned to be replaced in the CBD as a part of planned replacement programs during the current RCP. If this level of cable replacement was removed from the comparison, the remaining planned cable replacement for the remainder of the non-CBD network would be lower.[57]

SAPN has identified an error with the forecast expenditure for planned cable replacement

198. We asked SAPN to show the contribution of the planned underground cable replacement for its CBD replacement project separately to its other proposed cable repex, to confirm our understanding of the forecast repex. In its response, SAPN states:

> *When populating the expenditure forecast for REP001, the expenditure forecast from the risk cost model was used for both CBD and non-CBD cables whereas REP001 should have consisted of the expenditure forecast from our risk cost model for non-CBD cables (approximately $17.9m) and the expenditure forecast from the CBD reliability business*

---

[55] Using the cost escalators provided in SAPN's capex model, based on an estimated CBD project cost of $55.0 million in $FY22

[56] SAPN response to IR0021. Question2.

[57] We have not considered unplanned (reactive) cable replacement in the CBD which includes small sections of cable replacement (<50m), or new and replacement of cable joints.

case (approximately $55m) less the CBD ducts & manholes (REP013, approximately $2.7m), to form a total of approximately $70.2m.

This error has resulted in approximately $13m of forecast expenditure omitted from the Capex model.[58]

199. We show the updated data provided by SAPN compared with its capex model in Table 3.9.

Table 3.9: Composition of cable replacement program after correction by SAPN ($m, FY22)

Program	Location	FY26	FY27	FY28	FY29	FY30	Total
REP001 Cable planned	CBD	10.5	10.5	10.5	10.5	10.5	**52.3**
REP001 Cable planned	Non-CBD	3.3	3.4	3.6	3.7	3.9	**17.9**
REP013 Cable ducts	CBD	0.5	0.5	0.5	0.5	0.5	**2.7**
REP016 Cable unplanned	-	4.8	4.8	4.8	4.8	4.8	**23.9**
REP038 Other sub-transmission cables	-	0.0	0.0	0.0	0.0	0.0	**0.2**
Total (after correction)	-	**19.1**	**19.2**	**19.4**	**19.5**	**19.7**	**97.0**
Less Capex model	-	10.8	13.8	16.8	19.8	22.8	**84.0**
Variance	-	*8.3*	*5.5*	*2.6*	*-0.3*	*-3.1*	*13.0*

Source: EMCa analysis of SAPN response to IR018, Question 12

200. We have not been requested to review the CBD Reliability Program, which includes cable replacement (repex) and automation (augex). We note that the updated data would increase the forecast by $13 million in $FY22 dollars and would change the expenditure profile when compared with the capex included in its RP. However, as the record of SAPN's proposal to AER and the basis for the tariffs that it has proposed, we have based our assessment on the proposed capex for underground cables that was included in the RP.

3.5.2 Our assessment of the capex forecast for non-CBD underground cables

SAPN's proposed non-CBD replacement appears lower than its historical repex

201. In Table 3.10, we show a representation of the cable replacement expenditure with the CBD project removed, and also after inclusion of the SAPN error of $13 million ($FY22). We have used the repex included in the RIN as the starting point, and which includes application of the capex efficiency as described in Section 3.2.3. This analysis is indicative only, as the annual average in the current RCP and previous RCP would also need to be adjusted to remove planned CBD cable replacement, to be on a comparable basis.

---

[58] SAPN's response to IR018. Question 12. Pages 19-20.

Table 3.10: Historical and forecast non-CBD cable replacement by RCP ($m, FY25)[59]

Program	Total (Next RCP)	Annual average (Next RCP)	Annual average (Current RCP)	Annual average (Previous RCP)
As proposed in RIN	94.0	18.8	12.1	12.4
After deduction of CBD project expenditure (as proposed)	30.2	6.0	12.1	12.4
After correction for error (as advised by SAPN)	45.3	9.1	12.1	12.4

Source: EMCa analysis of RIN and SAPN response to IR018, Question 12

202.   The proposed expenditure for the non-CBD programs is less than the historical average, including where the error advised by SAPN is included in the analysis.

203.   In Figure 3.11, we have reproduced SAPN's analysis of its CBD versus non-CBD cable program (expressed in $FY22). Based on our review of the RIN data, SAPN's analysis appears to exclude LV cable replacement, as the total expenditure over that period FY17 to FY22, is closer to $63 million once included. We consider, if the LV cable expenditure is included, our observations hold.

Figure 3.11: Underground cable repex – CBD and non-CBD ($m FY22)
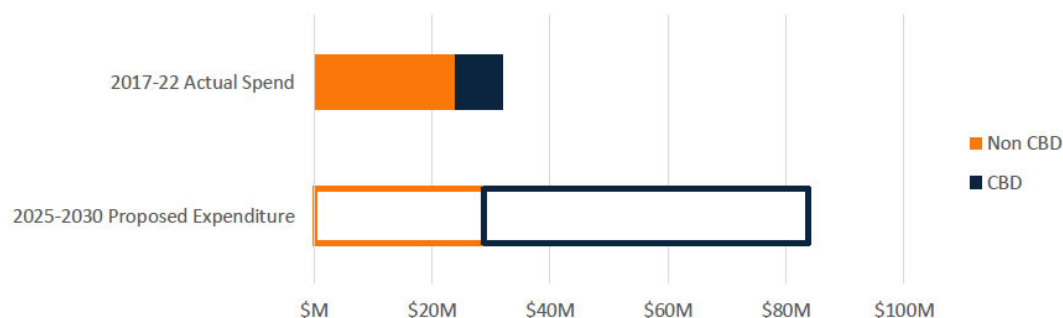
Source: SAPN 5.3.1 Network asset replacement expenditure – January 2024, Figure 46

SAPN identifies a key driver of failures being Paper Insulated Lead Covered (PILC) cable failures

204.   We note that SAPN has referred to PILC cable as being the primary source of cable failure. Whilst this may form a proportion of the unplanned cable replacement program, SAPN is not continuing the program REP014 11kV PILC that is present in the current RCP, in the next RCP. Whilst we have not reviewed the scope of the CBD program, we expect that this will target the PILC 11kV cables at highest risk of failure.

Historical cable replacement rates stated as being below that indicated by SAPN's repex model

205.   SAPN states that its long-term replacement rate is below SAPN's repex model outputs and below what SAPN considers to be a sustainable level. SAPN provides analysis of the replacement age at the current replacement level compared with its peers, concluding that the average age at time of replacement was the highest in the NEM.

Historical and forecast conductor replacement rates are below SAPN's economic modelling

206.   SAPN states that its long-term replacement rate is below the repex model and below a sustainable level. SAPN provides analysis of the replacement age at the current

---

[59]   Values expressed in $FY25 using the cost escalators in SAPN's capex model

replacement level compared with its peers, concluding that the average age at time of replacement was the highest in the NEM.

207.   As shown in Figure 3.12, in its options analysis SAPN concludes that the proposed expenditure represents a level below its economic model. The economic model is made up of sub-projects that each present a positive NPV from its risk-cost modelling, indicated by a BCR >1.

Figure 3.12: Underground cable expenditure comparison
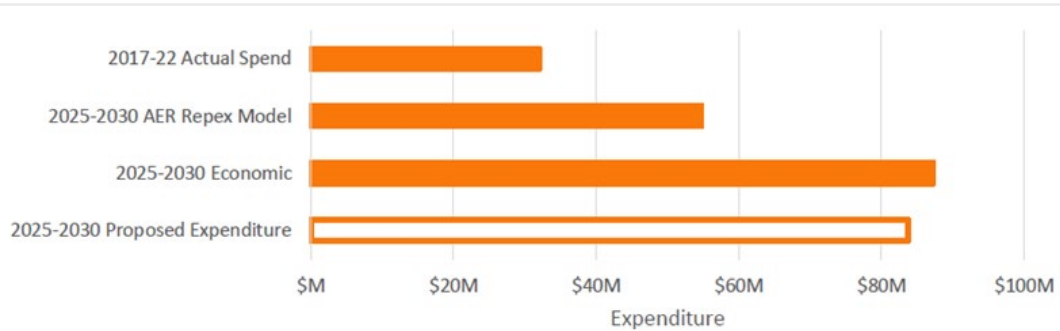
Source: SAPN 5.3.1 Network asset replacement, Figure 45

208.   Similar to our review of conductor repex, we have focussed our review on the forecasting methods and models provided by SAPN to support the proposed replacement volumes. As it was not possible to split the output between CBD and non-CBD cables, we do not comment further on the comparisons of scenarios in Figure 3.12.

The same approach for forecasting planned cable replacement is applied as was the case for conductor

209.   SAPN has applied the same process for cables as it has for its overhead conductor replacement, in its derivation of its input parameters including PoF. The historical and forecast failures are shown in Figure 3.13.

Figure 3.13: Historical and forecast underground cable failures
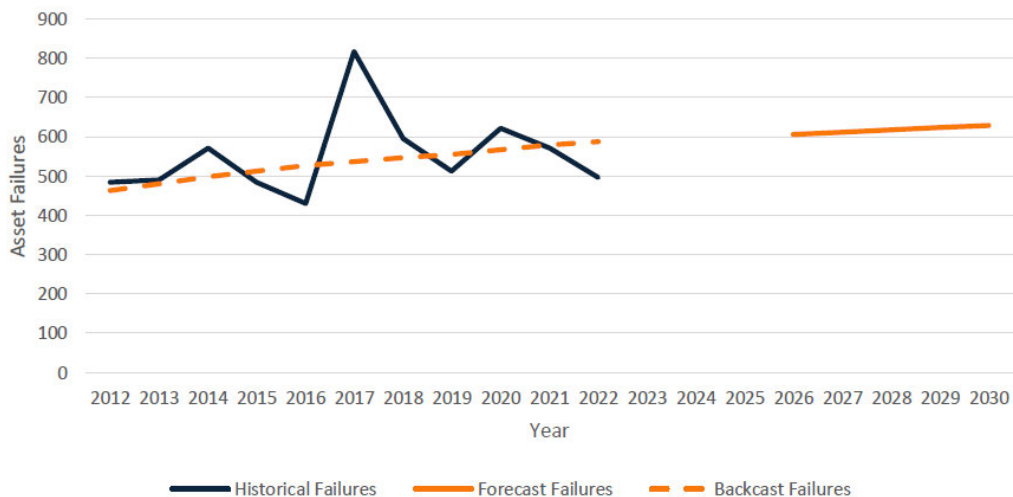
Source: SAPN 5.3.1 Network asset replacement, Figure 45

210.   In our review of the input parameters applied to the risk model for the planned cable replacement, we identified similar issues to those in the application of SAPN's risk modelling for conductors. As described in Section 3.3 and in our assessment of overhead conductor repex in Section 3.4, we do not find sufficient basis for the modelling assumptions that SAPN has relied upon for the assessment of PoF and for its reliability risk.

211. However, the risk modelling has only been applied for planned cable replacement and the emphasis in this modelling is on the larger proposed repex for replacement of CBD cables. The planned replacement of non-CBD cables, after removal of the CBD project is reduced to $5.8 million.

212. When we consider other measures, including by reference to the historical expenditure for planned replacement of non-CBD cables, we consider that on balance, the level of expenditure proposed by SAPN for planned replacement of non-CBD cables in its RP is reasonable.

Unplanned cable replacement based on historical trend is reasonable

213. Unlike for conductor replacement, SAPN has included an unplanned cable replacement (REP016) program, and which makes up the majority of the expenditure for non-CBD cables. SAPN has based the forecast on an historical average, which we consider a reasonable approach, and results in a reasonable estimate of its expenditure requirements:

> *The expenditure relating to REP013 - CBD Ducts & Manholes and REP016 - Cable Replacement Unplanned is not included in the risk cost model. It forms part of an 'unmodelled' repex and is derived from historic actuals.*[60]

3.6 Our findings and implications for proposed repex

3.6.1 Summary of findings

We have reviewed the forecasting methods relied upon by SAPN in producing its forecast for overhead conductor repex and aspects of underground cable repex

214. Our review has considered the proposed repex for overhead conductors and a proportion of repex for underground cables only. In these areas SAPN has relied upon its risk-cost modelling for its planned replacement programs and historical trend for unplanned programs.

Basis for the forecast of overhead conductor replacement is not formed on a reasonable basis, nor adequately considers the replacement that SAPN will likely address

215. For overhead conductor repex SAPN has relied on the output of its risk models.

216. We have identified several issues with SAPN's risk-cost modelling that it has undertaken to support the proposed repex for planned replacement of overhead conductor assets:

- Calibration of the risk models appears to be based on accelerated failure of the assets, which differs from observed failures. The implication is that the risk models, without moderation may indicate a higher level of replacement than is required to maintain the level of risk.

- Input assumptions appear to overstate the benefits, specifically because of the averaging periods which SAPN has selected, and events that without explanation, appear to lead to higher consequence values.

- Risk models appear disconnected from the risk areas that SAPN has identified and that SAPN will likely address in the next RCP, for example:

  - SAPN has not included repex for LV conductor, which is an area of increasing failure rate, yet SAPN has included a large increase in HV and single phase SWER conductor for which an increasing defect or failure rate is not demonstrated.

  - The conductor replacement appears to be targeting SWER, which has had a relatively low historical level of expenditure.

---

[60] SAPN's response to IR014. Question 29.

217.   Whilst an increase in replacement rates may be necessary, we consider that SAPN's risk-cost modelling, to the extent that it has relied on it for the forecast expenditure, does not support the levels of expenditure that it has proposed.

For underground cables, we consider that the proposed replacement program is reasonable

218.   For cable replacement we considered other factors such as the historical expenditure and failure rates that SAPN had provided, in addition to the specific forecasting methods that SAPN had applied to each part of its forecast. We consider that on balance, the forecast repex for cable replacement is reasonable.

Whilst the issues we have identified in SAPN's application of its risk cost modelling may also be present in other parts of the proposed repex, the additional expenditure is beyond our scope of review

219.   The issues that we have identified have implications for the application of SAPN's risk modelling to other asset categories included in its repex program, where the risk-cost modelling may have been relied upon for development of its capex forecast. However, review of the modelling for other asset categories is not within our scope of review.

3.6.2   Implications for proposed repex

220.   SAPN has proposed $77.7 million for overhead conductor replacement and $33 million for underground cable replacement (excluding CBD). This reflects a significant increase, in aggregate, from its expenditure in the current RCP.

221.   We find that the proposed expenditure for overhead conductor replacement is overstated relative to a reasonable forecast of prudent and efficient levels. We consider that the proposed expenditure for non-CBD cable replacement is reasonable.

4   REVIEW OF ASPECTS OF FORECAST AUGEX

Our review has considered the proposed augex for capacity, reliability management (excluding the CBD Reliability Improvement Program), and bushfire risk mitigation. In these areas SAPN has relied primarily on bottom-up analysis of a portfolio of specific projects to establish expenditure forecasts for its programs. In forecasting its demand-driven capacity projects, SAPN has introduced probabilistic planning criteria alongside deterministic planning criteria, and which it refers to as its Hybrid methodology.

The proposed expenditure for the areas we have reviewed is $369.6 million.

We consider that the aggregate proposed expenditure for these areas is overstated. We arrive at this position having considered the project-based modelling that SAPN has relied upon.

For its capacity program, SAPN's project selection criteria based on deterministic and probabilistic risk cost analysis leads to inclusion of some projects for which low net benefits would not withstand even small unfavourable variance over the relatively long study period. SAPN's CBA modelling also is not used to inform the economically optimum timing of the projects and from our assessment we consider that several projects could prudently be deferred until the 2030-35 RCP.

We consider that SAPN has provided insufficient evidence to support its forecast expenditure for its 'maintain underlying reliability' program, which is based on historical spend. However, we consider the proposed expenditure for its reliability improvement and bushfire risk management programs is reasonable.

4.1   Introduction

222.   In this section, we present our assessment of the forecast augex that SAPN has proposed for the three augex categories for the next RCP that we have been asked to review, namely:

- capacity;
- reliability management; and
- bushfire risk management.

223.   We reviewed the information provided by SAPN to support its proposed augex forecast, including the cost-benefit and other models it has developed to support individual projects and programs. Our focus was to ascertain the impact of the application of its governance and management processes and practices at the project and program level, and to assess the extent to which SAPN's proposal represents a reasonable forecast of prudent and efficient expenditure.

224.   We sought to establish the strategic basis for, and the reasonableness of, SAPN's proposed augex for each of the identified categories of expenditure. Forecast expenditure in the next RCP for these categories represents a significant increase from the augex SAPN has incurred and is expected to incur in the remainder of the current RCP.

225.   SAPN has provided its bottom-up forecast and has described how it has sought to avoid duplication or material overlap with other augex projects and programs, repex programs and

its CER Integration Program. We have considered SAPN's approaches and sought evidence to confirm this as part of our assessment.

226. We first summarise and compare SAPN's proposed expenditure for the next RCP with its historical actual and estimated expenditure in the prior and current RCPs. We subsequently provide our review of SAPN's forecast for each of the three categories of augex within our scope.

4.2 Overview of SAPN's proposed augex

4.2.1 Overview

227. SAPN proposes to spend $506.3[61] million on augex programs and projects during the next RCP. This is 44.9% higher than the $350.5 million augex SAPN expects to spend during the current RCP.

228. Our scope covers a subset of the augex program, as shown in Table 4.1, comprising network capacity, reliability management, and bushfire risk management programs. In aggregate the programs we have reviewed amount to forecast capex of $369.6 million or 73% of total augex.

Table 4.1: Augex by category ($m, FY25)

Augex program	Amount
Network capacity	240.90
Reliability management programs	103.10
Bushfire risk management programs	25.60
Sub-total (within reviewed scope)	**369.60**
Powerline Environment Committee Program (PLEC)	38.40
Network resilience	8.20
Other	63.00
CBD Reliability Improvement Program	27.00
Total Augex	**506.30**

Source: EMCa table derived from SAPN Attachment 5, Pages 35-53

4.2.2 Drivers of increased expenditure

229. SAPN attributes the need for the increased augex expenditure on network upgrades to:

- Forecast strong increases in load demand, driven by customer electrification

- Non-asset condition impacts on reliability (particularly fruit bats and weather-related damage on overhead power lines)

- Target upgrades to improve reliability in the Adelaide CBD to meet jurisdictional standards

- Target improvements for regions and customers who repeatedly experience poor reliability performance

- Mitigate the risk of network assets starting bushfires, and

- Minimise customer impacts when public safety power shutoffs are initiated during bushfire risk times.

---

[61] This amount is from SAPN Attachment 5 which is different to SAPN RIN and Capex model $505.5 million.

4.3 Assessment of augex forecast for network capacity

4.3.1 SAPN's capex forecast for capacity

SAPN proposes an 80% increase of capacity-related augex compared to the current RCP

230. SAPN has forecast $240.9 million capex for capacity-related network upgrades over the next RCP. The proposed expenditure is as shown in Table 4.2.

Table 4.2:   Proposed capex forecast for network capacity ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	Total
Compliance						
Connection Point Capacity	8.6	11.2	2.4	13.8	22.7	58.7
LV & Distribution Transformers	5.6	5.6	5.6	5.6	5.6	27.9
LV Two Way Network (QoS)	2.7	2.7	2.7	2.7	2.7	13.4
Subtotal	**16.9**	**19.4**	**10.7**	**22.1**	**31.0**	**100.1**
Demand driven and supporting augex						
Distribution Feeders (11 & 7.6kV)	0.7	0.2	0.0	2.7	3.0	6.7
Strategic Network Capacity (Other)	4.7	3.1	3.1	3.2	4.7	18.9
Substation Capacity	9.4	11.3	12.4	6.3	14.7	54.1
Sub transmission Network	8.5	8.0	15.6	19.7	5.2	57.0
Voltage Regulation	0.0	0.2	0.2	0.0	0.0	0.5
Land	0.0	1.6	1.7	0.2	0.2	3.7
Subtotal	**23.2**	**24.5**	**33.1**	**32.1**	**27.9**	**140.8**
TOTAL Augex network capacity	**40.1**	**44.0**	**43.7**	**54.2**	**58.9**	**240.9**

Source: EMCa table, from SAPN 5.1.1 Capex model

231. The capex trend in Figure 4.1 shows that the proposed capacity augex for the next RCP is approximately 80% higher than the current RCP. This increase is coming off a historically low base and the proposed capex grows through to 2030. The increase is attributed by SAPN to a material resurgence of forecast demand growth driven by '*macro factors such as electrification in business, transport and residential sectors, EV up-take, renewable targets, and localised factors such as in-fill housing, residential developments and commercial and industrial loads.*'[62]

232. SAPN proposes expanding / upgrading assets to ensure network capacity to meet demand and maintain service quality, reliability and security, with the addition of significant investment triggered by compliance. This comprises programs and projects extending or upgrading the sub-transmission, distribution and low voltage networks, and transmission connection points and substations.[63]

---

[62]   SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Page 15.

[63]   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Page 35.

Figure 4.1: Capex forecast for capacity – expenditure over RCPs ($m, FY25)
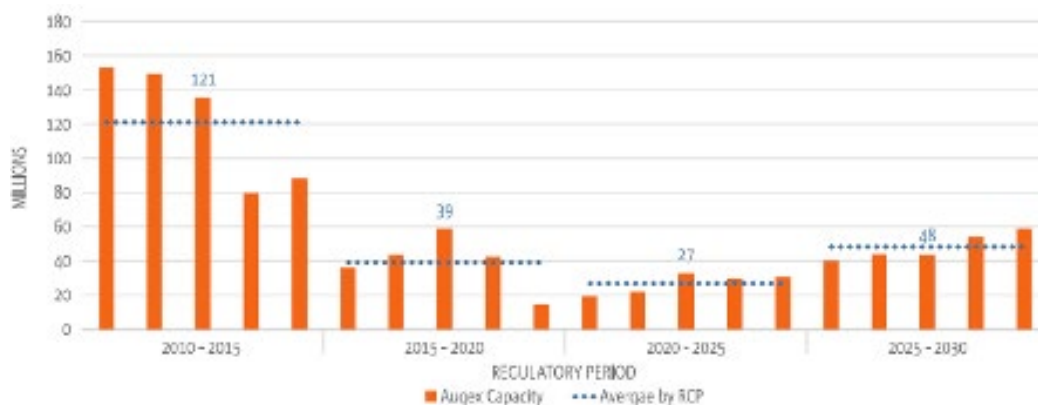
SAPN forecasts similar actual expenditure in the current RCP to its allowance

233. During the current RCP SAPN expects to spend capex consistent with the AER final decision, as shown in Figure 4.2. In $FY25, the respective numbers are $134.0 million expected capex versus the AER allowance of $138.4 million (excluding overheads).

234. This performance was enabled by reduced connection point and LV power quality augex. SAPN advises that the connection point reduction was in response to deferral decisions made by ElectraNet. The reduction in LV quality of supply compliance expenditure is attributed by SAPN to operational efficiency gains, including through the use of smart meter data.[64]

Figure 4.2: SAPN augex , comparison of AER allowance and 2020-25 capacity augex ($m, FY22)

	2020-25 RCP Allowance[4]	2020-25 Actuals[5] + Forecast
Connection Point (AUG001)	11.8M	1.4M
Sub-transmission (AUG006)	12.0M	17.7M
Substation (AUG004, AUG005, AUG008 & AUG009)	40.9M	51.1M
Distribution (AUG003 & AUG007)	7.7M	9.9M
Low Voltage (AUG002 & AUG010)	47.0M	38.5M
Fin Adj		1.2
TOTAL	119.4M	119.7M

AEMO predicts significant growth in demand in South Australia

235. AEMO's South Australian electricity demand forecast indicates an increase in the operational summer demand with compound annual growth rate of 1.91% from FY23 to FY32 (refer to Figure 2.3). SAPN assesses this as *'the most significant growth forecast for South Australia in the last decade'.*[65]

236. We have not been asked to review the demand forecast which is a primary input into proposed capex. Similarly, we have not assessed SAPN's methodology for converting the state-wide forecast into lower level forecasts (i.e. connection points and below), though we note that SAPN has provided the demand forecasts that it has relied on for each capacity-related project. Our review of SAPN's proposed capacity-related expenditure therefore takes these demand forecasts as a given.

237. As the demand forecast is one of the primary drivers of capacity augex, we have reviewed how SAPN has applied it when forming its capacity expenditure forecast.

---

[64] SAPN Day 1 Augex session. Slides 6-7.

[65] SAPN - 5.4.1 - Augex forecasting approach - January 2024 – Public. Page 15.

4.3.2 SAPN's expenditure forecasting methodologies

SAPN's capacity forecasting methodology incorporates deterministic and probabilistic criteria

238. Figure 4.3 describes SAPN's forecasting approach incorporating its 'hybrid' planning methodology. Compliance projects (which SAPN labels as mandatory) are included in the first step, although we note that SAPN treats other expenditure items as mandatory, which we consider in our assessment.

239. Outputs from various steps within this planning process are used to determine the forecast expenditure for constraint-driven projects and compliance driven expenditure. The forecasting methodology encapsulates SAPN's planning criteria.

Figure 4.3:   SAPN's capacity-driven augex forecasting methodology

Base: identify compliance works	‣ Joint planning connection point upgrades to meet the SA Electricity Transmission Code requirements - timing driven by ElectraNet repex. ‣ Transmission Connection Agreement obligations on power factor range at transmission connection point substations - notification from ElectraNet; plan developed with ElectraNet.
Apply SA Power Networks deterministic planning criteria	‣ Determine capacity ratings of network assets under system 'N' normal emergency conditions. ‣ Long term (5-20yr) demand forecast at each network asset. ‣ Compare forecast demand to rated capacity and identify year when forecast demand exceeds under system 'N normal or contingency 'N-1' conditions. ‣ Long term devleopment plans for regions: sub-transmission line and zone substation projects and capacity upgrades (10yr horizon) and distribution feeders (5yr horizon). ‣ Identify credible options to meet need / timing - select most efficient (most positive or least negative NPV).
Base: 50% POE 'N' projects	‣ Add to base expenditure, projects required to avoid unserved energy risk forecast at 50% POE level under 'N' conditions. ‣ Select least cost option.
Add projects: (N and N-1) from hybrid planning method	‣ Identify projects required by Planning Criteria required under 'N' conditions at 10% POE level. ‣ Identify projects triggered by Planning Criteria that address contingency (N-1) condition and only select projects which are NPV positive applying probabilistic planning. ‣ Select options with combined most positive NPV.

Source: SAPN - Attachment 5 - Capital expenditure - January 2024 – Public, Figure 22

240. Figure 4.4 shows the two forecasting 'streams' or 'channels' that SAPN deploys to identify and respond to either demand-related constraints or compliance obligations. The combination of deterministic and probabilistic criteria is applied to HV network elements or work types and the indicated LV categories for which SAPN identifies as compliance-driven expenditure are managed with different approaches, which we discuss as part of our assessment of these expenditure sub-categories.

241. SAPN's 'hybrid' approach to forecasting the HV projects in the next RCP is used to generate Option 1 in its options assessment. We consider the construct of these options in the following sub-sections.

242. We note that neither Figure 4.3 nor Figure 4.4 explicitly includes consideration of non-network solutions, although as pointed out in section 2.6.1, this step is included in another SAPN document. We consider this further in our assessments of the proposed expenditure.

Figure 4.4:   SAPN's capacity augex project selection process
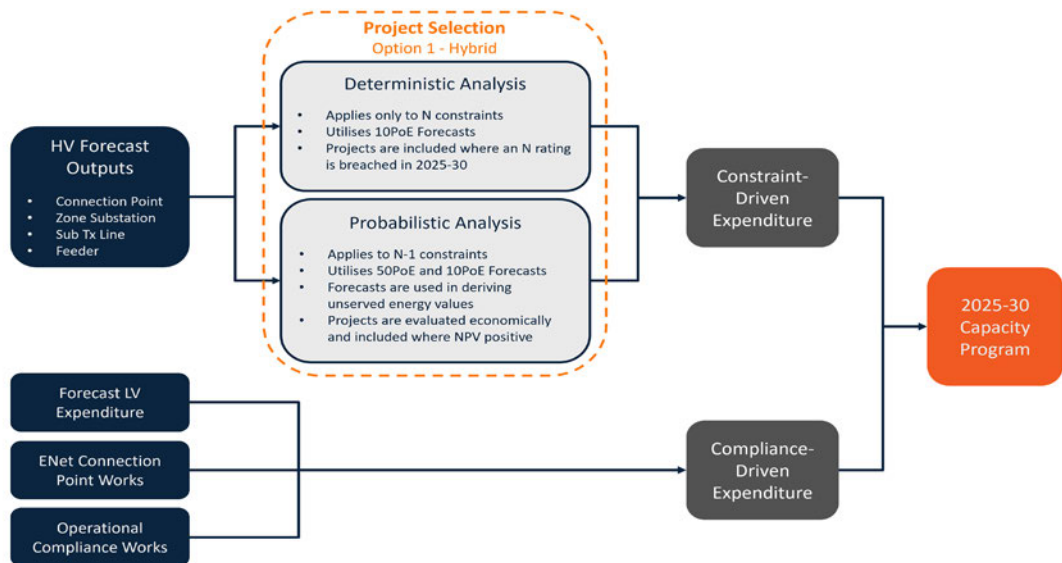
Source: SAPN - 5.4.2 - Capacity Reset Business Case Tool V2.8

SAPN's bespoke Capacity Reset Business Case Tool

SAPN's decision tool is fit for purpose[66]

243.   In response to an information request, SAPN provided the AER the decision tool that it had used to select the capacity-related projects from which it has determined its proposed expenditure requirement.[67] The model follows the planning and expenditure forecasting processes denoted in Figure 4.3 and Figure 4.4.

244.   This workbook contains a master list of projects and assesses project requirements based on deterministic and probabilistic selection criteria. 120 individual projects were selected as inputs to the model with a combined cost of $361.6 million.

245.   In summary, a project is selected under SAPN's Option 1 (Hybrid Case)[68] if:

- the project is defined as 'mandatory' or an 'LV project' or is defined as 'other' (with the last of these comprising preliminary design work or land purchases); or

- the project is required to meet an 'N' contingency event, based on the 10% Probability of Exceedance (PoE) forecast; or

- the project would meet an N-1 contingency requirement based on a 50% PoE forecast AND has a positive NPV.

246.   There is also provision in the model to manually override the selection criteria to include or exclude specific projects, though this is applied only twice – to include a project and to exclude a project.[69] The inclusion is a project that has already commenced. We discuss the exclusion as part of our assessment of SAPN's hybrid planning criterion.

247.   We consider that SAPN's model appropriately applies the decision criteria that it presents in its business case.[70] We consider that this is a fit-for-purpose tool that provides a transparent and auditable basis for the inclusion or exclusion of each project considered in it.

---

66   Dollar amounts referred to in this section are from the SAPN model and are in $FY22 real terms).

67   SAPN 5.4.2 – Capacity Reset Business Case Tool V2.8. We understand that this was provided in response to AER IR002.

68   Option 0 is its base case and Option 2 is its Deterministic case in its business case

69   Gawler East substation ($14.4 million) excluded and South Outer Metro 66 kV restring loop ($3.1 million included).

70   SAPN - 5.4.2 - Augex Capacity - January 2024 – Public

SAPN applies settings within the model to produce forecasts and economic outputs for three options

248.   SAPN's business case considers three options, selecting Option 1 (Hybrid Case) as its preferred approach. Each option includes mandatory/compliance driven expenditure, so the distinguishing features between options is the selection criteria for constraint-driven projects.

249.   Option 0 (Base Case): includes constraint-driven projects that are selected when the load is forecast to exceed capacity for N/50 PoE conditions. This leads to the lowest level of expenditure at $139.9 million ($FY22), which SAPN describes as the minimum to meet its essential compliance obligations. Planning to N-0 conditions does not account for the likelihood of plant failure and the impact on supply or for temperature-related demand variance. Whilst the likelihood of a significant failure (typically a line outage or a transformer outage) is relatively low, the risk across multiple assets in aggregate is material. In our view SAPN reasonably assesses the residual risk to be high on the basis of the likelihood of unserved energy, lack of alignment to minimum industry planning standards, and lack of alignment with its electricity transmission contract. This option generates the lowest benefit throughout the 10-year study period and a -$3.2 million NPV ($FY22) over the 20-year study period.[71] We consider this option to be inferior to Options 1 and 2.

250.   Option 1 (Hybrid Case) applies the hybrid approach described in Figure 4.4. The projects selected by application of its deterministic (N/10PoE) and probabilistic selection criteria in aggregate are forecast to cost $208.6 million ($FY22). We note that deterministic N-1 /50PoE studies were common in the industry but are progressively being replaced by probabilistic outage analysis. The Option 1 benefits are estimated by SAPN to be $817.2 million (which we consider to be reasonably derived), leading to an NPV of $618.6 million ($FY22). With the provisos discussed below, we consider this to be a superior option to Options 0 and 2.

251.   Option 2 is referred to by SAPN as its 'Deterministic Case', with a deterministic planning approach applied to the sub-transmission, substation and distribution feeder expenditure categories. This approach has been applied to capacity augex for SAPN's previous RPs. This leads to the highest level of expenditure of the three options at $275.9 million ($FY22) over 20 years and an NPV of $581.5 million ($FY22). It includes several projects that address contingency (N-1) scenarios but are NPV-negative, together with the NPV-positive projects included in Option 1. We do not consider this to be superior to Option 1.

252.   We note that Option 1 as described by SAPN as:

> *provides an opportunity for the maturation of non-network solutions and other developing technologies (e.g. flexible load connections) to address the demand forecast*[72]

253.   SAPN has only considered network solutions in all three options – we assume from the statement above that it will defer consideration of non-network solutions closer to the point of finalising its solution on a project-by-project basis, including as part of the RIT-D process.[73] The opportunity to defer projects into the next RCP which we have identified (refer to Table 4.3) also provides more time for 'the maturation of non-network solutions'.

254.   We therefore focus on SAPN's Option 1 hybrid analysis and the SAPN's application of its selection criteria.

SAPN's hybrid analysis and project selection criteria

255.   We make the following observations regarding the hybrid project selection approach shown in Figure 4.4 and which SAPN uses as its 'Option 1' in its options analysis, discussed above.

---

[71]   SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Table 15.

[72]   SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Table 5.

[73]   Which requires the DNSP to consider non-network solutions as part of the process

The inclusion of probabilistic project selection criteria is a positive enhancement

256. We consider it appropriate that SAPN has applied probabilistic criteria to those situations where an N-1 constraint would apply, since this then balances the potential project costs against the risk-cost of non-supply. This appropriately in our view takes account of the cost of the considered solution relative to the size of the load at risk, the likelihood of the contingency event(s) that may result in being unable to fully supply that load, and the assumed duration of that period of non-supply. The model calculates the value of the energy at risk from a constraint model, using VCR values that are specific to each project.

The 10% PoE deterministic criterion is an adequate 'first step' filter but we consider it is not appropriate to apply it mechanistically as a determining selection criterion

257. Projects that are required to meet the N contingency on a 10% PoE basis are effectively to meet new loads that SAPN would otherwise be unable to fulfil its obligation to supply if the peak load does eventuate. Load shedding would otherwise be required under these circumstances if the load persists beyond short-term emergency rating of transformers.

258. For deterministic selection purposes, use of a 10% PoE forecast applied against an N contingency constraint is an accepted approach. We consider it reasonable to apply a deterministic criterion such as this at least as a first step. However, the load found to be 'at risk' under this approach may be extremely small within the next RCP even to the extent that the NPV for the project may not be positive for many years (i.e. long payback period), depending upon the rate of load growth in the area supplied by the network infrastructure. That is, the result may be overly sensitive to unfavourable variances to be considered robust/achievable.

259. SAPN appears to have acknowledged the risk of over-investment in its description of its subsequent step to test the prudency of the result of the deterministic N/10 PoE criterion for 'high cost' projects. It further tested the prudency of two prospective new zone substation projects:[74]

   Due to the expected high cost to resolve these constraints, it is prudent to subject these constraints to further scrutiny and consider deferring part or all of the investment to maximise benefits.[75]

260. As a consequence, SAPN has deferred one of the new zone substations triggered by the N/10 PoE criterion, Gawler East ($14.4 million), to the 2030-35 RCP. We consider this to be a prudent step even for the purposes of expenditure forecasting for the next RCP. It is the sort of analysis that is required for projects subject to the Regulatory Investment Test - Distribution (RIT-D) process in which a range of network and non-network solutions need to be equally considered to confirm the prudency of the investment quantum and investment timing.

261. However, we consider that SAPN should have considered prudency cross-checks of all projects selected using the N/10 PoE criterion and N-1/50 PoE criterion, which we describe below.

The N-1/50 PoE probabilistic criterion may lead to imprudent project selection if applied mechanistically

262. SAPN's criterion for inclusion of a project to relieve a capacity constraint under N-1 conditions is that the NPV must be greater than zero. We have two concerns with this criterion:

- Projects with low but positive NPV are particularly susceptible to unfavourable variances:
  - The projects identified are based largely on: (i) a demand forecast that is inherently uncertain given the unknown impacts of the energy transition and macro-economic

---

[74] Mount Barker East zone substation and Gawler East zone substation.

[75] SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Page 27.

factors; and (ii) cost estimates that may increase due to a range of factors over the next 6-7 years (i.e. from when the cost estimates were developed)

– This level of uncertainty is usually managed by sensitivity analyses and by seeking to defer projects to provide 'option value' by deferring the decision for the large investment at the cost of accepting some extra risk or higher overall cost

– SAPN has undertaken sensitivity analysis at the Option 1 'program' level, which is a positive step, and has determined that, overall, the proposed program of work is still NPV positive even with unfavourable variances; however unfavourable demand and cost will affect individual projects, some of which are only marginally positive on SAPN's assumptions.

• A positive NPV does not establish that the optimal timing for augmentation is within the next RCP – that should be determined by comparing the annual benefit against the annualised cost.

263. We consider that the probabilistic criterion provides a valuable guide in project selection, but that projects for which the result is marginal (either positive or negative) should then be subject to further analysis to determine the project's sensitivity to assumptions, the validity of those assumption for that project, and the opportunities that may arise for an alternative solution or for deferral. The model should also be utilised to confirm the optimal economic timing of the project, either through project timing sensitivity analysis or by utilising the 'annuitised cost' method to compare with annual benefits.

264. Except for two instances, SAPN has applied its selection criteria mechanistically and, as a result, we consider that this has resulted in a bias towards including some projects that could prudently be excluded.

We have applied a number of tests to check the prudency of including projects derived from N/PoE10 or N-1/PoE50 criteria

265. To check for the robustness of projects in the face of reasonable unfavourable variances, we have considered a number of factors to test the possibility of prudently deferring them:

• Projects with a relatively low BCR – we have selected less than 1.2 as the criterion; there is no industry standard approach to this filter, however in our experience, projects with a BCR this low are more likely to be susceptible to unfavourable variances

• Projects where the economic timing is more than one year beyond the end of the next RCP (i.e. 2032 or longer) – we have derived a simple estimate of the economic timing using SAPN's data comparing the annual benefit with the annualised cost over time[76]

• Projects where the NPV is negative – we note that some projects are denoted as Mandatory by SAPN and we have not challenged the inclusion of these projects, however several of the N/10PoE projects selected by SAPN have a negative NPV. Typically projects with a negative NPV involve minor transgressions of the N capacity 'limit'.

• Projects where the capacity shortfall is small – SAPN's analysis effectively assumes that any demand that exceeds the capacity rating will not be met and has valued this at VCR. In reality, some tolerance for short-term overload will apply and customers will not be unsupplied if and when the capacity shortfall is within short-term overload ratings for what may be only a few hours on a probabilistic basis.

266. These criteria are not mutually exclusive, but rather provide a means of triggering closer analysis.

Forecasting expenditure for compliance projects

267. SAPN identifies compliance-related expenditure as comprising connection point (AUG001) and low voltage (AUG002 and AUG010) categories.

---

[76] The economic timing is when the annualised benefit exceeds the annualised cost.

268. The forecasting methodology for compliance projects is described in Figure 4.3. We focus on the application of the planning criteria.

Connection points compliance criteria

269. The compliance work proposed by SAPN in the next RCP is for:

- Connection point substation augmentation to comply with SAPN's Transmission Connection Agreement (TCA) with ElectraNet due to the timing of asset replacement works by ElectraNet, as approved by the AER as part of ElectraNet's most recent price Determination in 2023:

  – essentially, a bottom-up forecasting approach is applied with joint planning between ElectraNet and SAPN

  – our understanding is that these works are mandatory projects within SAPN's model[77]

- Works for power factor correction under the TCA – SAPN has determined a solution based on a bottom-up analysis.

Low voltage quality of supply compliance planning criteria

270. SAPN advises that this program consists of expenditure triggered by one or more of the following:

- overvoltage limits
- undervoltage limits
- thermal overloads
- other issues (harmonics, flicker, neutral voltages). [78]

271. SAPN has applied a historic trend-based (or top-down) approach to forecasting the required expenditure in the next RCP.

4.3.3 Our assessment of demand-driven and supporting augex forecast

272. In this section we assess the $140.8 million demand-driven and supporting augex as shown in Table 4.2. SAPN has:

- Identified a number of demand-driven capacity projects as 'mandatory', some of which are (i) embedded within the various demand-driven and supporting augex forecast and (ii) are not selected based on SAPN's hybrid planning criteria, and

- Applied its demand forecast and its hybrid planning criteria to determine the bulk of its proposed demand-driven projects.

273. We first identify and assess the mandatory expenditure before assessing the application of the hybrid planning criteria.

Projects identified as 'mandatory' by SAPN

274. In Appendix C of the business case, SAPN identifies mandatory capacity-related augex for which little information is provided.[79] The total expenditure of these items is $20.7 million ($FY22), but with the exception of capitalised design work (i.e. that cannot be allocated to projects that proceed) is relatively small:

- Design work (AUG004 Strategic Network Capacity (Other) and a subset of AUG005 Substation Capacity Augmentation): $16.6 million ($FY22) for labour capitalisation for long-term planning and network architecture, which is based on historic forecasting and

---

77 SAPN - 5.4.2 - Capacity Reset Business Case Tool V2.8. Option 1.

78 SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Page 19.

79 The expenditure referenced is ascribed to SAPN's preferred Option 1 in its business case SAPN - 5.4.2 - Augex Capacity - January 2024 – Public

is set at a constant annual rate – we consider this to be a reasonable approach to estimating the requirement.

- 11kV feeder exit load switches (a subset of AUG003, Distribution Feeder (11 and 7.6kV)): two projects together comprising $0.1 million ($FY22) which are required because SAPN is unable to isolate 11kV feeder exit cables – it is not clear whether this is carry-over work, but regardless the level of expenditure is relatively trivial

- Lyndoch substation cable replacements (a subset of AUG005, Substation Capacity): one project $0.7 million ($FY22) – permanent cable installations is required and we consider it is likely that SAPN is able to derive a reasonable estimate based on previous experience

- Land (AUG009): $3.3 million ($FY22) for substation capacity augmentation which may not all be required depending on the strategic nature of the proposed purchase(s) – nonetheless it is common practice to purchase land in advance of firm requirements as a hedge against higher future costs (e.g. through lack of access).

275. We consider the requirements to be reasonably classified as mandatory and to be a reasonable estimate of prudent and efficient requirements.

Projects subject to SAPN's hybrid planning criteria

SAPN utilised the AEMO demand forecast

276. The primary driver of forecast network constraints and associated capacity building works is the AEMO demand forecast, applied as a part of SAPN's demand forecasting process:

Our demand forecasting predicts the long-term demand trends (including negative growth) of each network asset i.e., connection points, zone substations, sub-transmission (66kV and 33kV) and distribution feeders (11kV and 7.6kV) over a 5 to 20-year period.

We use a custom-built tool co-designed with the Australian Energy Market Operator (AEMO) to generate Connection Point and Zone Substation forecasts at 10 POE and 50 POE levels.[80]

Including probabilistic selection criteria as part of a hybrid approach is an enhancement that should be retained by SAPN

277. SAPN says that it was responding to points made in its customer engagement process by developing its hybrid planning approach and the supporting model (i.e. including the probabilistic economic evaluation step).

278. We note that SAPN indicated that this would be a temporary departure from its deterministic planning criteria. Given the probabilistic approach is endorsed by the AER, it is becoming much more widely applied across the industry and has led to a reduction in proposed augex compared to SAPN's 'traditional' deterministic approach. In our view SAPN should adopt and refine its probabilistic planning criteria for ongoing use.

SAPN's application of risk analysis and the associated reductions it has made to its forecast expenditure are evidence of movement towards improved prudency

279. SAPN's appetite for managing risk has an impact on the investments it will need to make to address potential constraints eventuating. This means that the volume of work forecast to be required will change with the risk settings.

280. The addition of the probabilistic step in its forecasting methodology for identifying capacity-constraints and solutions will deliver a lower volume and cost program that is more efficient than would have been the case with its existing deterministic methodology (as represented by Option 2). This reduction is primarily attributable to the trade-off between risk and cost.

---

[80] SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Page 10.

The inclusion of this step has brought an increased level of quality to SAPN's planning and forecasting

Application of SAPN's project selection model provides some assurance but does not definitively demonstrate that the resulting expenditure is prudent

281. Whilst we have seen some evidence of SAPN prudently excluding some projects by moving to the hybrid planning approach, we do not consider it has gone far enough in testing the prudency of its forecast.

282. We believe that such a step is important because, whilst the modelled expenditure forecast selects only projects with a positive NPV, this does not guarantee that the forecast is prudent for reasons already discussed. We are also concerned with the preponderance of high-cost projects near to the end of the next RCP, which could well be deferred to the next RCP with a small negative variance in the actual demand over time. The impact of CER, for example, may over time lead to reduced peak demand.[81]

283. We have applied the extra step of testing for (and excluding) projects applying the criteria we describe in paragraph 265.

SAPN has not adequately tested for projects with marginal probabilistic selection indicators

284. We used SAPN's capacity business case tool[82] to identify projects that could be considered lower priority or marginal, starting with SAPN's analysis. We did not treat projects that are justified by SAPN from application of the N/10PoE projects as automatic inclusions as it has regardless of the NPV. We also considered N-1/50PoE projects as these had been included based on risk-cost assessment and for which inclusion is most dependent on a series of longer-term assumptions and therefore greater uncertainty. We considered BCR ratios that we derived from SAPN's modelling and our own derivation of the economic timing as tests for candidate projects for deferral to the 2030-35 RCP.

285. The AER has published a guidance note that describes processes for determining optimal timing for projects that are assessed using probabilistic risk-cost CBA.[83] In summary, a means for determining optimum timing is to identify the threshold year in which annual benefits exceed the annuitised cost. A positive NPV does not in itself determine that the assumed project timing is optimal, and the 'test' referred to above is intended to identify whether a project may have a higher NPV if it is deferred.

286. We added columns into a version of the workbook to calculate benefit/cost ratios. While we made this calculation for every project, we considered these ratios only for those projects that had been included based on a positive NPV.

287. As shown in Table 4.3, we find that there are nine projects that we consider are candidates for deferral to the next RCP. Each of them has economic timing beyond the current RCP based on our analysis, have relatively low BCRs and most have negative NPVs even with a 20-year study period.

288. Where we could estimate economic timing, we have shown this in the table. For other deferral candidates, we found on inspection of SAPN's constraint model and energy at risk calculations that the peak load at risk was typically small, hence the negative NPVs. For these projects we consider that on a probabilistic basis it would be prudent to assume (limited) use of overload capacity until the likelihood of a capacity shortfall sufficient to warrant the capacity investment, is better established.

---

[81] Noting, for example, that the load duration curves used in the model exclude CER impacts but do include site-specific solar PV estimations (Page 41 of the business case).

[82] SAPN - 5.4.2 - Capacity Reset Business Case Tool V2.8.

[83] See for example AER Industry practice application note, Asset replacement planning, section 4.6 (Determining the optimal timing)

Table 4.3: AUG003, AUG005 and AUG006 candidate projects for deferral based on boundary tests ($,000 2022)

#	Project	Com. Year	Cost in RCP	NPV (20 yr)	Benefit/ cost ratio	Economic timing	Limiting criterion[84]
62	Virginia sub upgrade	2028	6,854	971	1.16	2032	N-1/50PoE
714	Nairne sub upgrade	2028	4,595	-3,870	0.05	N/A	N/10PoE
1281	Kingston SE sub upgrade	2025	1,520	-624	0.09	N/A	N/10PoE
1022	Portee sub upgrade	2026	1,808	-1,001	0.01	N/A	N/10PoE
1236	Mount Burr Sub Upgrade	2025	392	-180	0.53	2035	N/10PoE
1263	Spalding 11kV sub + regulator upgrade	2027	423	-269	0.31	N/A	N/10PoE
1317	Qualco sub upgrade	2027	2,477	-212	0.85	2035	N/10PoE
1343	Hatherleigh-Robe #2 33kV line	2029	12,555	272	1.03	2034	N/10PoE
1243	Waterloo to Riverton Tee 33kV Line Upgrade	2026	924	133	1.15	2033	N/PoE50
	TOTAL ($2022)		**31,548**				

Source: EMCa analysis from SAPN 5.4.2 – Capacity Reset Business Case Tool V2.8; N/A indicates that the NPV is so negative that there is not an economic timing within the study period

289. Based on the above analysis we consider that SAPN has not provided sufficient evidence for us to conclude that the total capacity augex is prudent. SAPN's forecast capex for the nine projects in Table 4.3 is $36.4 million ($2025).

4.3.4   Our assessment of compliance driven augex

290. A total of $100.1 million is required to meet the identified need of complying with regulatory requirements in relation to joint planning with ElectraNet. This expenditure is comprised of:

- Connection Point Capacity (ETC/NER Code), $58.7 million (AUG001)
- LV & Distribution Transformers (QoS BAU), $27.9 million (AUG002)
- LV Two Way Network (QoS), $13.4 million (AUG010).

Connection Point Capacity - Upgrades

SAPN's forecast for connection point upgrades is reasonable

291. SAPN is required to respond to capacity upgrade requirements imposed by ElectraNet and which it classifies as mandatory. SAPN identifies three projects:

- Mannum Connection Point Upgrade
- Tailem Bend 33kV CP Upgrade and Segregation
- Mount Gambier CP Upgrade.

---

[84]   SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Appendix C.

292.   We consider that the forecast expenditure is likely to be reasonable because:

- It is required under the Electricity Connection Agreement with ElectraNet

- It responds to specific requirements of ElectraNet's asset replacement work

- The three projects have been subject to joint planning with ElectraNet

- The work and therefore the costs of the work should be familiar to SAPN and readily costed from the bottom up.

Connection Point Capacity - Power factor correction

SAPN has identified the driver and it is necessary to respond

293.   SAPN has provided evidence that it is non-compliant with power-factor obligations at connection points with ElectraNet:

- It had received written notice from ElectraNet on 21 September 2022 advising that:

    the capacitance of the distribution system is contributing to the occurrence of unacceptably high voltage levels on the South Australian transmission system, especially at times of low demand. This results in a compliance with the Technical Obligations included in Schedule 6, Part B item 3 of the TCA, as provided for in Schedule 5.3.1a(d) of the Rules.[85]

- Images of recordings from various connection points within its network demonstrating the power factor was typically well below the lower limit of 0.95 lagging and worsening, as illustrated in Figure 4.5.

Figure 4.5:   Example of power factor non-compliance - Metro East MVAr Historical Data
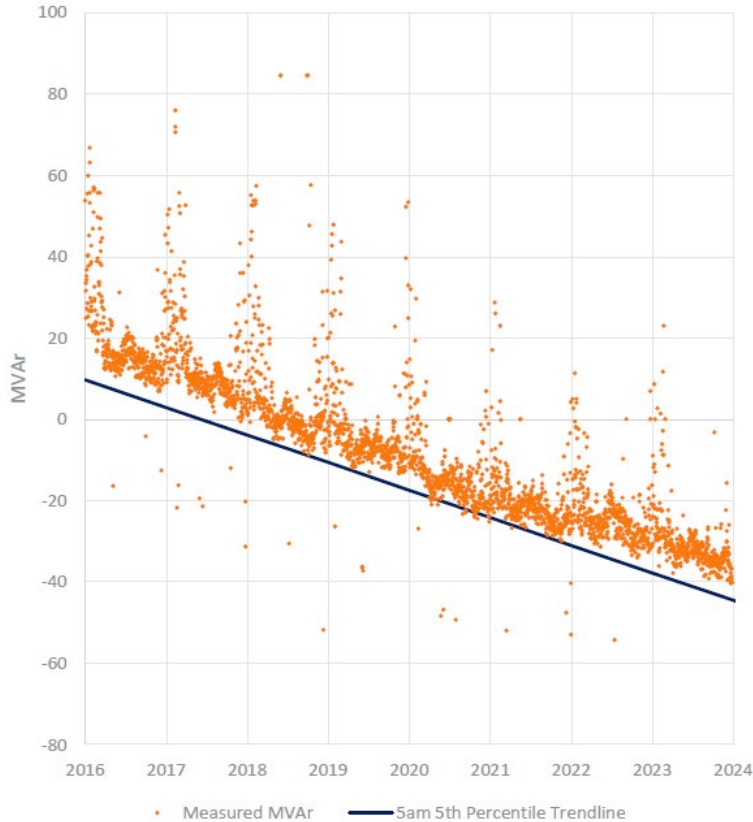
Source: SAPN Day 1 Augex session, Slide 25

---

[85]   SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Page 19.

294. SAPN attributes the underlying issue driving its TCA non-compliance to changes in network load causing transmission over-voltage and compromising system security. SAPN explains this is due to greater connected capacitance in household devices producing leading power factors.

295. SAPN considers that its level of TLC obligation compliance would increase over time because it expects the underlying trend primarily attributable to customer in-home appliances to continue.

296. SAPN states that it has worked collaboratively with ElectraNet to design cost-effective solutions, with a MVAr forecasting methodology established. The proposed solution is to install 66kV and 11kV reactors at targeted locations supplied by 66kV Transmission Connection Points.

297. We are satisfied that there is a clear requirement for SAPN to take action to improve power factor performance.

SAPN's proposed installation of reactors is an appropriate response to correct the power factor rapidly

298. We consider that the installation of reactors is the most appropriate option because:

- SAPN has a significant power factor issue that must be addressed urgently and with a solution that will guarantee at least a material improvement, and reactors are:

  – a proven method for addressing such issues

  – relatively cost effective and relatively quick to design, procure, and commission at substations.

- Whilst other remedial actions should be investigated by SAPN, the extent of the non-compliance, the requirements of the TCA, and the (reasonable) expectations of ElectraNet all demand an immediate and decisive response to at least turn the trend around within the next RCP, if not eliminate the non-compliance.

299. SAPN has identified 12 reactor projects (i.e. at 12 sites) to address non-compliance in six regions. The costs of reactors are readily available and based on our experience the cost per MVAr evident in Appendix C of the business case are within an acceptable range.

300. We consider that SAPN's proposed expenditure for compliance connection point should be accepted.

The root cause issue needs to be addressed as a longer term remedy

301. Whilst we consider that the forward estimate for the next RCP should reasonably include provision for the designated reactors for the reasons described above, we are conscious that there is an underlying issue or issues with the source of additional capacitance[86] that may be more cost effectively addressed over time. This will need research, perhaps by SAPN in consultation with industry bodies such as the Energy Networks Association, with consideration whether there is a non-compliance issue at the customers' premise, and/or non-compliance with the applicable Australian standards by suppliers of appliances to the Australian market, and/or whether the relevant Australian standards need to be modified.

LV Two Way Network (QoS) (AUG010).

SAPN has applied a trend-based forecasting methodology

302. SAPN's historical and forecast expenditure for AUG002 (undervoltage, thermal and other) and AUG010 (overvoltage) is shown in Figure 4.6, although we note that the extension of the 2020-25 reset forecast into the current RCP is unexplained by SAPN. It would also appear from the profile that the expenditure is expressed in nominal terms, given that SAPN has proposed flat annual expenditures for both AUG002 and AUG010.[87]

---

[86] Switch-mode power supplies, inverter-based appliances, appliances on standby).

[87] SAPN - 5.1.1 - AER Standardised Capex model - January 2024 – Public.

Figure 4.6: SAPN's historical and forecast expenditure for LV QoS augex (AUG002 and AUG010) $million, $FY22
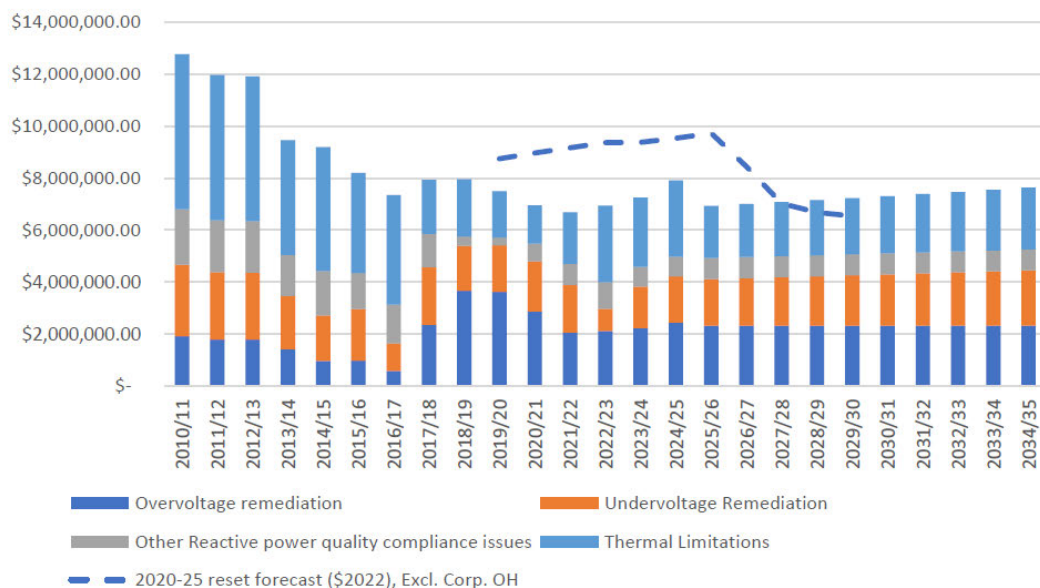
Source: SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Figure 5

SAPN's proposal to continue current expenditure levels to address undervoltage and overvoltage issues, is reasonable

303. SAPN describes that during the current RCP it has: (i) improved network visibility and data modelling/analytics capabilities; and (ii) implemented enhanced voltage management (including line drop compensation) to offset the impact of growing levels of CER uptake.[88]

304. SAPN recognises the potential overlap between its CER Integration Program and its AUG010 program but considers that the combination of: (i) improved visibility or non-compliance; (ii) load growth; and (iii) self-consumption of new CER systems, will continue to erode underlying demand resulting in unavoidable voltage issues persisting.

305. We consider that SAPN has taken reasonable steps in the current RCP to mitigate voltage non-compliance either directly or indirectly.

306. SAPN concludes that whilst it considers that it may need increased AUG10 expenditure for the next RCP, it proposes to cap expenditure at current levels. We consider this to be a reasonable position and propose no adjustment.

SAPN's proposal to continue expenditure at historical levels for thermal (transformer overload) and other QoS compliance activities, is reasonable

307. Expenditure to address thermal limitations in LV networks is proposed to be kept consistent with its recurrent historic expenditure in the current RCP, despite the forecast increase in demand, after considering the following offsets:[89]

- Overlap with augmentation works for voltage and other Power Quality (PQ) compliance issues

- Augmentation works undertaken in the CER Integration Program will overlap with some areas of thermal limitations

- Its proposed Demand Flexibility Program will enable control of some load connections to avoid some constraints.

308. We consider SAPN's position to be reasonable and propose no adjustment.

---

88 SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Page 21.

89 SAPN - 5.4.2 - Augex Capacity - January 2024 – Public. Page 22.

4.3.5 Implications for capacity program allowances

309. Based on our assessment, the implications for the proposed expenditure are as shown as in Table 4.4:

Table 4.4:   Implications of our assessment of proposed capacity program - $m, real2025

Augex network capacity	FY26	FY27	FY28	FY29	FY30	Total
SAPN proposed	40.4	44.1	43.8	54.0	58.5	**240.9**
less EMCa adjustments	-3.9	-3.3	-8.4	-15.7	-5.1	**-36.4**
EMCa adjusted	**36.0**	**40.5**	**35.6**	**38.4**	**53.5**	**204.4**

Source: EMCa table, derived from assessment of SAPN capacity project business modelling (in SAPN 5.4.2 Capacity reset business case tool v2.8), with adjustment to $FY25 based on SAPN business case reconciliation model

4.4 Assessment of capex forecast for reliability

4.4.1 Overview of SAPN's capex forecast for reliability programs

SAPN's proposed reliability program for the next RCP is 19% higher than the current RCP which in turn was significantly higher than the AER's allowance

310. As shown in Table 4.5, SAPN has forecast augex of $103.1 million on network upgrades in the next RCP to manage reliability with a flat annual profile. This is $16.1 million (18.6%) higher than the expected expenditure of $87.0 million in the current RCP. SAPN seeks the increase in expenditure in the next RCP to respond to what it describes as declining performance on its jurisdictional supply restoration targets and strong customer preferences for targeted and efficient improvements for worst served customers. SAPN explains the purpose and approach to its network reliability challenges as follows:

> *It comprises several programs responding to non-asset condition related causes of outages (as distinct from repex) such as weather, vegetation, and animal contact, via network upgrades to reduce outage causes and customer interruptions, and thereby maintain or improve reliability where needed for compliance, or efficient for customers.[90]*

311. SAPN proposes four reliability maintenance programs for the next RCP in addition to the CBD Reliability Improvement Project (which is not within our scope):[91]

- Maintaining underlying reliability on the network ($72.1 million) – described by SAPN as a 'general purpose' program covering a range of recurrent works necessary to maintain overall underlying reliability and customer service - we note however that SAPN has proposed two sub-programs:
  - Existing Network Protection Mgt – Planned
  - Maintain Underlying Reliability Performance
- Three programs within the 'Reliability Integrated Worst Served Customers Improvement Programs' totalling $31.1 million:
  - Low Reliability Feeder Improvement Program, targeting the worst performing feeders ($10.5 million)
  - Rural Long Feeder Supply Restoration Improvement Program, targeting worst performing Rural Long feeders ($5.0 million)

---

[90]   SAPN_-_Attachment_5_-_Capital_expenditure_-_January_2024_-_Public. Page 43.

[91]   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Page 43.

- Regional Reliability Improvement Program, targeting the three poorest performing regions (totalling $15.6 million): Eyre; South East; and Upper North.

Table 4.5: SAPN's annual reliability capex forecast ($m FY25)

	FY26	FY27	FY28	FY29	FY30	**Total**
Maintaining Reliability Programs						
Existing Network Protection Mgt - Planned	2.0	2.0	2.0	2.0	2.0	**10.0**
Maintain Underlying Reliability Performance	12.4	12.4	12.4	12.5	12.5	**62.1**
Subtotal	14.3	14.4	14.4	14.5	14.5	**72.1**
Reliability Improvement programs						
Low Reliability Feeders	2.1	2.1	2.1	2.1	2.1	**10.5**
Rural Long Feeders Supply Restoration Improvement	1.0	1.0	1.0	1.0	1.0	**5.0**
Regional Reliability Improvement (Eyre)	1.2	1.2	1.2	1.2	1.2	**6.0**
Regional Reliability Improvement (South East)	1.0	1.0	1.0	1.0	1.0	**4.9**
Regional Reliability Improvement (Upper North)	0.9	0.9	0.9	0.9	0.9	**4.6**
Subtotal	6.2	6.2	6.2	6.2	6.2	**31.0**
TOTAL	**20.5**	**20.6**	**20.6**	**20.7**	**20.7**	**103.1**

Source: EMCa, derived from SAPN 5.1.1 Capex Model

4.4.2 SAPN's expenditure and reliability performance in the current RCP

SAPN has significantly exceeded the AER's allowance in the current RCP

312. The forecast expenditure for the current RCP is $87 million,[92] which is well above the AER allowance of $54.7 million, as shown in Figure 4.7.

313. SAPN's expenditure has ramped up significantly over the last decade, with expenditure significantly above the AER's allowance in FY21, FY22 and FY23 an expected reversion to the annual allowance in the last two years of the RCP. SAPN does not explain the reason for this pattern of expenditure, although we infer that SAPN assumed it had done enough to affect the required impact on underlying reliability performance through the three years of significant overspend.

---

[92] Excluding network overheads.

Figure 4.7: Reliability augex historical ($m, FY25)[93]
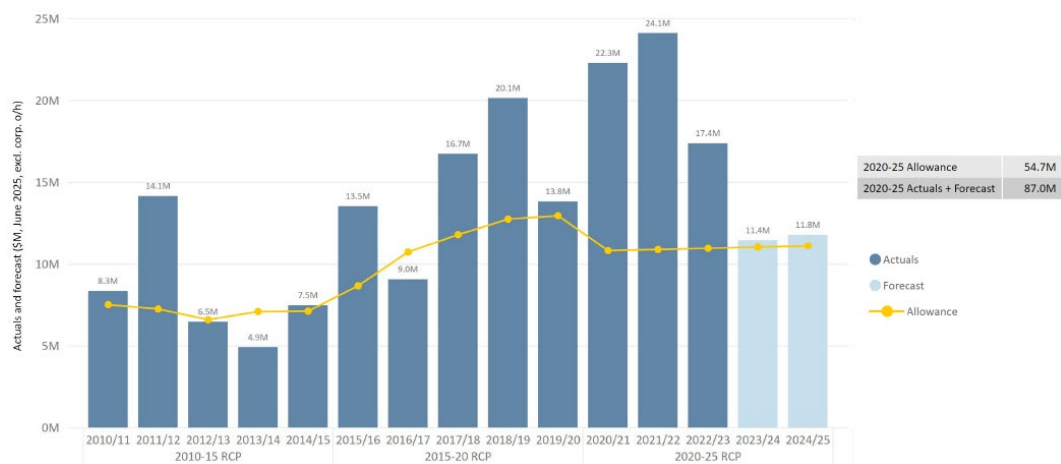
Source: SAPN Day 1 Augex session, Slide 28

SAPN's augex reliability program for the current RCP is 59% higher than the AER's allowance due primarily to increased expenditure on maintaining reliability

314. The expected $32.2 million increase in actual/forecast expenditure above AER's allowance in the current RCP is attributed by SAPN to escalating outage causes.[94] SAPN presents Figure 4.8 as evidence of the need for increased expenditure.

315. We observe the following:

- SAPN advises that its response was to prevent breaches of its jurisdictional targets but as shown in Figure 4.8, in FY21 and FY22 System Average Interruption Duration Index (SAIDI) was well under target (and, as discussed below, well under the SAIFI target):

    - the positive impact of its feeder automation program on reliability is evident

    - there has been no breach of the System Average Interruption Frequency Index (SAIFI) target up to FY23, however there is signs of an upward trend.

- SAPN does not present SAIFI as a reason for its increased expenditure – we comment on the solutions SAPN has deployed in the current RCP below but, in summary, the initiatives are directed more towards reducing the frequency of interruptions than interruption duration.

- The escalation in expenditure in FY21 followed a significant improvement in FY20 SAIDI - there is no obvious explanation (and no compelling rationale is provided by SAPN) for the magnitude of what appears to be a pre-emptive expenditure increase in FY21.

- By the end of FY21, SAPN would have been able to discern the relatively small deterioration in SAIDI but again, this would not of itself explain the magnitude of the expenditure increase above the allowance in FY22.

- There is usually a lag in SAIDI and SAIFI following increased expenditure on reliability, however there is limited evidence of SAIDI improvement by FY23 from the investment in FY21 and FY22 – this may point to the extent of the underlying issues or may be because most of the increased expenditure was directed to improving SAIFI (as discussed below).

316. We explore the initiatives SAPN took in the current RCP, and the reasons for the spend profile further in our assessment of its proposed reliability programs.

---

[93]   SAPN refers to this graph as showing (i) reliability and resilience expenditure, and (ii) reliability expenditure – we infer from the match between the $87.0m referred to in the graph and in the accompanying text in the source document, that at least the annual expenditure shown for the current RCP is for reliability only.

[94]   SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Page 43.

Figure 4.8: SAPN distribution system SAIDI performance, targets, and expenditure ($m, FY25)
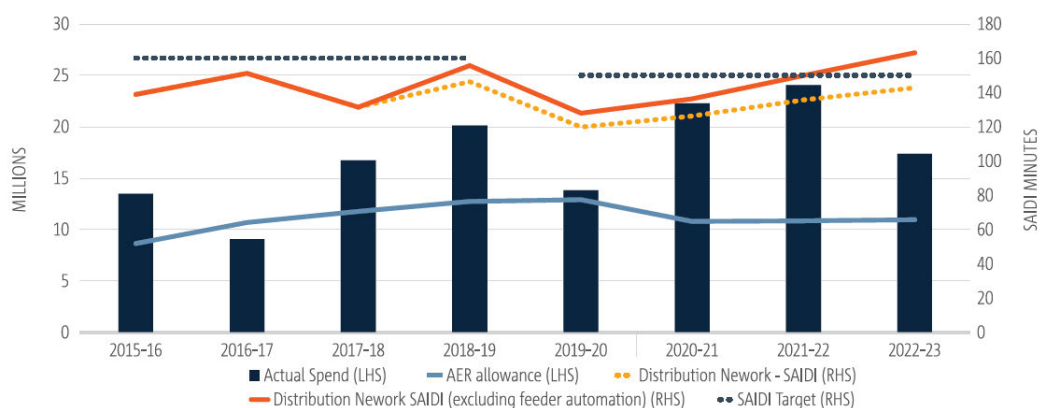
Source: SAPN - Attachment 5 - Capital expenditure - January 2024 – Public, Figure 26

4.4.3 Jurisdictional reliability service and STPIS targets[95]

317. Before assessing the reliability programs against the NER expenditure criteria, for context we first consider what SAPN refer to as the jurisdictional reliability obligations it is subject to (and are a significant driver of its reliability augex), and the AER's Service Target Performance Incentive Scheme (STPIS), which is also relevant to its investment strategies.

SAPN is subject to jurisdictional reliability service standards: the EDC imposes 'best endeavours' reliability targets on SAPN

318. SAPN refers to the South Australian Electricity Distribution Code (EDC) [96] which sets out the consumer protections that apply to SAPN, including customer service standards, reliability standards and a Guaranteed Service Level scheme.

319. SAPN also notes that the reliability standards in the EDC operate as 'best endeavours' to achieve reliability targets each year. SAPN must report to Essential Services Commission of South Australia (ESCoSA) its activities to achieve the targets if it falls short of them. The targets are defined by feeder types: CBD, urban, rural short, rural long. These apply to unplanned interruptions, with exclusions for major event days (MED). Similarly, there are jurisdictional network restoration time targets and reporting thresholds.

320. We looked for evidence from SAPN that the NER expenditure criteria (refer to Section 1.3.2) are fulfilled in its proposed reliability expenditure and initiatives, cognisant that the EDC targets and requirements and SAPN's CBD reliability are not within our scope.

STPIS targets incentivise SAPN to improve reliability and penalise declines in performance

321. The STPIS targets applicable to an upcoming RCP are based on historical performance. SAPN is incentivised to improve reliability (i.e. in cases where the investment is less than the performance payment). This is usually the case where a relatively inexpensive solution can reduce interruptions to a large number of customers.

322. SAPN advises that:[97]

- In addition to consideration of the jurisdictional EDC targets, a further objective of the Maintain Underlying Reliability Performance Program is maintaining the net-benefit to consumers by addressing areas where performance has declined, in line with the targets set by the STPIS

- Its reliability improvement programs are aimed at feeders where the reliability is consistently poor, but it affects a relatively small number of customers (i.e. where STPIS incentive does not support investment).

---

95 SAPN - 5.9.1 - Reliability forecasting structure - January 2024 – Public. Pages 5-7.

96 20230626-Electricity-Distribution Code-EDC14 (commencing 1 July 2025), released 5 April 2022.

97 SAPN - 5.9.1 - Reliability forecasting structure - January 2024 – Public. Table 8.

323. We take SAPN's assessment of STPIS targets into account in our assessment of the programs in Sections 4.4.4 to 4.4.8.

EDC targets were exceeded in FY22 for long rural feeders

324. Figure 4.9 shows that SAPN exceeded the ESCoSA reliability targets at least 50% of the time over the last five years for rural long feeder categories (SAIDI and restoration time) and CBD feeders across all three measures.

325. This indicates that SAPN needed to investigate means of correcting performance in the rural long feeder category. We consider this further in our assessment of the augex reliability programs, below.

Figure 4.9:   SAPN's assessment against its ESCOSA network reliability targets

Electricity Distribution Code Feeder Category targets Excluding Major Event Days	CBD	Metro	Rural Short	Rural Long
Interruption Duration (SAIDI)	✗	✓	✓	✗
Interruption Frequency (SAIFI)	✗	✓	✓	✓
Supply Restoration Time Performance	✗	✓	✓	✗

✗ Not meeting performance target at least 50% of the time in RCP

Source: SAPN Day 1 Augex presentation, Slide 43

SAPN does not raise significant reliability performance issues in its 2023 Annual Public Performance Review

326. SAPN's Annual Reliability Performance Report 2023 (APPR 2023) states that it met all:[98]

- customer service targets established by ESCoSA; and
- 'best endeavours' requirements for reliability in all aspects of how it is measured (outage numbers, duration, feeder type, historical comparison).

327. This does not necessarily conflict with ESCoSA's summary as SAPN is referring to overall reliability performance. Indeed, the concluding remarks state that:[99]

- The normalised reliability of the distribution system has been maintained
- The Unplanned SAIDI (USAIDIn) contribution due to equipment failure-related interruptions is stable
- The USAIDIn contribution from weather related interruptions is not increasing
- The average restoration of supply times for MEDs have been maintained
- The equipment failure percentage contribution to USAIDI during MEDs has been stable.

328. Arguably this outcome could have been achieved because of the investment made in FY21 and possibly FY22 (noting the typical lag in seeing SAIDI and SAIFI responses). However, in our view it diminishes the case SAPN has made for proposing the high level of expenditure in the next RCP.

329. Figure 4.10, Figure 4.11 and Figure 4.12 are from the APR 23 and show:

---

[98]   Annual Reliability Performance Report, August 2023. Executive Summary.

[99]   Annual Reliability Performance Report, August 2023. Page 29.

- A rise in FY21 and FY22 SAIDI and a slight rise in FY21 and FY22 SAIFI
- The main contributor to the SAIDI rise is weather related
- Duration limits were marginally exceeded in FY22.

330. Again, this illustrates that SAIDI-related investment is likely to be required in the latter part of the current RCP.

331. SAPN identifies that the solutions it deployed in the current RCP are:[100]

- Automation – comprising the majority of the expenditure
- Segmentation
- Lightning resilient insulator upgrades
- Vegetation solutions
- Animal guards.

332. These are industry-proven measures and SAPN advises that it has reduced the cost of deploying the animal guards by undertaking them in conjunction with other works (such as maintenance).

Figure 4.10: SAPN's distribution system historical reliability performance
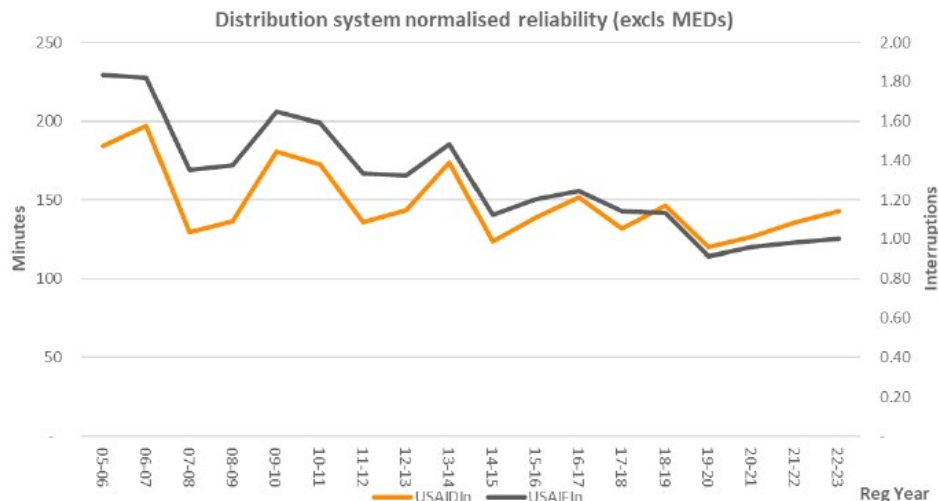
Source: SAPN Annual Reliability Performance Report 2023, Figure 6

Figure 4.11: SAPN's Normalised USAIDI contribution due to weather and equipment failure
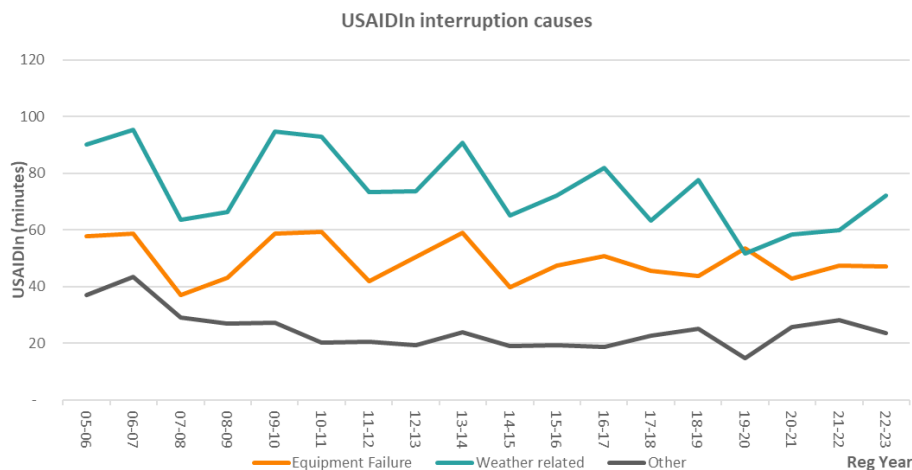
Source: Annual Reliability Performance Report 2023, Figure 8

---

[100]   SAPN, Day 1 Augex session. Slide 31.

Figure 4.12: SAPN distribution system % customer base restored after x hours

Source: Annual Reliability Performance Report 2023, Figure 7

4.4.4   Maintain underlying reliability performance program

Overview of proposed expenditure

333.   SAPN proposes $72.1 million capex on network augmentation to maintain underlying reliability at historic levels and to comply with regulatory obligations in the next RCP in two programs:

- Existing Network Protection Mgt – Planned ($10.0 million)
- Maintain Underlying Reliability Performance ($62.1 million).

334.   Figure 4.13 shows the expenditure increase above the AER's allowance since FY19. We note that SAPN has inferred a 'whole of network' SAIDI target from the EDC feeder category targets as 140 minutes in this figure, whereas in Figure 4.8 the SAIDI target is set at 150 minutes. Our understanding is that the correct figure is 150 minutes.

Figure 4.13: SAPN's reliability performance, actual spend, AER allowance - underlying reliability program ($m, 2022)
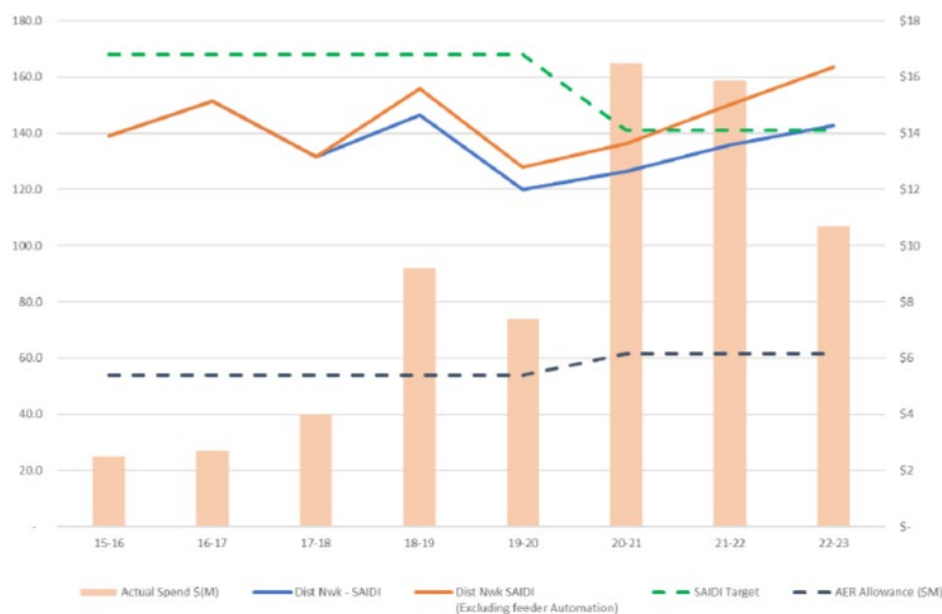
Source: SAPN - 5.9.3 - Maintain underlying reliability performance program - January 2024 – Public, Figure 2

Our assessment

SAPN claims to have improved reliability performance

335. SAPN states that it has 'kept increases in our part of the bill below CPI while doubling our number of field crews and **improving average reliability by 25%** for a customer base that has grown from 733,783 in 1999 to more than 915,000 today.'[101] [emphasis added]

336. This does not point to an issue with underlying reliability for the next RCP.

Historical SAIFI performance does not support the need for sustained high expenditure in the next RCP

337. Figure 4.14 does not support SAPN's assertion that it needed to invest heavily in solutions to address the underlying frequency of interruptions in the current RCP because the index is well under the ESCoSA-derived target. Moreover, the SAIFI performance indicates that relatively high levels of augex are unlikely to be required to address frequency of events in the next RCP.

Figure 4.14: Distribution system unplanned system average interruption frequency index normalised (USAIFIn) and implied jurisdictional target

Source: [102] *SAPN_-_Attachment_5_-_Capital_expenditure_-_January_2024_-_Public, Page 11*

SAIDI performance deteriorated over FY21 and FY22

338. SAPN identifies two overarching objectives for its proposed programs:

- To meet jurisdictional reliability requirements (per EDC)

- To mitigate persistent and escalating factors adversely affecting reliability, specifically attributable to:

  - increased frequency of lightning strikes

  - expected increase in grey-headed flying fox colonies. [103]

339. Figure 4.15 shows the increasing incidence of lightning strikes through to April 2024. SAPN also refers to wind-borne vegetation as a second driver of the increasing impact of weather on SAIDI.[104] SAPN does not provide statistics to support its assertion regarding vegetation, although it is reasonable to assume that the impact of lightning is increasing.

340. SAPN proposes mitigating the impacts of lightning by re-insulating lightning prone poor performing line sections (with lightning resilient insulators). This is a reasonable approach and will assist both SAIFI and SAIDI.

---

101   SAPN Regulatory Proposal 2025-30. Page 8.

102   SAPN - 5.9.3 - Maintain underlying reliability performance program - January 2024 – Public. Page 10.

103   Day 1 Augex session. Slide 41.

104   SAPN - 5.9.3 - Maintain underlying reliability performance program - January 2024 – Public. Page 10.

Figure 4.15: Increasing incidence of lightning ground strikes
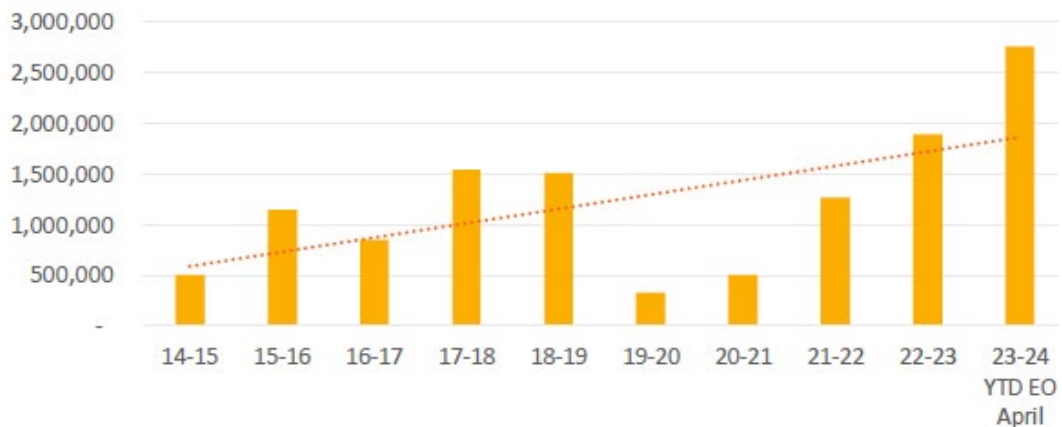
341. Weather-borne debris from outside clearance zones can be mitigated at least in part by focused vegetation management in particularly susceptible areas, if these can be identified. SAPN proposes installation of covered conductors or undergrounding bare conductors in sections prone to outages. The effective balance between augex and opex has not been demonstrated and we note that as with lightning, the benefit from investment depends on weather patterns which are obviously variable.

342. An increasing trend in the contribution of fruit bats to unreliability is evident from Figure 4.16. The contribution of an average of about 6 minutes to SAIDI over the last four reported years of the latter is material. SAPN has also provided information to support the expectation that fruit bat numbers will continue to grow in South Australia. We therefore consider it reasonable that SAPN considers mitigating actions for weather-related impacts and fruit bats.

Figure 4.16: Fruit bat outage population versus SAIDI impact (minutes)
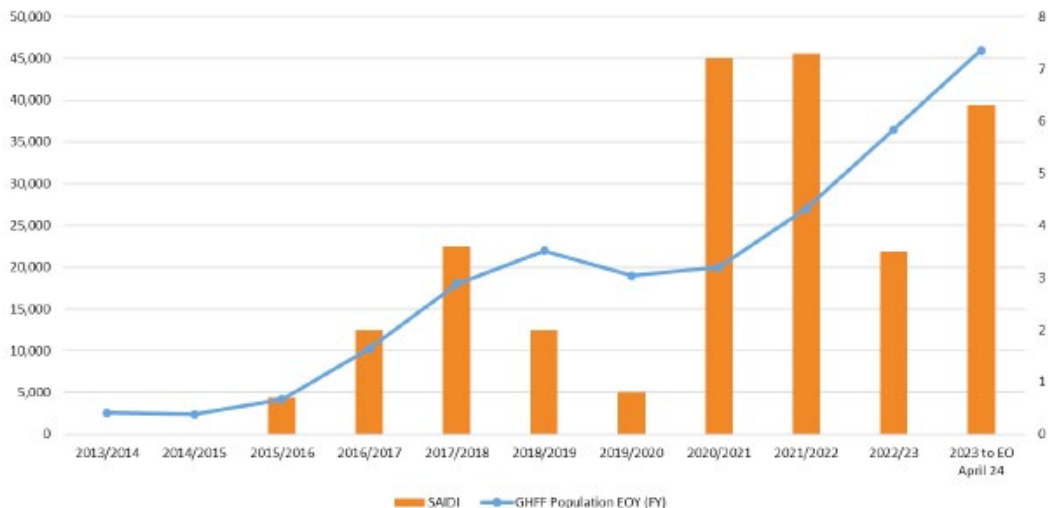
SAPN does not adequately justify the proposed level of augex

343. In our view, without the FY24 SAIDI and SAIFI results it is difficult to assess the ongoing requirement for investment. Nonetheless, SAPN maintains it is reasonable to assume that:

- The more frequent and severe pattern of weather-related events will continue in the next RCP

- It needs to increase its animal guard program because of the increasing risk of bat-related interruptions

- The current program will need to be continued into the next RCP at levels at least consistent with recent actual annual expenditure levels if reliability performance is to be maintained at historical levels - this is because SAPN concludes that its recent increase in expenditure on maintaining underlying reliability has not resulted in a consistently improving trend in reliability.[105]

344. In our view SAPN has not provided evidence that it has optimised its expenditure in the current RCP to address SAIFI and SAIDI. Moreover, given the significant volatility in its annual expenditure, as evident in Figure 4.13, SAPN's reference to needing to continue expenditure at least at 'recent actual levels' leaves considerable latitude for interpretation, depending on the period of reference. We also note that a significant proportion of the expenditure was directed to activities that favour SAIFI improvement and that did not appear to be required to the extent we infer from the information provided.

345. SAPN provides conflicting information in its business case regarding its derivation of the capex forecast for this program:

   - *We employ a 'top-down' approach, based on the analysis of historical reliability spend against the reliability levels and trends.*

   - *A bottom up approach supported by a cost-benefit analysis.* [106]

346. We have seen no evidence of the latter and moreover, SAPN repeated several times that a bottom-up approach is not deployed because it is not practicable to do so, which we accept.

347. SAPN states that it is confident that its recent historical expenditure on the program reflects least-cost upgrade solutions providing a net benefit for customers, because '*upgrade options considered through this program are developed from a detailed technical review of actual network outages and their reliability impact, and an upgrade is only undertaken if the STPIS incentive expected to be achieved by the upgrade outweighs the cost of the upgrade.*'[107] We consider this to mean that SAPN has proposed, at least in part, a reliability improvement program rather than a reliability maintaining program. This in turn indicates to us that at least a portion of the increased expenditure over the course of the current RCP on maintaining reliability could have been self-funded via the STPIS. We take this into account in our assessment of a reasonable forecast expenditure level for the next RCP.

348. SAPN goes on to say that:

   Using this methodology, we estimate the capex forecast for the Maintain Underlying Reliability Performance Program to be $53.8 million [$FY22] over the next RCP…This level of expenditure should allow us to continue to implement the piecemeal upgrades necessary to maintain customer reliability efficiently.[108]

349. However, elsewhere in the business case and in its capital expenditure report, SAPN proposes not only $62.1 million for 'piecemeal upgrades' but a further $10.0 million on management of protection systems and settings. The business case is largely silent on why this latter amount is required in addition to the $62.1 million and leading to its proposed $71.2 million forecast[109]

350. The FY24 reliability performance may reveal that the uplift in expenditure in the current RCP was sufficient or possibly excessive, noting that weather-related impacts are volatile. On the other hand, it may confirm that the increased expenditure is required, but we consider this unlikely, particularly for SAIFI which is where most of the proposed initiatives are directed, because of the significant margin to the target evident in Figure 4.14. However, in the absence of this information, we do not consider that SAPN has adequately justified the level of expenditure for the next RCP for the following reasons:

[105]   SAPN - 5.9.3 - Maintain underlying reliability performance program - January 2024 – Public. Pages 10-11.

[106]   SAPN - 5.9.3 - Maintain underlying reliability performance program - January 2024 – Public. Pages 5 & 23.

[107]   SAPN - 5.9.3 - Maintain underlying reliability performance program - January 2024 – Public. Page 17.

[108]   SAPN - 5.9.3 - Maintain underlying reliability performance program - January 2024 – Public. Page 17.

[109]   SAPN - 5.9.3 - Maintain underlying reliability performance program - January 2024 – Public. Page 17.

- We are not convinced that SAPN optimised its allocation of expenditure in the current RCP to the appropriate solutions to address the evident sources of unreliability, including operational responses (such as vegetation management)

- SAPN appears to be basing forecast expenditure on extrapolation of historical expenditure which could have been funded under the STPIS - the STPIS provides a reward for reliability improvement and should not be a direct consideration in a 'maintain' program

- Weather-related impacts may be more effectively mitigated by maintenance solutions (such as vegetation management) and regardless are volatile, notwithstanding the possible long-term impacts of climate change which SAPN has not attempted to model

- The cost of installing fruit-bat guards is likely to be small because of the deployment method adopted by SAPN

- Uplifts in asset replacement and other augmentation programs will improve reliability for the customers that benefit from these investments - the impact on underlying reliability performance from this investment does not appear to have been taken into account by SAPN – for example, SAPN does not appear to recognise in its forecast for this program that some reliability augex work formerly undertaken under this program will (if approved) be undertaken under the Regional Reliability Improvement Program:

  we have been installing lightning resistant insulators on selected sections of the 33kV sub-transmission system and installing possum guards on affected sections of lines to prevent possums climbing our Stobie poles. We are also installing feeder segmentation to reduce customers interrupted on some 33kV sub-transmission lines where the performance has been poor.

  *These upgrades **have been undertaken in the current RCP under the 'maintain underlying' program, not a dedicated regional improvement program**. The improved performance in 2021-22 and 2022-23 suggests that these recent upgrades could be arresting the decline.[110] [emphasis added]*

- SAPN has not provided a robust options analysis – only one alternative to its proposed expenditure was proposed and that was to spend nothing over the next RCP. This is in our view a poor counterfactual:

  – We suggest that a more reasonable counterfactual would be expenditure set at the AER's allowance

  – SAPN would need to demonstrate that even with optimised expenditure (i.e. directed more to SAIDI than SAIFI) an amount equivalent to the AER allowance is not adequate to avoid breaches of its EDC targets

  – Further, SAPN should demonstrate that the 'Existing Network Protection Mgt – Planned' sub-program is still required and that it is required on top of the provision for 'piecemeal work' and that the quantum is necessary.

  – Finally, SAPN should demonstrate that an amount somewhere between the AER allowance and its average over the period FY19-FY23 is not sufficient if it is directed to the appropriate solutions.

Summary of our findings on maintaining underlying reliability program

351. Whilst we consider that maintaining underlying reliability is appropriate, we do not consider that SAPN has justified the significant increase in expenditure that it is proposing for the next RCP. We suspect that SAPN is likely to be able to provide more compelling information to support its proposed expenditure on this program including by reference to the FY24 performance in its RRP and a more extensive options analysis. In the interim we propose that its allowance is set at the average of the revealed cost over the last eight years shown in Figure 4.13.

---

[110] SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public. Pages 19-20.

4.4.5 Worst served customers reliability improvement programs

SAPN's proposal

352. SAPN includes expenditure for three categories under its worst performing feeder programs:

- Regional Reliability Improvement Program ($15.6 million)
- Low Reliability Feeder Improvement Program ($10.5 million)
- Rural Long Feeder Supply Restoration Improvement Program ($5.0 million).

353. The Low Reliability Feeder and Rural Long Feeder Supply Restoration Improvement Program are a continuation of existing programs that SAPN commenced in the current RCP. The Regional Reliability Improvement Program is a new initiative which is designed to respond to stakeholder feedback.

354. SAPN identifies its worst served customers as those that experience consistent medium to long-term reliability issues, which tend to persist (and possibly) worsen over time, typically resulting in these customers having significantly poorer performance than their peers.[111] The worst served customers are identified for inclusion based on the SAIDI and SAIFI performance of the feeders that supply them.

355. SAPN identifies the overarching objective for its proposed worst served customer expenditure as maintaining its underlying reliability performance in the next RCP at historical levels.

Our assessment

Objectives and selection criteria for the worst served customer program are reasonable

356. SAPN has an obligation to comply with the EDC as a condition of its Distribution License.[112] The ESCoSA EDC targets applicable during the next RCP are the same as those that apply in the current RCP and are shown in Figure 4.17.

---

111   SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public. Page 10.

112   SAPN, Day 1 Augex session. Slide 39.

Figure 4.17: Network reliability minimum performance targets and reporting thresholds and network restoration targets

		CBD feeders	Urban feeders	Rural Short feeders	Rural Long feeders
USAIDIn (average minutes off supply per customer per annum)	Target	15	110	200	290
	Reporting threshold	20	125	220	330
USAIFIn (average number of supply interruptions per customer per annum)	Target	0.15	1.15	1.65	1.75
	Reporting threshold	0.20	1.35	1.85	2.10

		CBD feeders	Urban feeders	Rural Short feeders	Rural Long feeders
Percentage of total customers in each feeder category per annum	Interruption equal to or greater than 1 hour	11			
	Interruption longer than 2 hours	4	27		
	Interruption longer than 3 hours		11	27	
	Interruption longer than 4 hours				30
	Interruption longer than 5 hours			8	
	Interruption longer than 7 hours				10

Source: 20230626-Electricity-Distribution Code-EDC14 (commencing 1 July 2025)

357. SAPN's objective is to selectively improve the reliability performance to customers on the worst performing feeders where it is economical to do so. The criteria that SAPN applied when selecting projects for inclusion in the program are:

- There is a net-benefit (in terms of the value of avoided customer interruptions based on the VCR) in improving the supply reliability provided by that feeder

- The STPIS would not provide sufficient incentive to undertake the necessary upgrades. [113]

358. We consider the objective and the criteria for selecting projects to be reasonable. Provided that SAPN has applied this criteria and has demonstrated that the estimated NPV is robust, that is, it is likely to be positive even with reasonably unfavourable variances to one or more inputs, then the expenditure is likely to be reasonable. We examine this further in our review of the individual programs that SAPN has proposed.

SAPN's expenditure forecasting methodology requires a test of the robustness of the NPV calculations

359. SAPN describes its forecasting approach to its reliability improvement program as a bottom-up process including the steps shown in Figure 4.18.

---

[113] Day 1 Augex session. Page 42.

Figure 4.18: SAPN reliability improvement programs forecasting approach

Historical Analysis	› Analysed historical reliability performance to identify worst served customers and those vulnerable to extended outages, recurrent outage causes affecting these customers, the reliability impact of these outages, and the improvements in reliability achieved via previous reliability projects
Options	› Developed options to address specific recurrent outage causes and/or reduce customer numbers interrupted - and/or interruption duration, including the scoping of these options, the development of a cost estimate for the option, and the estimate of the expected improvement in reliability that will be achieved by that option.
Evaluation	› The evaluation of the options using formal cost-benefit analysis techniques to develop a preferred solution and program that maximises the net-customer benefit of the program.
STPIS and Opex	› The analysis of the STPIS and supply restoration Opex implications of the preferred program to determine the proportion of the program expenditure that could be covered by these mechanisms and the relevant adjustments to the settings of these mechanisms.
Interaction	› The preferred program and benefits are cross-checked with other programs to ensure there is no double counting of program elements and the expected benefits of the program or the other programs have been allowed for.

Source: SAPN, Day 1 Augex session, slide 45

360. SAPN has developed CBA models for each of the three reliability improvement programs. We consider the process SAPN has applied to determine the benefits for each of the programs is reasonable.

361. Our caveat on the step that involves maximising the net benefit is that the NPV needs to be demonstrated to be robust. We have checked that at the project level (i.e. within the three programs), a positive NPV is likely to be realisable even with reasonable unfavourable variances, such as the delivered cost.

362. We consider the application of the methodology to the three sub-programs in the sections 4.4.6, 4.4.7 and 4.4.8.

SAPN's proposed approaches to improving reliability are appropriate

363. The solutions proposed include:

- Re-insulation of lightning prone poor performing line sections with lightning resilient insulators

- Installation of covered conductor or undergrounding of bare overhead line sections prone to outages caused by vegetation from outside the prescribed clearance zone

- Installation of remotely monitored and controlled switches and feeder automation

- Installing animal guards

- Management of protection systems and settings.[114]

364. We consider that selection of one or more of these solutions is appropriate and that SAPN has sufficiently demonstrated that it has a process to select what is likely to be the appropriate solution to address the issue at the feeder level (i.e. on a feeder by feeder basis).

365. SAPN states that it has ensured that the feeders identified for the upgrade are those that will not be included in the other reliability improvement categories and that upgrades will only be applied where the benefits outweigh the cost. We are satisfied that SAPN has taken reasonable steps to identify interrelationships between projects based on:

- The process described in its Reliability Forecasting Structure and business case documents, and

- Evidence in a cost-benefit model. [115]

---

114 SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public. Table 7.

115 SAPN's SAPN - 5.9.5 - CBA Reliability Improvement Eyre Regional – Public removes three feeders from consideration to avoid duplication with the Rural Long Supply program.

366. SAPN also considered supply-side non-network solutions, including diesel generator/solar systems or battery-only systems. We consider that it is possible that these may be credible solutions in some circumstances, but for the purposes of forecasting expenditure for the next RCP, SAPN's view is that this is unlikely is acceptable.

SAPN has considered the interaction with the repex forecast

367. The business case outlines reasons why SAPN considers there is limited scope for duplication between the reliability improvement programs and the repex programs. In summary:

- Only about 30% of reliability issues derive from asset condition failures, and rather than focusing on asset replacement the program focuses on modifying existing assets, installing additional switches

- Some asset replacement works are included in the augex projects but represent a very small proportion of the existing asset population. [116]

368. We are satisfied that if there is any duplication in the forecast, then the amount is likely to be within the range of accuracy of the cost estimate given uncertainties about other inputs such as costs and scope.

4.4.6 Regional Reliability Improvement Program

Overview of SAPN's proposed program

369. During the next RCP, SAPN proposes spending $15.6 million[117] capex targeted at improving the performance of 53 feeders across 3 regions:

- Eyre Peninsula – expected 10% reduction in SAIDI and 10% SAIFI improvement

- Upper North – expected 10% reduction in SAIDI and 10% SAIFI improvement

- South East – expected 5% reduction in SAIDI and 6% SAIFI improvement.[118]

370. Through delivery of this program, it expects to improve reliability for 23,530 customers.[119]

Our assessment

SAPN's information shows that it did not breach its reporting thresholds in FY23

371. SAPN's 2023 APPR indicates that it did not breach its reporting thresholds in any of the three regions in question in FY23, as shown in Figure 4.19.

---

[116] SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public. Page 37

[117] SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Page 46.

[118] SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Page 46.

[119] SAPN - Attachment 5 - Capital expenditure - January 2024 – Public. Page 46.

Figure 4.19: SAPN's regional reliability performance

Eyre Peninsula	2022-23	Historic Ave.	reporting threshold
USAIDIn	481	497	577
USAIFIn	1.51	2.17	2.74

Upper North	2022-23	Historic Ave.	reporting threshold
USAIDIn	410	434	540
USAIFIn	1.41	1.76	2.12

Southeast	2022-23	Historic Ave.	reporting threshold
USAIDIn	206	271	328
USAIFIn	1.34	2.03	2.20

Source: APN - Annual Public Performance Report for 2021-2022 20231124 v1.4, Pages 48-52

372. SAPN supplied three charts, reproduced in Figure 4.20 to Figure 4.22, identifying the historical performance of the three regions it has targeted. Referring to Figure 4.19, this further illustrates that there is no SAIFI issue and there is no immediate SAIDI performance issue from an EDC target perspective.

Figure 4.20: SAPN - Eyre Peninsula historical annual reliability
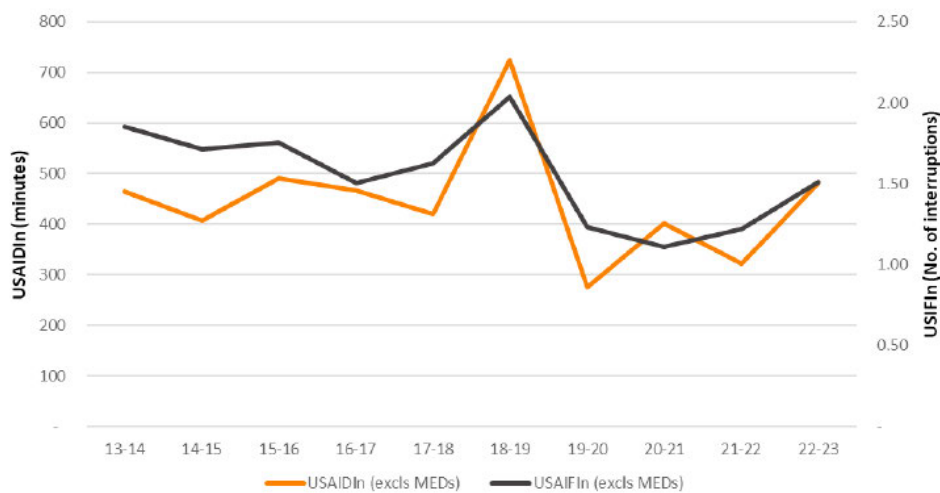
Source: SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public, Page 20

Figure 4.21: SAPN - Upper North historical annual reliability
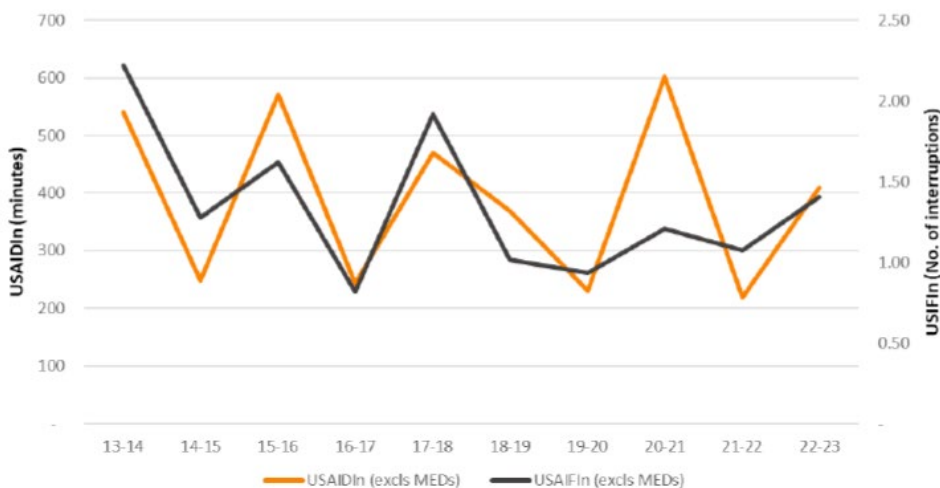
Source: SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public, Page 20

Figure 4.22: SAPN - South East historical annual reliability
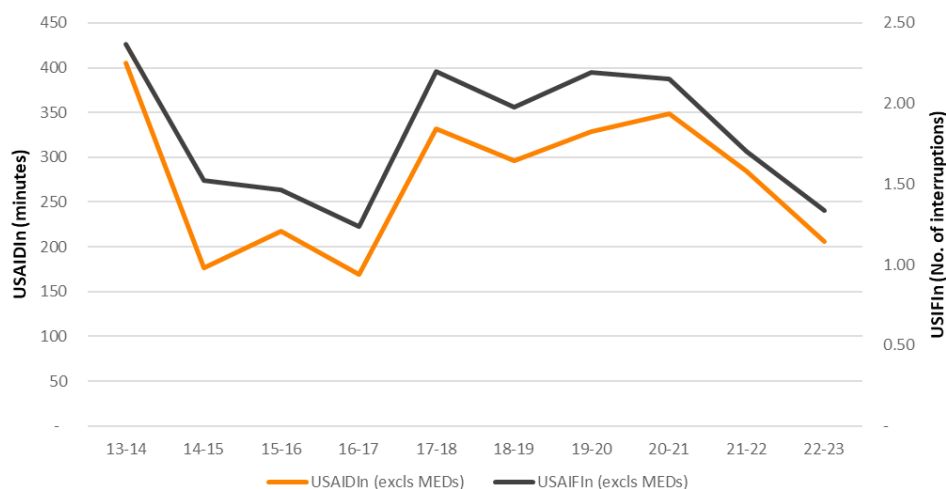
Source: SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public, Page 20

SAPN is under no obligation to undertake this program but is responding to People's Panel recommendation

373.   SAPN confirms that it has no obligation to undertake the proposed work:

> *Currently, we have no explicit obligation to improve the supply to these regions. This program responds instead to customers' concerns regarding the inequity in reliability performance experienced by customers in our worst served regions, and the need to achieve improvements in reliability performance where it is efficient for customers (i.e. benefits outweigh costs).[120]*

374.   SAPN is proceeding with this program because of support from its People's Panel, the Small Business Commissioner, and the Energy and Water Ombudsman. However, SAPN also notes that the South Australian Council of Social Service (SACOSS) did not support the program.[121]

Cost and benefit assumptions are reasonable

375.   SAPN has indicated that it had undertaken a detailed review of outage incidents and based on this, determined actions appropriate for the individual feeders. This detail is included in its accompanying models.[122]

SAPN's NPV analysis is reasonable

376.   SAPN considered three options in its business case:

- 0 - Do nothing, which does not address the need

- 1 - Optimal feeder improvements of all three regions[123] – 52 feeders addressed;[124] improves reliability for 23,540 customers at a cost of $13.7 million ($FY22)

- 2 - Optimal feeder improvement of Eyre Peninsular and Upper North – 35 feeders addressed; improves reliability for 17,354 customers at a total cost of $9.42 million ($FY22).

---

[120]   SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public. Page 6.

[121]   SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public. Page 42.

[122]   SAPN - 5.9.5 - CBA Reliability Improvement Eyre Regional; SAPN - 5.9.5 - CBA Reliability Improvement Upper North Regional; SAPN - 5.9.5 - CBA Reliability Improvement South East Regional.

[123]   Eyre Peninsular, Upper North, South East.

[124]   22 for Eyre Peninsula, 13 for Upper North and 17 for South East in Table 20 of the business case SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public.

377.   SAPN selects Option 1 which is not the least cost option, but it has a marginally higher NPV of $37.2 million compared to Option 2 at $34.1 million. This reflects SAPN's criterion of maximising NPV.

378.   Figure 4.23 shows the cumulative costs and benefits from one of the three regional reliability sub-programs (Eyre Peninsula) which indicates that one project has a relatively low cost and low benefit but that there are no other outlier projects which provide the majority of the benefits.

Figure 4.23: Eyre Regional - ranked projects – benefit versus costs ($,000 2022)
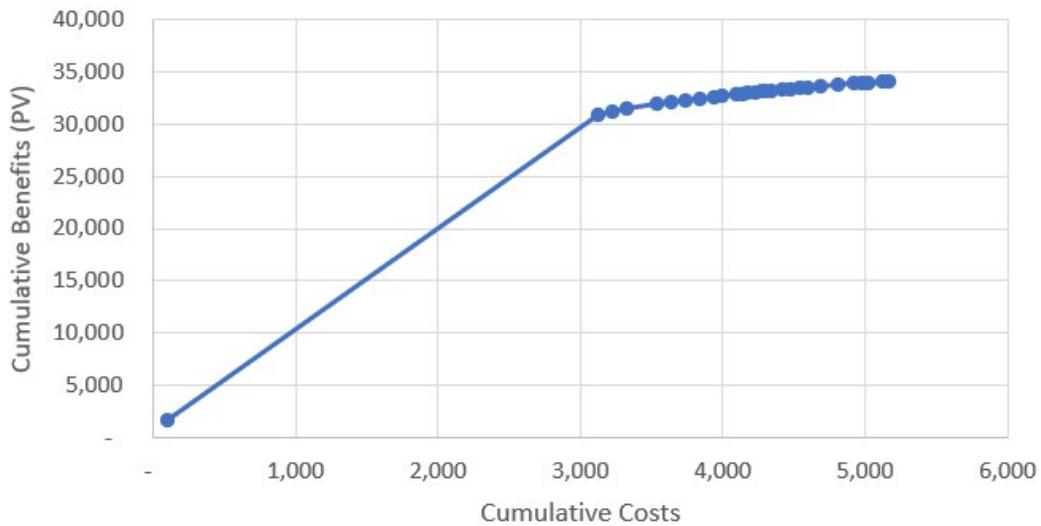
Source: EMCa analysis of SAPN - 5.9.5 - CBA Reliability Improvement Eyre Regional - Public

379.   The pattern in Figure 4.23 is similar for the other two regional sub-programs. Whilst the NPV for some projects is marginal, we are satisfied that:

- there is no undue bias in the benefit or cost analysis;

- SAPN has appropriately excluded feeders from this program where there is duplication with the rural long program; and

- there are no projects where there is a disproportionately low cost-to-benefit ratio.

380.   We therefore conclude that the proposed expenditure for this program is reasonable.

4.4.7   Low reliability Feeder Improvement Program

Overview of SAPN's proposed program

381.   SAPN's Low Reliability Feeder Improvement Program is targeted at improving reliability to customers that are mainly in remote and rural areas, supplied through consistently poor performing feeders. The proposed program is forecast to cost $10.5 million. The proposed program is a continuation of a current program. SAPN sometimes refers to these as long-term low reliability feeders (LT-LRF), which we adopt here.

382.   The current version of the EDC defines 'Low Reliability Feeders' as feeders within a particular geographic region, which have exceeded twice the mean Unplanned System Average Interruption Duration Index (USAIDI) for that region for two consecutive financial years.[125] We note however that the next version of the EDC (version 14) which comes into effect in July 2025 does not include a definition for Low Reliability Feeders.

---

[125]   We note that definition is only included in the EDC/13 version of the EDC which came into effect on 1 July 2020; the Electricity Regulatory Information – Requirements – Distribution Electricity Industry Guideline No. 1 version G1/13.1 12 February 2021 refers to the EDC for the definition of Low Reliability Feeder

383. We suggest therefore that the AER requires SAPN to forecast the impact of the absence of a specific definition for Low Reliability Feeders on its expenditure forecast as part of its RRP. We have assessed SAPN's proposed expenditure on the basis that it has used economic criterion to include feeders for remediation and not because there is a specific obligation under the EDC to rectify.

384. At the start of the current RCP, SAPN identified that it had 107 LT-LRFs supplying 23,319 customers and planned to act on 27 of those feeders during the current RCP.[126]

Our assessment

SAPN has appropriately identified 81 feeders as LT-LRF at the start of the next RCP

385. SAPN identifies that the consequence of not undertaking the program will be that these customers will continue to experience poor reliability at more than double their regional average.[127] The feeders SAPN identifies had exceeded twice the regional SAIDI in at least three out of five years. Whilst on its own this measure does not confirm that the poor performance will continue, it is a reasonable assumption.

386. SAPN states that it currently has 107 feeders consistently classified as LT-LRF under jurisdictional regulation, and that it expects 80 will be present at the start of 2025-30,[128] cognisant of the 27 feeders it expects to rectify in the current RCP.[129]

387. SAPN is proposing to rectify 67 feeders in its improvement program.[130] In the documents SAPN provided to support its reliability expenditure we did not find an explicit explanation as to why it will only address 27 of the LT-LRFs in the current RCP when it had identified more than 100 LT-LRF in FY21. We infer from its selection criteria and other information in the business case,[131] that only 27 of the feeders satisfied the selection criterion of requiring a positive NPV in the current RCP and noting that the customer minutes interrupted is increasing.

SAPN's solutions appear to be appropriate and it has sought to avoid double counting of benefits

388. SAPN plans to install animal guards, upgrade insulators, use covered conductor, and add switches, with the latter planned to be deployed in the greatest number of projects.[132] This is an appropriate strategy and will impact SAIDI, Customer Average Interruption Duration Index (CAIDI) and SAIFI.

SAPN 's options analysis leads to selection of the prudent option

389. SAPN considered three options:

- 0 - Do nothing - does not address the need

- 1 - Optimal feeder improvements – 67 feeders addressed, improved reliability for 31,360 customers, with average SAIDI improvement of 143 minutes (31% improvement on average per feeder)

- 2 - All feeder improvements – 81 feeders addressed, improved reliability for 41,483 customers, with average SAIDI improvement of 135 minutes (28% improvement on average per feeder).

---

126 SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public. Page 11.

127 SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public. Page 12.

128 SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public. Page 12.

129 SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public, Tables 2, 3, noting that the business case refers to 80 remaining LT-LRFs in some places and 81 in others; the Capital Expenditure Report refers to 81 feeders.

130 SAPN –Attachment 5-Capital Expenditure-January-2024. Page 45.

131 SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public, Figure 2

132 SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public. Table 11.

390. SAPN's preferred Option 1 is the least cost approach that will provide reliability improvement and ranks first in terms of the net-benefit at $17.7 million.[133] SAPN also identifies that:

- Its preferred option is low-risk in terms of its implementation, comprising relatively simple upgrades to existing systems that it has applied during the current and past RCPs

- It strikes a good balance between customer preferences to improve supply to its worst served customers and limit price increases.

391. Our examination of the provided NPV model reveals the following:

- The sum of $10.5 million applies to 109 projects on 66 feeders, eight of which are upstream non-LT-LRF feeders

- As with our analysis of the Reginal Improvement Program CBAs, in Figure 4.24 we present our derivation of the cumulative cost versus cumulative benefit for each proposed feeder project in this program; we found no 'outlier' projects (i.e. that provide the majority of the benefit).[134]

392. For the same reasons we explain for the Regional Reliability Program, we consider that SAPN's proposed expenditure for this program is reasonable.

Figure 4.24: Low reliability feeder – SAPN proposed projects – ranked by benefit versus cost ($,000, 2022)
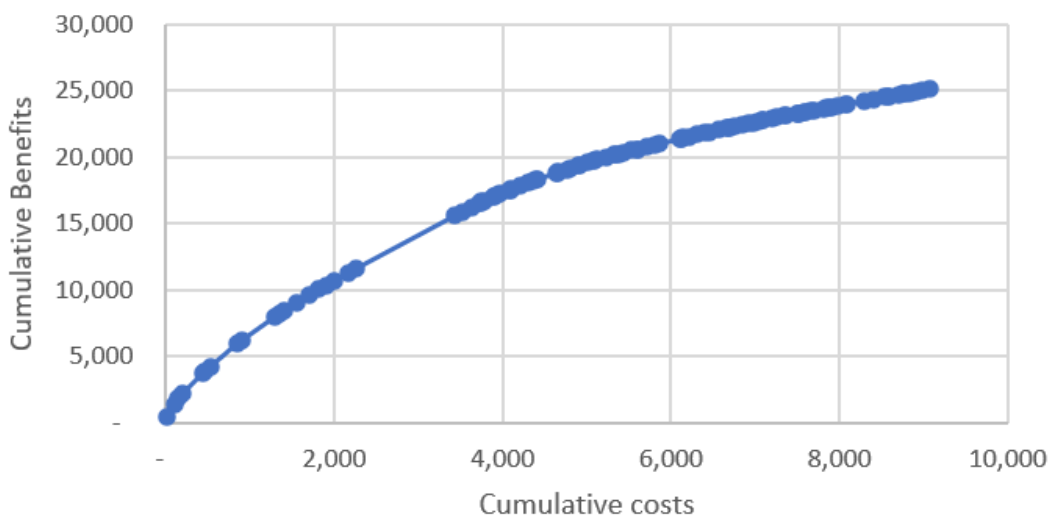
Source: EMCa analysis of SAPN - 5.9.5 - CBA Low Reliability Feeders Improvement - Public

4.4.8 Rural Long Feeders Program

Overview of SAPN's proposed program

393. The objective of the long rural feeder upgrade program is to improve the average restoration time of specific feeders and improve SAPN's compliance with EDC requirements.

394. During the next RCP, SAPN proposes $5.0 million augex to progress towards satisfying the EDC targets for long rural feeders.[135]

---

[133]   Attachment_5_-_Capital_expenditure_-_January_2024_-_Public. Page 46.

[134]   SAPN - 5.9.5 - CBA Low Reliability Feeders Improvement – Public.

[135]   SAPN_-_Attachment_5_-_Capital_expenditure_-_January_2024_-_Public. Page 46.

395.   The proposed program is expected to achieve an average 15% improvement in CAIDI across 44 feeders supplying 10,230 customers. SAPN calculates a positive NPV for the investment of $6.7 million.[136]

Our assessment

SAPN presents a reasonable case for some investment in rural long feeder performance improvement in the next RCP

396.   As shown in Figure 4.25, whilst there is annual variability in the 10-year trend, the incidents of target exceedance are increasing (at a slow rate). SAPN notes that:[137]

- Its performance breached the four-hour EDC supply restoration target for rural long feeders in FY22 and FY23, with 35% of rural long customers restored in over four hours compared to the EDC target of no more than 30% of customers

- The percentage of customers restored after seven hours exceeded EDC targets in FY21 and FY23.

Figure 4.25: Rural long network restoration - Percentage of total customers > 'X' Hrs
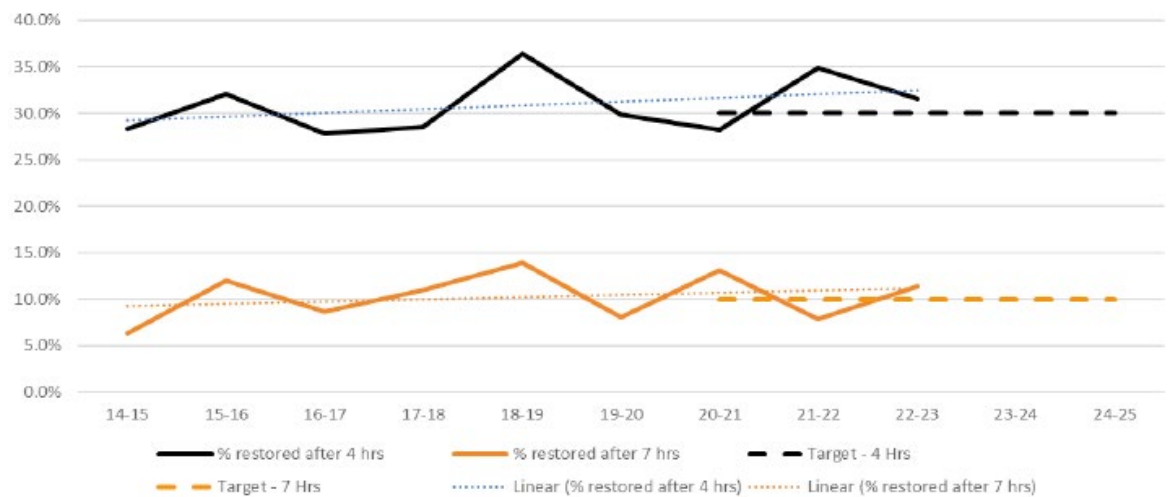
Source: SAPN - 5.9.5 - Worst Served Customers Reliability Improvement Programs - January 2024 – Public, Page 17

397.   SAPN's 2023 APPR provides the historical performance for USAIDI and USAIFI on the rural long feeders against the EDC targets. Graphs from the 2023 APPR are reproduced below as Figure 4.26 and Figure 4.27. These charts demonstrate that SAPN has achieved consistent SAIFI performance improvements, and constant performance on SAIDI over more than a decade, but with generally declining reliability over the last three years (noting that the FY24 result is not yet available). The charts also show that the tightening targets are a key driver for SAPN to continue to improve SAIDI performance.

---

[136]   SAPN_-_Attachment_5_-_Capital_expenditure_-_January_2024_-_Public. Page 46.

[137]   SAPN - 5.9.5 - CBA Low Reliability Feeders Improvement – Public. Page 15.

Figure 4.26: Rural Long feeder USAIDI performance
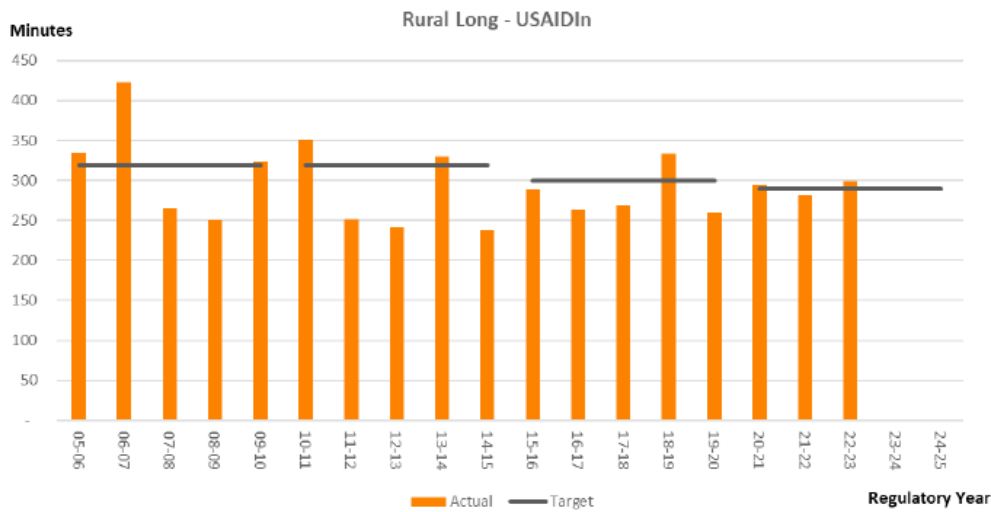
Source: SAPN - Annual Public Performance Report for 2021-2022 20231124 v1.4, Page 38

Figure 4.27: Rural Long feeder USAIFI performance
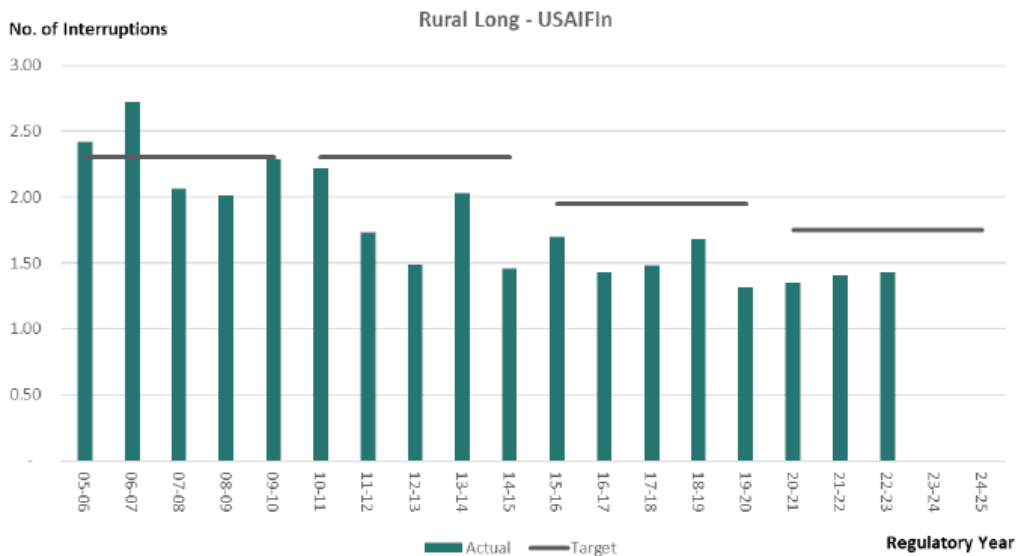
Source: SAPN - Annual Public Performance Report for 2021-2022 20231124 v1.4, Page 38

398.   SAPN has provided evidence that it is running tightly against its targets for SAIDI but is performing within its USAIFI targets. This indicates that the improvement program would best be targeted at reducing restoration times.

399.   Our conclusion is that a modest investment in arresting further decline in overall rural long feeder performance by addressing the worst performing feeders would be reasonable if it can demonstrate that there is likely to be a positive net benefit in each case from doing so.

SAPN's solutions appear to be appropriate

400.   SAPN plans to upgrade manually monitored and controlled switches to remote monitoring and controlled facilities and install additional remote switches/reclosers at new locations. On completion, SAPN will be better able to sectionalise its feeders enabling faulted sections to be isolated and supply restored more swiftly to other sections. This should improve SAIDI.

SAPN's options analysis leads to selection of the prudent option

401.   SAPN initially identified 334 rural long feeders with poor restoration performance and determined credible solutions to upgrade each of these feeders. It subjected these feeders

to options analysis based on estimated cost and NPV values to filter the projects to only allow those that met the criteria for each option.

402. SAPN considered three options:

- 0 - Do nothing - which does not address the need

- 1 - Optimal feeder improvements – 44 feeders addressed, improved reliability for 10,230 customers, with average CAIDI improvement of 15%

- 2 - Feasible feeder improvement – 183 feeders addressed, improved reliability for 33,352 customers, with average CAIDI improvement of 6%.

403. SAPN's preferred Option 1 is the least cost approach that will provide reliability improvement and ranks first in terms of NPV at $6.7 million.[138] SAPN also identifies that:

- Its preferred option represents a low-risk solution in terms of its implementation, comprising relatively simple upgrades to existing systems that it has applied during the current and past RCPs

- It strikes a good balance between customer preferences to improve supply to its worst served customers and limit price increases.

404. Our examination of the provided NPV model reveals the following:

- The sum of $4.3 million ($FY22, $5.0 million $FY25) applies to 64 projects on 44 feeders

- The NPVs for 20 of 64 projects are marginal (BCR ≤ 1.2);[139] removing these projects from the analysis would reduce the spend to $3.1 million ($FY22) a reduction of 30% for a 13% reduction in possible benefit. However, we do not observe indications of unreasonable bias in the analysis and, while these individual projects could be considered to be marginal, on balance we consider that SAPN has provided reasonable justification for its proposed program. [140]

405. We therefore conclude that no adjustment is warranted.

4.4.9 Summary of our findings and implications on the proposed reliability program

The 'maintain reliability' program expenditure is not adequately justified by SAPN

406. The extent of SAPN's proposed increased investment in maintaining reliability is not supported by performance through to FY23. Whilst there was a deterioration in overall reliability over FY22 and FY23, the EDC targets had not been breached at this point.

407. The unavailability of SAIDI and SAIFI performance for FY24 has meant that the impact of the significant over-spend in FY21 to FY23 is not yet visible, noting that such investments often lead to improved performance after 12-18 months and that weather impacts are variable. We also note that a positive NPV does not mean that the optimal timing for all the work is necessarily within the next RCP, particularly given the long study periods of up to 25 years and long payback periods evident with some projects.

408. We are also concerned that SAPN has not explicitly sought to account for the positive impacts on underlying reliability from the uplift in repex and augex and from the reliability improvement programs (although the latter is likely to be relatively small).

409. SAPN has provided minimal justification for the expenditure that it proposes, other than to indicate that it considers that it needs to continue to invest at 'recent' levels. However, the amount reflective of 'recent levels' is open to interpretation, given that SAPN incurred high levels of expenditure for three years in the current period, but reduced its expenditure in

---

138   Attachment_5_-_Capital_expenditure_-_January_2024_-_Public. Page 46.

139   A BCR of greater than 1.2 is likely to be positive even with some unfavourable variance – such as higher cost.

140   SAPN - 5.9.5 - CBA Rural Long Supply Restoration time – Public.

FY23 and then is estimating investment at around the level of the AER allowance in the final two years of the period.

SAPN's proposed reliability improvement programs provide a reasonable forecast of required expenditure

410.   We consider that SAPN's approach to forecasting costs and benefits is reasonable. There is sufficient information to conclude that it has both recognised and sought to eliminate sources of duplication from its improvement programs.

411.   There is ongoing scope and customer support for economically addressing pockets of feeder unreliability in the next RCP, noting that there is no regulatory obligation to improve regional reliability at current performance levels.

412.   We are satisfied that the cost forecasting methodology and the assumptions underlying the benefits calculations are reasonable.

413.   SAPN's project selection criterion is that the NPV for the proposed investment is economic (i.e. positive NPV). It has provided its cost-benefit analyses which show the derivation of NPV at a project level (often at a feeder level but in some cases, there are multiple solutions applied to a feeder). We are satisfied that SAPN's analysis is sufficiently robust as a basis for the forecast expenditure.

4.4.10   Implications for proposed reliability program allowances

We recommend an adjustment to SAPN's proposed $103.1 million reliability investment

414.   We recommend an allowance for the next RCP that takes into account our conclusion that SAPN has not justified the level of expenditure it proposes for its 'maintaining reliability' program. To this end, we propose an appropriate annual allowance for the next RCP to be equal to the average annual allowance derived from the revealed costs over the eight years from FY16 to FY23. We estimate this as being of the order of $10 million per year (in $FY25), therefore $50 million over the period, which is $22.1 million less than SPAN has proposed.

415.   With no adjustment to the proposed reliability improvement programs, the aggregate implication for the proposed reliability program allowances is as shown in Table 4.6.

Table 4.6:   Implications for proposed reliability program ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	Total
Reliability Improvement programs	6.2	6.2	6.2	6.2	6.2	**31.0**
Maintaining Reliability program	14.3	14.4	14.4	14.5	14.5	**72.1**
SAPN proposed	**20.5**	**20.6**	**20.6**	**20.7**	**20.7**	103.1
less EMCa adjustment on maintaining reliability	*-4.3*	*-4.4*	*-4.4*	*-4.5*	*-4.5*	*-22.1*
EMCa adjusted	**16.2**	**16.2**	**16.2**	**16.2**	**16.2**	**81.0**

Source: EMCa table derived from SAPN Capex model, att. 5.1.1 and from data shown in Figure 4.13

4.5   Assessment of capex forecast for bushfire risk management

4.5.1   SAPN's capex forecast for bushfire risk management

416.   SAPN has forecast capex of $25.6 million for the next RCP for its two bushfire risk management programs:

- Bushfire Risk Mitigation ($21.6 million)
- Public Safety Power Shutoff Mitigation ($4.0 million).

417. The proposed expenditure is shown in Table 4.7.

Table 4.7:   Proposed expenditure for bushfire risk management ($m, FY25)

program	FY26	FY27	FY28	FY29	FY30	Total
Regional Reliability Improvement	4.3	4.3	4.3	4.3	4.3	21.6
Public Safety Power Shutoff Mitigation	0.8	0.8	0.8	0.8	0.8	4.0
Total	**5.1**	**5.1**	**5.1**	**5.1**	**5.2**	**25.6**

Source: EMCa table derived from SAPN Capex model

418. The objective of the Bushfire Risk Mitigation Program is to reduce the risk of network assets starting fires.

419. The objective of the Public Safety Power Shutoff Program is to reduce the impacts on customers when power is disconnected during high bushfire risk periods.

The risk mitigation program work is a continuation of the existing program

420. During the current RCP, SAPN:[141]

- Has been progressing its programs on ultra-fast fault clearance, replacing fire-prone surge arrestors, and focusing on feeders in designated High Bushfire Risk Areas (HBFRA)

- Expects to spend $2.5 million less than the AER allowance - it has achieved this by realising efficiencies in sequencing and bundling works and optimisation between repex and augex solutions (i.e. without reducing the expected level of bushfire risk mitigation)

- Has extended its risk modelling to improve accuracy of risks for medium bushfire risk areas, which is relevant for the next RCP.

4.5.2   Assessment of the bushfire risk mitigation program

The bushfire risk mitigation program is driven by a number of factors, which SAPN has reasonably identified[142]

421. SAPN has identified the drivers of the program as:[143]

- Responding to customer concerns regarding the minimisation of our bushfire safety risk, where this is prudent and efficient and derives a net benefit for customers[144]

- Meeting the NER capex objectives in Clause 6.5.7(a)(2) and Clause 6.5.7(a)(4), which relate to ensuring the network is safe and safely operated through the application of good electricity industry practices.

422. ███.

---

[141]   SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Pages 8 & 10.

[142]   SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Page 17.

[143]   SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Page16.

[144]   SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Page15.

[large redacted block]

[redacted]

■ [redacted]

■ [redacted]

[large redacted block]

[redacted]

Overlap with other programs has been considered by SAPN but not quantified

425. SAPN describes the steps it has taken to assess and quantify the interrelationships between the Bushfire risk management programs and other programs.

---

145 SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Page10.

426. Both SAPN's bushfire risk management forecasting methodology description[146] and its Bushfire Model Framework[147] describe logical steps for accounting for duplication or overlaps in the investment in bushfire mitigation on other programs such as repex, maintenance, and resilience. However, in the bushfire mitigation business case we note that SAPN does not take the potential overlaps into account to reduce its program scope. Further it does not attempt to quantify the benefit from:

- Supply reliability improvement – from avoiding some fault types associated with the existing overhead network

- Reduced need for Public Safety Power Shutoffs (PSPS) where significant portions of undergrounding have occurred.

- Avoided operating costs pertaining to vegetation, inspection and patrol.[148]

427. SAPN states that it expects there could be material benefits in aggregate. In our assessment of the reasonable level of expenditure for SAPN's Maintaining Underlying Reliability Program, we have qualitatively considered the likely reliability impact from this bushfire risk mitigation program.

The expenditure forecast for both programs were forecast through bottom-up processes

428. In its business case document SAPN indicated that the expenditure forecast has been developed through a bottom-up process, which is summarised in Figure 4.30.

Figure 4.30: Bushfire risk mitigation expenditure forecasting methodologies

Feeder risk	Calculate bushfire risk of individual feeders (undertaken by the CSIRO).
Costs and benefits	Calculate each feeder's upgrade option cost and benefit in terms of bushfire risk reduction.
Total C&B	Calculate the total option cost and benefits across all feeders, only including feeder upgrades with a net benefit
Option selection	Select option that maximises the net benefit and aligns with customer preferences.
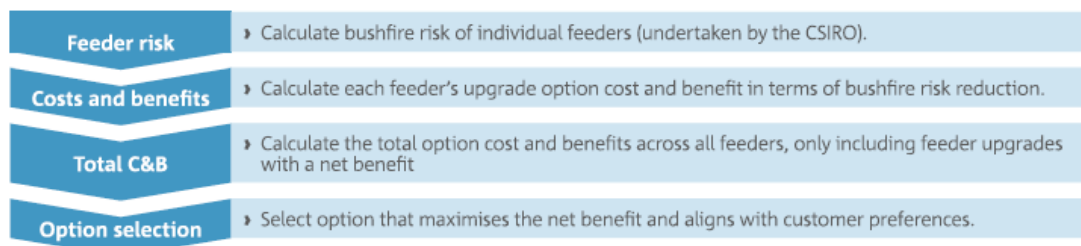
Source: SAPN_-_Attachment_5_-_Capital_expenditure_-_January_2024_-_Public, Page 48

429. We consider that:

- SAPNs forecasting methodology is reasonable for the purpose of selecting feeders for which to undertake augmentation works to mitigate bushfire risk, provided that the NPV analysis is robust[149]

- SAPN has demonstrated that it has reliable data and information on the causes of fire starts, trends, and locations - SAPN provided clear evidence that it had based its programs on sound analysis its data, including with the assistance of CSIRO

- The unquantified benefits described above may lead to more feeders having a positive net benefit, but we do not propose any upward adjustment of the forecast to account for this (and neither does SAPN).

SAPN has developed a reasonable range of options

430. SAPN identifies the following credible options in its business case, with its preferred option being Option 3b.

- The base case – 'do nothing'

---

[146] SAPN - 5.6.2 - Bushfire Risk Management forecasting approach - January 2024. Section 3.9.

[147] SAPN - 5.6.3 - Bushfire Model Framework - January 2024 – Public. Pages 22-23.

[148] SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Page 32.

[149] By this we mean that positive NPV results are reasonably able to withstand common unfavourable variances, such as modest cost increase.

- Option 1 – implement feeder-level ultra-fast protection scheme
- Option 2 – upgrade feeder to covered conductor or underground all overhead sections of the HV feeder
- Option 3a - implement feeder-level ultra-fast protection scheme + upgrading feeder sections to covered conductor or undergrounding
- Option 3b - implement feeder-level ultra-fast protection scheme + upgrading feeder sections to covered conductor to a capex-constrained level.

431.   SAPN also identifies three non-credible options that we also consider unlikely to be superior to the options listed above.[150]

Two options stand out from the rest – Option 1 and Option 3b

432.   SAPN's option assessment results for the two options which have the lowest capital costs and the highest net benefit are summarised in Table 4.8. The segments referred to in Option 3b are four projects to implement Aerial Bundled Cable (ABC) covered conductor which is a smaller number than in Option 3a because SAPN has capital-constrained Option 3b.

Table 4.8:   Selected option assessment results – Bushfire mitigation ($m, FY22)

Option	Capex	5-year opex	NPV	BCR	Percentage bushfire reduction
1 Protection	15.1	1.5	155.5	9.5	44%
3b Protection + segments + capex constrained	18.7	1.9	157.2	8.4	47%

Source: SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential, Table 4

SAPN's bushfire cost-benefit model is fit for purpose as are underlying assumptions

433.   SAPN describes eight core assumptions underpinning its analysis which we consider to be reasonable for the purpose of options comparison and analysis.

434.   For the bushfire risk mitigation program, SAPN developed and applied a special-purpose bushfire CBA model which we consider to be fit for purpose and we have used as the basis for our assessment of the robustness of the NPV determinations for each option as these are the cornerstone of SAPN's option selection process.

SAPN's CBA analysis is reasonable and its selection of Option 3b is justified

435.   In response to an information request, SAPN provided the CBA which it had used to identify the protection upgrade projects that would meet its NPV threshold and the economics of its proposed program, including the proposed ABC conductor upgrades.[151] SAPN has used the model to assess the risk-reduction benefit for each of 306 projects and to determine the NPV of each project and for the program in aggregate. As shown in Table 4.8, SAPN determines that its proposed option (Option 3b) has an NPV of $157 million ($2022).

436.   We observed that a number of projects were ascribed benefits but had zero capex or opex. We summed the NPV for these projects and find that it comes to $30 million. While significant, this is far less than the NPV for the project overall and allows us to discount the possibility that this is driving the NPV of the program overall, and that the projects with an investment cost might in aggregate return a negative NPV.

437.   We also tested the model to confirm that the four proposed ABC conductor upgrades, which have an aggregate capex of $3.6 million, have a positive NPV in their own right. We confirmed that this is the case, and that the positive NPV for these four feeders did not depend on the benefits of the protection upgrades that are to be made on the same feeders.

---

[150]   SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Page 19.

[151]   SAPN response to IR014, SAPN – Bushfire Q10, Q11, Q13 – Confidential (Excel model).

On this basis, we confirmed that SAPN's proposed Option 3b (which includes the ABC upgrades) is justified on an economic basis as the preferred option.

438. We tested for 'marginal' projects by inserting columns into SAPN's model to determine BCRs. We found that 12 of the proposed protection projects have a benefit/cost ratio of less than or equal to 1.2, with several in the range of 1.03 and 1.04. In aggregate the proposed capex for this subset of projects is $1.2 million. However, we do not observe indications of unreasonable bias in the analysis and, while these individual projects could be considered marginal, on balance we consider that SAPN has provided reasonable justification for its proposed program.

439. In forming this view, we also observe that SAPN identified other potential ABC projects that it assessed as having a positive NPV, but which it has not proposed based on an inferred 'capital constraint' against incurring what would have been an additional $8.2 million investment cost.[152]

SAPN Option 3b represents a significant expansion on the current program because of the reach into MBFRAs

440. Through its revised approach and planned program, SAPN is seeking to reduce fire start risk in the next RCP by implementing sensitive protection on 306 feeders across HBFRAs and MBFRAs and by replacing 48km of bare conductor with aerial bundled conductor.[153]

441. We consider this to be the prudent path.

4.5.3 Assessment of the PSPS Mitigation Program

SAPN's proposal

The PSPS Mitigation Program is new for the next RCP

442. The PSPS Mitigation Program is designed to reduce the extent of interruptions to SAPN's customers when it shuts off portions of its network during periods of extremely high bushfire risk.

443. To achieve its objective and the associated benefits to customers, SAPN plans to:[154]

- Install remotely operated switchgear

- Install targeted upgrading/undergrounding of powerlines to maintain supply to 12 towns and urban fringe areas during high fire risk conditions.

444. SAPN considers that its proposed investment delivers benefits to customers by avoiding the costs attributable to unserved energy when feeders are shut off.

The PSPS Mitigation Program expenditure was forecast via a bottom-up process

445. In its business case document SAPN indicated that the expenditure forecast has been developed through a bottom-up process summarised in Figure 4.31.

---

152   SAPN 5.6.1 Bushfire Risk Mitigation – January 2024 – Confidential. Pages 20 and 22.

153   SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Page 6.

154   SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Page 7.

Figure 4.31: SAPN's PSPS mitigation expenditure forecasting methodology
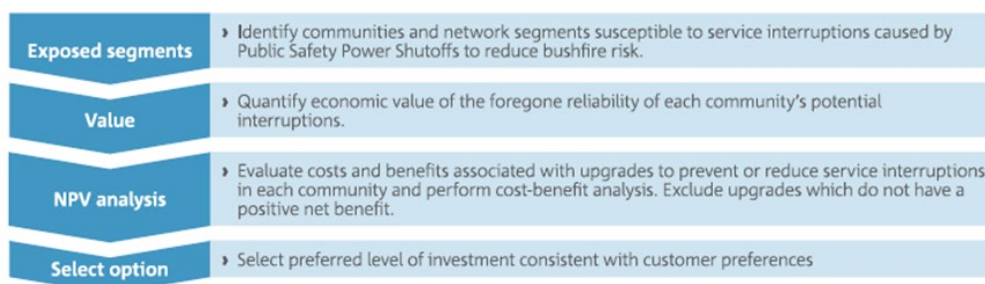
Source: SAPN_-_Attachment_5_-_Capital_expenditure_-_January_2024_-_Public, Page 48

SAPN has undertaken research and analysis to support the program

446. Analysis undertaken for SAPN by CSIRO found that increased use of PSPS would significantly increase the total number of customers who will have their supply interrupted during the bushfire season – and interrupted at critical times.[155] SAPN also undertook reviews of its feeders in high bushfire risk areas. The review enabled SAPN to identify the areas and feeders that would be suitable for the proposed treatment.

SAPN selected 17 candidate feeders for investment

447. SAPN established the following criteria to identify candidate feeders for investment to mitigate the impacts of PSPSs:

- A high likelihood of a PSPS, because of their bushfire risk

- A high consequence in terms of the number of customers that would be interrupted

- A low-cost upgrade solution to reduce the consequence (i.e. reduce the number of customers who would be interrupted).[156]

Assessment of SAPN's methodology and options

SAPN's forecasting methodology is reasonable

448. We are satisfied that:

- SAPNs forecasting methodology is reasonable other than our noted concerns with respect to the selection criteria - we are satisfied that the approach taken to derive the costs and the benefits are reasonable

- SAPN provided clear evidence that it has based its programs on sound analysis and data, including with the assistance of CSIRO

- SAPN has appropriately selected the candidates for investment.

SAPN has developed a reasonable range of options

449. Noting that SAPN pre-qualified 17 feeders as candidates for investment, we consider it reasonable for it to focus on two options only (i.e. in addition to 'do nothing').

450. SAPN identified the following credible options in its business case, with its preferred option being Option 1:

- Option 0 'do nothing'

- Option 1 'optimal program' upgrade on feeders that have a positive net-benefit for the upgrade

- Option 2 'full program' all identified upgrades on all 17 feeders, including those with a negative net-benefit.

---

[155]   SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Page 28.

[156]   SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Page 13.

451.   SAPN selected Option 1, the optimal program, which will reduce the number of customers interrupted during PSPSs by approximately 11,250, supplied from 12 bushfire risk feeders with high modelled bushfire risk and with positive NPV.

Our assessment of SAPN's PSPS Mitigation Program cost benefit analysis

SAPN selected Option 1 which we consider to be the prudent choice

452.   SAPN has provided the results of its cost-benefit analysis as reproduced in Table 4.9.

Table 4.9:   Results of SAPN's cost-benefit analysis – PSPS Mitigation Program

Option	$million ($FY22)			Customers improved
	Capex	Benefit (PV)	NPV	
O – Do nothing	0.0	0.0	0.0	0
1 – 'Optimal program'	3.5	14.5	9.6	11,258
2 – 'Full program'	7.0	17.4	8.0	13,510

Source: SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential, Table 22

453.   SAPN has also provided the results for each feeder from which it derived Options 1 and 2, where Option 2 includes all 17 candidate feeder projects, regardless of the net benefit and Option 1 excludes the five feeders for which the NPV is negative.[157]

454.   SAPN has selected Option 1, primarily because it had the higher NPV of the two viable options considered and despite the 'full program' assisting more customers during PSPS events.

455.   SAPN also presents the results of its sensitivity analysis which shows that its preferred Option 1 is NPV positive at the aggregate level for the 12 feeder projects.

456.   We consider Option 1 is superior to Option 2.

Some proposed projects are marginal however the cost saving would be small and would remove the benefit to estimated 1200 customers

457.   We also considered the robustness of the individual NPV results to negative variances by identifying projects from SAPN's cost-benefit analysis for which the BCR is less than or equal to 1.2. A low BCR may also indicate that the timing for the work may not be economically optimal in the next RCP.

458.   Three projects have a BCR less than 1.2 (in fact each have BCRs less than 1.0), with a combined capital cost of $2.3 million. The three projects are targeted undergrounding of feeder GA26 and remote switch installation on feeders GA43 and GA02. If these projects were not included in the program, the benefit to 3,500 customers would not be experienced. The largest of the three projects is for GA26 with a BCR of only 0.92 and capex of $1.6 million but it will mitigate the PSPS impact for 2,290 customers. We consider that it should be included in the program for the next RCP despite the uncertainty of realising the positive NPV.

459.   Given the small reduction in overall capex ($0.7 million, $2022) from removing the work on feeders GA43 and GA02 these projects should also remain in scope given they benefit 1,204 customers (or $600 per customer as a one-off cost, which is reasonable).

---

[157]   SAPN - 5.6.1 - Bushfire Risk Management - January 2024 – Confidential. Table 21.

4.5.4 Summary of our assessment of bushfire risk management augex programs

SAPN has demonstrated the opportunity for prudent risk reduction

460. SAPN has demonstrated that its assets and customers are subject to ongoing reliability and safety impacts from bushfires to the extent that there are candidate feeders for remedial action to mitigate risk. SAPN has appropriately identified that improvement initiatives need to demonstrate prudency and efficiency to satisfy the capital expenditure criteria.

461. SAPN has undertaken cost-benefit analyses based on a reasonable set of input assumptions for both the Bushfire Risk Mitigation Program and the PSPS Mitigation Program.

462. SAPN has demonstrated that it has researched and assessed options to address the stated objectives for its Bushfire Risk Mitigation Programs. It engaged expert advisors to assist with the analysis of issues and measures that could be taken to mitigate the identified risks and deliver positive benefits to customers and the public. This resulted in the refocussing of the current program to increase mitigation and deliver higher benefits.

463. SAPN has consulted with its customers and considered this when forming its proposal.

The program is required in addition to other augex and repex programs

464. SAPN provided[158] its assurance that it had taken steps to consider the interactions between inputs to expenditure. These steps included ensuring the avoidance of double counting throughout the regulatory proposal and identifying the optimisation of investments.

465. During our review we have not observed any double counting of project related expenditure or benefits.

The proposed capex for the Bushfire Risk Mitigation Program is likely to satisfy the capex criteria

466. SAPN demonstrated that it had considered a range of risk mitigation measures. The credible options represented a good range and were subject to options assessment using a CBA model. These models enabled sensitivity testing across a full range of input values.

467. We consider that the resultant program represents a prudent and efficient level of expenditure.

The proposed capex for the PSPS Mitigation Program is reasonable

468. SAPN undertook a process to identify candidate feeders for investment to mitigate the impact of PSPSs to the widest number of customers possible, provided the work could be demonstrated to be NPV positive.

469. We are satisfied with all but two of the proposed projects, both of which have NPV results which we consider not to be robust enough to provide sufficient certainty of providing a positive benefit over time. Excluding these two feeder projects would result in a small adjustment to the proposed cost of program, however we consider that in aggregate SAPN has provided a reasonable estimate of justified expenditure.

4.5.5 Implications for proposed bushfire management expenditure

470. We consider that the expenditure that SAPN has proposed, as shown in Table 4.7, is reasonable

---

[158] SAPN_-_Attachment_5_-_Capital_expenditure_-_January_2024_-_Public. Pages 81 & 82.

4.6 Our findings and implications for proposed augex

4.6.1 Summary of findings

SAPN has satisfactorily identified the need to invest in remediation of compliance and constraint driven projects and programs through augex in the next RCP

471. SAPN has adequately demonstrated the need to invest in responding to non-compliance (connection points, reliability) and to overcoming forecast constraints that arise because of the localised impacts of the strong demand forecast.

For capacity projects, SAPN's project selection criteria based on deterministic criterion (N / 10% PoE) and positive NPV is likely to lead to overstatement of a prudent level of augex because for some projects prudent deferral is a better option

472. We conclude that where SAPN has applied cost-benefit analysis with the selection criterion for including projects in the next RCP set to NPV > $0.0, this leads to including some projects that are unlikely to satisfy the NER capex criteria. Our concern is that given the uncertainty in underlying assumptions such as demand and cost over long study periods, the positive NPVs may prove to be unrealisable with even small unfavourable variances.

473. Similarly, SAPN has included some projects on the basis that they nominally meet the N / 10% PoE deterministic criterion, even though they have a negative NPV or for which the forecast may only marginally exceed the limiting capacity criterion. On further assessment of such projects, we consider that it is not consistent with the capex criteria to include all such projects in the expenditure forecast and that SAPN will find that some are not required, or for that for some there will turn out to be lower cost alternatives.

SAPN has reasonably sought to account for duplication of investment between augex in the categories we have assessed and other programs

474. In its business cases SAPN describes the steps it has taken to exclude either duplication or overlap of expenditure with other programs in the augex categories we have reviewed. With the exception of the Maintain Underlying Reliability Program in which we consider there may be beneficial impacts from SAPN's repex program and, to a much lesser extent, its targeted reliability improvement programs, we consider SAPN has done this satisfactorily.

The need for the proposed level of expenditure in 'maintaining underlying reliability' is not adequately justified

475. While there is some evidence of deteriorating or unsatisfactory reliability that needs to be addressed, this evidence is less compelling than SAPN has claimed and in some cases relies on relatively short-term trends that could equally be interpreted as statistical variance. Cognisant of (i) the high level of overspend in the current period compared to the AER's allowance, and (ii) the unjustified additional $10 million on protection settings, we are not convinced that the full extent of the proposed uplift is required.

SAPN's reliability improvement projects are economically justified

476. Whilst we note that the EDC will from July 2025 no longer include a definition for Low Reliability Feeders. However, we are satisfied that the feeders SAPN has selected for this program and for the regional and rural reliability improvement projects are justified on economic grounds. We therefore consider the proposed expenditure forecast to be reasonable.

SAPN's proposed bushfire mitigation program is reasonable as is its PSPS Mitigation program

477. SAPN has proposed two programs under one business case to (i) reduce the risk of fire starts and (ii) to reduce the customers who lose supply in the event of a bushfire occurring.

We have considered the selection criterion carefully, testing the robustness of the NPV analysis in generating positive NPVs.

478. On balance we are satisfied that SAPN has taken reasonable steps to select the projects for augmentation works.

4.6.2 Implications for proposed augex

479. Our estimate of an alternative forecast that reflects our findings on the augex components that we have been asked to review, is shown in Table 4.10.

Table 4.10: Proposed and adjusted augex for reviewed categories ($FY25)

	FY26	FY27	FY28	FY29	FY30	Total
Capacity:						
SAPN proposed	40.1	44.0	43.7	54.2	58.9	**240.9**
EMCa adjusted	36.0	40.5	35.6	38.4	53.5	**204.0**
Reliability:						
SAPN proposed	20.5	20.6	20.6	20.7	20.7	**103.1**
EMCa adjusted	16.2	16.2	16.2	16.2	16.2	81.0
Bushfire mitigation:						
SAPN proposed	5.1	5.1	5.1	5.1	5.2	**25.6**
EMCa adjusted	5.1	5.1	5.1	5.1	5.2	**25.6**
Sum of SAPN proposed	**65.7**	**69.6**	**69.5**	**80.0**	**84.8**	369.6
Sum of EMCa adjusted	**57.3**	**61.8**	**56.9**	**59.7**	**74.9**	310.6

Source: EMCa analysis derived from SAPN Capex model & Capacity Reset Business Case model

5 REVIEW OF FORECAST OF ICT CAPEX AND OPEX

SAPN proposes $132.7 million capex and $70 million opex for non-recurrent ICT projects, and $29.4 million opex for recurrent ICT projects, excluding Cyber Security projects. Our assessment does not include capex for recurrent projects, and we have provided our assessment of Cyber Security in a separate confidential report.

We consider that SAPN's proposed opex for recurrent ICT projects is reasonable. SAPN provided business cases for each of the three proposed amounts, including options analysis and evidence to support its proposed costings.

For non-recurrent ICT, we consider SAPN's proposed expenditure for most projects to be reasonable. SAPN provided evidence of forecasting methodologies, governance and management processes, detailed cost and benefit build-ups, NPV modelling, and business cases for each project.

The only two non-recurrent ICT projects that we consider SAPN has not adequately justified are *ESB AEMO Post 2025 Roadmap Changes* ($2.4 million capex) and *Legacy Metering Transition* ($4.8 million opex). SAPN states that the compliance requirements underpinning these two projects will not be finalised until later in 2024, and that it will submit justification for this expenditure in its revised proposal. As such we are unable to assess the prudency and efficiency of this expenditure at this stage.

5.1 Introduction

480. In this section we present our assessment of SAPN's proposed ICT expenditure, covering capex and opex, for non-recurrent ICT projects. We also present our assessment of recurrent opex for the three recurrent ICT projects for which SAPN has sought either a base year adjustment or a step change.

481. Due to confidential information, we assess proposed Cyber Security expenditure in a separate report.

482. For non-recurrent ICT projects, our assessment is based on our review of SAPN's business cases that were provided to us, together with CBA modelling that formed the basis of each business case. The structure of the SAPN business cases and the methodologies applied are the same for all projects, and as such our findings are largely the same for all projects.

483. SAPN has also provided a business case for each of the proposed recurrent opex projects. Our assessment of the proposed opex is based on consideration of the justification that SAPN has provided for the opex component of its proposal and assumes acceptance of the overall totex programs. We have sought to assess the possibility that the amounts might (in whole or in part) represent duplication of amounts presented elsewhere or included in base year opex.

484. This section of the report is structured as follows:

- Section 5.2 provides an overview of SAPN's proposed non-recurrent ICT expenditure
- Section 5.3 provides some observations on trend analysis and deliverability
- Section 5.4 provides our assessment of non-recurrent ICT expenditure
- Section 5.5 provides our assessment of recurrent opex for the three projects subject to review.

5.2 Overview of SAPN's proposed non-recurrent ICT expenditure

5.2.1 Overview

485. As shown in Table 5.1, SAPN has proposed $304.2 million ICT capex in the next RCP[159], with $168.8 million attributed to recurrent ICT and the balance of $135.5 million to non-recurrent capex in the next RCP.[160]

486. Our scope does not include recurrent IT expenditure, except for three items for which SAPN has proposed base year opex adjustments and opex step changes, which we discuss in Section 5.5.

487. The non-recurrent expenditure in Table 5.1 includes $3 million cyber security capex which we assess in a separate report due to confidentiality of the detailed information.

Table 5.1: SAPN's proposed 2025-2030 ICT capex ($m, FY25)

Category	FY26	FY27	FY28	FY29	FY30	Total
Recurrent	35.4	31.7	31.3	35.6	34.8	**168.8**
Non-recurrent	20.3	31.7	32.7	25.5	25.3	**135.5**
Total	**55.7**	**63.4**	**64.0**	**61.1**	**60.1**	**304.2**

Source: SAPN – 5.1.1 – AER Standardised Capex model – January 2024 – Public

488. In Table 5.2 we show the proposed ICT non-recurrent and recurrent opex. We have deducted cyber security opex, which is assessed in a separate report, to derive the opex assessed in the current report.

489. For opex step changes, we show the year-by-year values. However the majority of the proposed opex is represented by base year adjustments, which do not have explicit year-by-year values but rather feed into the overall BST opex forecast.

---

[159] Excluding $3.4 million capex for the OT cyber security program which is assigned to AER category 'Other non-network' .

[160] SAPN - 5.1.7 - Business cases to expenditure models reconciliation - January 2024 – Public.

Table 5.2:   SAPN's proposed ICT opex ($m FY25)

ICT opex	FY26	FY27	FY28	FY29	FY30	Total
Non-recurrent ICT opex:						
Step changes proposed	5.0	11.5	12.1	11.6	12.2	**52.4**
less Cyber Security	*-4.6*	*-10.9*	*-11.3*	*-10.4*	*-10.4*	*-47.6*
Opex step changes assessed	0.4	0.6	0.8	1.2	1.8	**4.8**
Opex base year adjustments proposed[161]	9.6	8.1	13.6	17.1	16.8	**65.2**
Total non-recurrent opex assessed	**10.0**	**8.7**	**14.4**	**18.3**	**18.6**	**70.0**
Recurrent ICT opex:						
Step changes proposed	4.3	4.8	5.5	6.2	6.7	**27.5**
less Cyber Security	*-3.5*	*-3.5*	*-3.5*	*-3.5*	*-3.5*	*-17.5*
Opex step changes assessed	0.8	1.3	2.0	2.7	3.2	**9.9**
Opex base year adjustments proposed[162]	3.9	3.5	4.1	4.2	3.8	**19.5**
Total recurrent opex assessed	**4.7**	**4.8**	**6.1**	**6.9**	**7.0**	**29.4**
TOTAL OPEX ASSESSED	**14.7**	**13.5**	**20.5**	**25.2**	**25.6**	**99.4**

Source: EMCa table, derived from information in SAPN opex model. Annual equivalents of proposed opex base year adjustments were provided by the AER.

490.   Table 5.3 lists the non-recurrent projects reviewed in this section. The majority of these projects are classified as 'Large Upgrades and replacements', with the primary driver being end-of-life (EOL) replacement, with a secondary driver for some projects being that the current system is no longer fit for purpose. SAPN has also proposed two projects classified as 'New or Expanded Capability' which it has justified with a positive NPV, and two projects classified as 'New Compliance' which are required to enable SAPN to meet new compliance requirements.

---

[161]   This data represents proposed expenditure in the year that SAPN expects the expenditure to he incurred. Note that SAPN has proposed regulatory treatment of this expenditure as a single base year adjustment and, if treated in this way, the annual impact on the allowed revenue would differ from this expenditure profile across the next RCP.

[162]   Ibid.

Table 5.3:   Non-recurrent ICT projects ($m, FY25). Total expenditure over the next RCP.

	Project	Capex	Opex	Total	Opex
Upgrade	Click Replacement	4.5	16.2	**20.7**	*Base*
Upgrade	Enterprise Data Warehouse replacement	16.5	2.1	**18.5**	*Base*
Upgrade	Integration Platform Replacement	15.1	0.0	**15.1**	*Nil*
Upgrade	Service Order System Replacement	24.0	0.0	**24.0**	*Nil*
Upgrade	SAP Module Lifecycle Management	14.3	1.2	**15.4**	*Base*
Upgrade	Consolidate Customer Portals	3.2	11.0	**14.2**	*Base*
Upgrade	Customer Notification System Replacement	11.8	0.0	**11.8**	*Base*
Upgrade	Website Replacement	0.4	2.4	**2.8**	*Base*
Upgrade	Meter Data Insights Replacement	0.5	2.0	**2.4**	*Base*
Upgrade	CRM Replacement	3.6	10.6	**14.3**	*Base*
New	Personalised on-demand services	1.4	8.3	**9.8**	*Base*
New	Assets & Work Phase 3	34.9	11.4	**46.3**	*Base*
Compliance	Legacy Metering Transition - Towards 2030	0.0	4.8	**4.8**	*Step*
Compliance	ESB AEMO Post 2025 Roadmap Changes	2.4	0.0	**2.4**	*Nil*
	TOTAL	**132.5**	**70.0**	**202.5**	

(Customer Technology Program — bracket spanning Consolidate Customer Portals through Personalised on-demand services)

Source: EMCa analysis, sourcing data from SAPN - 5.1.7 - Business cases to expenditure models reconciliation - January 2024 – Public. Note that the capex total for this table excludes $3.0 million of cyber security capex that was included in Table 5.1.

491.   As shown in Table 5.3 SAPN has proposed base year adjustments for the majority of opex associated with its non-recurrent ICT projects, except for the Legacy Metering Transition project for which it has proposed a step change.

5.2.2   Benefits realisation and the application of benefits

Total benefits of $528.6 million realise less than $50 million in tangible savings over 2025-30

492.   SAPN's ICT Plan (in $FY22) identifies $528.6 million in economic benefits forecast to be delivered by its ICT program over 2025-35, with $126.9 million forecast to be delivered over 2025-30.[163] The majority of the benefits over 2025-35 are non-financial, being risk monetisation ($272.8 million), avoided cost ($139.1 million) and customer time value ($10.7 million).[164] Realisable financial benefits, being cost savings, total $106.1 million over 2025-35, and $43.8 million for 2025-30.

493.   The $43.8 million in cost savings for 2025-30 are made up of benefits forecast for the Asset and Works project ($39.5 million) and from the Large Upgrades and Replacement category of ICT projects, as discussed below.

SAPN proposes a capex efficiency offset derived from the Asset & Works Phase 3 project

494.   SAPN's Asset and Works project is a discretionary project primarily driven by producing a net benefit through labour efficiencies in delivering its distribution network program of work. $39.5 million ($FY22) in cost savings is identified in the business case, which is recognised

---

[163]   SAPN - 5.12.1 - IT Investment Plan 2025-30 - January 2024 – Public, Section 7.7. Table 12.

[164]   SAPN - 5.12.1 - IT Investment Plan 2025-30 - January 2024 – Public. Table 11.

in SAPN's proposal as an efficiency dividend against its network capex forecast. We consider the quantum of the benefit in our consideration of this project in Section 5.4.

SAPN has elected to offset some of the new recurrent ICT-generated opex with benefits

495. SAPN has identified $4.3m ($FY22) in cost savings for the 'non-recurrent large upgrades and replacement' category of ICT projects for 2025-30. SAPN has proposed to use these cost savings to partially offset new recurrent opex of $10.1m for this ICT category which it has chosen not to seek funding for. SAPN has proposed to offset the remainder of this recurrent opex through unspecified productivity improvements.

5.3 ICT trend analysis and deliverability considerations

5.3.1 Trend and variance analysis

Variance of proposed expenditure to the current RCP and AER Allowance

496. Figure 5.1 shows SAPN's ICT expenditure profile through to the end of the next RCP, including cyber security expenditure. It also shows the AER's allowance (totex and recurrent) for the current RCP.

497. The 'below average' recurrent expenditure in the current RCP is proposed to cease in the next RCP with an above-average expenditure profile evident in Figure 5.1.

The cyclical nature of non-recurrent expenditure can lead to large variances from RCP to RCP

498. Figure 5.1 also shows the increase in non-recurrent expenditure in the next RCP reaching levels commensurate with the peak expenditure in FY21. The industry norm for major system replacements or upgrades is five to ten years, with technical obsolescence the most common driver. SAPN's expenditure profile shown in Figure 5.1 is therefore not uncommon. As discussed in more detail in Section 5.4, SAPN proposes a significant number of large upgrades and replacement of systems in the next RCP.

Figure 5.1: SAPN IT forecast versus historical: capex and new opex ($m, FY22)
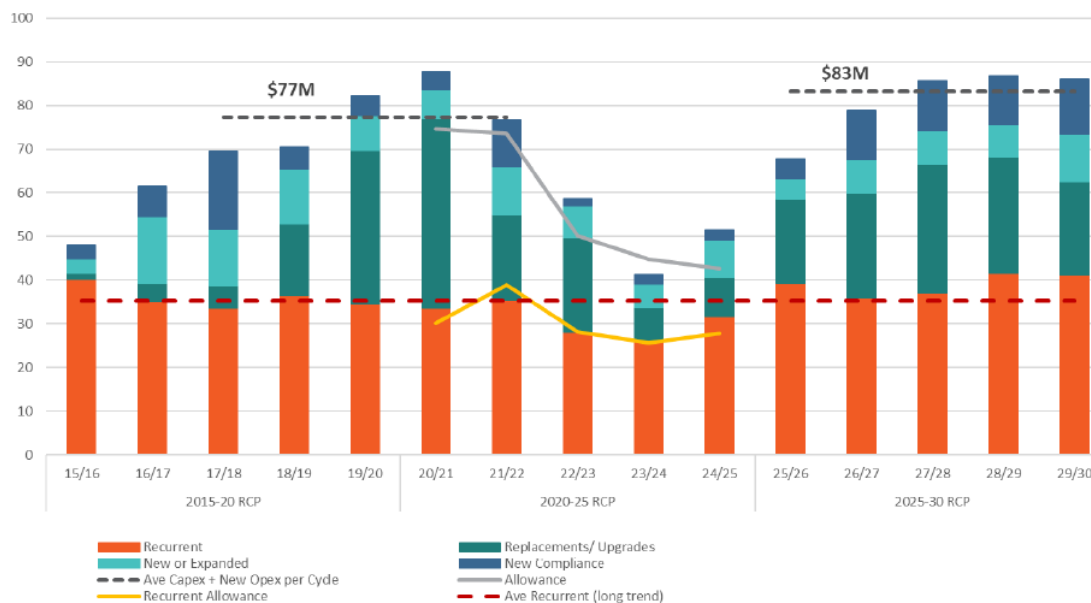
Source: SAPN, IT Plan 2025-2030, Figure 1

499. As shown in Table 5.4, SAPN's proposed non-recurrent totex is 37.0% higher than in the current RCP, including cyber security. The forecast totex for the current RCP is 19.2% higher than the AER allowance. SAPN explain that the estimated overspend for the current RCP is mostly due to a $12.7 million cost-shift from the previous RCP due to a project delay and a $14.7 million increase in upgrades and replacements not foreseen when the allowance was being set.[165]

Table 5.4:   Non-recurrent ICT project expenditure by category – including cyber security ($m, FY22)

Expenditure sub-category	2020-25 allowance	2020-25 forecast	2025-30 Proposed expenditure			Variance to 2020-25 forecast
			Capex	New opex	Total cost	
Replacements/ upgrades	73.9	101.5	81.0	40.1	**121.1**	19.3%
Compliance	18.4	20.8	4.6	46.3	**50.9**	144.7%
New or expanded capability	42.9	38.9	31.4	17.4	**48.9**	25.7%
Total	**135.2**	**161.2**	**117.0**	**103.8**	**220.9**	**37.0%**

Source: EMCa analysis, using data from SAPN IT Investment Plan 2025-30, Table 2

Other drivers of increased non-recurrent expenditure

500. In addition to the new cycle of end-of-life upgrades and replacements we refer to above, SAPN identifies projects to expand capabilities (to help facilitate the energy transition and customer engagement, and to reduce costs), and investments to increase cyber security maturity (to respond to increasing cyber risks) as key drivers.

5.3.2   Deliverability of the 2025-2030 ICT Program

501. We discuss SAPN's approach to 'optimising' its ICT program in Section 2.6.3. Here we consider SAPN's justification of the deliverability of its proposed program.

SAPN has provided information to support the deliverability of its ICT program

502. SAPN's ICT Plan presents its case for assuring the deliverability of its 2025-30 program at an efficient cost. The 'pillars' of its self-assessment are:[166]

- It has successfully delivered this magnitude of work before

- It has a track record of successfully estimating projects and delivering on time to budget (within usual allowances)

- It has developed a roadmap/Gantt chart showing, among other things, inter-dependencies and timing

- It has designed the portfolio (i) cognisant of delivery risks and benefits realisation, (ii) grouping related projects, and (iii) impacts of other organisational programs

- It has planned a steady increase in portfolio activity, as shown in Figure 5.2, which is underpinned by a '*mature, flexible and well-used resource augmentation model…*' and '…*effective approaches to managing high demand skills…*'

503. Much of the labour costs presented in Figure 5.2 are proposed to be capitalised, with the notable exception of labour associated with Software as a Service (SaaS).

---

[165]   SAPN - 5.12.1 - IT Investment Plan 2025-30 - January 2024 - Public. Page 19.

[166]   SAPN - 5.12.1 - IT Investment Plan 2025-30 - January 2024 – Public. Page 34-38.

Figure 5.2: SAPN's proposed IT spend profile ($m, FY22)
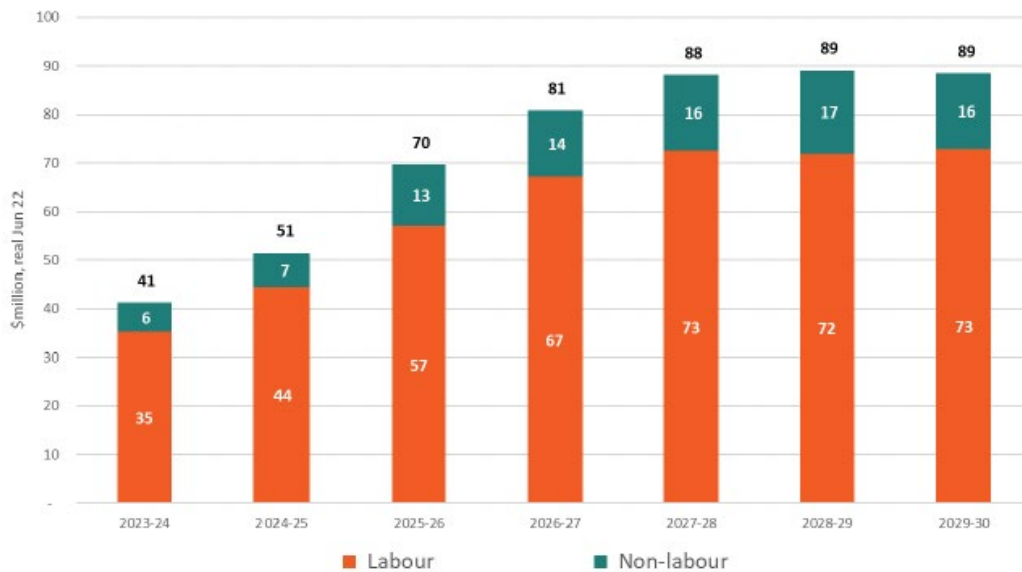
Source: SAPN - 5.12.1 - IT Investment Plan 2025-30 - January 2024 – Public, Figure 14

SAPN's ICT program is likely to be deliverable at an efficient cost

504.   We consider that the information provided in the IT Investment Plan and the supporting information in the ICT business cases are sufficient for us to conclude that SAPN's proposed ICT program is likely to be deliverable.

5.4 Assessment – Non-recurrent ICT

5.4.1 Overview

505.   In this section we assess the justification for SAPN's proposed non-recurrent ICT expenditure. SAPN has undertaken a bottom up build of its non-recurrent ICT expenditure forecasts and has allocated expenditure to either capex or opex in accordance with accounting principles. Given governance, management and forecasting methodology is the same for all non-recurrent ICT expenditure we have assessed both capex and opex together in this section.

506.   We have grouped our assessment by ICT non-recurrent sub-category, namely:

- Large upgrades and replacements
- Compliance
- New or expanded.

507.   We have called out specific issues relating to opex at the end of this section.

5.4.2 Large upgrades and replacements

Overview

508.   SAPN has forecast capex of $93.9 million and opex of $45.4 million in the next RCP for projects directed to maintaining existing service levels. Annual capex is shown in Table 5.5 and annual opex is shown in Table 5.6.

Table 5.5:   Capex forecast for large upgrades and replacement projects ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	Total Capex
Customer Technology Program						
Consolidate Customer Portals	0.0	0.0	0.9	1.1	1.1	**3.2**
Customer Notification System Replacement	1.4	7.9	2.5	0.0	0.0	**11.8**
Website Replacement	0.0	0.0	0.1	0.3	0.0	**0.4**
Meter Data Insights Replacement	0.5	0.0	0.0	0.0	0.0	**0.5**
CRM Replacement	0.6	3.1	0.0	0.0	0.0	**3.6**
Sub-total Customer Technology Program	**2.4**	**11.0**	**3.5**	**1.4**	**1.1**	**19.5**
Other Systems						
Click Replacement	0.0	0.0	0.3	3.8	0.4	**4.5**
Enterprise Data Warehouse replacement	0.0	1.8	8.7	3.7	2.2	**16.5**
Integration Platform Replacement	5.0	4.7	5.4	0.0	0.0	**15.1**
Service Order System Replacement	0.0	0.0	3.6	8.3	12.1	**24.0**
SAP Module Lifecycle Management	7.6	4.3	1.2	0.0	1.2	**14.3**
Sub-total other systems	**12.6**	**10.8**	**19.2**	**15.9**	**15.9**	**74.4**
TOTAL	**15.0**	**21.8**	**22.7**	**17.3**	**17.0**	**93.9**

Source: EMCa analysis, using data from SAPN – 5.1.1 – AER Standardised Capex model – January 2024 – Public and SAPN 6.1 Opex model.

Table 5.6:   Opex forecast for large upgrades and replacement projects ($m, FY25)[167]

	FY26	FY27	FY28	FY29	FY30	Total Opex
Customer Technology Program						
Consolidate Customer Portals	0.0	0.0	3.9	3.6	3.5	**11.0**
Customer Notification System Replacement	0.0	0.0	0.0	0.0	0.0	**0.0**
Website Replacement	0.0	0.0	1.3	1.1	0.0	**2.4**
Meter Data Insights Replacement	2.0	0.0	0.0	0.0	0.0	**2.0**
CRM Replacement	4.2	5.8	0.6	0.0	0.0	**10.6**
Sub-total Customer Technology Program	**6.2**	**5.8**	**5.8**	**4.7**	**3.5**	**26.0**
Other Systems						
Click Replacement	0.0	0.0	5.5	8.1	2.6	**16.2**
Enterprise Data Warehouse replacement	0.0	0.0	0.0	0.5	1.5	**2.1**
Integration Platform Replacement	0.0	0.0	0.0	0.0	0.0	**0.0**
Service Order System Replacement	0.0	0.0	0.0	0.0	0.0	**0.0**
SAP Module Lifecycle Management	1.2	0.0	0.0	0.0	0.0	**1.2**
Sub-total other systems	**1.2**	**0.0**	**5.5**	**8.6**	**4.1**	**19.5**
TOTAL	**7.3**	**5.8**	**11.3**	**13.3**	**7.7**	**45.4**

Source: Data supplied by the AER

Assessment

Key aspects of the AER's ICT Assessment Guideline for projects directed to maintaining existing services, functionalities, capability and/or market benefits

509. The AER expects that a business case should be provided to justify the project, with possible multiple timing and scope options to demonstrate prudency, and options for alternative systems and service providers to demonstrate efficiency.

510. A key criterion for establishing the prudency of the preferred option is that it should be the technically viable solution with the highest (often the least negative) NPV. The AER notes that the only exception to selecting an option with an inferior NPV is if the NSP can demonstrate that the unquantified benefits for that option contribute sufficiently to the case for the alternative.

511. We take these factors into account in our assessment.

Business cases and NPV analysis are provided for all projects

512. SAPN has provided business cases and NPV models for all projects. The NPV analysis includes the derivation of benefits.

---

[167] This data represents proposed expenditure in the year that SAPN expects the expenditure to he incurred. Note that SAPN has proposed regulatory treatment of this expenditure as a single base year adjustment and, if treated in this way, the annual impact on the allowed revenue would differ from this expenditure profile across the next RCP.

Need/risk assessment is sufficient to conclude that some form of action is required

513. The primary driver of the projects is risk, with looming end of life of the system (or application) the trigger for replacement/upgrade.[168] EOL is based on vendor advice and usually is determined as the cessation of extended support (if offered). In other cases, EOL is when the vendor advises that the product will be switched-off (i.e. without an extended support option offered). A second driver is that the current system/application is no longer fit for purpose.

514. For all projects within this category, we found that SAPN had presented sufficiently compelling information in its business cases for us to conclude that a prudent operator would investigate the need to address the associated risks (typically rated by SAPN as high or extreme by the end of the next RCP in the absence of treatment).

Option analysis is adequate

515. SAPN typically provides three options in the business cases. Its selection criteria align with the AER's ICT assessment guideline. SAPN also typically identifies options which it does not consider to be credible with reasons for its position.

516. In some cases,[169] the options presented for analysis are variations of the timing of the solution, however in many cases the options comprise of different solutions rather than different timings.

517. In each case, we find the following:

- The range of options considered by SAPN is sufficient to explore the technically viable alternatives based on scope or time variation

- SAPN has chosen the option with the highest NPV, noting that in most cases the NPV is negative, but as discussed above, this nonetheless aligns with the AER's guidance.

Project timing is adequately supported by SAPN's analysis

518. For the projects in this category, SAPN has established the timing of projects by managing the risk posed by the end date of an IT system's lifecycle. As discussed above, a secondary, but important consideration evident in some of the projects, is the risk posed by legacy systems that are no longer fit-for-purpose. SAPN further advises that it considers the timing to ensure the most cost-effective delivery approach across the portfolio asking the question:

> *is it more economic and better for the customers to make the change earlier or hold off as long as possible (including past the end of support date)? [170]*

519. SAPN explained that options to extend support are diminishing, either because of vendor practices, such as switching off systems or making it no longer legal to use a SaaS-based system once support ends, or because of the integration of modules with an existing larger system.[171]

520. SAPN also notes that managing technical debt is a prudent step in determining project timing. Technical debt refers to the cumulative consequences of prioritising speedy delivery over optimal long-term solutions, resulting in potential future costs, reworks and complications. SAPN cites benefits of $28.5 million from avoiding technical debt and rework across seven projects, and provides the example of its Integration System Replacement project timing for which it states:

---

[168] SAPN advises that in the case of its proposed 'Consolidate Customer Portals' project, the end-of-lie trigger applies to 'one of the key portal platforms' from which we infer other portals may not be at end-of-life. Nonetheless we consider EOL to be the trigger for the project

[169] For example, Click Replacement, Enterprise Data Warehouse Consolidation, and Integration Platform.

[170] SAPN response to IR018. Page 33.

[171] SAPN response to IR018. Page 32.

we plan to commence the replacement earlier, not only to spread the implementation risk across the RCP, but because of its ability to minimise long term technical debt i.e. reduce the cost for other dependent projects.[172]

521. SAPN also explained that it has optimised the timing of projects across its portfolio of IT projects and considers factors in addition to EOL such as deliverability and dependencies to maximise cost effectiveness across the portfolio.

522. We consider SAPN's approach to determining the timing for the projects in this category to be appropriate. Whilst there are some instances where perhaps a year's deferment may be possible, the risk-reward trade-off is likely to favour SAPN's proposed timing.

Costs are reasonably based

523. As discussed in Section 2.6.3, we consider that SAPN's IT forecasting methodology is sound. In our review of the projects in this category, we looked for evidence that its forecasting methodology was applied satisfactorily.

524. We are satisfied that there is sufficient evidence that the process has been followed:

- SAPN has provided detailed bottom-up forecasts for every project, typically based on one or more of:
  - Vendor budget quotes (but not tendered prices)
  - Leveraging off relevant historical costs
  - Third party input (i.e. consultants) either to shaping the scope or the cost or both
- SAPN has provided evidence of top-down challenge[173]
- SAPN has provided benchmarking showing its costs are reasonable compared to other DNSPs[174]
- SAPN has confirmed that forecasts do not include contingency amounts.[175]
- SAPN has proposed to self-fund extra recurrent opex incurred.

Benefits

525. SAPN has described its methodology for estimating benefits and has provided a detailed worksheet showing the build-up of benefits. Noting comments below, we consider SAPN's forecast of benefits to be reasonable.

526. We also consider SAPN's treatment of costs savings benefits, discussed in Section 5.2.2, as reasonable.

527. Upgraded and replacement systems will generally deliver new productivity enhancing functionality, in addition to the old systems capabilities. SAPN has accounted for most of these benefits as 'cost avoidance', that is eliminating growth in costs relative to the base year. The cost reductions relative to the base year that SAPN has modelled[176] are very modest compared to the 'cost avoidance' benefit. There is potential for SAPN's upgraded and replacement systems to deliver higher cost reductions than it has forecast. Although given these benefits are mostly not forecast to commence until late in the RCP, and given that they are difficult to quantify, we do not propose adjustments to SAPN's expenditure allowances for this reason. The AER could however take this potential cost savings into account in setting the opex productivity assumption for SAPN, and given the benefits are forecast to accrue from late in the RCP the AER could seek to ensure these cost savings are accounted for in the base year for the 2030-25 RCP.

---

172   SAPN response to IR018. Page 33.

173   SAPN response to IR018. Question 34.

174   SAPN response to IR018. Question 35.

175   SAPN response to IR018. Question 37.

176   SAPN has proposed to offset cost reductions against forecast growth in recurrent opex.

Review of aspects of proposed expenditure   AUSTRALIAN ENERGY REGULATOR | 103

Findings

528. We consider that SAPN has adequately demonstrated the prudency and efficiency of its proposed non-recurrent large upgrades and replacement ICT expenditure for the next RCP.

5.4.3 Compliance-driven projects

Overview

529. SAPN has forecast capex of $5.3 million and opex of $52.4m for three projects in this sub-category during the next RCP. SAPN's Cyber Security Uplift project is discussed in a separate report due to the highly confidential nature of the topic. Annual capex and opex for the two projects assessed in this section are shown in Table 5.7 and Table 5.8.

Table 5.7:   Capex forecast for SAPN's Compliance projects, not including cyber security ($m, FY25)

Project	FY26	FY27	FY28	FY29	FY30	Total
ESB AEMO Post 2025 Market Changes	0.0	0.6	0.0	0.1	1.7	**2.4**
Legacy Metering Transition	0.0	0.0	0.0	0.0	0.0	**0.0**

Source: SAPN – 5.1.1 – AER Standardised Capex model – January 2024 – Public

Table 5.8:   Opex forecast for SAPN's Compliance projects, not including cyber security ($m, FY25)

Project	FY26	FY27	FY28	FY29	FY30	Total
ESB AEMO Post 2025 Market Changes	0.0	0.0	0.0	0.0	0.0	**0.0**
Legacy Metering Transition	0.4	0.6	0.8	1.2	1.8	**4.8**

Source: SAPN - 6.1 - Opex Model - January 2024 – Public

Current position

ESB AEMO Post 2024 Roadmap Initiatives

530. The Australian Energy Market Operator (AEMO) has proposed network market system changes required to deliver post-2025 reforms by the Energy Security Board (ESB). Investment in SAPN systems will be required to remain compliant with national market changes and SAPN's license conditions and obligations.

531. AEMO is currently consulting on proposed changes and is expected to confirm compliance requirements later in 2024.

532. SAPN estimates cost of compliance at between $2 million and $11.9 million for the next RCP. Given this uncertainty SAPN has proposed a placeholder for $2 million capex for the next RCP and has proposed providing a revised business case with its revised proposal.

Legacy Metering Transition

533. The AEMC has recommended accelerating the rollout of smart meters to all customers by 2030, with DNSPs to develop a 'legacy metering retirement plan' and retailers to be responsible for installing smart meters at legacy sites. An increasing population of smart meters will increase costs for data storage and licensing.

534. SAPN has not provided any justification for its forecast for this sub-category. In response to an information request, SAPN stated:

> As discussed in the IT Investment Plan and mentioned in the EMCa Workshop on 24th June, this business case is still being developed, due to the ongoing nature of the

planning activities for the accelerated smart meter rollout in the National Market. We will provide the relevant updated information when it is submitted.[177]

Assessment and Findings

535. Given SAPN has not currently provided justification for its proposed expenditure for these two programs, we are unable to conclude that the proposed amounts are prudent or efficient in terms that satisfy the NER criteria. Once SAPN is in a position to provide such justification, then it will be possible to assess this based on substantiation of the need and of the estimated expenditure.

5.4.4 Projects to deliver new or expanded capability or functionality

Overview

536. SAPN has forecast capex of $36.3 million and opex of $19.7 million for two projects in this sub-category during the next RCP, as shown in Table 5.9 and Table 5.10. SAPN has proposed to treat the opex as base year adjustments averaged across the next RCP.

Table 5.9:   2025-30 capex forecast for new or expanded ICT projects ($m, FY25)

Project	FY26	FY27	FY28	FY29	FY30	Total Capex
Asset & Works Phase 3	5.3	8.7	9.0	7.2	4.7	**34.9**
Personalised on-demand services	0.0	0.0	0.0	0.0	1.4	**1.4**
Total	**5.3**	**8.7**	**9.0**	**7.2**	**6.1**	**36.3**

Source: SAPN – 5.1.1 – AER Standardised Capex model – January 2024 – Public

Table 5.10:   2025-30 opex forecast for new or expanded ICT projects ($m, FY25)[178]

Project	FY26	FY27	FY28	FY29	FY30	Total Opex
Asset & Works Phase 3	2.3	2.3	2.3	2.3	2.3	**11.4**
Personalised on-demand services	0.0	0.0	0.0	1.5	6.8	**8.3**
Total	**2.3**	**2.3**	**2.3**	**3.8**	**9.1**	**19.7**

Source: Data supplied by the AER

Assessment

Key aspects of the AER's ICT Assessment Guideline for new or expanded projects

537. The AER's foundational expectation for project justification is that a business case is provided to justify the project, including comprehensive options analysis.

538. A key criterion for establishing the prudency of the preferred option is that benefits should exceed costs (i.e. positive NPV), established through a cost-benefit analysis. Typically, the option with the highest NPV should be selected and consideration should be given to self-funding by the NSP. However, the AER notes that there may be cases where the non-quantified benefits in aggregate may justify choice of an alternative option.

---

[177] SAPN response to IR018. Page 61.

[178] This data represents proposed expenditure in the year that SAPN expects the expenditure to he incurred. Note that SAPN has proposed regulatory treatment of this expenditure as a single base year adjustment and, if treated in this way, the annual impact on the allowed revenue would differ from this expenditure profile across the next RCP.

539. Thirdly, the AER notes that for projects that either lead to or become recurrent expenditures in the future, the business case needs to identify and account for those costs in the cost-benefit analysis.

540. We take these factors into account in our assessment.

Business cases and NPV analysis

541. SAPN has provided business cases and NPV models for both projects. The NPV analysis includes the derivation of benefits.

Need / risk assessment is sufficient to conclude that some form of action is required

542. The driver for the Assets & Works project is primarily to extract efficiency gains from delivering distribution network services. It is positioned as a continuation to the preceding phases of the project: Phase 1 (in the period 2015-20) was focussed on foundational asset management elements[179]; Phase 2 (2020-25) is focussed on improving SAPN's approach to economic valuation of network investment.

543. The driver for the Personalised On-Demand Services project is to improve the efficiency of high-volume customer service processes, which are growing in demand, by digitalising those processes that are currently manual and paper based, and also to meet customer expectations for convenient online services.

Option analysis is adequate

Asset & Works Phase 3

544. The Asset & Works business case considered three options: maintaining service levels, deferring investment until the next RCP and the preferred approach. SAPN selected investing in the next RCP primarily because its cost-benefit analysis results in $38.8 million ($FY22) in tangible benefits in the next RCP and a further $49.8 million ($FY22) in the 2030-35 RCP for a NPV of $29.4 million ($FY22). This is the highest NPV of the options considered. SAPN has proposed offsetting 2025-30 capex with an efficiency adjustment of $45.0 million (1.8% of proposed capex) based on 8.75% labour cost savings for networks capex projects. With respect to the benefits analysis, we note the following:

- The positive NPV is largely dependent on investment savings in the 2030-35 RCP being realised and that without this the benefit to cost ratio would be insufficient to confidently warrant the proposed project

- The quantum of savings is based on SAPN's estimate of potential savings based on case studies pertaining to the seven sources of benefit[180]

- SAPN is on track to significantly outperform its benefits estimate from Phase 2 of the project, with $42.2 million deferred network investment so far (i.e. about the same that has been pro-offered for the next RCP)[181]

- Whilst most savings will be assigned to capex projects (i.e. via reduced capitalised labour), we expect there will be non-project opex benefits also.

545. From a combination of SAPN's benefit source descriptions, the benefit examples provided, its history in realising benefits from Phase 2, and our experience, we consider there is some upside potential in this estimate and that SAPN will be able to at least realise and possibly out-perform the $45 million (1.8%) capex offset offered from the proposed Phase 3 project.

Personalised On-Demand Services

546. The Personalised On-Demand Services business case considered three options:

---

[179] Such as asset data and a 'value versus cost' approach to network investment.

[180] Portfolio management, asset failure data, risk-cost modelling, demand forecasting, digital twin, digital engineering, asset information capture.

[181] SAPN - 5.12.15 - Assets & Work Phase 3 (Asset Management Transformation Program) - January 2024 – Public. Page 24, and SAPN - 5.12.1 - IT Investment Plan 2025-30 - January 2024 – Public. Page 24.

- Option 0 - Maintaining existing systems and services
- Option 1 - enabling new digital services
- Option 2 - Option 1 with extra services enabled.

547. SAPN's analysis found Option 1 to have the highest NPV and was also preferred by its customers. Whilst Option 2 offers greater benefits, the costs for that options are proportionally higher.

548. The NPV relies primarily on achieving cost avoidance benefit of $16.9 million across the next two RCPs, mostly during 2030-35, and a relatively smaller customer benefit also.

Project timing is adequately supported by SAPN's analysis

Asset & Works Phase 3

549. Project timing is ideally established through demonstrating the economically optimum point of investment on a project-by-project basis, which is the year in which the annualised cost is exceeded by the annualised benefit.

550. For the Asset & Works Phase 3 project, SAPN explored one alternative timing, deferral of expenditure to the 2030-35 RCP. We asked SAPN whether benefits could be maximised by deferring some components of the Project to maximise benefits. In response, SAPN advised that the components were not separable.[182]

551. We consider it highly relevant that SAPN has pro-offered the capex reduction referred to above and which approximately matches the proposed expenditure. Deferring the asset and works program would inevitably defer the benefits and reduce the extent to which SAPN could account for these as a capex deduction in the current period,

552. For these reasons, we consider SAPN's approach to determining the timing for the project is appropriate.

Personalised On-Demand Services

553. The NPV for this project is substantially positive relative to the proposed expenditure for the project, and any deferral of this project would deny customers the benefits that this project is expected to deliver until later. We also note that there are interdependencies between this and other projects within the Customer Technology Program. SAPN has optimised the timing of these projects to deliver the program efficiently and advised that it has profiled this project for deployment as soon as possible subject to dependencies.[183]

554. We consider the timing of this projects to be reasonable.

Costs are reasonably based

555. As discussed in Section 2.6.3 we consider that SAPN's approach to forecasting costs is reasonable. In our review of the projects in this category, we looked for evidence that its forecasting methodology was applied satisfactorily.

556. We are satisfied that there is sufficient evidence that the process has been followed for both projects:

- SAPN has provided detailed Excel workbooks showing the analysis underpinning the cost build-ups[184]
- SAPN has provided evidence of top-down challenge[185]

---

182 SAPN response to IR018. Question 40.

183 SAPN response to IR018. Question 28.

184 SAPN 5.12.27 Customer Technology Program estimate – Preferred and SAPN 5.12.15 Assets & Work Phase 3 estimate - Option 1 Preferred (Continue A&W Program in 2025-30)

185 SAPN response to IR018. Question 34.

- SAPN has provided benchmarking showing its costs are reasonable compared to other DNSPs[186]
- Bottom-up cost forecast for Asset and Works Phase 3 based upon:[187]
  - estimates leveraging SAPN's experience in delivering Asset and Works phases 1 and 2
  - the levels of activity to refresh and enable these systems are based on past experience of those systems as well as the estimates based on similar complexity systems for those newer systems.
- SAPN has confirmed that forecasts do not include contingency amounts.[188]

557. We consider SAPN's cost forecasts for the projects are reasonable.

Findings

558. We consider that both the Asset & Works Phase 3 and Personalised On-Demand projects are likely to satisfy the capex criteria, consistent with the AER's ICT Assessment Guidelines.

5.4.5 Assessment of opex arising from non-recurrent projects

559. As shown in Table 5.11, SAPN has proposed non-recurrent ICT opex of $70.0 million, including a $4.8 million opex step change and $65.2 million in opex base year adjustments.

Table 5.11: Non-recurrent ICT Opex ($m, FY25)

	Base year adjustments	Step change	Total
Non-recurrent ICT - Opex	65.2	4.8	**70.0**

Source: Source: EMCa analysis, sourcing data from SAPN - 5.1.7 - Business cases to expenditure models reconciliation - January 2024 - Public

560. Our assessment of non-recurrent ICT expenditure applies to total expenditure, and consistent with our findings above for capex we consider SAPN's proposed ICT non-recurrent opex to be reasonable, except for the Legacy Metering Transition project (for reasons that we discuss in Section 5.4.3).

561. SAPN has proposed most of its new opex as base year adjustments in accordance with the AER's advice on the treatment of SaaS expenditure. We understand that the AER is reviewing whether this expenditure would be better classified as an opex step change given the lumpy and short-term nature of the proposed expenditure. Whilst we have assessed the prudency and efficiency of the expenditure proposed, as requested by the AER we have not considered whether SaaS expenditure would be more appropriately treated as an opex step change.

562. As discussed in Section 5.3.1, SAPN is not seeking funding for $10.1 million in recurrent opex increases associated with its non-recurrent ICT program. It has proposed to offset the increase with cost savings expected to be delivered by its ICT program.[189]

563. In an information request we asked SAPN to detail opex incurred in the FY24 base year for relevant ICT projects. This allows us to assess whether the proposed opex step changes and base year adjustments may have been partly or wholly included in SAPN's base year opex.

---

[186] SAPN response to IR018. Question 35.

[187] SAPN - 5.12.15 - Assets & Work Phase 3 (Asset Management Transformation Program) - January 2024 – Public. Page 30.

[188] SAPN response to IR018. Question 37.

[189] SAPN - 5.12.1 - IT Investment Plan 2025-30 - January 2024 – Public. Page 30.

564. SAPN's response includes the base year expenditure for each ICT project and explanations of what is included in the base year amount, and distinguishing this from what is included in its proposed step changes and base year adjustments.[190]

565. SAPN has reported some opex in the 2023-24 opex base year for ICT projects proposed for the next RCP. SAPN states that new opex proposed for the next RCP is all in addition to opex reported for the base year.[191] SAPN further explained that the new opex proposed for the next RCP has different drivers, including:

- *Additional opex due to current period capex shifting to future period opex*

- *Additional opex due to the SaaS accounting changes (also an effective capex to opex change)*

- *Additional opex due to the new requirements.*[192]

566. We consider that the line item explanations that SAPN provides in this response are reasonable in each case, and that there is not apparent duplication.

Findings

567. Consistent with our findings for non-recurrent ICT capex, we consider that SAPN has adequately demonstrated the prudency and efficiency of its proposed non-recurrent ICT opex, except for the opex step change of $4.8 million proposed for the Legacy Metering Transition project.

5.5 Assessment of SAPN's proposed recurrent IT opex adjustments and step changes

5.5.1 Overview of what SAPN has proposed

568. SAPN has proposed base year adjustments and opex step changes for three items of recurrent expenditure, totalling $29.3 million. For each of these, the recurrent opex is associated with a larger amount of capex, which we have not been asked to review.

569. The relevant items are shown in Table 5.12.

Table 5.12: Proposed recurrent ICT opex ($m, FY25)

Item	Proposed opex	Proposed regulatory inclusion	Associated non-recurrent capex
IT infrastructure refresh	9.9	Step change	39.5
ICT applications refresh	16.3	Base year adjustment	72.7
Data analytics and intelligent systems refresh	3.2	Base year adjustment	13.8
Total	**29.3**		**126.0**

Source: SAPN opex model and SAPN 5.1.7 – Business case to expenditure models reconciliation

570. SAPN has provided a business case for each of the proposed recurrent opex 'projects. Our assessment of the proposed opex is based on consideration of the justification that SAPN

---

[190] SAPN response to IR023.

[191] SAPN response to IR023. Page 1.

[192] SAPN response to IR023. Page 1.

has provided for the opex component of its proposal and assumes acceptance of the overall totex programs. As part of our assessment, we have sought to exclude the possibility that the amounts might (in whole or in part) represent duplication of amounts presented elsewhere or included in base year opex.

5.5.2   Assessment

Consideration of AER guidelines

571.   As discussed in Section 2.6.3, the AER has a published guideline on assessment of ICT expenditure, that we have taken into consideration in our review.[193] While the principal topic of the guideline is ICT capex, there are aspects of it that are relevant to assessment of recurrent opex. This is especially the case since the guideline was published, given the decreasing capitalisation of ICT expenditure and consequently increasing opex, such that proposed ICT expenditure is most appropriately considered on the basis of 'totex'.

572.   We observe firstly the expectation that businesses will provide business cases, including sufficient information to demonstrate the prudency and efficiency of the proposed expenditure allowance. The guideline makes specific mention of (opex) step changes, though notes the expectation that this would be commensurate with the significance of the step change.[194]

573.   Secondly, we note the reference to expenditure to '*maintain existing services, functionalities, capability and/or market benefits*', the acknowledgment that this will not always have a positive NPV and that in this case it is reasonable to choose the least negative NPV.[195]

Overview of assessment rationale

574.   The proposed amounts reflect some or several of the following factors:

- Shift from capex to opex, including opex resulting from the industry-wide pivot to SaaS solutions

- Increased capacity requirements (e.g. for smart meter data)

- Increased ICT requirements to support the increasing levels of data-driven functionality, including for network asset decision-making and due to the energy transition and associated impact of DER.

575.   At a general level, these are supportable bases for increased ICT opex, though we comment below on specific matters that we considered.

Assessment – Infrastructure Refresh

SAPN produced a satisfactory business case and considered reasonable options

576.   For Infrastructure Refresh, SAPN provided a business case[196] in which it considered three options:

- Option 1: Maintaining current level of expenditure ('base case')

- Option 2: Maintaining the existing service level ('business as usual')

- Option 3: Accelerating the transition to the cloud.

577.   SAPN's assessment of these options is as shown in Figure 5.3.

---

[193]   Non-network ICT capex assessment approach, November 2019.

[194]   Non-network ICT capex assessment approach, November 2019. Pages 10 and 11.

[195]   Non-network ICT capex assessment approach, November 2019. Page 11.

[196]   SAPN 5.12.7: ICT business case: Recurrent – IT infrastructure refresh.

Figure 5.3: SAPN assessment of options for IT infrastructure refresh

Option	2025–2030 costs			10-year estimates		Residual risk rating
	Capex	Opex	Total	Risk avoidance benefits	NPV	
Option 1 – Current five-year expenditure 2020–25 (Base case)	36.5³	-	36.5	N/A	-61.9	High
Option 2 – Business as usual (Preferred)	34.1	8.8	42.9	N/A	-78.6	Low
Option 3 – Transition faster to cloud	43.2	15.8	59.1	N/A	-109.5	Low

Source: SAPN 5.12.7: Business case for IT infrastructure refresh

SAPN's preferred option is prudent

578. SAPN's CBA covers only costs, as SAPN has not quantified the risk avoidance benefits. However, SAPN provides what we consider to be a comprehensive three-tier risk assessment for each option against the categories of:

- Network
- Customer
- Safety
- Governance
- Technology, and
- Performance and growth

579. For each of these categories, SAPN describes its considerations in arriving at a rating of high, medium or low risk against each of these categories, for each of the three options together with a 'do nothing' option. SAPN undertakes this assessment by considering four scenarios.

580. We consider that SAPN's assessment method represents a thorough approach. Unsurprisingly, the 'do nothing' option, which would involve no expenditure over the next period, would result in an extreme overall residual risk. SAPN assesses Option 1 as resulting in a 'high' residual risk, and Options 2 and 3 a 'low' residual risk.

581. Having reviewed the basis for SAPN's assessments at the granular level of categories and scenarios that SAPN has considered, we consider that SAPN's judgments represent a reasonable assessment of the overall residual risk of each option. On this basis, we consider it reasonable that SAPN has rejected the lowest net present cost option (i.e. Option 1). SAPN assesses the residual risk of Options 2 and 3 to be the same (i.e. 'low'), and we are satisfied that SAPN's preferred option (Option 2) is the prudent choice given that it has the lower net present cost of these two options. Option 2 also therefore represents the optimum timing.

582. Given that Option 3 would involve an accelerated transition, and that the more negative NPV demonstrates that this is not justified, Option 2 also therefore represents prudent timing.

The basis for SAPN's estimation of proposed opex is reasonably demonstrated

583. SAPN describes the derivation of its proposed opex as follows:

- $1.8 million is related to capex/opex shift
- $1.6 million is related to forecast growth in data storage and computing for smart meter billing and analytics

- $5.3 million is related to increased capacity for forecast growth in BAU data storage and computation requirements.[197]

584. Each of these amounts are for cloud computing services and so are reasonably defined as 'opex'. While the specific calculations are not provided, we consider that the level of granularity of SAPN's cost estimation is indicative of a sound bottom-up approach and is reasonable for the level of costs proposed.

585. We were initially concerned that a component of the proposed cost ($1.6m for smart meter analytics) may duplicate similar costs in SAPN's 'network visibility' proposal. However, on closer review of the business cases, we observe that the infrastructure costs allowed for in this business case are for 'BAU' meter data and that the implications of the accelerated smart rollout and the utilisation of PQ data for 'network visibility' purposes are separately allowed for in the network visibility proposal.

SAPN provides trend information that further supports its proposed expenditure

586. SAPN's business case includes an expenditure comparison that shows that while its proposed expenditure for the next RCP would be more than its forecast for the current RCP, it is less (in real terms) than its actual expenditure in the 2015-20 RCP, once reduction in capex is taken into account (due to transition to the cloud).[198] While this analysis is not definitive, we consider that it provides a worthwhile top-down reasonableness check.

SAPN's proposed recurrent opex for IT infrastructure refresh is reasonable

587. We consider that SAPN has adequately demonstrated that its proposal represents a prudent needs-based option and that its proposed recurrent opex step change is reasonable.

Assessment – Applications Refresh

SAPN produced a satisfactory business case and considered reasonable options

588. For Infrastructure Refresh, SAPN provided a business case[199] in which it considers three options:

- Option 1: Maintaining current level of expenditure ('base case')

- Option 2: Maintaining the existing service levels with a prudent level of expenditure

- Option 3: Patching and upgrading all systems based on vendor schedules, regardless of criticality.

589. While SAPN's reference to 'prudent' in its description of Option 2 could be considered circular, we consider that this option is reasonably defined as representing a 'risk-based' approach to refresh of applications which takes account of their criticality. This usefully distinguishes this option from Option 3.

590. SAPN's assessment of these options is as shown in Figure 5.4.

---

[197] SAPN IT infrastructure business case. Page 26 and Appendix B.

[198] SAPN IT infrastructure business case. Table 4.

[199] SAPN 5.12.4: ICT business case: Recurrent – IT applications refresh.

Figure 5.4: SAPN assessment of options for IT applications refresh

Option	2025–2030 costs			10-year estimates		Residual risk rating[3]
	Capex	Opex	Total	Benefits	NPV[4]	
Option 1 – Maintain existing levels of expenditure	58.4	12.2	70.5	N/A	-115.3	**High**
Option 2 – Maintain existing levels of service with a prudent level of expenditure	62.8	14.4	77.2	N/A	-126.3	**Medium**
Option 3 – Patch and upgrade all systems based on vendor recommended cycles	86.2	15.2	101.4	N/A	-167.6	**Medium**

Source: SAPN 5.12.4: Business case for IT applications refresh

SAPN's preferred option is prudent

591. As with its infrastructure refresh business case, SAPN provides a detailed three-tier risk assessment against a range of categories, from which it arrives at the overall residual risk ratings shown in Figure 5.4.[200] For this assessment, SAPN considers two scenarios and assesses the three options together with a hypothetical 'do nothing' option.

592. We consider that SAPN's judgments at the granular level represent a reasonable assessment of the overall residual risk of each option. On this basis, we consider it reasonable that SAPN has rejected the lowest net present cost option (i.e. Option 1).

593. SAPN considers an option of patching and upgrading all systems in accordance with vendor release schedules (Option 3). However, SAPN considers that applying a prioritisation approach based on business criticality, will allow it to maintain the existing level of service at a totex cost that is $24.2 million less than this option.[201] As shown in Figure 5.4, SAPN assesses the residual risk of Options 2 and 3 to be the same (i.e. 'medium'), which validates its preferred option (Option 2) as the prudent choice.

594. Given that Option 3 would involve accelerated patching and upgrading, and that the more negative NPV demonstrates that this is not justified, Option 2 also therefore represents prudent timing.

The basis for SAPN's estimation of proposed opex is reasonably demonstrated

595. SAPN has derived its costs on a bottom-up basis taking account of the frequency of system refresh requirements for each type of application. For the opex component, SAPN has considered which specific applications will be SaaS based and provides examples of those that it has considered, and which include Microsoft 365, Project Online, ServiceNow and several SAP applications.[202] The proposed opex step change is a capex-to-opex switch which SAPN is proposing as a base year adjustment, claiming consistency with AER guidelines on such expenditure.

SAPN provides trend information that further supports its proposed expenditure

596. SAPN provides information that supports its claim that it reduced recurrent expenditure in the mid years of the current RCP (and which it explains as having been deferred in favour of its non-recurrent program) and provides trend evidence that shows that this was well below historical levels.[203] This evidence shows that on a totex basis, while SAPN's proposed recurrent expenditure for applications refresh will be more (in real terms) than in the current RCP, it will be less than its average expenditure in the 2015-20 RCP. In broad terms, this

---

[200] SAPN's assessment at this level of detail is in Appendix C of its business case.

[201] SAPN 5.12.4 business case. Table 6. Totex for option 3 ($101.4 million) less option 2 ($77.2 million) = $24.2 million.

[202] SAPN Applications Refresh Business Case. Page 20 and Appendix B.

[203] SAPN 5.12.4 Business case. Figure 1.

demonstrates a stable long-term level of expenditure, consistent with it being classified as 'recurrent'.

SAPN's proposed recurrent opex for IT applications refresh is reasonable

597. We consider that SAPN's choice of preferred option represents a prudent and supportable approach and that the increased opex requirement is adequately justified by the continued migration to SaaS.

Assessment – Data analytics and intelligent systems refresh

SAPN's proposed opex base year adjustment reflects a capex to opex switch due to migration to SaaS. The amount is the same for the two options considered.

598. For this business case, SAPN presents two options.[204] In this case the opex is the same for both options (i.e. $3.2 million, as shown in Table 5.12), and they differ only with respect to the required capex.

599. While the choice of option therefore does not have implications for the proposed opex, we consider that the increased opex is adequately justified in SAPN's business case. The key elements of this justification are the need to support the increasing utilisation of analytics to support improved decision-making and improved management of the SAPN network, and the shift to cloud-based solutions for this purpose.

600. For this component, SAPN also presents analysis in which it has sought to assess monetised risk-benefits. While noting that the proposed opex represents only around 20% of the proposed totex, SAPN nevertheless derives a positive NPV for both options and a higher NPV for its preferred option.[205]

SAPN's proposed opex is derived as a bottom-up costing for specific data analytics applications

601. SAPN's cost estimation is based on bottom-up costings for specific applications. SAPN describes the relevant applications and their movement to SaaS as follows:

> During the 2020–25 RCP, key reporting capabilities migrated from onsite to SaaS cloud-based services. This includes Microsoft Power BI and part of SAP reporting (to SAP Analytics Cloud) and the Informatica data governance tool.[206]

602. We consider that this is a reasonable approach to estimating the required expenditure.

SAPN's proposed expenditure allowance represents an increase compared with the current RCP

603. At a totex level, SAPN's proposed option is for $14.8 million ($2022). This is greater than its forecast expenditure of $11.4 million (real $2022) in the current RCP. However, we observe that its expenditure was below average in the first year of the current RCP and its average expenditure in the remaining three to four years would be equivalent to around $13 million (in real terms) and therefore on a trajectory closer to its proposed totex for the next RCP.

SAPN's proposed expenditure is reasonable

604. We consider that SAPN's proposed opex step change for data analytics is a reasonable amount, reflecting the combination of increased analytical requirements and SaaS migration. On a qualitative basis, we also consider that this expenditure needs to be incurred in the proposed timeframe – i.e. in the next RCP. We also consider that SAPN's

---

[204] SAPN 5.12.8: Business Case: Recurrent – Data Analytics and Intelligent Systems Refresh.

[205] SAPN 5.12.8 Business Case. Table 6.

[206] SAPN 5.12.8 Business Case. Appendix B

level of justification is commensurate with the relatively low significance of this proposed step change, consistent with the AER's guideline.

Assessment with respect to base year expenditure

605. We sought information from SAPN on its expenditures in the relevant programs in its 'base year', in order to assess whether the proposed opex step changes and base year adjustments may have been partly or wholly included in SAPN's base year opex.

606. SAPN provided a relatively detailed response in which it lists each ICT program together with base year expenditure and explanations of what is included in the base year amount, and distinguishing this from what is included in its proposed step changes and base year adjustments.[207] In its response, SAPN states that the '*step changes and base year adjustments……are in addition to values reported in 2020-25 for all line items.*'

607. We consider that the line-item explanations that SAPN provides in this response are reasonable in each case, and that there is not apparent duplication.

5.5.3 Finding

608. We consider that the three recurrent ICT opex step changes and base year adjustments that SAPN has proposed, as listed in Table 5.10, are reasonable.

5.6 Our findings and implications for proposed ICT expenditure

5.6.1 Summary of findings

609. In this section we assessed SAPN's proposed capex and opex for non-recurrent ICT projects and opex for recurrent ICT projects, excluding cyber security expenditure which we assess in a separate report.

610. We find the categories of SAPN's proposed ICT expenditure that we reviewed to be reasonable, with two exceptions that we refer to below. SAPN provided evidence of forecasting methodologies, governance and management processes, detailed cost and benefits build-up, NPV modelling, and business cases for each project. For opex, SAPN has satisfactorily explained that its proposed new opex is in addition to opex reported in its opex base year.

611. The only two ICT projects that we do not accept are ESB AEMO Post 2025 Roadmap Changes and Legacy Metering Transition. SAPN stated that the compliance requirements underpinning these two projects will not be finalised until later in 2024, and that it would submit justification for this expenditure in its revised proposal. As such we are therefore currently unable to confirm that the proposed amounts reflect prudent and efficient forecasts, as required by the NER criteria.

5.6.2 Implications for proposed non-recurrent ICT capex

612. SAPN proposed non-recurrent ICT capex of $132.7 million (excluding the cyber security uplift program). We found that capex for the ESB AEMO Post 2024 Roadmap Initiatives project should not be accepted, representing a reduction of $2.4 million. As shown in Table 5.13, this results in non-recurrent ICT capex allowed of $130.4 million.

---

[207] SAPN response to IR021.

Table 5.13: Implications for proposed non-recurrent ICT capex ($m, FY25)

	FY26	FY27	FY28	FY29	FY30	Total
Non-recurrent ICT capex proposed	20.4	31.8	32.8	25.6	25.3	**135.7**
less Cyber Security Uplift	*-0.1*	*-0.6*	*-1.0*	*-0.9*	*-0.4*	*-3.0*
Sub-total Non-recurrent ICT capex assessed	20.3	31.2	31.8	24.6	24.8	**132.7**
less adjustment for ESB AEMO Post 2025 Roadmap Changes	*0.0*	*-0.6*	*0.0*	*-0.1*	*-1.7*	*-2.4*
Non-recurrent ICT capex adjusted (excl. Cyber Security)	**20.3**	**30.6**	**31.8**	**24.5**	**23.2**	**130.4**

Source: EMCa analysis, using data from SAPN - 5.1.1 - AER Standardised Capex model - January 2024 -Public

5.6.3   Implications for proposed ICT opex adjustments and step changes

Non-recurrent opex

613.   SAPN proposed new non-recurrent ICT opex of $70.0 million (excluding Cyber Security). We find that opex for the Legacy Metering Transition project is not currently justified, representing a reduction of $4.8 million. As shown in Table 5.14, this results in non-recurrent ICT opex allowed of $65.2 million.

Table 5.14: Implications for proposed non-recurrent ICT opex ($m, FY25)

Non-recurrent	FY26	FY27	FY28	FY29	FY30	Total
ICT non-recurrent opex step changes proposed	5.0	11.5	12.1	11.6	12.2	**52.4**
less Cyber Security	*-4.6*	*-10.9*	*-11.3*	*-10.4*	*-10.4*	*-47.6*
ICT non-recurrent opex step changes assessed	0.4	0.6	0.8	1.2	1.8	**4.8**
ICT non-recurrent opex base year adjustments proposed [208]	9.6	8.1	13.6	17.1	16.8	**65.2**
Total non-recurrent ICT opex assessed	10.0	8.7	14.4	18.3	18.6	**70.0**
less adjustment for Legacy Metering Transition	*-0.4*	*-0.6*	*-0.8*	*-1.2*	*-1.8*	*-4.8*
Non-recurrent ICT opex adjusted (Excl. Cyber Security)	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**65.2**

Source: EMCa analysis, using data from SAPN - 6.1 - Opex Model - January 2024 – Public and SAPN 5.1.7 – Business case to expenditure models reconciliation. Annual non-recurrent opex base year adjustments were provided by the AER.

Recurrent opex

614.   SAPN proposed new recurrent ICT opex of $29.4 million (excluding Cyber Security), comprising $9.9 million of step changes and a base year adjustment of $19.9 million. As shown in Table 5.15, we find SAPN's proposed new recurrent opex to be reasonable and have not proposed any adjustments.

---

[208]   This data represents proposed expenditure in the year that SAPN expects the expenditure to he incurred. Note that SAPN has proposed regulatory treatment of this expenditure as a single base year adjustment and, if treated in this way, the annual impact on the allowed revenue would differ from this expenditure profile across the next RCP.

Table 5.15: Implications for proposed recurrent ICT opex ($m, FY25)

Recurrrent	FY26	FY27	FY28	FY29	FY30	Total
ICT recurrent opex step changes proposed	4.3	4.8	5.5	6.2	6.7	**27.5**
less Cyber Security	*-3.5*	*-3.5*	*-3.5*	*-3.5*	*-3.5*	***-17.5***
ICT recurrent opex step changes assessed	0.8	1.3	2.0	2.7	3.2	**9.9**
Plus ICT opex base year adjustments proposed [209]	3.9	3.5	4.1	4.2	3.8	**19.5**
Total recurrent ICT opex assessed	0.8	1.3	2.0	2.7	3.2	**29.4**
less adjustments	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	***0.0***
Recurrent ICT opex adjusted (Excl. Cyber Security)	**0.8**	**1.3**	**2.0**	**2.7**	**3.2**	**29.4**

Source: EMCa analysis, using data from SAPN - 6.1 - Opex Model - January 2024 – Public and SAPN 5.1.7 – Business case to expenditure models reconciliation. Annual opex base year adjustments were provided by the AER.

---

[209]   Ibid.

6 NETWORK VISIBILITY OPEX STEP CHANGE

SAPN proposes an opex step change of $6.8 million. It proposes to enhance its data analytical framework and storage and processing capability, to utilise the 'basic' smart meter data that (under an AEMC rule change) is expected to become available at no cost and which, by 2030, will be available from 100% of customer connections. SAPN has provided a business case, with associated CBA, based on use cases that will provide enhanced customer safety from service line neutral integrity detection, improved DER hosting capacity and energy conservation savings.

We consider that SAPN's proposed expenditure is justified.

6.1 Introduction

615.   In this section we assess the justification for a step change that SAPN has proposed for a program to enhance visibility of its LV network.

6.2 Overview of SAPN's proposed network visibility opex step change

6.2.1 Overview

616.   In the operating expenditure attachment to its regulatory proposal, SAPN proposes opex of $6.8 million ($FY25) for a program to enhance its network visibility capability over the next RCP.[210] The intended program will involve developing systems to receive, store and process basic PQ data from smart meters that, under a rule change, is expected to become available to DNSPs at no cost.[211] The proposal includes expenditure to implement data analytics and business process to enable several use cases utilising this data.

617.   The proposed expenditure is shown in Table 6.1.

Table 6.1:   Proposed step change for network visibility program ($m FY25)

	FY26	FY27	FY28	FY29	FY30	**TOTAL**
Network visibility step change	1.0	1.2	1.4	1.5	1.6	**6.8**

Source: SAPN opex model (Document 6.1), Calc|Opex forecast sheet

618.   SAPN has provided a business case to support its proposal.[212] Noting that the business case is presented in $FY22, it refers to proposed capex of $7.93 million and opex of $5.96 million. When converted to $FY25 terms, the opex forecast in SAPN's business case is equivalent to the amount that SAPN has proposed as a step change.

---

[210]   SAPN RP, Attachment 6 – Operating Expenditure. Page 32.

[211]   See AEMC Final Report: Review of the Regulatory Framework for Metering Services, August 2023, page ix: *To help DNSPs get efficient access to power-quality data (PQD) from smart meters, we recommend implementing a Basic PQD access framework that provides DNSPs access at no direct cost.* For updates on this rule change process please refer to the AEMC website.

[212]   Business Case: Network Visibility (January 2024)

6.2.2   SAPN's business case

Use cases

619.   SAPN's business case is based on actualising three use cases, providing the following benefits:

- Customer safety benefits from detecting neutral integrity faults on services

- Reduced export curtailment due to more accurate information on hosting capacity used in calculating Dynamic Operating Envelopes (DOEs), enabling flexible export limits, and

- Energy savings for consumers from being able to reduce average network supply voltages through targeted identification and proactive reduction of voltages at specific supplies where they may have been (or, through DER exports may have become) unnecessarily high.

What is required to deliver the program

620.   SAPN's business case leverages off the target set in the AEMC's metering review of a 100% smart meter rollout by 2030, and the AEMC's recommendation that basic meter data, being 5-minute PQ data provided between 6-hourly and daily, should be made available to DNSPs at no cost.[213] SAPN's proposed program comprises development of a data analytics platform that is scalable to provide the capability to receive basic PQ data from >1 million end-points, supplemented by near real-time data from around 1,000 end-points. The program will provide specific data analytics and development of associated business processes to actualise the targeted use cases, together with some other use cases that will be trialled.

621.   SAPN presents the expenditure required to deliver the proposed program as shown in Table 6.2. Almost all of the proposed expenditure is for the visibility and analytics platform, storage and processing infrastructure.

Table 6.2:   Proposed expenditure items for network visibility ($000 FY22)

OPEX item	FY26	FY27	FY28	FY29	FY30	TOTAL
Visibility and analytics platform licencing	479	537	594	651	668	**2,928**
Data processing and storage infrastructure	353	423	493	563	633	**2,466**
Smart meter data procurement (high frequency sample)	20	20	20	20	20	**100**
Overheads	72	83	94	105	112	**467**
Total cost	**924**	**1,063**	**1,202**	**1,339**	**1,434**	**5,961**

Source: EMCa, derived from information in SAPN 5.7.6 CBA network visibility model, sheet DER005 Visibility v5

622.   The opex increases over the RCP as the number of smart meters increases, therefore requiring higher licencing charges and higher storage and processing costs. SAPN has also provided a forecast of its required expenditure beyond 2030, which it utilises for its CBA, and we observe that the opex of $1.4 million in 2030 represents a plateau that is assumed to continue. This is consistent with the assumption that smart meter deployment will be at 100% from 2030.

SAPN's presentation of CBA

623.   SAPN's summary of its CBA is as shown in Table 6.3.

---

[213]   Final Report: Review of the Regulatory Framework for Metering Services. AEMC. 30 August 2023.

Table 6.3:   SAPN NPV for network visibility options ($m FY22)[214]

	Net Present Cost			Net Present Benefit				
	Capex	Opex	**NPC**	Neutral integrity	CECV	Voltage reduction	**NPB**	**NPV**
Option 0 - Base case	0	0	**0**	0	0	0	**0**	**0**
Option 1 - 100% data	-7.43	-15.06	**-22.49**	8.98	6.58	65.20	**80.76**	**58.27**
Option 2 - 30% data	-9.53	-11.27	**-20.80**	2.69	4.60	45.64	**52.93**	**32.13**

Source: EMCa, from information in network visibility business case, Table 4

624. SAPN defines its base case as its counterfactual. It assumes that SAPN does not source any smart meter data other than the very small amount that it obtains for its current small-scale trials. Consequently, under its base case it would not be able to develop any of the proposed use cases and it would incur no additional expenditure.

625. Option 1 is SAPN's preferred (and therefore proposed) option and would involve obtaining and utilising the basic PQ data from all smart meters as it becomes available. In SAPN's CBA, the 'energy conservation' benefit from voltage reduction is the dominant benefit and this option has the highest NPV.

626. SAPN also analyses a scenario in which it would obtain PQ data from only 30% of smart meters. It explains that capex would be slightly higher because of the reduced opportunity to utilise smart meter data to validate aspects of its network model. Neutral integrity-related safety benefits would be reduced to only 30% of the benefit achieved with 100% data. CECV and voltage reduction benefits would also be less than with 100% data, though SAPN estimates that 70% of these benefits can be achieved with only 30% of the data.

6.3   Assessment

6.3.1   Assessment of SAPN's CBA

While SAPN's CBA overestimates the benefits, SAPN has demonstrated that its proposed program is economic provided the AEMC rule change enables provision of PQ data at no cost

627. We consider that SAPN has overstated the economic benefit from the voltage reduction use case, by basing its assessed energy conservation benefit on the retail price of electricity to consumers.

628. In response to our information request, SAPN provided a model that showed how it had calculated the energy conservation saving. This is based on a cost saving that is costed at a retail Default Market Offer (DMO) value of $460/MWh.[215] The DMO is a regulated reference point for the retail price paid by residential and small business customers and would be a reasonable proxy value for assessing the financial savings that customers should achieve. However, the economic value of energy saved is more reasonably given by the wholesale cost of the energy itself.

629. In its advice to the AER in setting the DMO for 2024/25, ACIL Allen has estimated a Total Energy Cost for SAPN residential and small customers of $218.44/MWh.[216] This is a wholesale market cost and takes account of network losses and environmental costs. We

---

[214]   In SAPN's CBA model, the relevant NPV column heading states that NPVs are over 20 years. However, we confirmed that its NPV calculation is over 15 years, which is consistent with statements in its business case (footnotes 31 and 32).

[215]   SAPN 5.7.6 CVR model.

[216]   Default Market Offer 2024-25: Wholesale energy and environment cost estimates for DMO6 Final Determination, ACIL Allen (22 May 2024), Report to AER. Table 4.36.

consider this to be a reasonable proxy for the economic cost of energy delivered to SAPN's customers, and therefore of the economic benefit per unit of energy saved.

630. We consider that other elements of SAPN's assessment of the achievable voltage reduction and the achievable energy savings from this, are reasonable. Applying the ACIL Allen economic value per unit of energy saved will reduce the voltage reduction benefit by just over a half. However, as we show in Table 6.4, the CBA nevertheless provides a clearly positive NPV.

Table 6.4:   EMCa alternative proxy CBA with reduced voltage reduction benefit ($m, FY25)

	Net Present Cost			Net Present Benefit				
	Capex	Opex	NPC	Neutral integrity	CECV	Voltage reduction	NPB	NPV
Option 0 - Base case	0	0	**0**	0	0	0	**0.00**	**0.00**
Option 1 - 100% data	-7.43	-15.06	**-22.49**	8.98	6.58	30.96	**46.52**	**24.03**
Option 2 - 30% data	-9.53	-11.27	**-20.80**	2.69	4.60	21.67	**28.96**	**8.16**

Source: EMCa analysis with alternative voltage reduction benefit

A network visibility program of the proposed scale would not be economic if SAPN was required to purchase PQD

631. SAPN has undertaken alternative CBA runs, to test the sensitivity of needing to purchase PQ data. By comparison with the NPV of $58.27 million for Option 1 shown in Table 6.3, SAPN derives an NPV of negative $9.29 million for 'option 1a', that is, if it was required to purchase this data at market rates.[217] In our alternative analysis, the NPV would be further reduced by the reduced benefits (NPB) shown in Table 6.4 compared with those in SAPN's analysis in Table 6.3.

632. In SAPN's sensitivity analysis, it derives an NPV of $13.2 million for Option 2a (i.e. purchasing 30% data),[218] however if the alternative (lower) benefit assumptions as shown in Table 6.4 were applied, then this option too would result in a negative NPV.

Observations on neutral integrity benefit

Estimates of neutral integrity safety benefits are challenging but SAPN's estimate may be conservative

633. With 850,000 customers, SAPN estimates a neutral integrity safety benefit with a PV of $8.98 million.

634. SAPN has applied its Value Framework risk values to safety risks.[219] This scales risks from minimal (minor injuries) to catastrophic (fatality). In accordance with its framework, SAPN applies a VSL (Value of Statistical Life) of $5 million, with a 6X Disproportionality Factor (DF) for calculating the risk-cost of a fatality, and a value of $1.5 million with a DF of 5.3 for a 'severe injury'.

635. SAPN has utilised OFGEM information on the likelihood of death or serious injury from a pole failure, in deriving a likelihood of consequence from a service line failure. Of failures leading to a fatality or serious injury, SAPN ascribes a factor of 0.4 to the likelihood of a fatality and 0.6 to a serious injury. SAPN also factors in risks of lesser consequences resulting from Lost Time Accidents.[220]

---

217   SAPN 5.7.6 Network visibility business case, table 4

218   As above

219   SAPN 5.7.6 Network visibility business case, appendix B. Table 18.

220   As above. Table 23.

636.   As an indication of a result from this, SAPN derives a total likelihood of a fatality (resulting from a failure) as 0.0013056%, and the total likelihood of a severe injury of 0.0019584%. (as well as factoring in the likelihood of lesser consequences as described above).[221]

637.   As a comparator, Ergon Energy has slightly fewer customers (around 780,000) and in its CBA for its use case based on neutral integrity detection utilising basic smart meter data, it has estimated a benefit with a PV of $84.2 million.[222] In deriving this estimate, Ergon has assumed that 0.02% of service line failures and 0.0003% of service line defects, result in a fatality.[223] We observe the difference of the order of a factor of 10 in the resulting benefit estimates from Ergon and SAPN, and which appear to result largely from the order of magnitude difference in the assumed likelihood of a service line failure resulting in a fatality.

638.   Compared with Ergon's risk-cost estimate, we observe that SAPN's estimate is more granular and includes supporting evidence that is absent from Ergon's estimate. While individual parameters can be debated, the fact that SAPN's estimate is an order of magnitude less than Ergon's also suggests to us a degree of conservatism by SAPN that further supports the validity of its business case.

SAPN's cost estimation

639.   SAPN has derived its cost estimate from information from its pilot program, which involves 25,000 smart meters, 7,638 customer inverters and 500 transformer monitors. Its opex forecast costs are based on vendor pricing for the relevant systems and current market pricing for the relatively small amount of data that is to be purchased.

640.   We consider that SAPN's approach is likely to have resulted in a reasonable forecast of efficient costs.

6.3.2   Treatment of proposed expenditure as a step change

641.   SAPN claims that the proposed expenditure arises from the impact of external factors (notably CER) that are not accounted for under the inbuilt provisions that account for growth, prices and productivity.[224] We consider that this is a valid claim and that the proposed expenditure meets the requirements for treatment as a step change.

642.   We also note that the expenditure that SAPN has proposed is additional to its base (BAU) expenditure. We do not see evidence of a need to adjust the proposed amount as, relative to this, there was no expenditure in the base year.

6.4   Our findings and implications for proposed opex step change

643.   We consider that SAPN has adequately demonstrated the need for its proposed opex step change of $6.8 million ($FY25) in the next RCP.

---

[221]   As above. Table 23.

[222]   Ergon 6.05A Business case for Smart Meter Data Acquisition and LV Monitor. Table 2.

[223]   Ergon 6.05A (as above). Page 8.

[224]   SAPN Attachment 6 – Operating Expenditure. Page 33.