SP AusNet Revenue Determination: Technical Review

Findings on SP AusNet's Revenue Proposal

PUBLIC (REDACTED) VERSION

Report to

Australian Energy Regulator

Energy Market Consulting associates
Strata Energy Consulting

August 2013

This report has been prepared to assist the Australian Energy Regulator (AER) with its determination of the appropriate revenues to be applied to the prescribed transmission services of SP AusNet from 1 April 2014 to 31 March 2017. The AER's determination is conducted in accordance with its responsibilities under the National Electricity Rules (NER).

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

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

Except where specifically noted, this report was prepared based on information provided by SP AusNet prior to an Engagement Meeting on 30th May 2013 and at which the key findings emerging from this review were discussed with SP AusNet. The findings and recommendations in this report are nevertheless considered valid based on all information provided in response to our presentation up to 24th July 2013.

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About Strata

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

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Date saved:	28/08/2013 11:44 a.m.
Version:	FINAL PUBLIC (REDACTED) TO AER v4.0
Acknowledgements:	Analysis, report drafting assistance and QA: Mark de Laeter and Choon Yen Chee. Review input from John Scott.

Table of Contents

1 Introduction 7
1.1 Purpose of this report 7
1.2 Regulatory framework 7
1.3 Approach taken for the review 8
1.4 Data sources 9
1.5 Structure of this report 9
1.6 Our qualifications 11
2 Findings and recommendations 12
2.1 Findings and recommendations 12
2.2 Implications of these findings 18
2.3 Other observations 20
3 Expenditure Trends 21
3.1 Capex trends 21
3.2 Opex trends 28
4 Asset management and expenditure planning 34
4.1 Introduction 34
4.2 Overview of assets works planning and management within SP AusNet 34
4.3 Capex program and portfolio planning 37
4.4 Capex project cost estimation 43
4.5 Opex program and expenditure planning 47
4.6 Overall findings on asset management and expenditure planning 48
5 Replacement capex– Stations 51
5.1 Overview 51
5.2 Review of CBD Substations 52
5.3 Review of Major substations 62
6 Asset Replacement, Safety and Compliance and Non-System Capex 65
6.1 Introduction 65
6.2 Overview 65
6.3 Assessment of the asset replacement programs expenditure proposal 67
6.4 Assessment of the safety, security and compliance expenditure proposal 68
6.5 Assessment of non-system capex (excluding IT) 68
6.6 Assessment of IT capex 69
6.7 Conclusions on Asset Replacement, Safety and Compliance and Non-System Capex 77

7 Opex 79
7.1 Introduction 79
7.2 Step changes in recurrent maintenance 80
7.3 Asset Works 89
7.4 Opex efficiency gains 97
7.5 Recurrent opex – base and other adjustments 97
8 Contingent Projects 99
8.1 Overview 99
8.2 Findings 100
9 STPIS 102
9.1 Overview 102
9.2 SP AusNet's proposed STPIS parameters 102
9.3 Assessment of SP AusNet's method 103
9.4 Findings on STPIS 104
9.5 Recommendations on STPIS parameters 107
Appendices 109
Annex A: Assessment of Parsons Brinkerhoff recommendations on STPIS 110
Annex B: Capex and Opex trends 113
Annex C: Current RCP capex project variance 116
Annex D: Addendum re WMTS 118
Annex E: Resumes 122
Glossary 128

Tables

Table 1: Source of capex adjustments 19
Table 2: Results of capex adjustments (by proposed expenditure category) 19
Table 3: Opex adjustment table 20
Table 4: Capex summary – Current and next RCP 22
Table 5: Capex comparisons of average annual expenditure 22
Table 6: Opex summary – current and next RCP 29
Table 7: Opex comparisons of average annual expenditure 30
Table 8: Comparison between proposed and actual Opex 32
Table 9: Current RCP Capex comparison 38
Table 10: Analysis of projects proposed and undertaken during current RCP 41
Table 11: Proposed projects and programs of work, by type and status 42
Table 12: Proposed cost 52
Table 13: Effect of one-year deferral of WMTS rebuild 55
Table 14: GIS vs AIS comparative cost 59
Table 15: Proposed and adjusted WMTS capex allowance 61
Table 16: Proposed capex for major stations capex (as reviewed) 62
Table 17: SP AusNet Group IT 70
Table 18: Benchmarks 72
Table 19: Proposed opex: comparison of incremental expenditure and step changes 83
Table 20: Step changes (As adjusted by EMCa) 88
Table 21: Current and next RCP asset works program opex and associated metrics 92
Table 22: Current RCP and proposed asset works programs 95
Table 23: STPIS 108
Table 24: Programs 116
Table 25: Projects 116
Table 26: Roll In/ Roll Out 117
Table 27: Cost difference between GIS and AIS 120

Figures

Figure 1: Proportion of annual average non-load expenditure – current versus next RCP 23
Figure 2: Capex: Comparison between Current RCP and Next RCP 23
Figure 3: Proportion of annual average non-network expenditure – current versus next RCP 24
Figure 4: Proposed increase in non-network expenditure 24
Figure 5: Capex comparison with 2007-08 RP and associated AER Decision 25
Figure 6: Capex comparison with 2007-08 RP and associated AER Decisions - Cumulative 26
Figure 7: Capex comparisons – excluding CBD Rebuilds -cumulative 26
Figure 8: Opex : Comparison between Current RCP and Next RCP 31
Figure 9: Opex comparison with 2007-08 RP and associated AER Decision 32
Figure 10: Opex comparison with 2007-08 RP and associated AER Decisions - Cumulative 33
Figure 11: SP AusNet expenditure forecasting methodology 35
Figure 12: Capex comparison with 2007-08 RP and associated AER Decision 38
Figure 13: Project cost variance 40
Figure 14: Program cost variance 40
Figure 15: Current RCP cost estimation variance by project size 46
Figure 16: Capex: Comparison between Current RCP and Next RCP 52
Figure 17: As proposed($2013/14) 55
Figure 18: As adjusted ($2013/14) 55
Figure 19: GIS Cost minus AIS Cost ($m) 58

Figure 20: GIS Cost minus AIS Cost (as % of GIS Cost) 59
Figure 21: Asset replacement programs capex 66
Figure 22: Safety, security and compliance capex 66
Figure 23: Non-system capex 67
Figure 24: SP Group IT expenditure, by regulated business 70
Figure 25: Proportion of transmission-related IT expenditure, by IT initiative (2009 – 13) 71
Figure 26: Proportion of transmission-related IT expenditure, by IT initiative (Proposed 2014 – 2017) 71
Figure 27: SP Group IT expenditure, by regulated business (%) 73
Figure 28: Proportion of transmission-related IT expenditure, by IT initiative (2009 – 13)) 76
Figure 29: Proportion of transmission-related IT expenditure, by IT initiative 76
Figure 30: Current and next RCP recurrent opex, showing proposed step changes 81
Figure 31: SP AusNet's categorisation of proposed step changes 82
Figure 32: Recurrent controllable expenditure, with adjusted step changes 89
Figure 33: Opex: Asset works 90
Figure 34: Current RCP Asset works: 2007 Revenue Proposal and revised revenue Proposal versus actual/estimated ($2013/14) 91
Figure 35: Capex – Detailed trending by category (RRP 2008 v current RCP Actual/Estimate)and as proposed for next RCP 113
Figure 36: Opex – Detailed trending by category – Current RCP (RRP 2008 vs. current RCP Actual/current Estimate) and as proposed for next RCP 114

1 Introduction

1.1 Purpose of this report

1. The Australian Energy Regulator (AER), in accordance with its responsibilities under the National Electricity Rules (NER), is required to conduct an assessment into the appropriate revenue to be obtained from provision of prescribed transmission services provided by SP AusNet for the years 2014/15 to 2016/17 (the next regulatory control period, or RCP). The process that the AER is required to follow is described in chapter 6A of the NER.

2. SP AusNet provided its Revenue Proposal for the period 2014-17 to the AER on 28th February 2013.

3. The AER engaged EMCa and Strata Energy Consulting (Strata) as a Technical Consultant to review and provide advice on specific areas of SP AusNet's Revenue Proposal. The focus of the review is on SP AusNet's past and forecast capital expenditure (capex) and operational expenditure (opex), associated policies and procedures, proposed contingent projects and its service standard proposals.

4. The purpose of this report is to provide the AER with our findings from our technical review.

1.2 Regulatory framework

1.2.1 The NER requirements

5. The main relevant chapter of the NER for our assessment of transmission revenue proposals is Chapter 6A which deals with the rules for economic regulation of transmission services, including such services provided by SP AusNet.

6. The Revenue Proposal must establish how forecast expenditure meets SP AusNet's regulatory obligations. To do this the forecast expenditure must meet the submission

guidelines, be for prescribed transmission services, and be provided as a total and for each year of the regulatory control period. In addition, the revenue proposal must identify whether forecast capex is for reliability augmentation (i.e. to meet the reliability standards in the NER or State legislation) or has met the regulatory investment test for transmission.

7. Under the NER, the AER must accept SP AusNet's proposal if the costs are considered efficient, prudent, and realistic in relation to forecast demand and anticipated input costs as set out in the Operating Expenditure Criteria (cl 6A.6.6 (c)) and the Capital Expenditure Criteria (cl 6A.6.7(c)).

8. SP AusNet can propose contingent projects as part of its revenue proposal. These are subject to the same capex and opex tests as non-contingent expenditure. A trigger must be set to determine if and when the capex and opex associated with contingent projects will be added to the aggregate annual revenue requirement (AARR). When the trigger event occurs, SP AusNet must make an application to the AER for inclusion of the contingent capex and opex in a revised revenue allowance.

1.3 Approach taken for the review

9. The scope for this review covers the requirements for the technical consultant as set out in the AER's "Terms of Reference for Technical Consultant" (the TOR). Our interpretation of the TOR was also informed by direct reference to the NER, as described above. The terms of reference for the Technical Consultant were subject to a number of clarifications and some changes of emphasis as the review progressed. This review is primarily focused on SP AusNet's proposed capital and operational expenditure.

10. AEMO plans and procures SP AusNet's augmentation and connection capex and therefore EMCa was not required to review these components of SP AusNet's expenditure.

11. This technical review considers SP AusNet's actual expenditures for the current RCP and considers the reasons for any significant variances from the expectations and assumptions on which the revenue allowance was based. This assessment also takes into account material variations between historical expenditures (planned and actual) and the proposal.

12. The scope of this review can be summarised as comprising the following components:

Asset ownership and management structure and practices	Assessed SP AusNet's asset management framework as an integral part of the assessment of its capex and opex forecast. This included an assessment of the treatment of capex / opex trade-offs, including its use of condition monitoring, performance monitoring and risk assessment as tools and information to inform its decision-making.

Replacement capex forecast methodologies and assumptions	Provided a description of the methodologies and assumptions used by SP AusNet when determining the replacement capex forecast Sought to identify SP AusNet's use of innovation and efficiency management and reasonable incorporation of these assumptions in the capex forecast
Cost estimation methodologies	Reviewed the cost estimation methodologies used by SP AusNet for capex projects and opex programs to test for reasonableness and potential bias
Contingent projects review	Reviewed contingent projects to test their justification and compliance with the requirements of the NER.
Replacement capex projects review	Reviewed a sample of projects that are included in the development of the prescribed transmission services capex forecast
Opex planning and management	Reviewed opex plan development methodologies and practices (including input data, such as asset age and condition monitoring, and work prioritisation) and performance against comparative benchmarks.
Service target incentive scheme	Reviewed the accuracy of inputs and the appropriateness of the methodology used and targets proposed by SP AusNet

1.4 Data sources

13. In the course of this review we have examined a large quantity of documents. This includes documents that SP AusNet provided to the AER with its Revenue Proposal and a number of other significant documents that were provided in the course of the on-site meetings or in response to our requests for information. We held on-site meetings with SP AusNet from 18th – 21st March, and held a follow-up meeting for clarification and feedback on 30th May 2013.

14. We wish to acknowledge the considerable assistance that SP AusNet provided with this review. This assistance was of a highly professional nature, as evidenced in the course of on-site meetings and by SP AusNet's prompt and open provision to us of supporting information and responses to queries.

1.5 Structure of this report

15. The structure of this report is, to the extent possible, aligned with the structure of the AER TOR and with the above scope for the review.

Section	Title	Content
1	Introduction	The section sets out the purpose and scope of this review
2	Findings and recommendations	The section provides the key findings and recommended capex and opex adjustments
3	Expenditure Trends	Provides an outline of SP AusNet's replacement capex forecast for the next RCP and reviews capex and opex for the current RCP and its implications for expenditure forecasts in the revenue proposal for the next RCP
4	Asset management and expenditure planning	This section provides an overview and assessment of SP AusNet's approach to: • Integrated asset management: – Total asset life cycle methodology – System condition and risk management – Asset performance data – Project management methodology • Innovation and efficiency • Benchmarking
5	Replacement capex– Stations	This section includes: • A review of the project components of the replacement capex forecasting method • Key assumptions on which the replacement capex program of works and expenditure forecast is based • Our review and finding from our review of the CBD substation and Major substation replacement capex projects • Assessment of the deliverability of each project reviewed
6	Asset Replacement, Safety and Compliance and Non-System Capex	This section includes the review of proposed general asset replacement work, including safety and compliance capex, communications capex and non-system capex. Of this, the major review focus is on the IT program, specifically: • The construction and composition of the IT capex forecast

Section	Title	Content
		• Current and next RCP transmission-related IT expenditure • IT capex cost estimation method and assumptions • Business Case for the IT expenditure proposal
7	Opex	Provides an outline of SP AusNet's opex forecast for the next RCP This section also covers the assessment of and findings regarding: • Recurrent opex, in particular, the proposed step changes • Asset works • Other controllable operational expenditure
8	Contingent Projects	This section covers the assessment of and findings regarding the three proposed contingent projects
9	STPIS	This section provides the analysis and recommendations regarding SP AusNet's STPIS proposal

1.6 Our qualifications

16. To support our management-level approach, the review team is comprised of people with senior Management, Board and senior advisory experience with electricity network businesses. The credentials of our team are summarised in Appendix E.

2 Findings and recommendations

17. This section of the report provides our review findings and the recommended actions and adjustments based on those findings. We also indicate the overall impact of making the proposed adjustments.

2.1 Findings and recommendations

2.1.1 General observations and areas of focus

18. SP AusNet's PAS 55 accredited asset management framework comprises well documented asset related policies and strategies that guide the procedures used by the business to establish its capex and opex forecasts. We found that SP AusNet has introduced a two stage process for reviewing the projects and work programmes to establish a reasonable priority order for projects and programs of work. For the most part, SP AusNet undertakes appropriate analysis to establish the need, scope and proposed timing of individual projects and programs of work.

19. We have found some exceptions in which SP AusNet's application of the asset management framework for the purposes of establishing the Revenue Proposal are not sufficiently rigorous and have led to the proposal of some items of expenditure that are not sufficiently justified. We consider also that SP AusNet has focussed overly at the individual project and program level and has paid less attention to the realism and scope of the aggregate portfolio of projects and programs that it proposes. Given SP AusNet's considerable underspend against the similarly built-up budgets that it proposed for the current RCP, we consider this to be a weakness in the proposed budget which has led to over-forecasting the expenditure needs for the next RCP.

20. Following the initial analysis, we identified the following aspects of the proposed budget on which to focus our review:

- The timing, assumed technology and proposed capex budget for the West Melbourne Terminal Station project;
- Proposed capex on other major stations;
- Proposed IT capex and related opex savings;
- Capex cost estimation, prudency and deliverability;
- Proposed opex step changes;
- Proposed opex asset works program;
- Contingent projects;
- STPIS.

2.1.2 Findings on proposed capex

Overall finding on proposed capex

21. We find that key elements of the replacement capex proposed by SP AusNet are not reasonable in terms of the NER requirements because we consider that:

- The proposed level of expenditure for the replacement of West Melbourne terminal substation based on Gas Insulated Switchgear(GIS) infrastructure has been insufficiently justified and should be reduced and the proposed timetable is unlikely to be met;
- The proposed expenditure on two of the major substation replacement projects has been insufficiently justified and should be reduced;
- The business case for the significant level of proposed IT capex does not justify the level of expenditure.

Proposed West Melbourne Terminal Station (WMTS) expenditure

22. While we support the need for refurbishment of WMTS, we consider that:

- The case for this station to be rebuilt as a GIS station is not compelling and leads to a high estimate. We are not persuaded by the arguments that a rebuild as a GIS station is required for visual amenity, space or refurbishment logistics. We do not consider SP AusNet's costing of an AIS alternative to be a reliable estimate, and we consider that this is likely to have led to premature rejection of this option on the assumption that the costs are "close";
- We are not persuaded by arguments that SP AusNet can adequately manage the risk of undertaking this refurbishment in parallel with Richmond Terminal Station refurbishment, and major work at other major CBD-supply substations. The "risk graphs" which were produced to show the optimum timing of the WMTS do not include sufficient allowance for the additional risks arising from undertaking these projects at the same time. We therefore consider a more prudent overall risk profile can be achieved by deferring WMTS refurbishment by at least one year, and that this is the likely outcome for this project.

23. On this basis we recommend that the AER adjusts the proposed capex allowance for this station, by reducing it from $107.9m as proposed, to an expenditure of $52.1m within the RCP[1].

Proposed capex on other major stations

24. We find that the need for proposed refurbishment and replacement work at each of the other major stations is justified. However, we consider that aspects of the scope of two of the projects have been engineered conservatively at this initial scoping stage, and some of the proposed expenditure will not be required. Accordingly we recommend that the AER reduces the proposed capex by $3.9m for Fisherman's Bend and by $0.4m for Hazelwood Power Station stage 4.

25. For Yallourn Power Station, while no adjustment is recommended for the proposed expenditure within the RCP, we have concerns regarding the remaining life of the station and recommend that SP AusNet do not propose any future expenditure unless the investment has only a low risk of being stranded.

Proposed IT capex

26. We find that the proposed IT expenditure is not justified. We have reviewed this from a number of perspectives and we find that:

- It is above the level required to sustain ongoing IT replacement;
- It is above benchmarks with other transmission businesses;
- Benefits from the "strategic" element of past and proposed IT have not been quantified in business cases put to the Board, nor have the expenditure categories been specifically identified from which the benefits would be derived. Application of PAS 55 asset management methods would require economic analysis, including cost/benefit assessment, to be undertaken as an input into investment decision making;
- Net benefits proposed as "negative step changes" in the current RCP are insufficient to justify the proposed expenditure;
- The weighting of proposed group-wide IT expenditure on transmission, rising from 18% (historical) to 31% of the proposed spend, is disproportionate and circumstantially appears to be based on the regulatory cycle.

27. We recommend that the AER reduces the proposed IT capex of $48.5m to $31.5m.

Portfolio assessment: Cost estimation, prudency and deliverability

28. From analysis of proposed projects and outcomes in the current RCP, we find that SP AusNet has spent considerably less capex than it proposed. Setting aside the deferral of RTS and WMTS from the current period into the next period, and other proposed projects that were "rolled out" of the current RCP program, SP AusNet spent 11.7% less on site-specific projects and 12.6% less on non site-specific programs of work than it had proposed. The reasons for this appear to be a combination of portfolio-

[1] These figures are before the application of the 1.4% efficiency allowance that SP AusNet has proposed.

level effects including prudent reductions in scope, optimisation between projects and prudent deferrals.

29. From the stage that business cases are developed, we find that SP AusNet's cost estimation has been relatively accurate, with a 1.4% over-estimation bias.

30. Most proposed projects and program of work do not at this stage have business cases. Accordingly we recommend the following portfolio-level adjustments to the proposed capex:

- No further reductions for those projects or programs for which we have proposed specific reductions under the previous headings;
- A 1.4% reduction for those projects that have business cases, but are not substantially underway;
- An 11.7% reduction for the aggregate of costs for site-specific network projects (other than those above);
- A 12.6% reduction for the aggregate of costs for non site-specific programs of work (other than those above).

Other capex

31. Other than the items and proposed adjustments above, we consider that the remainder of proposed capex is reasonable. We have some concerns with proposed communications opex, as the scope of the work program and the associated cost estimates appear to be provisional. However this concern is covered by the program adjustment proposed above.

2.1.3 Findings on proposed opex

Overall finding on proposed opex

32. We find that key elements of the controllable opex proposed by SP AusNet are not reasonable in terms of the NER requirements, because we consider that:

- The case for accepting the aggregate of proposed step changes is not well made and a number of them are not consistent with the AER's guideline;
- The case for the level of some proposed asset works is not adequate and is inconsistent with the levels of such expenditure that SP AusNet is choosing to spend prior to the next RCP.

Proposed step changes

33. We have reviewed each of the twelve proposed step changes against the AER's guidelines. We have sought to confirm that each step change is externally driven or arising from the application of new policies and procedures generally applicable to similar firms in the NEM, that it is not already included in the base year, and that its timing aligns with the timing of the new / changed investment driver.

34. The proposed step changes are significant, representing an increment of 18% on the base rolled–forward recurrent opex (excluding taxes, leases and insurance), and they are proposed to occur only from the commencement date of the next RCP. We found

that some drivers already exist and therefore the evidence of actual and estimated expenditure in the current RCP suggests that it is either already included in recurrent expenditure or that the proposed increment at the commencement of the next RCP is not required. We also found that SP AusNet was unable for some time to provide information on current levels of expenditure for a number of items, therefore it could be reasonably inferred that the proposed increments had been developed without a satisfactory understanding of such existing expenditure. We also found that an innovation program exists already and we consider that the proposed expenditure should be considered part of an existing overall program, and internally justified.

35. We recommend:

- Disallowing the following proposed step changes:
  - Impact of carbon price on SF6
  - Innovation program
  - IT network security
  - SCADA security
  - Enable market reporting
  - Transitional arrangements
- Allowing 50% of the proposed step increase for security of critical infrastructure;
- Re-classifying “corrosion management” (tower painting) as an Asset Works program;
- Accepting the remaining proposed step changes.

36. The impact of this adjustment would be to reduce the proposed step changes from a total of $32.5m over the three years to $10.9m.

Proposed asset works programs

37. While the proposed level of asset works expenditure is less than was proposed for the current RCP, it would nevertheless represent an increase of around 25% on the level that SP AusNet is spending in the last four years of the current RCP and we consider that this increase for the “as-proposed“ works is not justified. We have reviewed the shortfall of $45.8m between the asset works proposed for the current RCP and the work that SP AusNet undertook, and which represents a 46% underspend[2]. We find that there was a tendency for SP AusNet to over-estimate unit costs for this work but that the majority of the variance is explained simply by less work having been done.

38. While SP AusNet has put forward justifications for the various programs of forward work, and we are generally satisfied that they support the need to do the work, they are at this stage indicative programs that have not been committed to and, for the most part, do not have firm metrics. As it develops its commitment plans for such work, we consider it likely that SP AusNet will find that the actual work required is less than the indicative programs suggest due to reduced need, delivery issues and opportunities to prudently de-scope and defer, as has been the case in the current RCP.

[2] Figures comprise field work, plus asset works support

39. We also consider that $3.4m on transformer refurbishment work at RTS and WMTS is more suitably classified as capex, on the basis that the supporting documents show that it is to extend the lives of these assets beyond their current average age of around 48 years.

40. We consider that the proposed costs for five programs should be adjusted:

- Tower corrosion - ground level;
- Transformer and CT failure risk;
- Transmission line hardware;
- Replacement of tower steelwork.

41. The recommended adjustments would retain each of these programs, but with a lower assumed expenditure level. However, offsetting these reductions, we recommend re-categorising "tower painting" from an opex step change to an asset works program. At a portfolio level, we recommend allowing the aggregate of proposed asset works opex, but with the inclusion of the tower painting program within the proposed budget of $24.6m.

Recurrent opex – base and other adjustments

42. Although we are concerned that the 2011/12 base year recurrent opex is $5m (11%) greater than was proposed[3] for this year, we consider it acceptable for base year purposes on the grounds of being "actual expenditure" and it is less than the average of recurrent opex in the preceding three years.

43. We have reviewed the escalator calculations, which we consider to be satisfactory. In accordance with our scope, we have not reviewed the proposed escalators themselves.

44. We consider the "group 3 roll-in adjustment" that SP AusNet has proposed is erroneous and should be based not on the change in relativity between the unregulated and regulated asset bases, but on the value of currently-unregulated assets to be rolled into the RAB (with associated opex) relative to the replacement cost value of the RAB. Further, we consider that different scaling factors should apply, with a very low scaling applied to corporate costs. We have estimated an adjusted allowance of $2.4m in aggregate over the three-year period, compared with $5.2m as proposed by SP AusNet.

45. There are two other adjustments to base year escalated opex that flow from our consideration of other components.

46. We consider an estimate of the efficient level of opex, as is required under the NER, should take into account the continuation of efficiency improvements that can reasonably be expected. In this regard the main benefits that we can identify would be expected to flow from SP AusNet's considerable strategic investments in IT and we have calculated that this should be of the order of $2.4m per year. This would

[3] SP AusNet RRP, 2008

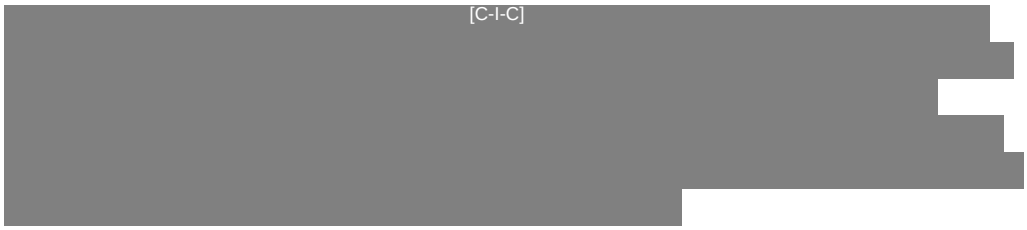
represent approximately a 2.6% reduction in SP AusNet's proposed controllable opex, and we consider this to be a reasonable proxy for continuous improvements generally.

47. SP AusNet advised that a number of tower steel members for which replacement is proposed under asset works, were replaced under recurrent maintenance in the current period. We estimate that an amount of $0.6m needs to be adjusted out of the base year, thereby effectively reducing next RCP recurrent opex by $1.8m

48. Finally, if the AER does not include the strategic enterprise asset management system in IT capex, then the "savings" of $0.8m that SP AusNet has estimated and allowed for, should be added back.

2.1.4 Findings on contingent projects

49. [C-I-C]



50. For the proposed South Morang transformer replacement, we consider that the proposal would effectively provide a higher level of security than is required and that SP AusNet's plan for the replacement of transformers at South Morang already adequately deals with contingent events.

2.1.5 Findings on STPIS

51. We consider that the rationale for the proposed STPIS parameters is unconvincing and is biased towards achieving higher revenues to SP AusNet rather than as a balanced incentive mechanism. We consider that the statistical distributions used are not fit for purpose and different distributions should be used. We also are not persuaded of the need for an adjustment for increased capital works.

52. We have recommended alternative targets and caps and collars, based on more appropriate distributions and without the capital works adjustment. Please see the table in section 9.5 for the details of these recommendations.

2.2 Implications of these findings

2.2.1 Implications for required capex

53. The following table summarises the proposed and adjusted capex:

Table 1: Source of capex adjustments

($m, 2013/14)

	Implied Adjustment	Total Capex
SP AusNet forecasted capex		**564.2**
Adjustments:		
Deferral of WMTS	- 55.1	
Deferral of FBTS replacement	- 3.9	
Deferral of HTS rebuild	- 0.6	
Projects - No business case (11.7% reduction)	- 9.5	
Programs (12.6% Reduction)	- 21.9	
IT	- 16.8	
Adjusted Capex	- 107.7	**456.4**

Source: EMCa analysis from SP AusNet Capex Forecast Model

Table 2: Results of capex adjustments (by proposed expenditure category)

($m, 2013/14)

	As Proposed	EMCa adjusted	Difference
Non Load			
CBD rebuild	185.8	130.7	- 55.1
Major station replacement	149.8	135.9	- 14.0
Replacement Other	121.1	105.9	- 15.2
Security / Compliance	44.7	39.1	- 5.6
Non Load Subtotal	501.5	411.6	- 89.9
Non Network			
Non System -Other	9.0	7.9	- 1.1
Vehicles	5.2	5.2	-
Premises	0.7	0.7	-
IT	47.9	31.1	- 16.8
Non Network Subtotal	62.7	44.8	- 17.9
Total Capex	**564.2**	**456.4**	**- 107.7**

Source: EMCa analysis from SP AusNet Capex Forecast Model

2.2.2 Implications for required opex

54. The following table summarises the proposed and adjusted opex:

Table 3: Opex adjustment table[4]

$m, 2013/14

	Implied Adjustment	Total Opex
SP AusNet forecasted controllable opex		**281.0**
Step change adjustments:		
Recurrent Maintenance	- 12.5	
Support SR	- 1.8	
System operations	-	
Health and safety	- 2.5	
IT	- 2.0	
Other corporate	- 2.9	
Subtotal	- 21.7	
Adjustment to recurrent benchmarked	- 9.0	
Grp 3 rollin	- 2.8	
Asset work adjustment	- 0.6	
IT-enabled opex savings	- 6.4	
Adjusted controllable opex	- 40.4	**240.6**

Source: EMCa analysis from SP AusNet Opex Forecast Model

2.3 Other observations

55. We have concerns regarding the impact of the relatively high values of Value of Customer Reliability (VCR) and the estimated cost of life which are key inputs into SP AusNet's economic evaluations of projects. These are external inputs that we understand SP AusNet is obliged to use. Whilst sensitivity testing undertaken on a limited number of projects led to the conclusion that these inputs did not materially drive expenditure, it is considered likely that in some cases the VCR will have a material impact on both the timing and level of project expenditure.

56. We recommend that the use of the VCR is reviewed and calibrated to local conditions when it is found to have a material impact on a proposed project.

[4]The proposed capex and the adjustments in this table are based on SP AusNet's proposed escalation factors. A second-order adjustment will be required if the AER decides to alter these escalation factors. The adjustments also take account of SP AusNet's proposed capex efficiency adjustment. These may lead to minor differences between the summary amounts shown in these tables and amounts reported elsewhere in this report.

3 Expenditure Trends

3.1 Capex trends

3.1.1 Comparisons between current RCP and SP AusNet's proposal for next RCP

57. Tables 4 and 5 below provide a summary of the current RCP actual/estimated capex and the proposed forecast capex included in SP AusNet's 2013 RP (for the next RCP). Because of the different time-periods of the two RCPs, it is more useful to compare expenditure on an annualised average basis. On that basis, the next RCP proposes capex that is $56m p.a. (43%) higher than in the current RCP[5, 6].This is a significant increase that requires compelling justification. While most of the increase ($52m p.a.) is because of the proposed CBD rebuilds, there is also a material increase proposed for major station replacements and a proposed increase in non-network expenditure.

[5] The original proposed total capex for the next RCP is $575m (real 2013/14).

[6] The total capex for next RCP was then modified to $564.2m (see: EMCA019_Q4A_-TRR_SP_AusNet_Capex_Forecast_Model)

Table 4: Capex summary – Current and next RCP

($m, 2013/14)

	Current RCP						Next RCP			Total	
	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Current RCP	Next RCP
	Actual	Actual	Actual	Actual	Estimated	Estimated	Proposed	Proposed	Proposed		
CBD Rebuilds	-	-	-	-	14.2	43.2	65.7	58.3	61.9	57.5	185.8
Replacement - Major Station	46.2	47.6	47.9	58 8	55.6	38.5	32 2	50.0	67.7	294.6	149.8
Station Rebuilds subtotal	46 20	47.6	47.9	58 8	69.8	81.7	97 8	108.2	129.6	352.0	335.7
Replacement Other (asset replacements)	26.3	40.9	35.1	34 9	52.8	28.4	38 2	38.8	44.1	218.4	121.1
Security / Compliance	16.5	20.2	16.8	30 9	23.5	3.0	16 3	14.9	13.5	110.9	44.7
Other	1.9	2.9	2.2	1.1	2.6	1.4	-	-	-	12.1	-
Non Load subtotal	**90.90**	**111.6**	**102**	**125.7**	**148.8**	**114.4**	**152.4**	**161.9**	**187.2**	**693.4**	**501.5**
Non System -Other	4.4	2.9	3.3	1.4	2.1	1.6	2.9	3.0	3.1	15.7	9.0
Vehicles	1.1	0.3	- 0.0	0.2	1.6	1.6	1.9	1.9	1.3	4.8	5.2
Premises	0.3	0.3	0.1	0.1	0.2	0.2	0.2	0.2	0.2	1.2	0.7
IT	8.5	7.1	12.8	12.3	17.2	17.5	20 3	14.3	13.2	75.3	47.9
Non Network subtotal	**14.2**	**10.6**	**16.2**	**14.0**	**21.1**	**21.0**	**25.4**	**19.4**	**17.8**	**97.1**	**62.7**
Total Capex	**105.1**	**122.2**	**118.2**	**139.7**	**169.9**	**135.5**	**177.8**	**181.3**	**205.0**	**790.5**	**564.2**

Source: SP AusNet Capex Forecast Model

Table 5: Capex comparisons of average annual expenditure

($m, 2013/14)

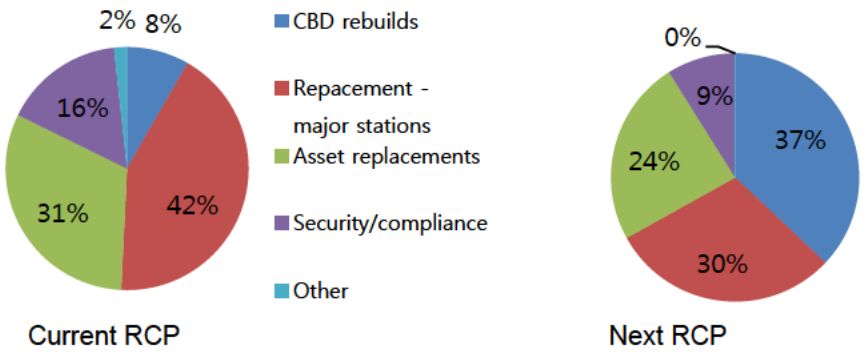
	Current RCP Average	Next RCP Average	
CBD Rebuilds	9.6	61.9	547%
Replacement - Major Station	49.1	49.9	2%
Station Rebuilds subtotal	58.7	111.9	91%
Replacement Other (asset replacements)	36.4	40.4	11%
Security / Compliance	18.5	14.9	-19%
Other	2.0	-	-100%
Non Load Subtotal	**115.6**	**167.2**	**45%**
Non System -Other	2.6	3.0	14%
Vehicles	0.8	1.7	115%
Premises	0.2	0.2	8%
IT	12.6	16.0	27%
Non Network subtotal	**16.2**	**20.9**	**29%**
Total Capex	**131.8**	**188.1**	**43%**

Source: EMCa analysis from SP AusNet Capex Forecast Model

3.1.2 Disaggregation of capex

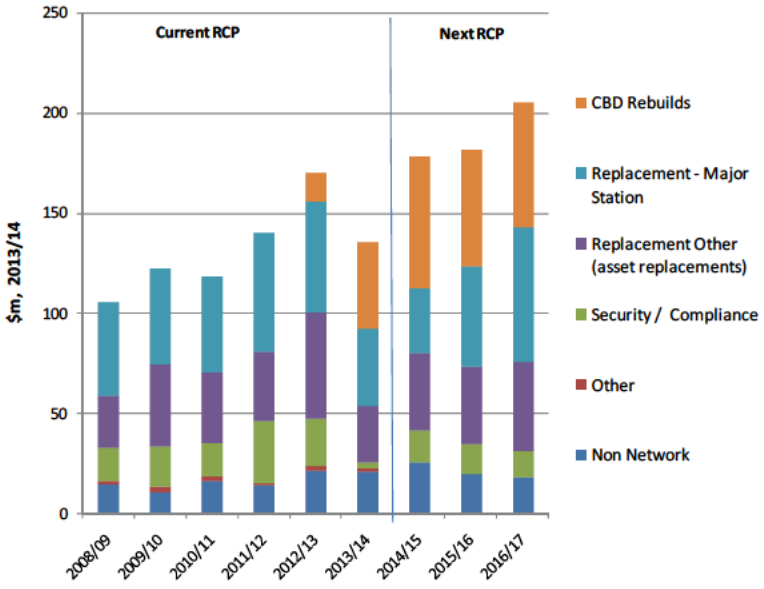
58. The figures below provide a breakdown of the historical and proposed capex. The contribution of the CBD rebuilds to the increase between the current and next RCP is evident. However it is also noticeable that, at the same time as the CBD replacements are occurring, SP AusNet also proposes a significant ongoing investment in its "Major Station replacements". Both programs are essentially asset replacement projects as they are driven by asset condition. The increases are offset by a $3.6maverage annual reduction in security/compliance work.

Figure 1: Proportion of annual average non-load expenditure – current versus next RCP



Source: SP AusNet Capex Forecast Model

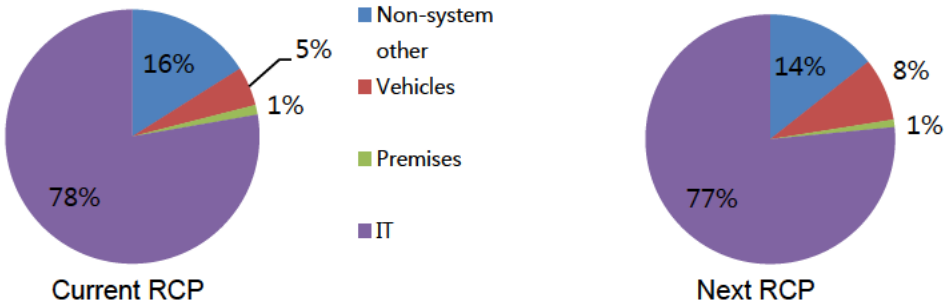
Figure 2: Capex: Comparison between Current RCP and Next RCP



Source: SP AusNet Capex Forecast Model

59. Figure 3 compares the categories of non-network expenditure for the current RCP and the next RCP. It is evident that there is very little change in the proposed average annual expenditure by category, with IT expenditure continuing to dominate.

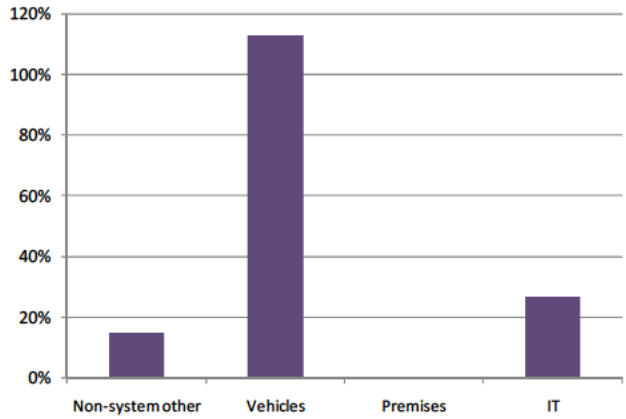
Figure 3: Proportion of annual average non-network expenditure – current versus next RCP



Source: SP AusNet Capex Forecast Model

60. Figure 4 however shows that SP AusNet proposes to more than double its annual average expenditure on vehicles and increase IT expenditure by an annual average of 27% or $4m p.a.

Figure 4: Proposed increase in non-network expenditure

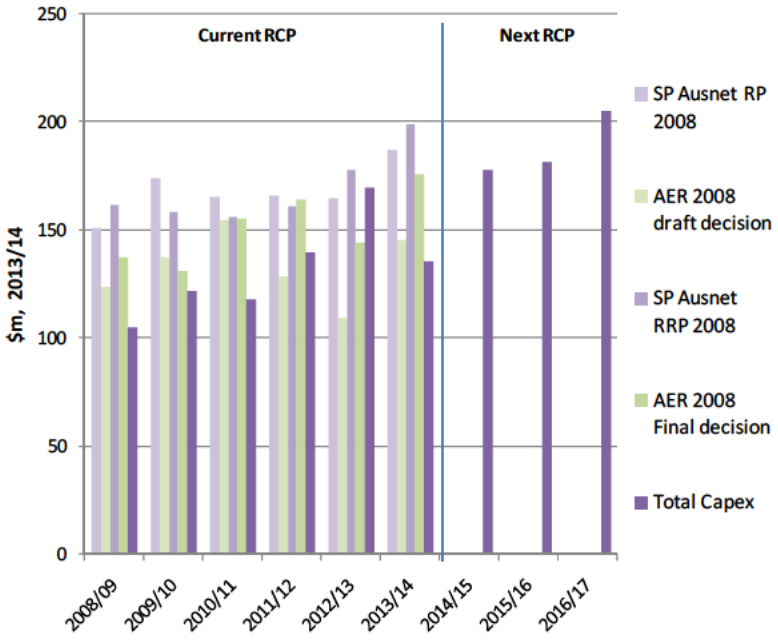


Source: SP AusNet Capex Forecast Model

3.1.3 Comparisons of actual / estimated capex with 2008 proposals and AER decisions

61. Figure 5 compares current RCP actual/estimated capex with the current RCP determination figures: SP AusNet's initial RP, AER's Draft Decision, SP AusNet's Revised Revenue Proposal, and AER's Final Decision. Figure 6 tracks cumulative proposed / actual expenditure. It can be seen that in aggregate, and in all years except 2012/13, SP AusNet's actual capex was less than was allowed for in the AER's Final Decision and in all years it was less than SP AusNet had proposed to the AER.

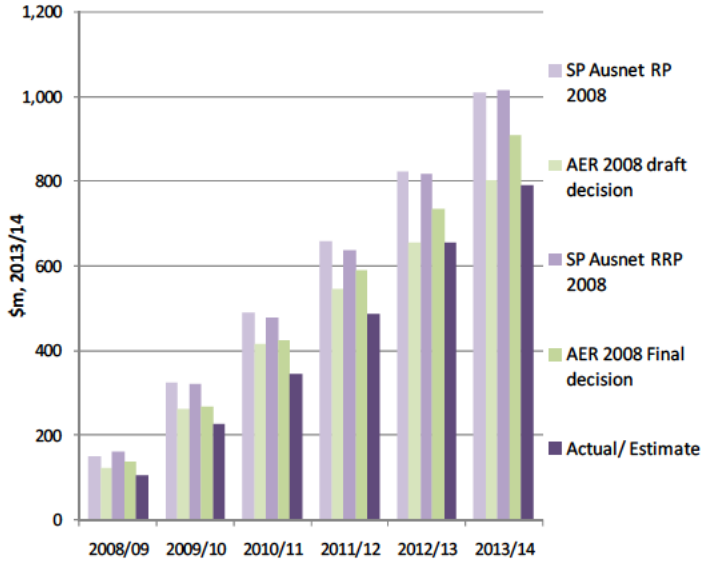
Figure 5: Capex comparison with 2007-08 RP and associated AER Decision



Source: SP AusNet Capex Forecast Model and current RCP templates

62. As shown in Figure 5, aggregate capex expenditure in the current RCP is approximately $118m (13%) less than the AER's Final Decision and $224m (22%) less than SP AusNet proposed.

Figure 6: Capex comparison with 2007-08 RP and associated AER Decisions - Cumulative

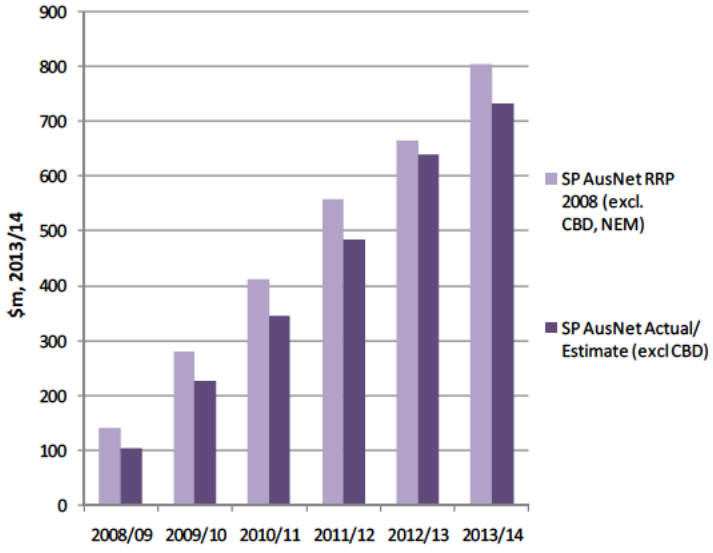


Source: SP AusNet Capex Forecast Model and current RCP templates

63. A significant proportion of the reduced spend was related to deferral of the CBD rebuilds that had been programmed to occur within the current RCP.

64. However, excluding CBD rebuilds from the proposed and actual expenditure, SP AusNet nevertheless spent around $73m (9%) less in the current RCP than it proposed in 2008 (as is shown in Figure 7 below).The deferral of the Richmond Terminal Substation rebuild was due to a revision of the scope and design for the project and, in particular, a decision to redevelop the entire 66 kV switchyard with indoor GIS rather than a combination of AIS and GIS. These changes meant that the initial project timing was optimistic and the scoping revision led to considerable variation from the original estimate.

Figure 7: Capex comparisons – excluding CBD Rebuilds -cumulative



Source: SP AusNet Capex Forecast Model and current RCP templates

65. In summary, SP AusNet has consistently underspent its previously-forecast expenditure. The reasons that have been provided by SP AusNet include:

- The need was found to be less urgent and the solution could be prudently deferred;
- The impact of the GFC[7].

66. In addition, we have found a tendency towards estimating conservatism, in that the projects as built tended on average to cost less than was estimated. We believe this was due to a combination of prudent de-scoping, optimising the engineering design and specification, rationalising between projects, and purchasing and delivery efficiencies.

67. In regards to the GFC impact, SP AusNet has explained[8] that there was a corporate drive to reduce expenditure. As Technical Advisers we are not satisfied by this explanation. While we are fully supportive of continuous improvement measures to achieve efficiencies in design, scoping and delivery of works and of the need to ensure that works are appropriately justified, we are concerned that works that were proposed as being required, justified and efficiently budgeted for and for which consumers have paid through transmission charges, have not been done. The explanations for this can only be that:

- The work was conservatively over-scoped and over-estimated in the first place; or
- The work was scoped and estimated appropriately, but has been de-scoped and/or deferred imprudently, from an engineering/economic perspective.

68. SP AusNet has stated that "it accepted higher risk" as a result of the reduced level of spending. We would have expected to see advice to the Board on the risk implications of these major reductions in planned replacement and refurbishment capex and similar reductions in asset works opex[9]. SP AusNet has advised that it does not have records of any formal advice to the Board on this matter. SP AusNet has drawn attention to statements made in its 2011 Asset Management Plan (which was approved by the Board), however these state only that work was being prioritised "to manage the most pressing reliability and supply risks" and that the "immediate increase in technical risk in 2011 from (the asset works) deferrals is minimal".[10]Since SP AusNet has stated that the implications of such significant deferrals is relatively minor, the corollary is that the work was to a degree over-scoped and over-estimated in the first place, and that corporate financial pressures led to a more appropriate level of work being undertaken. Further, to the extent that there was increased risk, then that was a risk (or increase in risk) placed on consumers (of non-supply) since this is one of the two main drivers that SP AusNet has put forward to justify its work program. This situation is exacerbated by the pricing outcome, in which consumers were charged already as if this work

[7] Response to information request SP_AER20_GFC_230513

[8]Meeting SP AusNet, AER and EMCa, 30th May 2013

[9] See section 3.2.3

[10] Response SP_EMCa37 network Risk (26/06/2013)

would be done, and are now being asked to "pay for it again" as it is incorporated into the proposed expenditure for the next RCP.

69. Our analysis of the significant variance between the proposed and actual expenditure in the current RCP and SP AusNet's statements that these reductions had a relatively minor impact reduces our confidence in SP AusNet's capital expenditure forecasts for the next RCP. As will be seen in section 4, we have undertaken a more detailed assessment of SP AusNet's portfolio planning and expenditure budgeting, which we present in section 4, and we have also been mindful of this evidence in assessing proposed capex and risks for major projects, particularly West Melbourne Terminal Station (section 5).

3.2 Opex trends

3.2.1 Comparisons between current RCP and SP AusNet's proposal for next RCP

70. Tables 6 and 7 below show component-level opex trends across the current RCP and as proposed for the next RCP. As can be seen in Table 6 and from the current/next RCP boundary trends in Table 7, SP AusNet is proposing a significant increase in recurrent Routine Maintenance expenditure. Further inspection of trends shows that opex declined during the current RCP from a high in 2008/09, driven by reductions in Asset Works and Corporate costs, and is estimated to increase in 2012/13 and 2013/14, driven mainly by increases in Asset Works and Routine Maintenance.

Table 6: Opex summary – current and next RCP

$m, 2013/14

	Current RCP						Next RCP			Total	
	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Current RCP	Next RCP
	Actual	Actual	Actual	Actual	Estimated	Estimated	Proposed	Proposed	Proposed		
Routine maintenance - System Recurrent (SR)											
Maintenance	27.0	27.7	25.6	25.4	25.6	27.1	32.5	32.9	33.3	158.4	98.6
Support SR	7.1	9.0	5.8	5.1	5.1	5 2	5.7	6.0	6.1	37.3	17.8
System Operation	3.3	4.0	5.2	5.7	5.8	6.1	6.5	6.6	6.7	30.0	19.8
Heal h & Safety	0.8	0.8	1.0	0.7	0.7	0.7	2.4	2.5	2.5	4.8	7.4
Taxes/Leases	3.8	5.6	5.1	5.4	5.4	5.4	5.4	5.4	5.4	30.7	16.2
Insurance	2.8	2.9	3.2	4.0	4.6	5.2	5.7	6.3	7.0	22.7	19.1
Subtotal	**44.8**	**50.0**	**45.9**	**46.2**	**47.3**	**49.7**	**58.2**	**59.7**	**61.0**	**283.9**	**178.9**
Asset works - System Non Recurrent (SNR)											
Total SNR costs	12.4	12.4	7.8	4.2	5.8	5.0	8.0	8.0	8.5	47.5	24.6
Support SNR	1.1	0.9	1.5	1.0	1.1	1.1	1.3	1.3	1.3	6.8	3.8
Subtotal	**13.5**	**13.3**	**9.3**	**5.2**	**6.9**	**6.1**	**9.2**	**9.3**	**9.8**	**54.3**	**28.4**
Corporate costs - Recurrent											
Finance	3.5	4.0	3.1	3.6	3.6	3.7	3.7	3.7	3.8	21.5	11.2
HR	1.0	1.3	1.6	0.5	0.5	0.5	0.5	0.5	0.5	5.3	1.5
IT	2.2	6.3	7.2	6.4	6.4	6.4	7.0	7.0	7.0	34.8	20.9
Other Corporate	7.6	5.1	5.5	4.1	4.2	4.2	4.2	5.6	5.6	30.7	15.4
Management Fee	12.2	2.2	5.0	6.3	6.4	6.5	6.7	6.8	6.9	38.6	20.4
Subtotal	**26.5**	**18.9**	**22.4**	**20.9**	**21.0**	**21.2**	**22.0**	**23.6**	**23.8**	**130.9**	**69.4**
Savings from IT capex	**-**	**-**	**-**	-	-	-	-	- 0.1	- 0.8	-	- 0.8
Grp 3 rollin (asset base growth)											
Total asset roll-in adjustment	-	-	-	-	-	-	1.7	1.7	1.8	-	5.2
Controllable Opex	**84.8**	**82.2**	**77.6**	**72.2**	**75.2**	**77.0**	**91.1**	**94.3**	**95.6**	**469.0**	**281.0**

Source: SP AusNet Opex Model

Table 7: Opex comparisons of average annual expenditure

$m, 2013/14

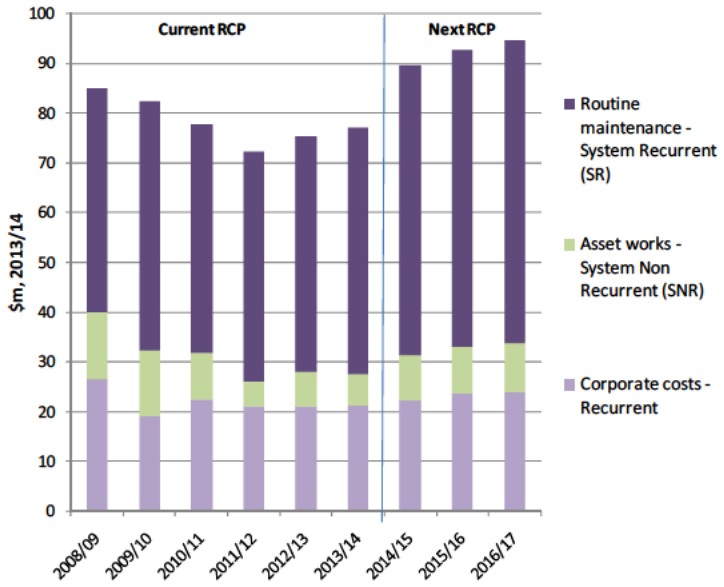
	Current RCP Annual Average	Next RCP Annual Average	
Routine maintenance - System Recurrent (SR)			
Maintenance	26.4	32.9	25%
Support SR	6.2	5.9	-4%
System Operation	5.0	6.6	32%
Health & Safety	0.8	2.5	208%
Taxes/Leases	5.1	5.4	5%
Insurance	3.8	6.4	68%
Subtotal	47.3	59.6	26%
Asset works - System Non Recurrent (SNR)			
Total SNR costs	7.9	8.2	3%
Support SNR	1.1	1.3	12%
Subtotal	9.0	9.5	5%
Corporate costs - Recurrent			
Finance	3.6	3.7	4%
HR	0.9	0.5	-43%
IT	5.8	7.0	20%
Other Corporate	5.1	5.1	1%
Management Fee	6.4	6.8	5%
Subtotal	21.8	23.1	6%
Savings from IT capex	-	- 0.3	
Grp 3 rollin (asset base growth)			
Total asset roll-in adjustment	-	1.7	
Controllable Opex	**78.2**	**93.7**	**20%**
	base year difference	21.4	30%

Source: EMCa analysis based on SP AusNet Opex Model

3.2.2 Disaggregation of opex

71. Figure 8 provides a comparison between the current actual/estimated opex and proposed controllable opex for 2014/17. As per the data tables above, the substantial step change in opex proposed for the next RCP is well above the average for the previous three years, with Routine Maintenance evident as the main driver.

Figure 8: Opex : Comparison between Current RCP and Next RCP



Source: SP AusNet Opex Model

3.2.3 Comparisons of actual / estimated opex with 2008 proposals and AER decisions

72. Figures 9 and 10 provide a view of controllable opex for the current RCP when set against the 2008 RRP forecast and the AER 2008 final decision. It can be seen that actual/estimated opex for the current RCP is significantly below what SP AusNet proposed in its 2008 RRP and also below the AER 2008 Final Decision. We note in particular the significantly lower expenditure on Asset Works than was proposed and we consider this further in our consideration of proposed Asset Works opex in section 7.The much lower expenditure also raises concerns regarding the added risk that was carried, assuming that the expenditure was genuinely required and we reiterate in this regard the concerns we have expressed in section 3.1.3 on the considerably lower capex expenditure incurred.

Table 8: Comparison between proposed and actual Opex

$m, 2013/14

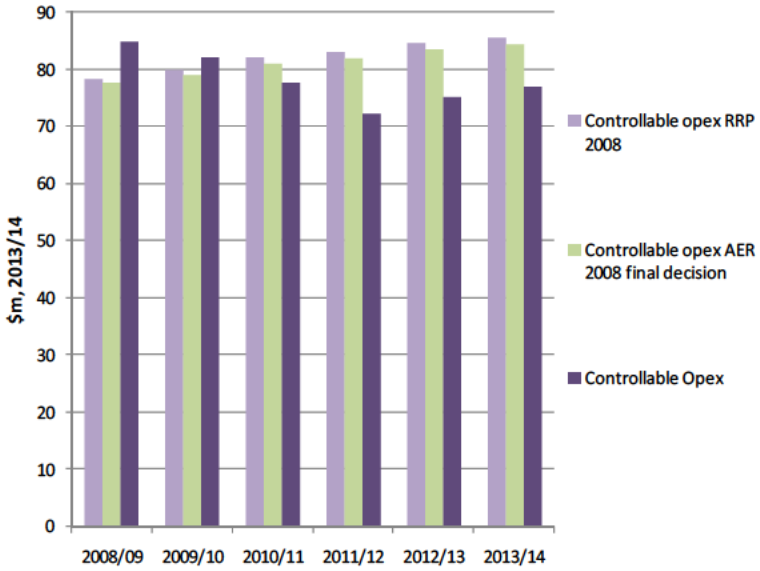
	As Proposed (RRP 2008)							
	2008/09	2009/10	2010/11	2011/12	Subtotal	2012/13	2013/14	Total
	Forecast	Forecast	Forecast	Forecast		Forecast	Forecast	
System Recurrent	31.2	31.7	32 2	32.7	**127.8**	33 2	33.6	**194.6**
Asset works - System Non Recurrent	16.1	16.3	17.1	16.7	**66.2**	17.1	16.7	**100.1**
Corporate costs - Recurrent	13.2	13.4	13 6	13.8	**54.1**	14 0	14.2	**82.3**
Total controllable opex	60.6	61.4	62 9	63.2	**248.1**	64 3	64.6	**377.0**

	Actual							
	2008/09	2009/10	2010/11	2011/12	Subtotal	2012/13	2013/14	Total
	Actual	Actual	Actual	Actual		Estimate	Estimate	
System Recurrent	38.2	41.5	37 5	36.8	**154.0**	37 3	39.1	**230.4**
Asset works - System Non Recurrent	13.5	13.3	9 3	5.2	**41.3**	6 9	6.1	**54.3**
Corporate costs - Recurrent	14.3	16.6	17.4	14.6	**62.9**	14 6	14.7	**92.2**
Total controllable opex	65.9	71.4	64 2	56.6	**258.1**	58 8	59.9	**376.8**

	Difference							
	2008/09	2009/10	2010/11	2011/12	Subtotal	2012/13	2013/14	Total
System Recurrent	6.9	9.8	5 3	4.2	**26.2**	4.1	5.5	**35.8**
Asset works - System Non Recurrent	- 2.6	- 3.0	- 7 8	- 11.6	**- 25.0**	- 10 2	- 10.6	**- 45.8**
Corporate costs - Recurrent	1.1	3.2	3 8	0.8	**8.8**	0 6	0.5	**9.9**
Total controllable opex	5.3	10.0	1 3	- 6.6	**10.0**	- 5 5	- 4.7	**- 0.1**

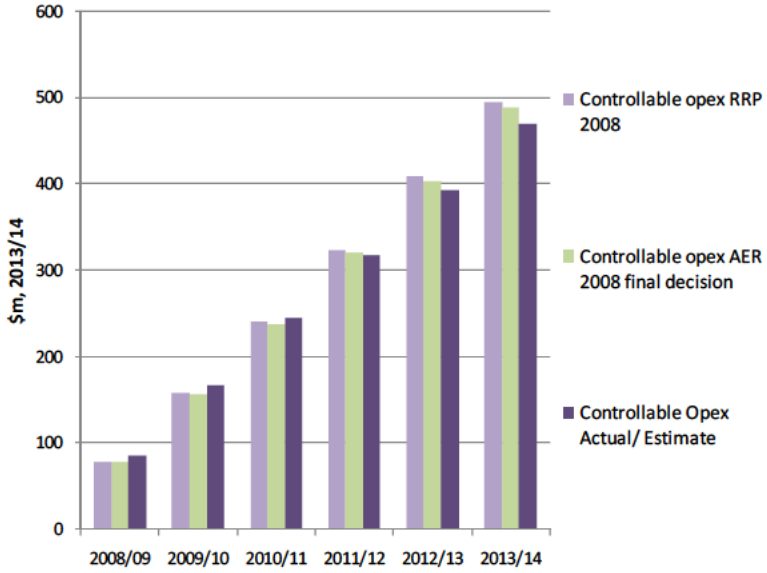
Source: RRP 2008 Templates - Cost information (12 October) and templates from AER current RCP decision (Note: This table excludes management fee, taxes, insurance, savings from IT capex and Group 3 roll-in (asset base growth))

Figure 9: Opex comparison with 2007-08 RP and associated AER Decision



Source: SP AusNet Opex Model and templates from AER current RCP decision

Figure 10: Opex comparison with 2007-08 RP and associated AER Decisions - Cumulative



Source: SP AusNet Opex Model and templates from AER current RCP decision

4 Asset management and expenditure planning

4.1 Introduction

73. In this section, we comment on the policies and processes that SP AusNet applies in planning expenditure, and the outcomes of that process, in order to form a view on the reasonableness of the expenditure that SP AusNet has proposed in its Revenue Proposal. We first consider SP AusNet's asset management planning policies and processes, we then consider the way in which these are applied. This includes consideration of:

- Need – as identified ex ante for planning over the four years from now to the end of the next RCP[11];
- Likely changes to that need, that would be expected to occur with the passage of time and improved information, including opportunities for prudent deferrals, project synergies and scope optimisation; and
- SP AusNet's cost estimation processes and outcomes.

4.2 Overview of assets works planning and management within SP AusNet

74. SP AusNet has established an asset management framework that includes well documented:

- Policies;
- Corporate level strategies;

[11] Comprised of the final year of the current RCP and the three years of the next RCP

- Specific asset strategies; and
- Procedures.

75. The continuing PAS 55 accreditation achieved by SP AusNet provides evidence that the asset management framework meets international practice standards. In our on-site review we generally found that SP AusNet applies its policies, strategies and procedures in a systematic manner.

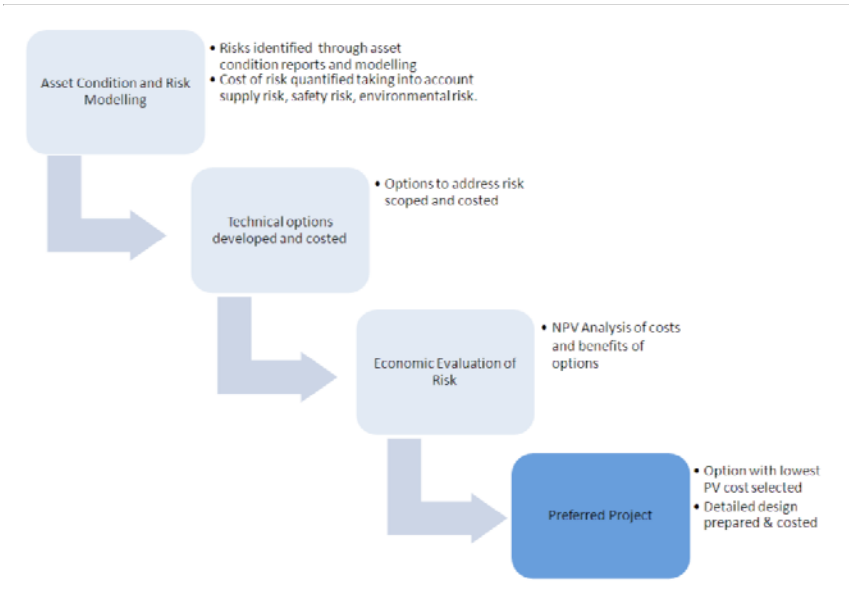
76. The PAS 55 requirements provide SP AusNet with an international standard benchmark against which it can establish its asset management practices and asset related replacement capex and opex expenditure forecasts. We noted that the asset management objectives set out in SP AusNet's Asset Management Strategy did not include a specific economic efficiency objective. However, we observed economic evaluation is a key component of asset management prioritisation.

77. Given that the asset management framework is subject to periodic audits and assessments for continuing PAS 55 accreditation, our review focused primarily on SP AusNet's application of its asset management processes when establishing its expenditure forecasts.

4.2.1 SP AusNet asset related expenditure forecasting methodology

78. SP AusNet uses a bottom up process that utilises asset age, condition and performance data to develop its expenditure forecast. A high level description of this process is provided in the diagram below.

Figure 11: SP AusNet expenditure forecasting methodology



Source: RP Appendix 4A

79. During the onsite sessions SP AusNet demonstrated the application of its method and how this was used to establish the asset related expenditure forecasts. We observed and assessed each of the steps outlined in the diagram.

80. On asset condition and risk modelling SP AusNet described how it uses of a range of methods to produce a definition of remaining service potential (RSP). This information is then used to establish probability of failures for each asset. We found that the collection and management of asset data was systematic and logical. Where efficient to do so, SP AusNet used sampling to establish its information on likely asset health for a specific asset type. Using the data collected, SP AusNet applies standard formulas to establish a forecast of the likelihood of failure for specific assets.

81. We observed that a feedback loop is used to calibrate the forecast failure rates established using standard formulas with actual historical asset failure rates for each asset category. We consider that this is good practice and likely to produce reliable output predictions of asset failure risk.

82. The probability of failure rating is used to develop an initial ranking of assets requiring attention. We observed that SP AusNet use the probability of failure rating to develop an initial asset works program. At this stage SP AusNet apply Total Asset Lifecycle and Reliability Centred Maintenance (RCM) techniques to determine asset management options for addressing assets with the highest failure risk.

83. The output from this second step can be considered as a work-program that is based on a bottom up process that takes into account a range of asset characteristics to determine a quantified risk based priority. The third step applies an economic evaluation, using condition based quantitative risk, to add a further level of prioritisation to the work-program.

84. The economic evaluation used by SP AusNet takes into account the consequences of failure in terms of the cost of loss of supply and potential costs of loss of life. To undertake the economic assessment SP AusNet uses the AEMO Value of Customer Reliability and a $20 million cost of a lost life. Whilst we have some concerns regarding the broad application of these values without calibration and testing for local conditions, we found that the sensitivity of the proposed expenditure to these values was not material.

85. We observed how, through use of the above methodology SP AusNet are able to determine an economic risk based asset works program that takes into account the likelihood and consequence of asset failure. Using this methodology SP AusNet is able to consider the impact of increasing or decreasing expenditure in terms of probability of failure and economic cost.

86. Each of the programs and projects produced identified from the above process are scoped and costed to produce a time based expenditure forecast.

4.2.2 Findings on asset management framework and risk based expenditure forecasting

87. SP AusNet has a well-documented asset management framework that is benchmarked against international good practice standards. We found that SP AusNet has developed and applied its asset management framework in an appropriate manner when establishing its asset work programmes.

88. The gathering of asset condition data is systematic and in line with practices that we have observed in other transmission businesses aligned with good industry practice. We noted that, where appropriate, SP AusNet uses sampling techniques to determine asset health, we consider that this is pragmatic and appropriate.

89. The method used for establishing the asset related projects and programs was found to be sound and likely to result in an accurate assessment of the level of work required to maintain the asset portfolio on a bottom-up basis. However, such a forecast should also be subjected to rigorous top down assessment.

90. Whilst we observed the use of a feedback loop to calibrate the calculated failure rate predictions we did not observe a similar feedback loop for calibration of the resulting expenditure forecast. Given that the methodology is well established, we would have expected that a top down calibration against historical forecast vs actual would have been applied.

91. This aspect of SP AusNet's process for developing its expenditure forecast is discussed in the following sections.

4.3 Capex program and portfolio planning

4.3.1 Aggregate comparisons of expenditure in the current RCP

92. In section 3, we showed SP AusNet's historical capex program in comparison with what was proposed for the current RCP, and the trend implied by the proposed capex program. We have reviewed the RP and associated appendices supporting the capex program and we sought further information, which SP AusNet provided, in order to better understand the reason for past variances and to help in forming a view on the reasonableness of the proposed program.

93. As is shown in the Figure 12 (reproduced from section 3), SP AusNet spent considerably less capex in the current RCP than it proposed, and less also than the amount the AER allowed for in its Decision on that RP. We have reviewed the sources of these differences and the results are shown in the table below.

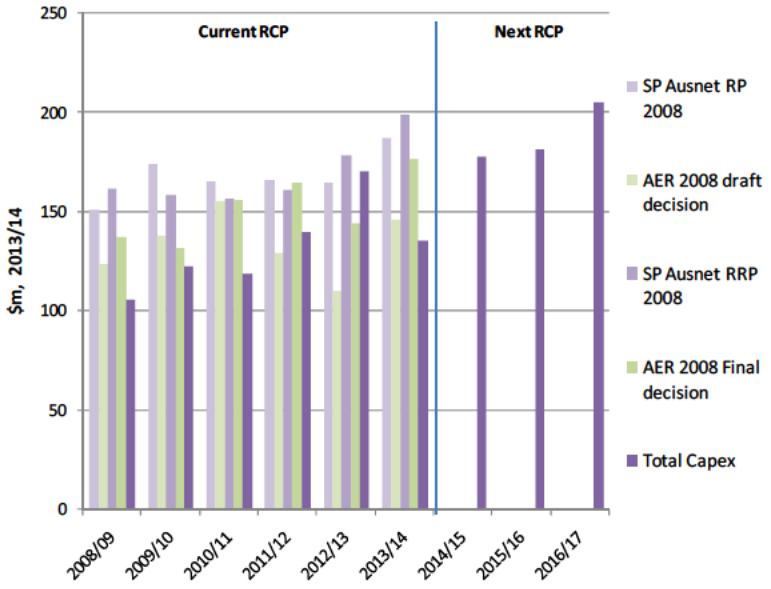
Table 9: Current RCP Capex comparison

($m, 2013/14)

	Total (Current RCP)		
	As Proposed	Actual/ Estimate	Difference
CBD Rebuilds	150.0	57.5	- 92.5
Replacement - Major Station	328.5	294.6	- 33.9
Replacement Other (asset replacements)	283.6	218.4	- 65.2
Security / Compliance	110.6	110.9	0.3
Other	75.4	12.1	- 63.3
Non Load Subtotal	**948.1**	**693.4**	**- 254.7**
			-
Non System -Other	5.5	15.7	10.2
Vehicles	5.9	4.8	- 1.0
Premises	0.9	1.2	0.3
IT	54.2	75.3	21.2
Non Network subtotal	**66.5**	**97.1**	**30.7**
Total	**1,014.5**	**790.5**	**- 224.0**

Source: SP AusNet Capex Model and current RCP templates

Figure 12: Capex comparison with 2007-08 RP and associated AER Decision



Source: SP AusNet Capex Model and current RCP templates

94. In aggregate SP AusNet spent $224m (22%) less than it proposed for this period. A significant portion of this variation resulted from the deferral of the two major CBD rebuilds at Richmond (RTS) and West Melbourne (WMTS) terminal stations. However after allowing for these, SP AusNet also spent $72.5m (9%) less on the remainder of its program.

4.3.2 Analysis of current RCP cost variations with reasons

95. We have reviewed the portfolio of 57 projects that SP AusNet proposed in the current RCP. We classify only 14of these as site-specific projects that would have had a relatively distinct scope. They are all substation projects, two of them being RTS and WMTS. The remaining 43 are non site-specific projects, which are better characterised as "programs" of work; for example:

- EA15: oil containment at stations;
- EA24: replacement of insulators and fittings.

96. Of the 43 proposed programs of work, no work was done in the current RCP on nine programs, nor is any proposed on these programs in the next RCP, while work on one program was commenced but significantly deferred into the next RCP. The proposed expenditure on these ten programs that were subsequently "rolled out" of the program in full or in part were $64.1m. On the other hand fourteen projects totalling $75.9m were not originally proposed, but were subsequently "rolled in" to the capex program. We would have expected more roll-ins towards the end of the RCP, however the amount was relatively evenly spread and started with $16m of additional programs in the first two years of the current RCP[12].

97. We sought information from SP AusNet to establish the reasons for the significant variances in the cost of the capex program. Specifically we were interested in the extent to which it resulted from reduced volumes of work conducted under generic work programs, reduced scope of work through engineering prudency, or from cost efficiencies. SP AusNet provided information in response to request EMCa023[13]. With regards to programs of work, SP AusNet provided information for the 10 programs which exceeded $7.5m. In two of these projects, a greater volume of work was achieved than was proposed, in two others it was the same, in one it was less and for the remaining five no comparison was possible either because no volumes had been articulated in the original proposal or because no figures for actual volume of work were provided.

98. Similarly, SP AusNet provided further information on scope changes that may have affected the cost outcomes for the site-specific projects. For two terminal station projects - Hazelwood (HWPS) and Brooklyn (BLTS) - SP AusNet indicated that the scope had been significantly reduced or work staged/deferred[14]. For Kyneton (KTS) SP AusNet indicated that the scope had increased, yet expenditure was still less than proposed. Excluding the two projects for which the scope of work carried out within the period was reduced (i.e. HWPS and BLTS), the aggregate expenditure on the portfolio of site-specific projects was 18% less than was proposed. We comment further on this in the next subsection.

99. From the data provided, we observe variances that are mostly negative. The following two figures show the cost variances for single-site projects and for multi-site work programs respectively.

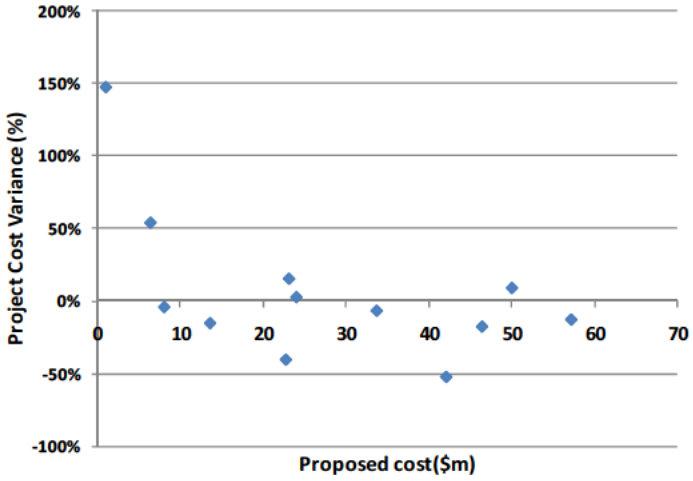
[12] See Appendix C for the details of these projects

[13] Response_SP_EMCa023_-_Project_categorisation, Response_SP_EMCa023_A and Response_SP_EMCa023_B

[14] Hazelwood deferral was due to the re-prioritisation of the Hazelwood Power Station redevelopment

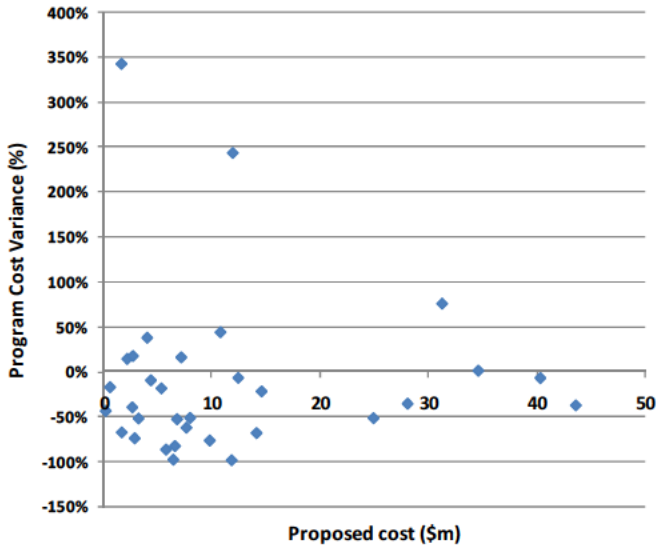
SP AusNet has staged components of major stations projects such as Brooklyn and Ringwood Terminal Station redevelopments. This was attributed by SP AusNet to the acquisition of improved information on the condition of these assets at the detailed design stage which led to certain components of these rebuilds being efficiently deferred to the next stage of works at the station.

Figure 13: Project cost variance[15]



Source: Current RCP templates

Figure 14: Program cost variance[16]



Source: Current RCP templates

100. We analysed the data above to establish the portfolio-level variance between the amounts that SP AusNet proposed at the last revenue reset, and the amounts it spent. From this analysis we find that, excluding the two CBD rebuild projects, SP AusNet spent 11.7% less on site-specific projects and 12.6% less on non site-specific programs of work. The summary of our analysis of all projects proposed and/or undertaken in the current RCP, is shown in the table below.

[15] Excludes RTS and WMTS, since these were not completed in the period and no actual cost is currently available

[16] Excludes programs substantially deferred out of the RCP period. And one program with minimal proposed expenditure ($0.2m)

Table 10: Analysis of projects proposed and undertaken during current RCP[17]

($m, 2013/14)

	Proposed	Actual/ Estimate (within RCP)	Remainder (next RCP)	Total (Actual/ Estimate)	Variance	%
Projects (Excluding RTS and WMTS)	328.1	283.3	6.3	289.6	- 38.4	-11.7%
Programs	370.0	323.0	0.5	323.5	- 46.5	-12.6%
Roll Out	71.4	7.4	N/A	7.4	- 64.1	N/A
Roll In	-	75.9	N/A	75.9	75.9	N/A
Exclude (major time deferral):						
EA 29 Redevelopment of RTS	150.0	55.3	80.6	135.9	- 14.1	N/A
EA 49 Commencement of redevelopment of WMTS	28.7	14.5	107.9	122.4	93.8	N/A
	948.1	759.4				

Source: Current RCP templates

101. The variances of negative 11.7% and negative 12.6% for projects and programs are significant and somewhat more than we would expect to be explainable by cost efficiencies alone. From a range of information provided by SP AusNet, we consider that the under-spend most likely resulted from a combination of:

- Prudent deferrals of projects or programs of work which are found not to be required within the period (or for which there is a reduced requirement within the period) based on changed consumer requirements and/or better condition information. In other words, SP AusNet is dynamically adjusting its program for changing circumstances, and/or
- De-scoping of projects and/or optimization across a portfolio of projects that reveals a reduced overall requirement. That is, the project scope can be reduced and is not simply deferred, and/or
- Engineering design optimisation which delivers the identified required outcome in a more cost-effective manner than was assumed at the early proposal stage; and/or
- Cost efficiencies in delivery of the project (e.g. post design implementation).

4.3.3 Findings on project and portfolio planning for next RCP proposed capex

Project need, scope definition and portfolio planning

102. We observe that, as with the current RCP, the proposed capex for the next RCP is similarly built up as the aggregate of SP AusNet's estimate of costs for 35 named projects or programs of work (see Table 11). Sixteen of these are site-specific projects, nearly all at substations, and one "project" is a roll-up for all existing committed projects brought forward from the current RCP. Of the sixteen projects, five are significantly underway and these projects, plus three others, have an approved business case. The remaining eight site-specific projects, with proposed expenditure in the next RCP totalling $95m, do not yet have an approved business case; similarly, none of the 18 proposed non site-specific programs of work, with expenditure totalling $176m, has an approved business case at this stage[18].

[17] See appendix C for the full list of these projects and programs

[18] This information is based on business case status information provided by SP AusNet in its capex model

Table 11: Proposed projects and programs of work, by type and status

($m, 2013/14)

No	Description	Business case approved	Total (in next RCP)
8	Projects	Yes	245.3
8	Projects	No	95.2
Committed projects b/f from previous RCP			0.8
18	Programs	No	176.5

Source: EMCa analysis from SP AusNet Capex Forecast Model

103. We consider this situation, with a range of projects at different stages, would have also applied at the time SP AusNet proposed its capex requirements for the current RCP and is not unusual considering the timing of the projects and programs. However, in the same way, we consider it likely that SP AusNet will find opportunities to defer, de-scope, optimise and realise efficiencies relative to the expenditure that has been proposed at this stage. In section 5, we also raise concerns with risk and deliverability of the capex program as proposed. For all of these reasons we consider it likely that SP AusNet will not spend, and will not need to spend, the amount currently proposed. Accordingly we propose adjustments as set out below.

4.3.4 Proposed portfolio adjustment for project and portfolio planning and scoping prudency

104. We propose that the AER applies a reduction to the aggregate capex portfolio calculated based on the following sub-set of projects:

- A 12.6% reduction to the aggregate budget proposed for “work programs”; that is, those that are not site-specific; and
- An 11.7% reduction to the aggregate budget proposed for network projects that are not already substantially underway and for which no business case has yet been approved, except in the limited instances where we propose a project-specific adjustment (see section 5).

105. These portfolio-level adjustments equate to a $31.4m (5.6%) reduction of the capex portfolio.

Project churn

106. In the current RCP $64m of proposed projects were rolled out and $76m of new projects were rolled into the portfolio. We interpret this essentially as “project churn” that in aggregate is not materially biased, and is as we would expect for a portfolio of projects that are proposed with a six-year time horizon. We would expect less project churn in the next RCP, give that it is only three years. Extrapolating from the current RCP, we do not expect a churn bias in aggregate expenditure, therefore we do not see reason for any adjustment for this factor.

4.4 Capex project cost estimation

4.4.1 Information reviewed

107. We have obtained information on the following aspects of the project management and cost estimation processes that are relevant to the way in which SP AusNet has estimated projected costs for the proposed capex projects:

- Procurement processes;
- Project delivery models: in-sourced work allocation and outsourced tendering;
- Project risk allocation;
- Project management governance processes: approval "gates", financial delegations, change control, etc;
- Sources of unit cost information, and the process and governance for updating this information;
- Project cost estimation building blocks and quantities estimation, including treatment of allowances for "provisional" sums and contingencies and risk allowances including Monte Carlo risk modelling;
- Cost escalation(in regards the base for "unit costs") and in projecting forward;
- Ex-post reviews and feedback loop into continuous improvement of cost estimation.

108. Our primary reference material for SP AusNet's methodology is Appendix 4C of the Revenue Proposal[19]. In addition to information provided as part of the Revenue Proposal, we conducted extensive on-site discussions with SP AusNet to clarify our understanding of the end-to-end cost estimation process. Subsequent to these meetings, we requested further documentation of the process and evidence of the application of these processes through sample projects[20]. We also sought and were provided with analysis that SP AusNet had undertaken of its cost estimation performance.

4.4.2 SP AusNet's cost estimation process

109. SP AusNet undertakes cost estimation using a building block approach in which project quantities are estimated by its project managers, and dedicated cost estimators then apply unit costs and allowances to build up project costs for budget and business case approval purposes.

110. Project cost estimation is undertaken in three stages, as follows:

- Indicative estimates, used for the Initiation Phase, which includes an initial cost/benefit analysis, optimisation and prioritisation;

[19] Project Engineering – Project Cost Estimating Methodology TRR 2014/15 – 2016/17. Revision 1 07 February 2013

[20] The majority of the information was provided as Response SP EMCa019. A number of documents were provided as part of this response.

- Planning estimates and (depending on risk and materiality) a Risk-adjusted estimate, which are used in the Planning Phase for development and approval of the business case;
- Control estimates, used for project cost control purposes.

111. Projects are classified based on materiality and risk (class 1, 2, 3 – with class 1 project deemed to have the highest overall business risk).

112. Indicative estimates are prepared principally to support options analysis and first-pass business case analysis. These estimates are based on standardised building blocks.

113. Planning estimates are based on a more granular building block build-up, with a defined project scope and allowance for site-specific factors, and have a nominal allowance for risk and uncertainty. For "class 1" projects, a risk-adjusted estimate is produced and for this SP AusNet uses a Monte Carlo simulation, in which specific "inherent risks" and "contingent risks" are identified and quantified. This produces a cost estimate distribution, which in turn can be interpreted to produce "P50" and "P90" estimates. P90 estimates are used for business case approval purposes and, following approval, the difference between the P90 and the P50 estimate is held as a Management Reserve (typically +5% of the P50 estimate) . For the purpose of the RP capex forecast, we have confirmed that the P50 estimates have been used[2122].

114. SP AusNet includes Interest During Construction in its project costs estimates. However in calculating proposed revenue, IDC should not be included since it is inherent in the WACC that is applied to "as incurred" capex. We have confirmed that the capex proposed in the RP does not include IDC.[23]

4.4.3 Observations on cost estimation process

115. For the most part, we consider that the cost estimation process follows a logical path and represents good industry practice. We observe increasing focus on risk and uncertainty for larger projects as they advance through the gate process, and a well-designed process for modelling project risk for larger projects. However, we have three concerns about the suitability of the cost estimation process:

[21] In responding to information request EMCa019, SP AusNet advised that for some projects, P90 estimates had inadvertently been used for some projects proposed in the RP. SP AusNet corrected these to P50 estimates and provided a revised version of the capex model. We have used these revised costs as the basis for our review. The total capex for next RCP was modified from $575m to $564.2m (source: EMCA019_Q4A_-TRR_SP_AusNet_Capex_Forecast_Model)

[22] Where an asymmetrical cost distribution arises, there is a difference between the portfolio aggregate of the P50 "most likely" estimates for each project and the mean-derived "expected value" of the portfolio. SP AusNet has not proposed a specific adjustment for asymmetric risk and, to the extent that it is inherent in the estimates provided, we consider that the adjustment that we propose later in this section nets out this factor.

[23] SP EMCa022_-_Historical_Capex_data_check_18042013

- The process for updating unit cost rates, including the lack of certain adjustments that we would have expected (e.g. for unit cost escalation) and a relatively light governance process;
- A risk of errors and inconsistencies driven by the predominantly spread sheet based process, rather than using an industry-proven cost estimating tool such as Success Estimator[24]. Such tools support good project governance, helping to address the concerns in the first point above; and
- The competitiveness of the labour component of SP AusNet's estimates[25].

Governance and unit cost rates

116. SP AusNet advised us that unit cost rates used for estimating purposes are generally based on "most recent" tenders, and that for the majority of required items, SP AusNet has pre-tendered purchase options which provide the source data. Since those tendered prices were provided at different times in the past, we asked how they are brought into "current cost" terms. SP AusNet advised that they were not escalated. For example, it would appear that unit costs that were prepared and are stated as being in $2011/12 have been used without adjustment as a basis for costing which is presented in $2013/14 terms. We consider this to be a weakness in the cost estimation methodology although, without historical escalation data and an audit of all unit costs information sources, it is not possible to say whether this has or might lead to an over- or under-estimate.

117. We have some concerns in regards to governance of the process for updating cost estimates, which appears to have less independent review and formal governance than we would expect. For example, it is good practice to:

- Have a rigorous process for unit and building block costs and updates, including limiting the personnel authorised to change unit rates, change control, and regular audits of the updates (rationale and frequency);
- Undertake independent value assurance for large projects (say, greater than $30m) at least once in the project development phase.

Cost estimation tools

118. Further, cost estimation is not carried out within a company-wide cost estimation tool and is essentially spreadsheet-based. While the spreadsheets as presented to us appeared to operate as we would expect, and in accordance with the methodology described by SP AusNet in accompanying documentation, we consider that there is risk of inconsistent unit cost rates being applied to different projects, of calculation errors for some projects and of factors or adjustments being applied but which may not be recognised or understood by those responsible for the forward budgets. The error referred to above, where some project cost estimates were initially P90 estimates in the RP, is an example.

[24] Success Estimator is a widely used software tool in the construction industry

[25] SP AusNet's estimates assume a 60% labour component

Labour cost competitiveness

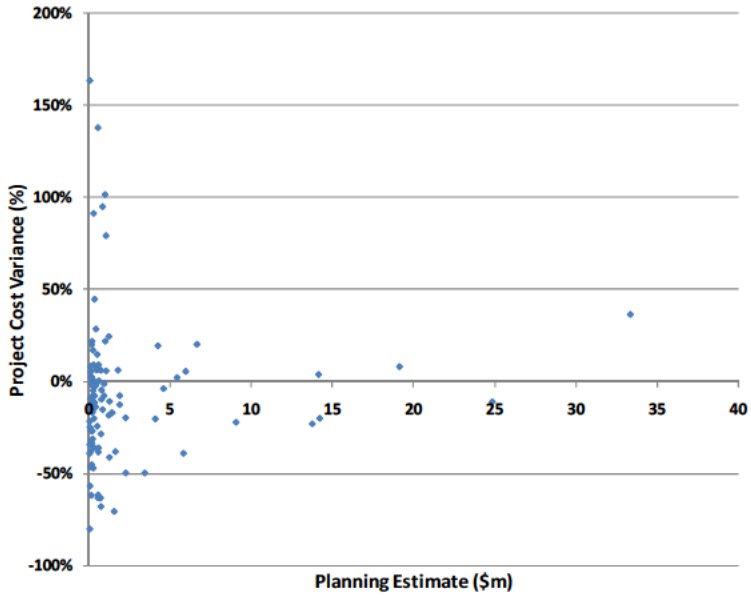
119. We also have some concern about the competitiveness of the labour component of cost estimates. We enquired as to the extent to which SP AusNet outsources work and the ability to compare outsourced project costs with internally-resourced projects. However we were advised that where SP AusNet chooses to outsource projects, it does not "bid" against the outsource providers. Conversely, in-sourced projects are simply allocated to internal project delivery teams and the competitive quotations are not sought for them. This is an indication that some cost estimates are not based on competitive information, nor does there appear to be a process in SP AusNet which would reasonably lead to competitive outcomes for the labour component of in-sourced projects and we were not provided with comparable benchmark information to demonstrate that labour costs are competitive.

4.4.4 Analysis of outcomes of capex cost estimation process

120. We sought information from SP AusNet to test the outcomes of its cost estimation process, to help us in assessing the reasonableness of the cost estimates used in producing the RP budget.

121. SP AusNet described a project close-out process (including a feedback loop on cost estimation), which is consistent with good practice. The evidence of the results from the post-project analysis was provided as requested and indicated an overall cost under-estimation of 1.4%. Figure 15 shows the variance in project cost for each project, as a function of the size of the project.

Figure 15: Current RCP cost estimation variance by project size



Source: Response_SP_EMCa009_A

122. Noting that many projects (and those with the highest proportionate variance) are quite small, we re-analysed the data considering only projects >$2m, since these would have had a greater degree of rigour applied in estimating their costs. This subset of 17 projects had a cost under-run of 0.4% in aggregate. However this subset was

dominated by data for the TTS rebuild, which had a cost over-run of 36%. Removing this outlier, the remaining 16 projects, with an aggregate cost of $140m, had a cost under-run of 9% in aggregate.

123. The "projects" listed in the analysis that SP AusNet provided are in many cases "sub-projects" of rolled up projects that have been presented in the RP, and so we consider that they are a better indication of cost estimation variance, and are less affected by volume variances. Nevertheless there are some significant variances for individual projects which can really only be attributed to cost estimation or to scope variations, and in the main the estimates proved to be too high.

4.4.5 Findings on capex cost estimation

124. Overall we are relatively satisfied with the accuracy of cost estimation, where the scope is known and not subject to change as condition information becomes apparent. Although we noted some concerns with the cost estimation process, for the purpose of assessing the proposed capex we have judged cost estimation by its outcomes which we consider to be within an acceptable range, albeit biased slightly upwards. We propose applying a 1.4% cost estimation reduction to all capex, based on the estimation bias revealed from the analysis that SP AusNet provided. This cost estimation adjustment is inherent in the portfolio adjustment described in the previous section and is not additive. Therefore we ascribe 1.4% of the adjustments proposed in the previous subsection to cost estimation bias, and the remainder to portfolio-level optimisation, scope reductions and prudent deferral opportunities that will be found over the course of the next RCP.

4.5 Opex program and expenditure planning

125. The proposed opex program expenditure has been determined as follows:

- For recurrent expenditure items, SP AusNet has proposed a trend from a base year (2011/12) by applying escalation factors to these "benchmark" actual costs;
- SP AusNet has identified 12 step changes that it considers represents reasons for departures from the escalated benchmark costs;
- An Asset Works program is proposed, based on a bottom-up build;
- An allowance is made for proposed IT opex savings; and
- An allowance is made for the additional opex requirements resulting from "group 3 roll-in" assets.

126. We understand that cost estimates for Asset Works are developed using a similar project costing methodology as described for capex projects. However in our assessment of the opex asset works program, we have formed the view that the dominant issue is the scope and scale of programs achieved and we have focused on this, although there are also indications from the current RCP that unit costs used for opex cost estimation may also be biased towards over-estimation.

127. In section 7 we analyse the proposed step changes and asset works program and we present there our findings on their reasonableness and on adjustments to SP AusNet's proposal. Review of SP AusNet's base year expenditure, proposed escalation factors,

non-controllable costs, management fees and other accounting matters relating to related parties, are not within the scope of our review.

4.6 Overall findings on asset management and expenditure planning

4.6.1 Asset management

128. We have found that, while SP AusNet's asset management framework can provide a sound basis for the management of the assets, the application of the framework when developing expenditure forecasts could be improved. We take this view because the forecast expenditures rely on a bottom-up aggregation with insufficient attention to the aggregate portfolio forecast that results, and its realism.

129. The PAS 55 accredited asset management framework adopted by SP AusNet provides a well-documented and sound theoretical basis for managing the network assets. As discussed in section 4.2.1 the projects and programs are developed on the basis of asset age, condition and performance data. SP AusNet applies an economic risk assessment to derive a first cut (bottom up) expenditure forecast.

130. Whilst we have seen evidence that SP AusNet apply top down assessments and adjustments to the bottom up derived expenditure estimates, we have remaining concerns that this has been insufficient. Our concerns are significantly influenced by our review of expenditure outcomes in the current RCP, which in many areas fall well short of what SP AusNet projected in 2007/08. For replacement capex, for example, our findings suggest that it is likely that some of the proposed works will not be undertaken and will be either deferred, re-scoped or found to be unnecessary. These concerns are covered further in other sections of this report.

131. We also have concerns that the top-down adjustments made by SP AusNet in the current RCP were made for inappropriate reasons. Namely, SP AusNet has stated that expenditure was reduced because of corporate financial constraints caused by the GFC. In our view, if the work was required for consumer needs and had a sound engineering/economic justification, then it should have been done. If it was not done because of financial constraints imposed at the corporate level, the implication is that the business acted contrary to sound engineering/economic practice or did not meet customers' needs.

132. We suggest that SP AusNet could improve the validity of outcomes from its otherwise sound asset management framework, by addressing these issues, and thereby developing expenditure forecasts that better reflect what is likely to be spent. This could be assisted by obtaining a more strategic-level review of expenditure proposals, to strengthen the governance process.

4.6.2 Findings in regards budgeting for the proposed capex portfolio

Findings

133. With some specific exceptions and which we cover in section 5, we consider that the asset management framework has been reasonably applied in first determining the need for the list of proposed projects and programs, also in estimating the timing of these projects and in producing a scope and cost estimate for these projects on bases that reflect their status as at the time the RP was being prepared.

134. At a portfolio level, we consider that there will be considerable opportunities to rationalise this program, to de-scope certain projects through prudent engineering, to prudently defer projects as more information is gathered and to refine cost estimates. We consider that the evidence from the current RCP outcomes leads to the conclusion that SP AusNet will find that it needs to spend less at a portfolio level than it has currently proposed.

Proposed adjustments

135. Based on the analysis presented in this section, we proposed applying the following adjustments:

- A cost estimation adjustment of -1.4% applied to all network capex other than projects that are substantially underway; and, in addition to this:
- A prudency adjustment of -10.3% (-11.7% + 1.4%) applied to all site-specific projects" that are not otherwise adjusted for specific project factors;
- A prudency adjustment of -11.2% (-12.6% + 1.4%) applied to all non site-specific programs of work.

4.6.3 Findings in regards budgeting for the proposed opex portfolio

Findings

136. Specific findings on the proposed step changes and asset works programs are provided in section 7.

137. At a general level, we consider that the methodology used for planning and costing the opex program is reasonable as a bottom-up process, but that the RP budget presented by SP AusNet lacks a top-down portfolio-level assessment of the reasonableness of delivery and of the overall costs of the whole program as built up. We have undertaken such assessment in section 7.

138. SP AusNet has not made an allowance for improvements in opex efficiency that we would expect to occur. SP AusNet has stated that its strategic IT investments were justified based on opex savings and we have estimated that it would require savings of the order of $2.4m p.a. to justify these investments to date. SP AusNet had proposed such an adjustment in its revenue proposal, but only for the benefits from IT capex yet to be incurred. We consider it logical to account for the benefits of IT investment

already made and we are satisfied that these benefits are not inherent in base year opex. This adjustment is equivalent to an IT-enabled opex efficiency adjustment of approximately 2.5% of controllable opex, and is required to produce a prudent and efficient expenditure forecast as required under the NER.

5 Replacement capex– Stations

5.1 Overview

139. CBD substation and major substation rebuilds are the major drivers of the proposed replacement capex. We have given specific attention to these in both our desktop and on-site reviews.

140. As discussed in section 4 of this report, aggregate capex expenditure in the current RCP is approximately $118m (13%) less than the AER's Final Decision and $224m (22%) less than SP AusNet proposed. SP AusNet gave following reasons for this underspend:

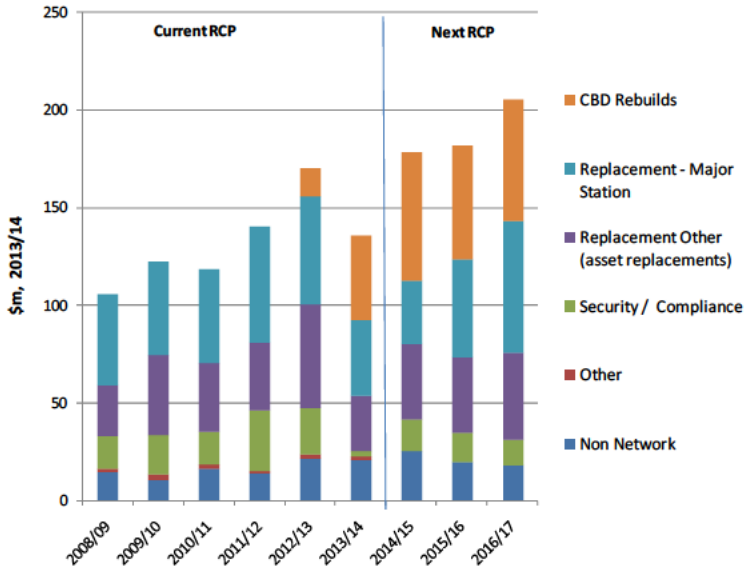
- Deferral of Richmond substation replacement;
- Staging of major stations due to improved condition assessment;
- Reprioritisation of Hazelwood power station development.

141. Our analysis of the forecast and current expenditure for the current RCP revealed that a number of deferred projects have been 'rolled into' the 2013/17 RCP from the current RCP, however an allowance has not been made to take into account the project expenditure that can be expected to 'rolled out' of 2013/17 into the next RCP.

142. Given the above point and the ambitious replacement capex program, that includes several coincident CBD and major substation replacements, and the economic justifications for many of the programs for which timing is highly dependent on certain assumptions, we have sought objective justification from SP AusNet to assess whether there is room for prudent deferral of a proportion of this planned expenditure into the next RCP.

143. The proposed replacement capex shows large increase from the current period. As can be seen from the following Figure 16, this is attributed mainly to the CBD Station rebuilds. However, we are of the view that the CBD Stations are a sub-set of the Major Stations and we would expect to see a reasonably steady trend of expenditure with these two categories combined.

Figure 16: Capex: Comparison between Current RCP and Next RCP



Source: SP AusNet Capex Model

144. The large increase in expenditure raises concerns regarding SP AusNet's ability to deliver the proposed program of work. The proposed average annual capex for the next RCP represents a 43% increase over the current RCP annual average.

145. We are concerned about the risks associated with carrying out the Richmond and West Melbourne terminal station (TS) rebuilds simultaneously owing to the increased risk to CBD supply security. Although the two stations supply different parts of the CBD, there is still risk of a major fault on one impacting the system. There is also the risk of attempting to manage two complex rebuilds simultaneously from a planning and execution perspective.

5.2 Review of CBD Substations

146. There are two major CBD rebuild projects included in the RP with the following expenditure proposed in the next period:

Table 12: Proposed cost

($m, 2013/14)

	2012/13	2013/14	2014/15	2015/16	2016/17	Next RCP
RTS Rebuild	12.6	32.1	32.5	23.1	25.0	80.6
WMTS Rebuild	1.6	11.1	34.1	36.0	37.8	107.9
Total	14.2	43.2	66.6	59.1	62.8	188.5

Source: SP AusNet Capex Model

147. From the provided documentation and the site visit we concluded the following:

5.2.1 Richmond Terminal Station:

148. The total project cost is forecast at $125.3m, with $44.7m ($2013/14) spent in the current period and $80.6m ($2013/14) forecast for the next period.

149. The Board approved $137m for this rebuild in March 2010. The subsequent redesign using GIS equipment pushed the price up to $180m and the board approved this amount in 2012. However the current proposed cost is $125.3m and we have not seen a reconciliation between the two figures.

150. Most of the equipment is at the end of its useful life and four of the six major transformers have condition scores of C4 or C5[26] for core, windings or bushings. The B3 transformer is only 13 years old, in good condition and will be used on another site.

151. Given the age and condition of the assets we support the rebuild of this Terminal Substation, which supplies the eastern half of the Melbourne CBD plus adjacent suburbs. The rebuild includes the replacement of the 220, 66 and 22kV switchyards.

152. We have visited the site and found it to be extremely confined on all sides and we agree that the use of GIS equipment is the appropriate approach for all the Richmond switchyards. The tightness of available space and the legacy structure of the substation (e.g. location of 220kV in the centre with 22kV and 66kV switchyards either side) would present extreme difficulties and risks if AIS replacement was attempted.

153. The use of GIS will also significantly improve the visual impact of the Terminal Station from the surrounding urban area.

154. Given the site restrictions and technical challenges the logistics of the rebuild will be challenging and great care will be required to maintain system security and personnel safety throughout the job.

155. We support the inclusion of this project.

5.2.2 West Melbourne Terminal Station

156. WMTS is one of three terminal stations in Melbourne supplying the CBD plus surrounding residential, commercial and industrial areas. Much of the existing equipment was installed in 1964 and is now considered by SP AusNet to be at high risk of failure. It is proposed to redevelop the site due to reliability considerations and load criticality.

157. The proposed rebuild will replace ageing assets with modern and more compact equivalents and the station will also be redesigned to accommodate future capacity expansions to meet future demand.

158. The project was submitted to the SP AusNet Board on 15 May 2012 for approval of the rebuild of WMTS and preliminary work has commenced. Completion is due in 2017/18.

159. The board paper dated March 2012 sought approval of $160.9m for Project Direct Expenditure and $192.8m for Project Total Expenditure. The latter figure includes contingencies, overheads, finance charges and existing asset write downs. The Board paper considered various options but did not consider the option of using 220kV AIS circuit breakers. The capex model indicates a total project cost of $125.5m, and

[26] SP AusNet measures asset condition with reference to an asset health index, on a scale of 1 to 5. C4 =Deteriorating and C5 = Advanced deterioration

proposes expenditure of $107.9m within the next RCP. The spread of this expenditure was shown in table 12, at the beginning of section 5.2.

160. We have studied all the information supplied and have focused on the following aspects of this project[27]:

- The justification to redevelop the Terminal Station owing to asset condition;
- The timing of the redevelopment;
- The justification to redevelop using GIS equipment for all voltages rather than AIS equipment;
- The justification to provide for future expansion capacity;
- The recommended capex allowance in the coming period for this project.

Redevelopment needed owing to asset condition

161. Three of the four 220kV transformers are some of the highest risk transformers in the network. The fourth transformer is in good condition with an estimated 30 years remaining life. Recent condition assessments indicated that most switchgear needs replacement. Most of the circuit breakers, instrument transformers and other equipment in the station is unreliable and/or poses a significant risk to safety of personnel and adjacent equipment.

162. We support redevelopment of the station to replace the ageing equipment.

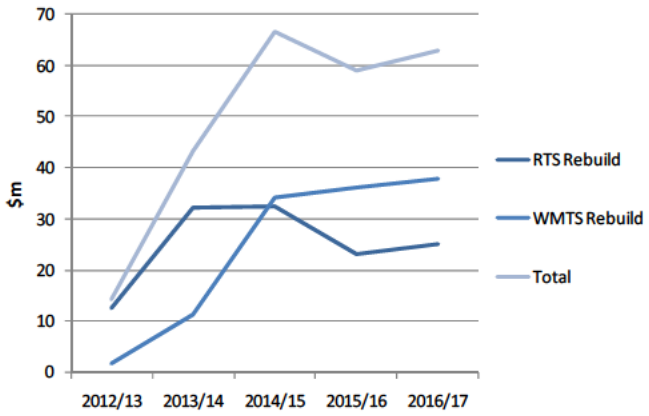
The timing of the redevelopment

163. This is a complex project involving the replacement of nearly all of the major equipment in the three switchyards, whilst maintaining secure supplies to a major part of the Melbourne CBD. There is a fair risk of interruptions and the project will require very careful coordination and planning to avoid endangering both human lives and supply security. We note that the redevelopment of the Richmond Terminal Station is being carried out at the same time as WMTS and both of these stations supply parts of the CBD. We are concerned that the simultaneous redevelopment of WMTS will put additional pressure on the organisation and resources and increase the risk of outages and accidents.

164. The following table and graph shows the build-up of expenditure for the RTS and WMTS projects as proposed. This shows a rapid build- up to a peak of $66.6m ($2013/14) in 2014/15.

[27] SP AusNet provided additional information to the AER on 18th June and 8th July 2013, after this Report was prepared for the AER and findings presented to SP AusNet. The AER asked EMCa to consider this information and to provide a Supplementary Briefing Paper, which is included in the current report as Annex D

Figure 17: As proposed($2013/14)



Source: SP AusNet Capex Model

165. We recommend allowing for the project for revenue determination purposes, by assuming a delay for WMTS by one year to allow a slower build-up of activity to reduce pressure on resources and the associated risks. This leads to a $26.7m shift of expenditure out of the next RCP and into the subsequent period. Table 13 and Figure 18 show the shift in expenditure that results from such deferral, which would now peak at $61.0m, an 8% reduction on the $66.6m peak expenditure as proposed by SP AusNet. Importantly there is a slower build-up and this peak would now occur in 2016/17, two years later than under SP AusNet's proposed timing and would occur when the two projects are at quite different stages of completion.

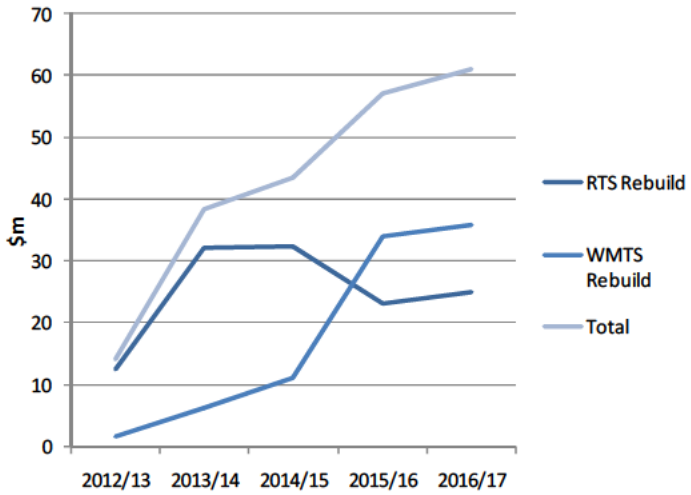
Table 13: Effect of one-year deferral of WMTS rebuild

($m, 2013/14)

	2012/13	2013/14	2014/15	2015/16	2016/17	Next RCP
RTS Rebuild	12.6	32.1	32.5	23.1	25.0	80.6
WMTS Rebuild	1.6	6.4	11.1	34.1	36.0	81.2
Total	14.2	38.5	43.6	57.2	61.0	161.8

Source: EMCa adjustment with SP AusNet Capex Model data

Figure 18: As adjusted ($2013/14)



Source: EMCa adjustment with SP AusNet Capex Model data

Use of GIS equipment for all voltages

166. SP AusNet proposes to replace all equipment with GIS equipment. The main stated reasons for this are to reduce the visual impact of the Terminal Station and to facilitate the logistics of replacing the existing equipment. Additional reasons are to free up space for future developments and to allow the installation of breaker and a half arrangement for additional flexibility and reliability. We will address each of these in turn.

The Visual Impact Argument

167. The City of Melbourne is proposing to redevelop the Arden Macauley District as a high density residential and commercial area and SP AusNet is concerned that this will bring pressure to improve the visual aspect of the Terminal Station. The triangular WMTS site is at the very south Western limit of the urban development District and is bounded on one side by a road and a railway line, on the second side by the river and another railway line, with the motorway running overhead, and on the third side by roads. It appears that the only reason WMTS is included in the area plan is because of a small area of river reserve which runs between the river and the WMTS. It should also be noted that the elevation of the switchyards is such that they sit well above the level of the surrounding roads and river. The Arden Macauley Structure Plan clearly identifies the WMTS as an electrical switchyard. It does however indicate a possible co-gen power station to be included on the edge of the existing site.

168. We are concerned that SP AusNet may have prejudiced its option for an AIS rebuild, by promoting the solution of a fully GIS Terminal Station in their discussions with authorities and by issuing a public brochure showing images and a description of the future station. This will make it difficult for it to obtain consents for the station with AIS equipment.

169. Our view of the proposed development is that significant additional expenditure for GIS is not justified on the grounds of visual improvement. The location of the site is such that it is not readily seen by many neighbours, being largely surrounded by other transport service routes. Much could be done to provide additional screening by vegetation and panelling. The site is too small to allow the addition of any reasonable sized co-gen plant so this should not be a consideration.

Small Site

170. Regarding the logistics of the redevelopment on a small site, our view is that the site is of sufficient size to allow redevelopment using AIS equipment with careful planning. We have not seen any evidence that this has been adequately considered, despite asking for a detailed options breakdown.

171. The material provided did provide cost estimates for a full AIS site, but no information on the proposed layouts, the logistics of carrying out the project nor the likely breaker arrangements were provided.

172. There is no doubt that the limitations of the site area would make redevelopment with AIS equipment a more complex job with more stages and more outages to be planned. SP AusNet has allowed an additional $4.8m for this brownfields risk which we consider to be reasonable.

173. Working in proximity of existing live equipment would also require more care and could increase the risk of accidents. These are serious considerations and need to be balanced against the cost savings of an AIS solution.

Provision for future expansion

174. In its Planning Report (Version 2, May2012) SP AusNet state that "The proposed redevelopment of WMTS with compact GIS technology will unlock the existing augmentation constraints at WMTS. It will provide for efficient future augmentations to meet the capacity demands of CitiPower's distribution network."

175. SP AusNet states in the Board Paper that: "A Regulatory Investment Test (RIT-T) is not required for this project because it does not enhance the capacity to transmit or distribute more electricity and the proposed expenditure relates to maintenance or replacement and is not intended to augment the transmission network." However they then say that project benefits will include: "Unlocking augmentation constraints by using compact GIS technologies to overcome the space restrictions and the existing inflexible 220kV switching configuration..."

176. We are of the view that GIS can be used for future augmentation on the site if needed in the future. Provision should be made in the revised layout of the terminal station. The incremental cost of GIS should be considered as augmentation and be subject to the RIT-T approval process. However, assumptions on the timing of the need for future capacity would need to be carefully evaluated.

177. Based on the information we have reviewed, we consider that the GIS component of the project has not been sufficiently justified on the basis of ability to provide future capacity.

Financial Approval Process

178. [C-I-C]

[C-I-C]

179. On the basis of the above statement, it would appear that there is a high likelihood that SP AusNet will continue this project as a fully GIS station regardless of the AER's decision in regards the current Revenue Proposal, and has the capacity to do so.

Cost Comparison of GIS versus AIS equipment

180. As discussed in sections 5.2.1 movements in project cost estimated have occurred as approvals were sought for GIS seen on the Richmond Terminal Station replacement project. This raised concerns regarding the accuracy of similar estimates for West Melbourne Terminal Station. The accuracy of these cost estimates are important if any credibility is to be given to the options analysis for the AIS/GIS comparisons.

181. [C-I-C]

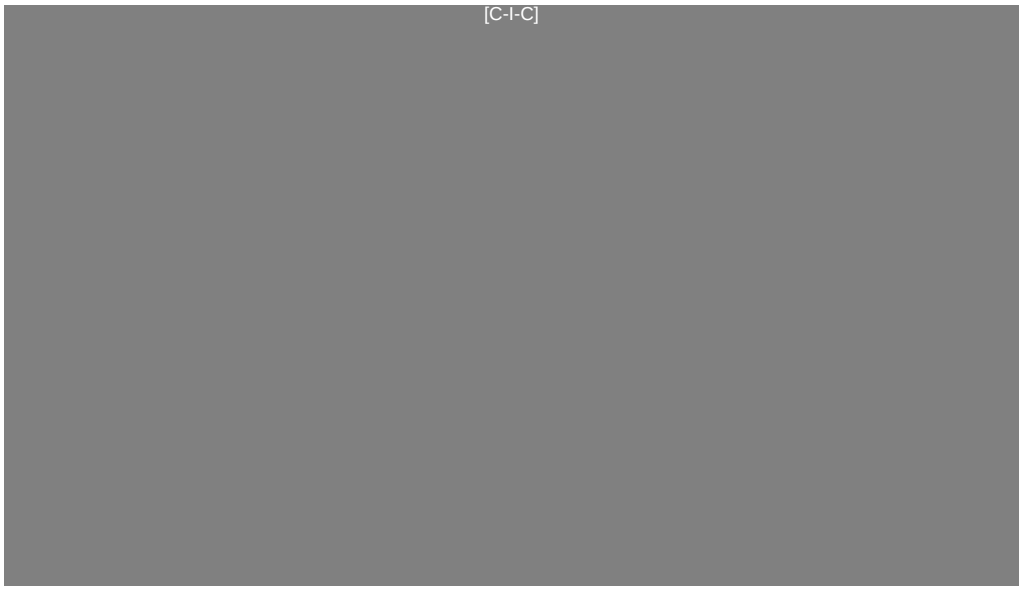
Figure 19: GIS Cost minus AIS Cost ($m)

[C-I-C]

182. [C-I-C]

183. [C-I-C]

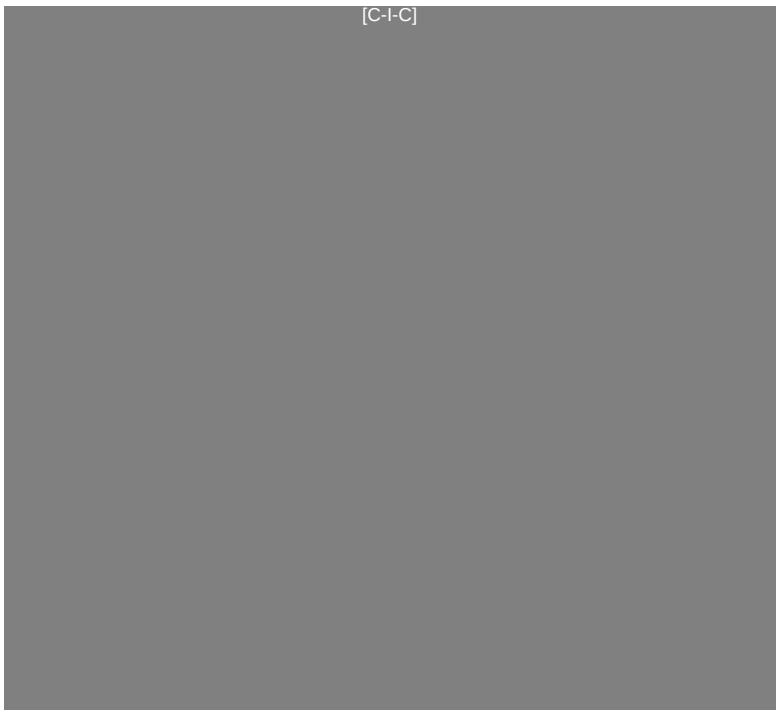
Figure 20: GIS Cost minus AIS Cost (as % of GIS Cost)



184. 

185. 

Table 14: GIS vs AIS comparative cost



186. The proxy AIS cost in the table above shows that there is a significant mark up in West Melbourne costs above what would have been expected from the GIS/AIS

comparative costs [C-I-C]. The majority of these additional costs are in the 'design' and 'brownfields' factors.

187. This analysis leaves us in considerable doubt as to the accuracy of the WMTS budget figures provided and we suspect that there is a large degree of contingency built in to the AIS option costs. This makes the GIS option look more favourable. We consider that a reasonable estimate for the AIS costs would fall between the proxy AIS and SP AusNet AIS cost at $94.95m (i.e. mid point between $131.6m & $58.3m). This would imply a reduction of $53.4m on the proposed total cost, or a reduction of $38.8m in the cost within the next RCP, in the absence of deferral. With the deferral that we have proposed, the net effect of this adjustment is a reduction of $29.2m within the next RCP.

188. Given our concerns regarding project timing, the periodic downwards adjustments in cost estimates seen for the Richmond Terminal Station project and the concerns we have regarding the accuracy of the West Melbourne cost estimates, we consider that the following adjustments should be made to the forecast expenditure on West Melbourne Terminal Station:

- Deferral of the project by one year; and
- Provide for reconstruction, but at a lower cost than the costs presented to date.

Conclusions on WMTS

189. The various arguments for and against the proposed expenditure on this project need to be weighed carefully:

- We support the redevelopment of the WMTS due to age and condition of most of the equipment;
- We do not support the visual amenity argument as a good case for a GIS solution;
- We recommend the redevelopment project be deferred by at least one year to provide a more gradual build-up of activity of the WMTS project following the RTS project. This will reduce the risk;
- We believe there is a good case to take a long term view in redeveloping this site so as to provide adequate space for additional feeders and transformers in the future. The 20-30 year horizon provided by AEMO would be approximately half life for most of the equipment and hence it would be a bad time to have to replace a large amount of the equipment to create the space required. However we recommend that the AER consider whether this should be subject to the rigour of a RIT-T approval;
- We have considerable doubts about the accuracy of the cost estimates;

- Following our 30th May 2013 meeting SP AusNet provided further information[28] referring to a scoping investigation undertaken by BECA in 2011. SP AusNet state that the BECA investigation included:

  A detailed analysis of the costs, benefits and supply risks of the AIS option was carried out at the planning stage, prior to submitting the business case for SP AusNet management and Board approval. This analysis involved establishing the step by step construction sequence (fifteen steps in total) and identifying the risk at each step[29]

- SP AusNet say the investigation revealed:

  Extraordinary cost and supply risks (compared with a normal brown field type redevelopment) for the different project development stages. The extraordinary cost and supply risks can be ascribed to the unconventional 220 kV switching configuration, restricted site space, special operation of the 220/66 kV transformers and high demand levels

190. [C-I-C]

191. The additional information provided by SP AusNet has not been sufficient to convince our review team that the project costs, AIS comparative costs, and barriers to AIS rebuild has been sufficiently justified.

192. [C-I-C]

Table 15: Proposed and adjusted WMTS capex allowance

($m, 2013/14)

	2012/13	2013/14	2014/15	2015/16	2016/17	Next RCP
As proposed	1.6	11.1	34.1	36.0	37.8	107.9
Adjustment (Deferral)			- 23.0	- 1.9	- 1.8	- 26.7
Adjustment (Costing)			- 4.0	- 12.3	- 12.9	- 29.2
Total	1.6	11.1	7.1	21.8	23.0	52.0

Source: EMCa analysis based on SP AusNet Capex Model

[28] Following this meeting and the submission of EMCa's draft report to the AER, SP AusNet provided additional information on 18 June and 8 July 2013 on aspects of the WMTS project. The additional information provided has been incorporated into this report only where it revealed a material error or misunderstanding. Annex D sets out our consideration of the additional WMTS information.

[29] SP AusNet initial response to EMCa/Strata findings

5.3 Review of Major substations

193. A budget of $140.1m has been proposed in the RP for 16 Major Station replacement projects. Of these we reviewed the five largest projects totalling $101.5m (72%)[30]. The projects reviewed were:

Table 16: Proposed capex for major stations capex (as reviewed)

	2014/15	2015/16	2016/17	Total
Fishermans Bend TS	0.5	6.2	10.4	17.0
Heatherton TS	5.7	12.4	15.3	33.5
Hazelwood PS Stage 4	-	0.3	3.9	4.2
Yallourn PS	5.3	8.9	5.7	19.8
South Morang TS	7.1	12.1	7.7	26.9
Total	18.6	39.9	43.0	101.5

Source: SP AusNet Capex Model (Revenue Proposal)

5.3.1 Fisherman's Bend Terminal Station

194. This project includes the replacement of 1 x 150MVA 220/66kV transformer, 12 x 66kV CTs, 12 x bulk oil circuit breakers and sundry secondary system equipment.

195. The transformers on site have been assessed as part of SP AusNet's Condition Monitoring Programme. This has concluded that they are generally condition 3 which indicates that the proposed replacement of the first of these could be deferred until at least the following period without undue risk. Condition 4 indicates that replacement will be necessary in the not too distant future and Condition 5 indicates replacement is required as soon as reasonably possible.

196. We support the CTs and circuit breakers being replaced in the coming period but consider that the replacement of the transformer can be deferred. The capex allowed for this project should therefore be reduced by 25%.

5.3.2 Heatherton Terminal Station

197. This project includes the replacement of 3 x 150MVA 220/66kV transformers, 2 x 220kV AIS circuit breakers, 11 x 66kV AIS circuit breakers and some reconfiguration of the 220kV switchyard to alleviate operational and supply security constraints.

198. The transformer bushings and windings are in poor condition and warrant replacement in the coming period. Replacement of the CTs and circuit breakers is supported.

199. The economic modelling indicates that deferring the work in the 66kV switchyard ($12m) by 5 years is 20% more expensive.

200. This project is supported in full.

5.3.3 Hazelwood Power Station

201. The proposed expenditure in the RCP is for Stage 4 of a multi stage project of which the first two stages are complete and stage 3 is currently underway.

[30] SP AusNet modified the capex amounts subsequent to the RP

202. This project includes the replacement of seven 220kV bulk oil circuit breakers. Four of these are for lines and three for generator connections. These breakers are considered to have a significant risk of explosive failure and thus carry a high risk cost from system security, human injury and collateral damage.

203. The three generator CBs are for G3 transformer to #1 bus, G4 to #1 bus, and G6 to #4 bus. Each of these generators currently has two CBs allowing selection to alternate busses.

204. Hazelwood Power Station was built 1965-71. Forty plus years is at the outer bounds of life for a coal fired power station. This is driven by plant condition, maintenance costs, fuel use efficiency and environmental pollution. For Hazelwood the environmental issues are a big threat to future viability and the increasing maintenance costs must be significant.

205. Considering this the provision of new CBs carries a significant risk of these assets being superfluous within a short time span.

206. Five of the generators can currently connect to one bus only, these being G1 & G2 to #1 bus, G5 to #2 bus, G7 & G8 to #3 bus. Each of these has a breaker in good condition.

207. The remaining 3 generators are currently arranged so that they can be switched to two busses. Each of these already has one breaker in good condition. G3 & G4 have new breakers on the #2 bus. In normal operation these two generators are usually selected to this bus so the older breakers on the #2 bus could be disconnected and scrapped. This would remove some flexibility but this constraint could be justified by the limited future of the generators. G6 has a good breaker on the #3 bus and the other breaker on the #4 bus could be scrapped. In this case this generator is normally connected to the #4 bus so it may be necessary to move the good breaker to the #4 bus.

208. We consider that the replacement of the four CBs connecting to lines should be approved and the three CBs for Hazelwood generator connections should be declined. This would reduce the project cost by 43% from $15.2m to $8.7m.

209. In the Revenue Proposal the Total Project Cost was $15.2m and the Period Cost was $4.2m. These were amended subsequently to $19.6m and $0.9m. Regardless of the minor period cost we recommend that the adjustment be noted as the overall cost is $19.6m. The approval for the reduced number of breakers would be on record and should not slip through in the following period.

210. We recommend allowing a Period Cost of $0.6m ($13/14) and a Total Project Cost of $11.2m (i.e. a reduction of 43% of $19.6m).

5.3.4 Yallourn Power Station

211. This is a key node in the system that connects the four Yallourn generators and interconnects with two lines from the Hazelwood Power Station and four lines to Rowville Terminal Station. The project includes the replacement of 7 x generator circuit breakers and associated oil insulated CTs, refurbishment of 12 x circuit breakers, and replacement of the line protection relays.

212. Although Yallourn is 40 years old it still generates approximately 20% of Victoria's energy and Energy Australia says there are no plans to close it[31].

213. SP AusNet have carried out an economic analysis considering various reasonable alternatives and selected an option involving some replacement and some refurbishment. The refurbished breakers will need to be replaced at some future date.

214. The proposed option is considered appropriate and is supported.

5.3.5 South Morang Terminal Station

215. This project is in two stages with the first stage scheduled for completion in 2016 and stage 2 in 2020. The switchyard includes two 700MVA transformers (330/220kV). These transformers are critical for system security and are 45 years old. Their condition is poor but not critical, but there are no spares held of this type and rating.

216. The first stage includes the purchase of 3 x 700MVA single-phase transformers. Also included is the installation of a new double switched 330kV bay for connection of the new transformer to the No. 1 and No. 2 busses, 2 x live tank circuit breakers, 2 x CTs, 1 x VT, extensions to both busses and a new 330kV line connection. The replaced H transformer will be retained on site as a cold spare.

217. The second stage, in a later period, will include replacement of the second H transformer bank.

218. Also included in the second stage is the purchase of a spare single-phase transformer. This is considered justified because the new H transformer bank (3 x single phase transformers) is the only one of this type on the system. A failure of any one phase would take the whole bank out of service. It would not be feasible to replace it with one of the old single-phase units as it would not be a matched unit.

219. After careful review we support this project on account of its critical role in the system and the prolonged impact of a failure of any of the current 700MVA transformers.

[31] Source of this information - XC18 Yallourn Switchyard Planning Report (final paragraph Page 9) and in discussions onsite with SP AusNet

6 Asset Replacement, Safety and Compliance and Non-System Capex

6.1 Introduction

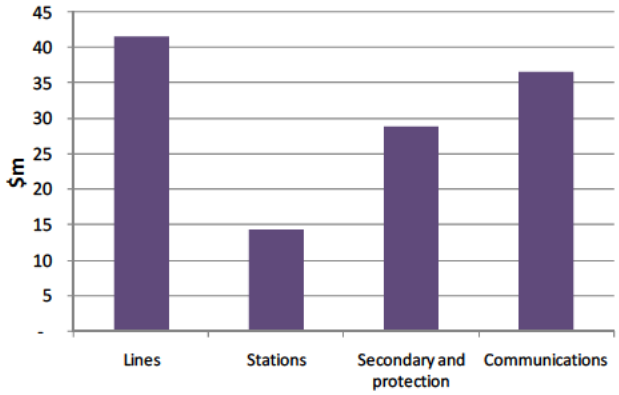
220. This section covers our review of the remaining aspects of the capex program, which comprises proposed expenditure for asset replacements (other than substation replacements covered in the previous section) for safety and compliance and for non-system capex. Of non-system capex, the dominant item is IT and we have focused

6.2 Overview

221. SP AusNet is proposing to undertake $121 million of expenditure on asset replacement programs (other than the major station programs described in the previous section) over the forthcoming regulatory control period.

222. SP AusNet considers that this expenditure is necessary *to "maintain the resilience and reliability of the network and address operational or asset failure risk".* The proposed expenditure also allows for some modernisation of protection, control and communication assets so that they meet the required operating standards. There are a small number of circuit limit improvement projects (e.g. protection relay and isolator replacements) that fall under the Network Capability Incentive Parameter Action Plan (NCIPAP). These projects are additional to the proposed asset replacement expenditure. The components of the proposed asset replacement expenditure for the 2014 -17 RCP are shown in the following chart.

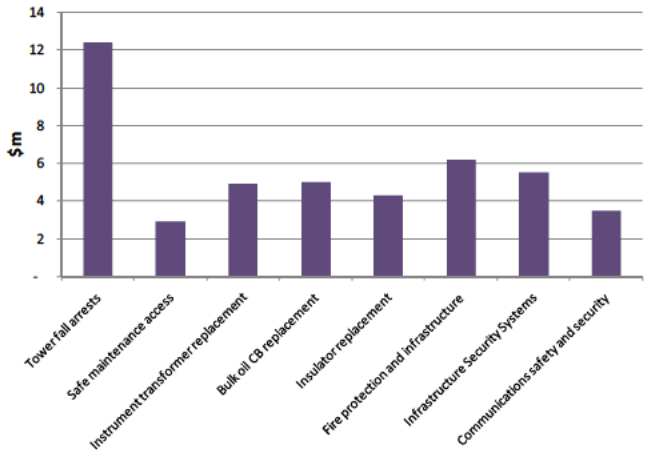
Figure 21: Asset replacement programs capex



Source: SP AusNet Revenue Proposal section 4.7

223. SP AusNet is proposing approximately $45 million in capex for safety, security and compliance. Included in this expenditure category are items related to safety such as the installation of tower fall arrests, fire protection and infrastructure for security management systems. The components of the proposed expenditure for the 2014 -17 are shown in the following chart.

Figure 22: Safety, security and compliance capex

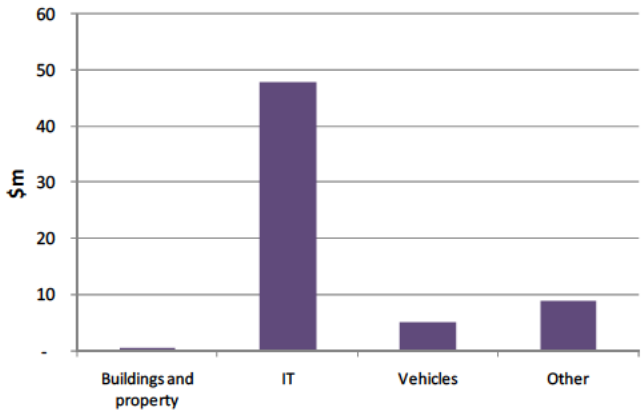


Source: SP AusNet Revenue Proposal section 4.8

224. SP AusNet has proposed expenditure of $63 million for non-system capex that covers buildings and property, vehicles, other and IT. Included in non-system capex is IT that accounts for $47.9 million (76%) of the proposed expenditure for this category[32].

[32] Figures quoted are after applying efficiency adjustments that SP AusNet has proposed

Figure 23: Non-system capex



Source: SP AusNet Revenue Proposal section 4.9

6.3 Assessment of the asset replacement programs expenditure proposal

225. The proposed expenditure on lines is largely made up from SP AusNet's tower replacement program. The identification of assets to be replaced is established through condition assessment and consideration of asset age. SP AusNet has identified a concentration of assets in the 46-50 year age range, which require condition monitoring, and possible replacement.

226. Expenditure under the Stations category includes replacement of synchronous condensers required to meet AEMO's reactive support requirements and an allowance for minimal transformer replacements.

227. Expenditure on secondary and protection systems is required to modernise existing assets, replace obsolete equipment that is difficult to maintain and to meet the NER and AEMO Protection & Control Requirements.

228. SP AusNet is proposing to modernise some communications components to improve performance and to replace obsolete components. Included in the communications forecast is the replacement of a number of components that are reaching the end of expected life and upgrades of communication operation and management systems.

229. We have reviewed the items included in this expenditure category and consider that the proposed work to be undertaken is appropriate and the expenditure should be allowed. We identified that a proportion of the expenditure forecasts are based on 'ball park' initial cost estimates, which will be firmed as the actual work program is established. This was particularly found to be the case for communications asset replacement. Given this we consider that it is appropriate to allow the expenditure subject to adjustments to take into account cost estimation accuracy and prudency.

6.4 Assessment of the safety, security and compliance expenditure proposal

230. The largest component of this expenditure category is for tower fall arrestors. This expenditure is required for SP AusNet to comply with statutory health and safety regulations. The proposed $12.5 million will allow the completion of the program which was commenced in 2008.

231. We consider that the proposed work is appropriate and the expenditure should be allowed subject to adjustments to take into account cost estimation and prudency.

232. Expenditure on instrument transformer replacements is based on condition assessment including information from dissolved gas analysis through which SP AusNet are able to identify at risk components. The proposed expenditure is to complete a replacement program that was commenced during the current RCP.

233. The proposed expenditure for cap and pin insulator and oil circuit breaker replacements are a continuation of existing programs and are required to address identified risks.

234. SP AusNet proposes to replace some components of its existing fire protection systems due to age, corrosion, obsolescence and non-compliance with the current Australian Standards. The expenditure is prioritised on asset condition and risk information and assessment.

235. SP AusNet has developed a long term plan to ensure it will become compliant with the Terrorism Community Protection Act (2003). The proposed expenditure on infrastructure security systems upgrade is required under the planed upgrade to the existing security arrangements at key sites.

236. Included in this expenditure category is $3.5 million for Communications safety and security. SP AusNet proposes to use this expenditure to purchase tools to improve communications security and to install fall prevention systems on communications towers.

237. SP AusNet must manage increasing risk and potential vulnerabilities associated with physical and cyber security of critical national infrastructure. The communications networks are critical to the safe and reliable operation of the transmission network. Security takes the form of electronic security and physical security with many communications sites located in remote locations (such as mountain tops).

238. We have reviewed the items included in this expenditure category and consider that the proposed work to be undertaken is appropriate and the expenditure should be allowed subject to adjustments to take into account cost estimation and prudency.

6.5 Assessment of non-system capex (excluding IT)

239. SP AusNet proposes to spend $700k on refurbishment and maintenance of existing buildings, including portable offices and office equipment. The proposed expenditure is consistent with historical expenditure in this category and appears to be reasonable.

240. We consider that the proposed expenditure to maintain the existing vehicle fleet at the current level of capability is appropriate given that the transmission network is not undergoing significant development during the RCP. Similarly, forecasting 'other' non-system expenditure at historic levels is considered to be appropriate.

6.6 Assessment of IT capex

6.6.1 Introduction

241. SP AusNet's proposed IT capex represents approximately 8% of total proposed capex. The estimated/proposed IT capex (i.e. for the last 2 years of the current RCP, plus as proposed for the next RCP) is 63% higher on a per annum basis than the most recent actual IT capex (i.e. in the first 4 years of the current RCP). While some of the expenditure appears to be for the transmission business alone, the majority is part of a much larger IT initiative at the group level, and as such is subject to other regulatory determinations that the AER has made or will make. For the reasons stated in section 3.2 above, EMCa understands that it is not within the scope of our technical advice to advise on the group-level IT strategy or to investigate linkages between the IT capex proposed for transmission determination purposes and the wider group-level IT program that is subject to different regulatory determinations.

242. EMCa has considered transmission related components of the proposed IT capex from a governance viewpoint, by reviewing the business needs and strategic considerations identified and presented in the business case. Our review was not required to include an assessment of IT delivery options, including IT platform requirements or the scope and cost of proposed applications software/middleware and their licensing and integration requirements.

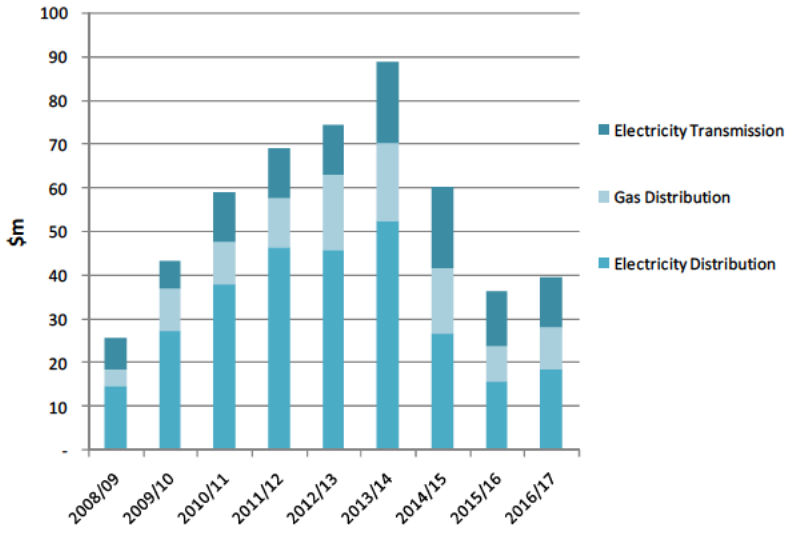
6.6.2 Overview of proposed IT expenditure

243. Across the nine financial years 2009/17 SP AusNet's actual and forecast IT expenditure for its three regulated businesses is $495m. Electricity transmission IT expenditure for the same period is $108m. The allocation of SP AusNet's annual IT expenditure across its electricity distribution, gas distribution and electricity transmission businesses is shown in the Figure 24. It can be seen that the business has and continues to make considerable investment in its IT infrastructure through to 2013/14 with a subsequent fall in years 2015/16 and 2016/17.

244. During financial years in the current RCP major components of the IT investment have been in 'Network Management Automation (stage 1)' and 'Enterprise Application Integration EAI Replacement'. A major contributor to the increased expenditure in electricity distribution was 'MDMS Upgrade' which is not related to transmission.

245. In the 2014/17 financial years the IT whole of business focus will shift to 'Asset& Works Management (EAM / ERP Upgrade)' which accounts for $71m (32%) of IT expenditure across the three regulated businesses.

Figure 24: SP Group IT expenditure, by regulated business



Source: Response EMCa005

246. Whilst annual IT expenditure in total is expected to decrease over the three financial years in the next RCP, SP AusNet proposes that it will increase for electricity transmission, as shown in table 17 below.

Table 17: SP AusNet Group IT

($m)

	Current RCP		Next RCP	
Electricity Transmission	65.9	18%	42.2	31%
Electricity Distribution	224.3	62%	60.6	45%
Gas Distribution	69.7	19%	33.2	24%
	360.0	100%	136.0	100%

Source: EMCa005_F-_Forecast_IT_Capex_by_Network_and_Project_FY14-17

247. During the five financial years 2009-2013, IT expenditure for transmission of $47.4m has been spread across a number of initiatives (see Figure 25) with 34% of transmission related expenditure being accounted for by three areas:

- Enterprise Project Management Systems Upgrade [C-I-C];
- Enterprise Application Integration EAI Replacement [C-I-C]; and
- Data Centre Facilities and Life Cycle Management [C-I-C].

Figure 25: Proportion of transmission-related IT expenditure, by IT initiative (2009 – 13)

Source: EMCa005_E

248. The annual average IT expenditure for transmission as proposed will increase from $9.5m for the 2009 -2013 to $15.2 for the 2014 - 2017 financial years. During the four financial years 2014 - 2017[33] the emphasis is clearly shifting to the Asset & Works Management (EAM/ERP upgrade) with this project alone accounting for [C-I-C] of the forecast [C-I-C] transmission related expenditure (See Figure 26).

Figure 26: Proportion of transmission-related IT expenditure, by IT initiative (Proposed 2014 – 2017)

Source: EMCa005_F-_Forecast_IT_Capex_by_Network_and_Project_FY14-17

249. We have undertaken a basic benchmarking assessment of IT expenditure across similar transmission businesses to SP AusNet. The results of this analysis are provided in Table 18.

[33] It should be noted that the next RCP covers only three of these four years

Table 18: Benchmarks

IT capex/ Revenue	
SP AusNet (2015 - 2017)	**3.2%**
Western Power (2013 - 2017)	1.4%
Transgrid (2010 - 2014)	2.6%
Powerlink (2013 - 2017)	1.7%
ElectraNet (2009 - 2013)	2.5%
IT capex/ Total capex	
SP AusNet (2015 - 2017)	**8.5%**
Western Power (2013 - 2017)	2.5%
Transgrid (2010 - 2014)	3.9%
Powerlink (2013 - 2017)	2.4%
ElectraNet (2009 - 2013)	4.6%
IT opex/ Total opex	
SP AusNet (2015 - 2017)	**7.4%**
Western Power	
Transgrid (2010 - 2014)	8.0%
Powerlink (2013 - 2017)	5.5%
ElectraNet (2009 - 2013)	3.2%

Source: SP AusNet RP, Western Power RRP, Transgrid RRP, Powerlink RRP, ElectraNet RRP

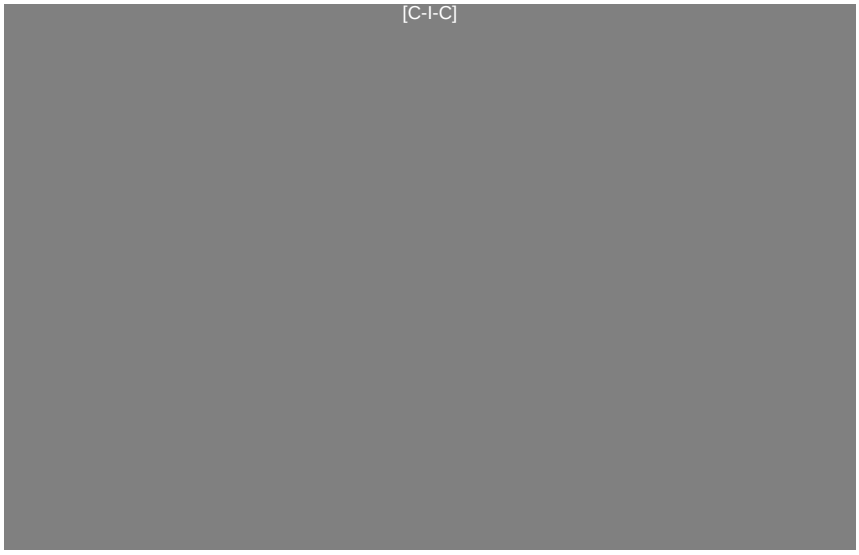
250. The above benchmarks should be treated with caution as there are a number of differences between the businesses that need to be taken into account. For example, when looking at 'IT capex/total capex' it needs to be noted that for SP AusNet this excluded augmentation capex whereas for others this is included.

251. Not withstanding the above the comparison shows that SP AusNet is one of the larger investors in IT.

6.6.3 Allocation of IT expenditure to transmission

252. [C-I-C]

Figure 27: SP Group IT expenditure, by regulated business (%)



Source: Response EMCa005

253. [C-I-C]

4

254. [C-I-C]

255. [C-I-C]

256. [C-I-C] 35.

34 [C-I-C]

35 [C-I-C]

257. [C-I-C]

6.6.4 Assessment of the IT expenditure proposal

258. We have reviewed the additional information provided by SP AusNet in response to questions we submitted subsequent to our on-site sessions. In particular we sought to obtain clear business case justification for the significant IT expenditure that has and is continuing to be made. For this scale of investment it is important that clear, unambiguous tangible and measurable benefits are identified.

259. For transmission the investment of $108m across the nine financial years is significant. The proposed $61m for the next RCP represents a step change in annual IT expenditure above previous years.

260. We are not satisfied that the documentation for the transmission related IT expenditure over the nine financial years 2009 to 2017 for the three SP AusNet regulated businesses (electricity transmission and distribution and gas distribution) has adequately justified the levels of expenditure. We would have expected to see clear efficiency and performance gains occurring across the business from the introduction of this level of investment in new technology. For the IT expenditure relevant to the next RCP we have not seen adequate business case justification for the proposed level of expenditure or for the large asset and works management upgrade.

261. We found that on page 9 of the Issue 2 (August 2010) ICT Strategy (FY 2011/15) a table setting out the costs and expected benefits of the proposed IT expenditure had not been completed. A note in the strategy stated *'Action: To insert financial benefits when complete.'* We asked SP AusNet to provide an updated table with the benefits included. SP AusNet's response stated that:

> *With regards to the table (Page 9 of the Issue 2 August 2010 ICT Strategy (FY 2011/15)), no further updates of this document are available, so the requested update to the table cannot be provided. As far as we are aware, work to determine the financial benefits has not been undertaken.*[36]

262. In its response SP AusNet provided a table describing expected benefits and, for some components of the IT investment program, a Present Value of expected operating costs savings. The total PV for all projects listed in this table was given as $641k[37] ($465k + $405k – $229k). With regard to the expected benefits for the IT investment program SP AusNet state that:

> *The quantified benefits are estimated benefits only and do not include realised benefits because to date, SP AusNet has been unable to assess realised benefits.*

[36] SP_EMCa034_-_ICT_Plan_Benefits

[37] Real 2013/14 dollars

Similarly, there is no benchmarking information available to compare the benefits of these projects with similar programs. These are both issues SP AusNet would like to address in the future.

263. In response to our question asking identification of the expenditure category where quantifiable benefits would be realised SP AusNet stated that:

"The expenditure categories where the benefits would be derived have not been specifically identified but given the projects stem from the following categories, it could be assumed that costs/benefits they incur/deliver would be related to those categories.

a) Asset and works management

b) Back office management

c) Workforce collaboration

d) Analytics and reporting

e) Network management

f) ICT infrastructure and operations"

264. For the Asset & Works Management (EAM/ERP upgrade) which accounts for 35% ($21.3m) of the forecast[38] IT transmission related expenditure SP AusNet consider that the project benefits are as follows:

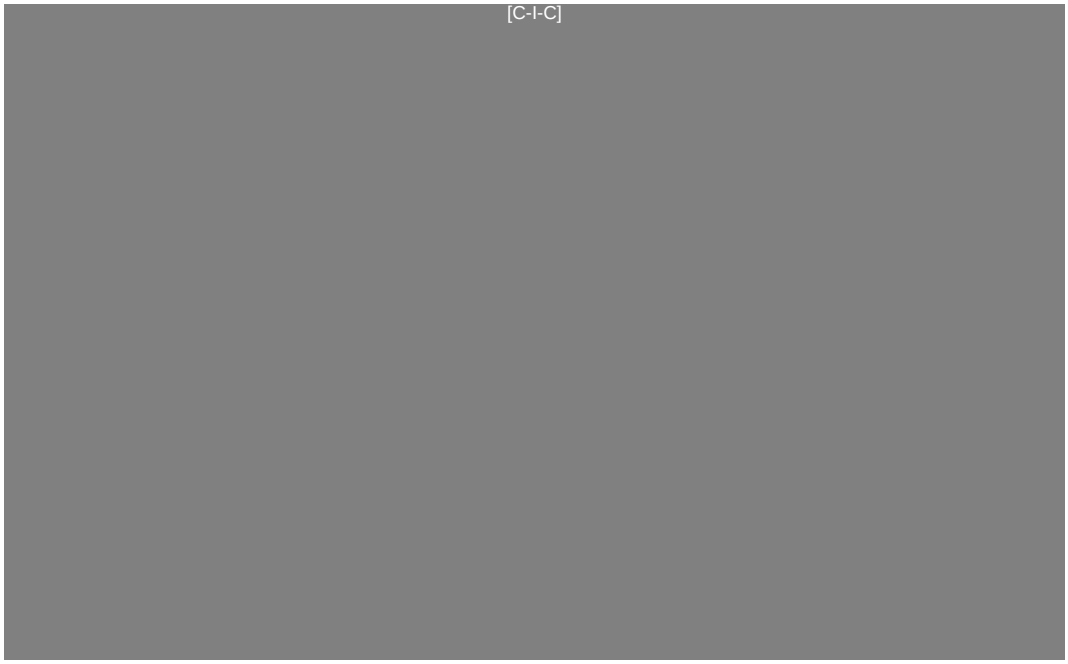
"Adopt an asset and work management platform integrated with enterprise resources planning which will be used to manage the lifecycle of assets including investment planning, construction and maintenance programs through to asset retirement."

265. The proposed strategic investments in IT systems should only be made if there are clear quantifiable benefits that will be derived from the investment. SP AusNet has not adequately identified where these benefits lie. To estimate the expected benefits of strategic IT investments it is necessary to identify those strategic investments.

266. IT expenditure forecasts can be considered to have both a strategic and replacement cycle component. We have calculated the replacement cycle component from an assessment of both the past, and proposed future, IT expenditure. The Figures 27 and 28 below identify in dark green what we consider to be strategic investments, replacement cycle expenditure in light green and those that are likely to have both strategic and replacement components are shaded in mid-green.

[38] Figures relate to the four years of the forecast expenditure, as per SP AusNet's responses, and include the year ended 2014. This figure represents only the transmission share of the proposed system cost. SP AusNet's has estimated a cost of [C-I-C] for the EAM/ERP solutions, in total across all SP Australian group businesses.

Figure 28: Proportion of transmission-related IT expenditure, by IT initiative (2009 – 13))



Source: EMCa005_E

267. SP AusNet has included a 1.4% ($12m) capex efficiency benefit we consider can be attributed in part to the historical investment made in enterprise project management. This level of benefit is consistent with what we would have expected to see from the strategic IT investments. However, we have seen no equivalent quantified opex benefits, and we have calculated that the investments in strategic IT that SP AusNet has undertaken should result in opex benefits of the order of $2.4m/year.

Figure 29: Proportion of transmission-related IT expenditure, by IT initiative

Source: EMCa005_F-_Forecast_IT_Capex_by_Network_and_Project_FY14-17

268. In its IT Strategy documentation and in the Revenue Proposal SP AusNet has identified $695k benefits that will be realised from the IT investments to be made during the 2014 – 17 RCP. Given such a low level of benefits, as presented the

business case for the strategic investment in the Asset and Works Management Upgrade is insufficient to justify the investment.

269. For communications projects contained in the ICT expenditure proposal we found that the projects are generally scoped and costed at a relatively high level. Whilst this raised questions regarding the accuracy of the component costs of the expenditure forecast, we found no reason to doubt that the forecast was a reasonable reflection of what SP AusNet will spend in this area.

270. We consider that:

- The allowance for IT capex should be reduced by $17m, from $48.5m to an adjusted amount of $31.5m[39]. This would bring SP AusNet broadly into line with other TNSPs on a revenue benchmarking basis, would cover for ongoing IT lifecycle refresh and for version upgrades. It would not allow for the EAM system on the basis that this investment has not been subject to appropriate governance and quantified benefits have not been presented in the RP. The adjusted IT capex nevertheless exceeds the annualized IT capex incurred in the current RCP.
- A downwards adjustment of $2.4m / year should be made to the opex forecast to reflect expected benefits that will be realised from historical strategic investments in IT; and
- The $0.8m of opex benefits[40] identified by SP AusNet (and which would result from the EAM system) should be added back to the forecast.

6.7 Conclusions on Asset Replacement, Safety and Compliance and Non-System Capex

6.7.1 Conclusion and recommendation on IT

271. Our conclusion on the IT forecast is that:

- The allowance for IT capex should be reduced by $17m, from $48.5m to an adjusted amount of $31.5m ;
- The $0.8m benefits identified by SP AusNet be added back to the forecast; and
- A downwards adjustment of $2.4m / year should be made to the opex forecast to account for the benefits of previous strategic investment, and which should accrue largely to the business, but also to some extent to IT opex through the reduced need to maintain legacy and parallel duplication of systems.

[39] Total over the three years, before SP AusNet's general allowance for capex efficiency

[40] Aggregate over the next RCP

6.7.2 Conclusions on Asset Replacement, Safety and Compliance and Non-System Capex

272. We have reviewed the components of this expenditure category and found that the proposed work to be undertaken is appropriate and the expenditure should be allowed. Due to the proportion of cost estimates that are provisional we consider that it is appropriate to endorse the expenditure subject to adjustments to take into account cost estimation accuracy and prudency.

6.7.3 Other non-network

273. We have found the proposed expenditure to maintain 'other' non-system expenditure at historic levels to be appropriate.

7 Opex

7.1 Introduction

274. SP AusNet has prepared its opex proposal through a combination of:

- Trend forecasting from a base year (2011/12), for recurrent expenditure;
- Addition of proposed step changes to that recurrent expenditure (and which SP AusNet has estimated by a bottom-up process); and
- A bottom-up build for proposed non-recurrent expenditure.

275. Our terms of reference are to provide advice on technical aspects of the proposed step changes and on those components of opex that are calculated from a "bottom-up build". The scope of our work covers controllable opex only, and does not include the matters relating to the choice of base year, the methodology by which SP AusNet has escalated base-year costs, or the escalation factors that it has applied. We also have not considered related party costing matters and margins, including the proposed "management fee" and allowances for taxes and insurance.

276. Our primary sources of information for this aspect of the review are as follows:

- Revenue Proposal, section 5, in particular sections 5.10 Step Changes and 5.11 Asset Works;
- SP AusNet Opex model;
- Current RCP submission templates;
- Revenue Proposal Appendix 5E - Opex Step Changes;
- Revenue Proposal supporting document: Corrosion Risk Mitigation;
- Response SP EMCa015 – Opex asset works;
- Response SP EMCa027 - Opex step changes.

7.2 Step changes in recurrent maintenance

7.2.1 Review guidelines

277. SP AusNet has proposed step changes based on the AER's guideline, section 4.3.4(c)(3) which requires that:

> *"the operating expenditure forecast must include any necessary adjustments for changes in responsibilities that result from compliance with a new or amended law or licence, or other statutory or regulatory requirements, including a requirement that can be demonstrated to arise directly from a recognised policy, practice or policy generally applicable to similar firms participating in the National Electricity Market".*

278. We have based our review on the application of this guideline.

279. SP AusNet sets out its views on the application of this guideline in "Table 1.2: Justification for Opex Step Changes" in the RP Appendix 5E. As a general observation, we note that SP AusNet for the most part quotes from NER obligations, licence obligations or other statutory obligations which are not new and therefore do not in themselves evidence of the need for a step change, and that SP AusNet does not provide satisfactory evidence on the timing of an applicable change. As we show in illustrating the proposed step changes in the next section, the changes in obligations would appear to have almost all appeared at this moment, that is, coincident with the commencement of the next RCP. This seems to be an unlikely alignment of circumstances and has led us to seek further evidence on the external drivers and their timing[41].

280. We also sought information on the current RCP expenditures in each of the areas for which a step increase is proposed. Within the timeframe of our primary analysis, SP AusNet did not have this information available, and stated that it would require a forensic accounting exercise of around 4 weeks' effort[42]. The fact that SP AusNet had proposed step increases without having information on baseline expenditure raised a degree of doubt that some of the proposed expenditure may be already inherent in baseline opex and that there may be an element of double-counting. SP AusNet subsequently provided baseline information on current RCP costs for some but not all of the proposed step change categories[43]. Our concerns regarding double-counting remain, given the incomplete information provided. The information that SP AusNet did provide showed (for example) that the proposed step increases in SF6 top-up costs, innovation, outage planning, terminal station security and IT security are greater than the entire amounts spent in these categories in the previous three years. Also that the proposed step increases in regulatory costs ("transitional arrangements") and controller training are approximately the same as the entire amounts spent in these categories in the last three years.

[41] Request EMCa032

[42] Response SP_EMCa032, Q1, 22 May 2013.

[43] Follow-up to response SP_EMCa032, 17 June 2013

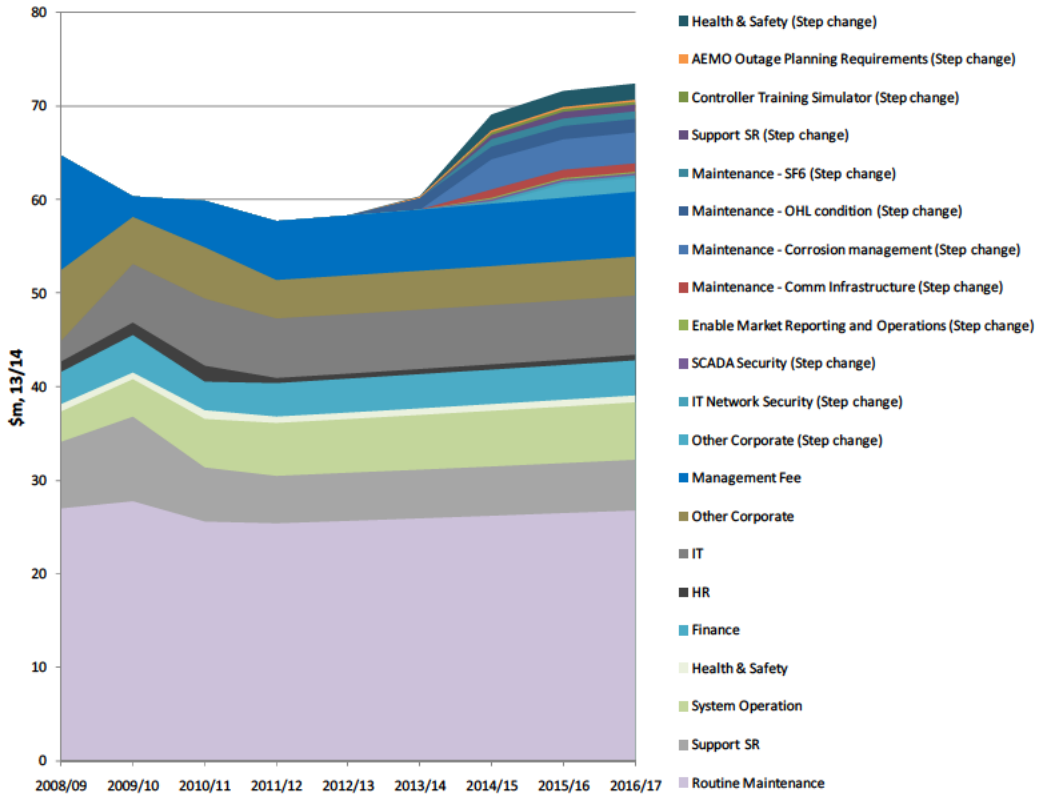
281. With these observations in mind, however, we have not proposed any form of "global" adjustment to the proposed step change amount, but rather we have reviewed each of the proposed step changes individually against the guidelines.

7.2.2 SP AusNet proposed step changes

Overview of step changes as proposed by SP AusNet

282. SP AusNet has proposed twelve such step changes which in aggregate (and with escalation according to SP AusNet's assumptions) add $33m or $11m per year to the base trend forecast. This would represent a 17% increase in the controllable "benchmark" recurrent expenditure of $180m[44]. The impact of these step changes on aggregate controllable opex is shown below:

Figure 30: Current and next RCP recurrent opex, showing proposed step changes



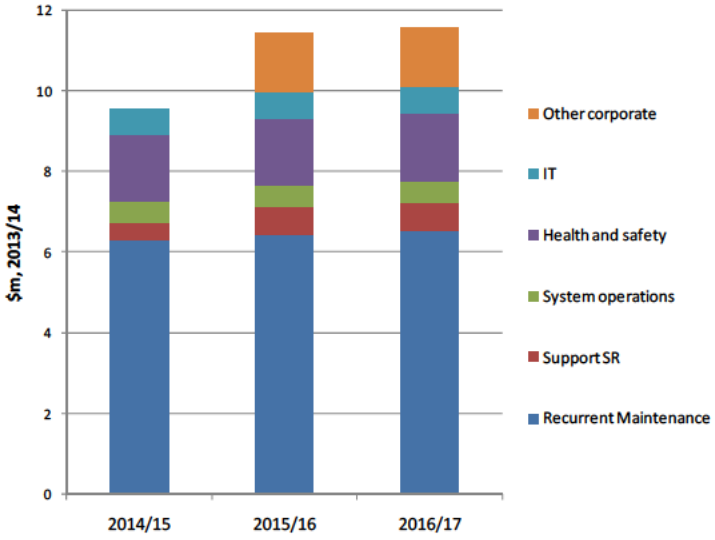
Source: EMCa analysis from information provided in templates and SP AusNet Opex model[45]

283. SP AusNet has categorised the expenditures according to drivers, as shown in the following chart.

[44] Excluding taxes and insurance

[45] Data presented comprises recurrent expenditure excluding taxes and insurance

Figure 31: SP AusNet's categorisation of proposed step changes



Source: SP AusNet Opex model

Reconciliation between step change and template information in SP AusNet's proposal

284. As part of its RP, SP AusNet has proposed opex using the AER's required template. This template requires the controllable expenditure to be proposed according to:

- Whether it is System Recurrent, System Non-recurrent, or Non-system;
- For asset-related system recurrent expenditure, a breakdown by asset category: Substations, secondary systems, lines, communications and easements, with a further breakdown of this by labour and materials, and by the type of work: Routine, condition-based or corrective.

285. We attempted to reconcile the expenditure proposed in the AER template format with the proposed step changes and found that the step change justifications do not align with the increases in expenditure that are proposed in SP AusNet's opex model template. For example, as shown in the table below, the opex model template shows incremental expenditure (relative to the base year of $19.9m on substations and $3.5m on lines. However the proposed step changes justify only $2.6m of the incremental expenditure on substations, and on the other hand propose $15.3m of step expenditure on lines, far more than is shown in the template.

Table 19: Proposed opex: comparison of incremental expenditure and step changes

$m, 2013/14

	Step Changes as advised by SP AusNet	Incremental opex (as calculated from Forecast templates)	Difference
Substations	2.6	19.9	- 17.3
Lines	15.3	3.5	11.7
Comms	2.7	0.6	2.0
Easements	-	0.3	- 0.3
SUBTOTAL Recurrent Maintenance	**20.5**	**24.3**	**- 3.8**
Support SR	1.8	2.8	- 0.9
System operations	1.6	3.2	- 1.6
Nealth and safety	5.0	5.2	- 0.3
IT	2.0	1.8	0.2
Other Corporate	2.9	3.0	- 0.1
TOTAL	**33.8**	**40.3**	**- 6.6**

Source: SP AusNet Opex model

286. We sought information from SP AusNet on these apparent discrepancies, and to assist in deciding which forecasts should be considered as the definitive proposed expenditures. In its response SP EMCa027 SP AusNet has explained the differences as follows:

> *"The AER's submission templates provide recurrent maintenance splits on an indicative basis only and therefore caution must be exercised when using the information reported……*
>
> *As such the forecast maintenance costs in the above categories have been derived by:*
>
> *1. Taking the total maintenance cost found in SP AusNet's opex model (i.e. Row 7 of the 'Forecast Calculation' worksheet)*
>
> *2. Allocating the total amount between asset types based on the average activity levels across the current RCP……"*

287. In other words, the asset breakdown for the proposed expenditure has been pro-rated on the current RCP breakdown and cannot be aligned with the proposed step changes.

288. We consider it a weakness of the RP and a concern for the application of the AER's approval process that the breakdowns of the proposed expenditure in the templates cannot be relied on. Nevertheless for the purposes of this review we consider that SP AusNet has made clear its methodology for estimating the proposed opex and this led us to review the step changes as proposed, without reference to the asset, driver or labour type disaggregation that SP AusNet has put forward in completing the AER's opex model template. Because we cannot rely on the template information, there is no visibility of opex trending across the time from the current to the next RCP, by asset type. Such information, if reliable, would be useful in assessing changes in the application of opex by asset type, and thus, the alignment of the proposed expenditure with SP AusNet's asset management strategies.

7.2.3 Review of specific proposed step changes

289. In the following subsections we summarise our review of each of the step changes that SP AusNet has proposed, according to each of the six drivers.

Ageing asset profile

290. SP AusNet has listed two step change expenditure amounts driven by the ageing asset profile[46]:

- Overhead line condition assessment ($5.3m), of which $1.2m is to be incurred in the current RCP and a further $4.1m in the next RCP;
- Corrosion risk management (tower painting) ($9.9m).

291. Overhead line condition assessment is an existing policy which SP AusNet states is commencing in 2013/14. We observe that in recent years other Australian transmission utilities have found condition issues with their lines that had not been fully recognised and which were being picked up only on an ad-hoc basis. These utilities have developed similar programs to embed lines condition assessment into their maintenance routines and we consider that the four routines proposed by SP AusNet (smart aerial image processing, overhead line corrosion detection, intrusive inspection of structure foundations and conductor joint testing and replacement, along with increased activity targeting connections and corrosion quantity surveying) are consistent with good transmission asset management practice. The focused corrective maintenance resulting from such inspections is likely to be justified by avoiding the need for premature replacement and, ultimately, by being able to extend line lives and the AER should seek evidence of this benefit in future regulatory reviews. While it is arguably the case that such work should have commenced earlier, we are satisfied that this work has not been previously carried out and is therefore not inherent in recurrent maintenance base expenditure, and that moving to undertake such work represents a step change that is justified by the application of good utility practice. However it is also unclear whether this work might replace other activities by which line defects were identified, and which is inherent in base year expenditure.

292. SP AusNet has also proposed the repainting of 17 towers as a step change. While we consider it possible that the condition monitoring work above may demonstrate the need for higher levels of lines corrective work such as tower painting, we do not consider that this should be covered by a step change at this stage. SP AusNet painted two steel towers and 17 steel poles under its “Asset Works” program in the current RCP, and proposes repainting a further 17 steel towers in the next RCP. Pending more comprehensive information from the condition assessment, we consider it imprudent to view tower painting at the proposed level as an on-going step change: the actual amount required may be found to be higher or lower than this level, and may fluctuate from period to period as determined by the condition assessments at that time. Until the information has been gathered to support a steady routine effort, and to quantify the size of this effort, we consider that this work (the need for which we

[46] Costs quoted here are inclusive of escalation applied by SP AusNet, as per its capex model. Some costs quoted in the SP AusNet RP and associated appendices do not include such escalation

accept) should be classified under Asset Works and we address the required expenditure in our review of the proposed Asset Works program.

Changes in compliance obligations

293. SP AusNet has proposed two step increases driven by changes in compliance obligations:

- Changes to AEMO outage planning requirements ($0.6m);
- Security of critical infrastructure ($5.0m).

294. We are satisfied that the changes to AEMO's outage planning requirements are an additional externally driven requirement, requiring operation of a B2B process that is additional to current requirements and on the grounds of reasonableness we accept SP AusNet's estimation of the additional cost.

295. We have considered whether the security of the transmission network as "critical infrastructure" is an additional requirement and, if so, when it has come about. While the need for enhanced security of power networks has been recognised for some time, and was brought into focus by the 9/11 terrorism attack, the mechanisms for doing so and the specific needs have been evolving. We are satisfied that enhanced measures are to be instituted and that they are representative of similar policies now being applied by similar firms in the NEM, and that an amount of expenditure should be allowed on this basis. Initially SP AusNet was unable to provide information on the amounts of such expenditure that are already being incurred, and what existing security measures might be replaced or modified. Some existing cost information was provided on 17th June. For the reasons described in paragraph 280, we are not convinced that the proposed step increase was informed by a sound understanding of existing costs nor that they reflect the net effect of changes in processes or practices. Accordingly, we recommend halving the proposed step increase (i.e. to $2.5m).

Regulatory changes and government policy initiatives

296. SP AusNet has proposed three step increases driven by regulatory changes and government policy initiatives:

- Impact of carbon price on SF6 top-ups ($2.6m);
- Transitional arrangements to align RCPs ($2.9m);
- Changes to planning arrangements in Victoria, arising from AEMC's transmission framework review (Placeholder, no cost proposed at this stage).

297. We propose that the AER not accept either of the first two step change increases, and should consider a step increase for any changes to planning arrangements should this be required based on government decisions.

298. We sought information from SP AusNet on the current cost of SF6 top-ups and this too was unable to be provided initially to support the calculation of the proposed increase. For the reasons described in paragraph 280, we are not convinced that the proposed step increase was informed by a sound understanding of existing costs and the information provided by SP AusNet subsequent to the 30th May Engagement Meeting indicated that the proposed step increase was equivalent to the entire current level of expenditure. Moreover the proposed amount is based on a carbon price of $29/tonne,

which is considerably greater than current estimates and may be abolished in the event of a change of government. We also note the considerable amount of replacement and refurbishment work being conducted at substations, which we would expect to decrease the volumes of leakage and we would expect that SP AusNet would focus more attention still on reducing leakage in the event of a higher SF6 price.

299. The proposed step change for "transitional arrangements" is based on the asserted need for additional regulatory resources due to the transmission and distribution RCPs being aligned, with the next RCP being for only 3 years. We are not persuaded by the suggestion that the shorter RCP requires a step increase in expenditure. First, the shorter RCP is a one-off, not an on-going requirement. Second, while the coincidence of regulatory resets across the SP group will lead to a greater cyclical fluctuation of resource needs, similar businesses deal with this by re-deploying resource in the lower part of the cycle and/or by outsourcing to meet the peaks. We do not consider that this should lead to a higher cost overall. Thirdly, regulatory reset resources are by definition needed in every RCP and, whether longer or shorter, to the extent that this cost is inherent in current opex, it is reasonable to assume that it is inherent in forecast baseline opex.

Recurrent expenditure not reflected in base year

300. SP AusNet has proposed one step change for recurrent expenditure not included in the base year:

- Operating expenditure on communications infrastructure ($2.7m).

301. SP AusNet states that this step change is required to reflect a transfer of such expenditure from "Asset Works". From line-item detailed information that SP AusNet has provided listing each of its current RCP items of asset works expenditure, this expenditure does not appear. We sought further information on the current RCP expenditure and in its response SP AusNet identified this expenditure as being part of "Asset Works – Miscellaneous Works".

302. We have considered information provided on the drivers for this expenditure, which appear to be on-going compliance requirements that have existed for many years (e.g. maintaining documentation as required under the Occupational Health and Safety Act 2004). However on the basis that this amount has historically been included in Asset Works and has not been included in base year current expenditure, we consider that this should be accepted.

IT capital works

303. SP AusNet has proposed four step change increases in IT expenditure as follows:

- Controller simulator training ($1.0m);
- SCADA security ($0.6m);
- IT network security ($0.8m);
- Enable market reporting and operations ($0.5m).

304. We consider that the proposed amount for controller simulator training should be included on the basis that it implements a policy that is good industry practice and

used by other utilities in the NEM and internationally with a worthwhile benefit in improving system operational management and reducing system operational risk.

305. We do not support the inclusion of the other three proposed step increases. While we are fully supportive of the need for reasonable and prudent measures to maintain SCADA and network security, these are not new requirements. SP AusNet refers to reviews in 2009 and 2010 as drivers for SCADA security enhancements; it is difficult to understand why it proposes to introduce such measures only in 2014/15. We assume that SP AusNet as a prudent transmission system manager and operator has existing security mechanisms and protocols; further, the considerable expenditure on IT would normally bring with it enhanced security capability. As has been referred to above, SP AusNet has not been able to provide information on current levels of expenditure in these areas and has therefore provided neither context for the proposed increases, nor sufficient detail to indicate consideration of savings that might offset the costs of the proposed measures. The proposed step increases therefore present as changes in the way SP AusNet undertakes these functions, rather than increased requirements.

306. The amount proposed to "enable market reporting and operations" is for the enhanced AEMO requirements for B2B outage planning. We have proposed accepting the amount of $0.6m proposed under that heading, and which is presented as enabling this capability. There does not appear to be any additional driver to justify the further $0.5m proposed under the heading of IT. SP AusNet has not presented a breakdown of its proposed total IT opex requirements at this level of granularity and we do not consider it reasonable to add a specific resource allowance for this interface, when the total IT opex budget includes IT resource to maintain a range of B2B and internal IT interfaces.

Enhanced efficiency through technology improvements

307. SP AusNet proposes the following step increase:

- Technology innovation (four specific programs listed) ($1.8m).

308. SP AusNet refers to its existing innovation program and the maintenance benefits that it has achieved from this program. We are fully supportive of well-focused R&D. This is not a program that is driven by external change, nor is it a new program. Further, the benefits of any R&D / innovation program should be realised (for example) through more efficient maintenance, reduced augmentation or replacement capex requirements or improved performance. To the extent that SP AusNet has already set what it considers to be a prudent level of expenditure on innovation, we cannot see a valid reason for this to step up at a time which coincides with the commencement of the next RCP.

309. We therefore propose that the AER does not allow this step increase, and we would nevertheless expect that SP AusNet will continue to undertake properly justified innovation programs.

7.2.4 Finding on proposed step increases

310. Our finding is that a number of the proposed step increases are not justified in accordance with the AER's guideline and we recommend that the AER does not allow

$21.7m of the $32.5m additional recurrent maintenance that SP AusNet has proposed[47]. The table below summarises the proposed adjustments.

Table 20: Step changes (As adjusted by EMCa)[48]

$m, 2013/14

	As proposed	As adjusted by EMCa	Difference
Impact of a Carbon Price on SF6 Top Ups	2.6	-	
OHL condition assessment program	4.1	4.1	
Corrosion Management	9.9	-	
Communications Infrastructure	2.7	2.7	
Recurrent Maintenance	**19.2**	**6.8**	**- 12.5**
Innovation program	1.8	-	
Support SR	**1.8**	**-**	**- 1.8**
AEMO Outage Planning Requirements	0.6	0.6	
Controller Training Simulator	1.0	1.0	
System operations	**1.6**	**1.6**	**-**
Security of Cri ical Infrastructure (Terminal Statio	5.0	2.5	
Health and safety	**5.0**	**2.5**	**- 2.5**
IT Network Security	0.8	-	
SCADA Security	0.6	-	
Enable Market Reporting and Operations	0.5	-	
IT	**2.0**	**-**	**- 2.0**
Transi ional Arrangements	2.9	-	
Other corporate	**2.9**	**-**	**- 2.9**
Subtotal	**32.5**	**10.9**	**- 21.7**

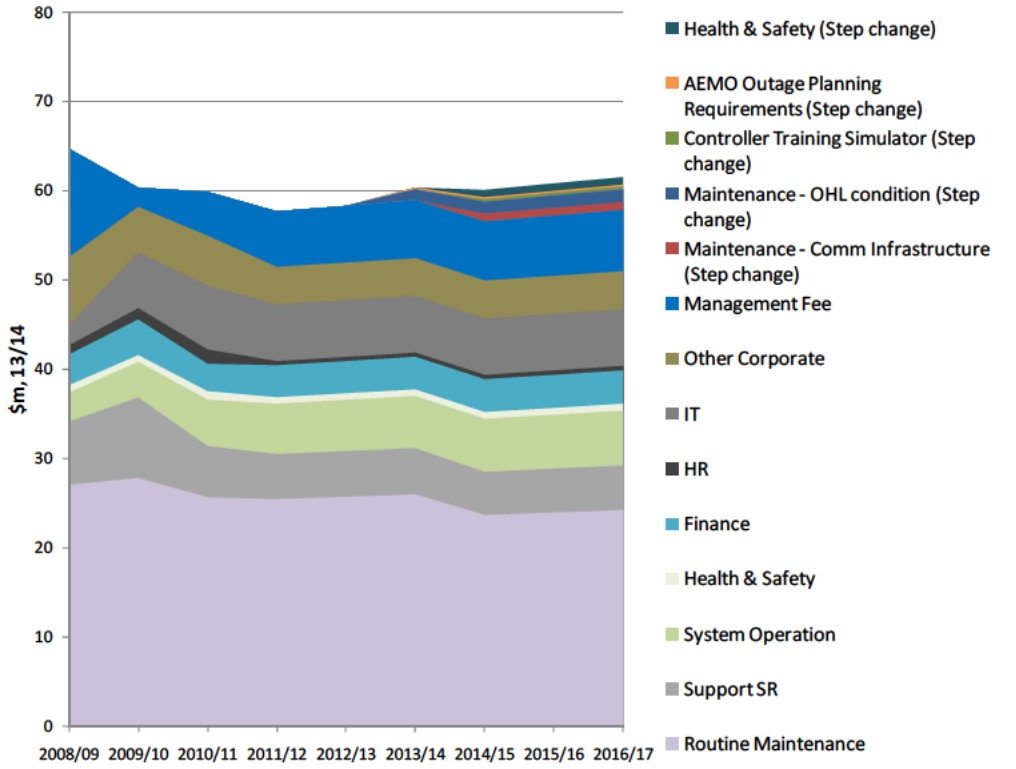
Source: EMCa analysis

311. The resulting opex profile with the adjustments to the proposed step changes is shown in the diagram below.

[47] EMCa has moved the amount of $9.9m proposed for Corrosion Management, to Asset Works, and this amount is further considered there.

[48] Amounts in this table include escalation (as proposed by SP AusNet in its opex model). Cost data presented in SP AusNet's written proposal is generally excluding escalation, and so differs slightly from the amounts in this and similar tables.

Figure 32: Recurrent controllable expenditure, with adjusted step changes



Source: SP AusNet templates, with step changes adjusted per EMCa analysis[49]

7.3 Asset Works

7.3.1 Expenditure on asset works in the current RCP

312. To assist in understanding the proposed asset works expenditure, we first reviewed expenditure in the current RCP, which is shown in Figure 33. It can be seen that SP AusNet's expenditure on asset works declined considerably after 2009/10 and, including support costs, the business spent $45.8m, or 46%, less than it had proposed to spend in the current RCP (in $2013/14 terms).

313. The variance to what was proposed raises several questions of significance:

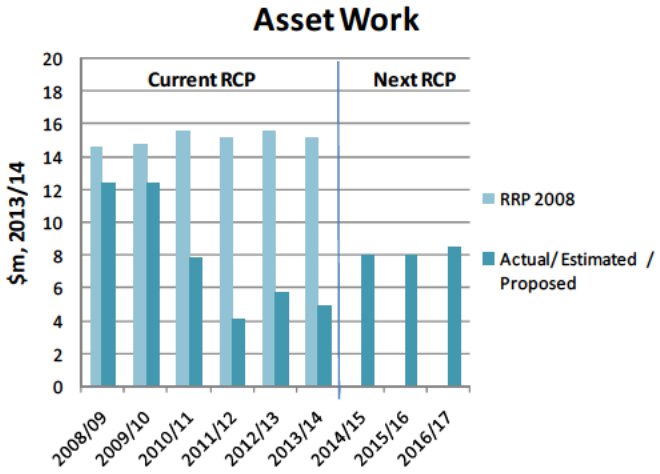
- To what extent does the lower expenditure reflect a lower achievement of work? If so, what are the reasons, and do they have a bearing on the level of work now proposed for the next RCP?
- Was work re-categorised or covered through other programs (e.g. capital works? Routine maintenance?)
- To what extent is the variance a result of over-forecasting or over-estimating relative to needs reasonably foreseen at the time, and to what extent did the reduced expenditure reflect circumstances changing in the course of the RCP?

[49] Data presented comprises recurrent expenditure excluding taxes and insurance

- Has the work that was proposed but not undertaken, in effect been re-proposed for the next RCP?

314. The level of variance is such as to raise questions of regulatory gaming in order to "double dip", given that this saving has already flowed directly to SP AusNet's bottom line and that further benefits will accrue to SP AusNet in the next RCP, under the EBSS.

Figure 33: Opex: Asset works

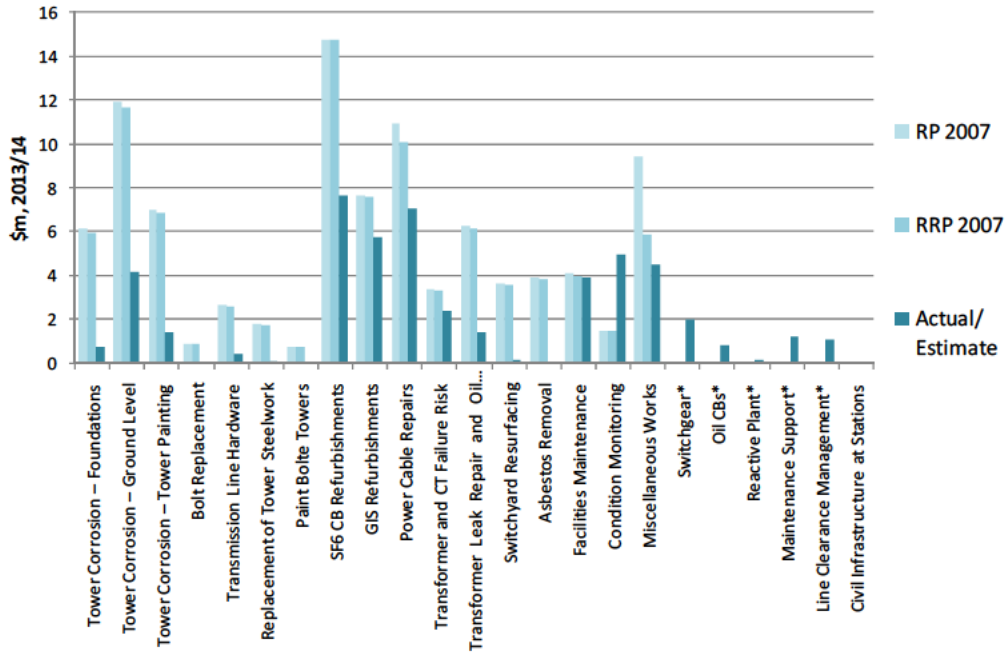


Source: SP AusNet Capex Model

Analysis by program of work

315. For the most part, Asset Works have been presented as programs of similar types of work for a particular type of asset, and which are undertaken generically across the whole network or, based on condition or other data, across a subset of sites. We investigated the expenditure variance in the current RCP by reference to the different programs of work undertaken, as shown in the following chart.

Figure 34: Current RCP Asset works: 2007 Revenue Proposal and revised revenue Proposal versus actual/estimated ($2013/14)[50]



[51] *Source: Response EMCa015and EMCa021*

316. The information provided showed that SP AusNet spent nothing, or minimal amounts, on a number of programs that it had proposed as required in 2007, and significantly underspent on a number of other programs. We judged the underspend to be too large to result from efficiencies, and we therefore sought further information so that we could assess the quantum of work undertaken. We also sought information on the risk implications of this lower-than-proposed expenditure.

317. SP AusNet provided metrics that were proposed in the 2008 determination process for the current RCP for asset works programs totalling $53.9m and, for these programs, only $23.3m was spent[52]. The metrics show that, for the majority of programs, the reason for the lower expenditure was primarily that SP AusNet undertook less work. Comparison between the cost variances and the metrics variances also indicates a tendency towards actual unit costs being lower than those used as the basis for the original estimation.

318. For $36m of proposed expenditure ($26m of actual expenditure) SP AusNet was not able to provide program metrics, either because the programs as originally proposed did not have such metrics, or they could not be readily accessed, or because the nature of the programs was such that it is practical or meaningful to quantify "volumes" of work.

[50] * = New programs introduced during the current RCP, for which no expenditure was proposed in the RP for that period

[51] SP AusNet responded on the matter of risk implications in response SP_EMCa037. Our views on this response are provided in sections 3.1.3 and 3.2.3.

[52] All costs have been converted to $2013/14

319. The "planned versus actual" metrics that SP AusNet provided[53] have showed that, for the most part, it did less asset works than it had proposed. We have voiced our concerns already on the risk implications of doing less work than had been previously presented as being "required" for the prudent management of the network[54], In addition, to the extent that an allowance for further work on these same programs has been sought for the next RCP, it could be argued that this has been already recovered from revenues in the current RCP. Two examples are as follows:

- Transmission Line Hardware: Replacement of Broken or Corroded Fittings on Towers/Conductors, for which SP AusNet proposed in 2007 an amount based on 2000 replacements, but undertook only 1,220 and has re-proposed expenditure for 563 replacements in the next RCP;
- Tower Corrosion – Ground Level, for which SP AusNet proposed intrusive testing and condition-based application of protective coatings for 2,700 structures. It undertook this work for 1,330 structures in the current RCP and has re-proposed expenditure for 1,129 structures in the next RCP.

Table 21: Current and next RCP asset works program opex and associated metrics[55]

	Current RCP (6 years): EXPENDITURE ($m)				Current RCP (6 years): METRICS			Next RCP (3 years)	
	RP 2007	RRP 2007	Actual/ Est	Var (%)	Metric			Proposed Cost ($)	Metrics
					Forecast	Actual	Var (%)		
Tower Corrosion – Foundations	6.1	5.9	0.7	*-87%*	32	4	*-88%*	-	-
Tower Corrosion – Ground Level	11 9	11.6	4.2	*-64%*	2,700	1,330	*-51%*	5.2	1,129
Tower Corrosion – Tower Painting	7 0	6.8	1.4	*-80%*	20	19	*-5%*	-	17
Transmission Line Hardware	2.6	2.5	0.4	*-85%*	2,000	1,220	*-39%*	0.4	563
Replacement of Tower Steelwork	1.7	1.7	0.1	*-96%*	1,250	316	*-75%*	1.4	1,604
Paint Bolte Towers	0.7	0.7	0.0	*-99%*	3	-	*-100%*	-	-
SF6 CB Refurbishments	14.7	14.7	7.6	*-48%*	58	59	*2%*	2.2	60
Power Cable Repairs	10 9	10.0	7.0	*-30%*	36	36	*0%*	-	-
Oil CBs *	-	-	0.8	*0%*	-	28	*0%*	1.6	78
Line Clearance Management *	-	-	1.0	*0%*	-	15,070	*0%*	1.0	20
Metrics explained subtotal	55.6	53.9	23.3	*-57%*				11.8	
Others - No Metric subtotal		36.3	26.2	*-28%*				12.8	
Total		**90.2**	**49.4**	*-45%*				**24.6**	

Source: EMCa analysis based on SP AusNet Opex Model and Response SP EMCa 021A

320. Further information also revealed that expenditure on two projects: switchyard resurfacing and asbestos removal, for which expenditure totalling $7.2m was allowed for in the current RCP, had been capitalised and is therefore now included in the RAB. Our understanding of the EBSS mechanisms is that these amounts should be deducted to avoid them being double-counted as "efficiencies".

321. We found that some work on replacement of steel tower members had been undertaken under recurrent maintenance. To avoid double-counting for the next RCP this needs to be deducted from the base year recurrent maintenance. Information was not available to estimate the cost of such work in that year, and we have estimated it based on the shortfall in proposed work, at $0.6m. Adjusting this out leads to a reduction of approximately $1.8m in the next RCP.

[53] Response SP EMCa 021A

[54] See sections 3.1.3 and 3.2.3

[55] * = New programs introduced during the current RCP, for which no expenditure was proposed in the RP for that period

322. We also found that, while repainting of 20 steel towers had been proposed in the current RCP, SP AusNet had repainted two steel towers and 17 steel poles, hence the considerably lower cost incurred. It now plans to repaint the remaining 17 steel towers in the next RCP, and has again sought an opex allowance for this.

Analysis of underspend in current RCP – by reason

323. We have analysed the current RCP asset works program underspend according to the information provided by SP AusNet. SP AusNet under-spent on field work for the works categories that it proposed for the current RCP, by approximately $49m[56]. In broad terms, this can be attributed as follows:

- **Significant over-forecast of cost, but volume of work largely achieved:** SF6 CB Refurbishment ($7.0m); Power Cables Repair ($3.0m); Tower painting ($5.4m). (Total = $15.4m);
- **Significant over-forecast of cost / less work achieved. Not re-proposed:** Tower Corrosion – Foundation ($5.1m); Transformer Leak Repair & Oil Treatment ($4.7m); Misc. Works ($1.4M). (Total = $11.2m);
- **Significant over-forecast of cost / less work achieved (and re-proposed in the next RCP)[57]:** Tower Corrosion – Ground Level ($7.4M); Transmission Line Hardware ($2.2m); Replacement of Tower Steelwork ($1.6m). (Total = $11.2m);
- **Significant Over Forecast / volume variance unknown (and re-proposed in next RCP):** Transformer & CT Failure Risk ($0.9m); GIS Refurbishment ($1.8m). (Total = $2.7m);
- **Cancelled:** Paint Bolte Towers ($0.7m); Bolt Replacement ($0.9M)[58] .(Total = $1.6m);
- **Moved into Capex:** Switchyard Resurfacing ($3.4M); Asbestos Removal ($3.8m). (Total = $7.2m).

324. We also noted the two items above where the work was undertaken, but was capitalised, amounting to $7.2m. We understand that the EBSS may allow an adjustment where a change in capitalisation policy has occurred. It is outside of the scope of our advice to confirm whether SP AusNet has made such adjustment but, if it has not, then there is a clear instance of double-dipping on the proposed and incurred expenditure.

Underspend- implications for revenue over-recovery

325. While some Asset Works may have been found not to be required, or at least not to be required in that timeframe, and may therefore have been "prudently deferred", SP AusNet has nevertheless recovered revenue to undertake this work in the current

[56] At the portfolio level, this was partially offset by undertaking some works that were not in the current RCP revenue proposal, leading to an aggregate underspend on field works of $43.4m.

[57] Some transmission line hardware and replacement of tower steelwork was undertaken as routine maintenance. The volumes and/or costs of work proposed in the next RCP are not exactly equal to the amounts of under-spend and/or under-achievement of works in the current RCP, but at an aggregate level they are approximately equivalent on an annualised basis.

[58] Unknown volume of work undertaken as routine maintenance

RCP. And it is further seeking revenues to undertake what to some extent is the same work, in the next RCP. It appears to us that there is a clear issue of "double dipping" here. Moreover, the amount is substantial: SP AusNet proposed that it needed $100.1m[59] but underspent this by $45.8m. And further, we understand that there is not provision in the Rules to adjust the EBSS for a lower quantity of work performed, therefore (and particularly because the underspend has largely occurred in the last 4 years) if this amount was to be allowed in the next RCP, the business would continue to enjoy an "efficiency incentive" extending into the next RCP, at the same time as it recovers for a second time the revenue required for this work.

326. We considered whether the underspend and double-dipping might be a pattern, indicative of gaming, by reviewing SP AusNet's actual expenditure compared with its proposed expenditure in the previous RCP (i.e. commencing in 2003). However, after adjusting for inflation for comparison purposes, we found that SP AusNet's spend was materially as it had proposed: $58m total over that five year period.

327. We bring this matter to the AER's attention as Technical Advisers, since the implications of under-achieving previously-accepted opex asset works appears to lead to a regulatory anomaly under the current Rules.

7.3.2 Implications for the next RCP

328. It is difficult, given information on the current RCP, to have a high degree of confidence in SP AusNet's asset works program budget for the next RCP. Our view is that the significant variance to budget can be ascribed to one or a combination of factors and we have no evidence to suggest that these factors have materially changed. These include:

- That the need was conservatively over-estimated;
- That the unit costs for the program were conservatively over-estimated;
- That needs that were reasonably estimated based on information available at the time of proposing for an RCP tend to be later found not to exist, or to be less than has been reasonably estimated;
- Noting that recurrent expenditure was considerably higher than was proposed, starting from the first year of the current RCP, it is possible that work that was proposed as asset works has in fact been undertaken under recurrent maintenance, or has been capitalised. In either case, this would be a concern as, unless adjusted for, it leads to "double dipping". Other than in the specific instances referred to above, we have not found further evidence for this, however it would require a regulatory accounting audit of current RCP expenditure to unequivocally rule out this possibility and it indicates a need to focus on expenditure categorisation in regulatory accounting;
- That SP AusNet has held over work that reasonably should have been done, in order to obtain the three-pronged benefits of (a) increased profit and increased cashflow within the regulatory period (since revenue was not reduced for the work

[59] EMCa has converted all costs to $2013/14 equivalents. This amount comprises both field work (90.9m, but spent $43.4m less) and asset works support costs (9.2m, but spent 2.4m less).

not done), (b) an EBSS efficiency benefit and (c) obtaining an allowance for the same work to be undertaken in its proposal for the next RCP.

7.3.3 Assessment of proposed asset works program

329. The following table shows the asset works programs that SP AusNet has proposed, against the expenditures on "like" programs in the current RCP.

Table 22: Current RCP and proposed asset works programs

$m, 2013/14

Category	Actual / Expected Expenditure						Next RCP		
	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Tower Corrosion – Ground Level	1.3	1.2	0.6	0.4	0.5	0.1	1.8	1.7	1.6
Transmission Line Hardware	0.0	0.2	-	0.2	0.0	0.0	0.1	0.1	0.1
Replacement of Tower Steelwork	0.0	0.0	-	-	0.0	0.0	0.4	0 5	0.5
SF6 CB Refurbishments	1.1	1.4	2.0	1.3	1.6	0.3	0.9	0 8	0.5
GIS Refurbishments	1.6	1.7	0.7	- 0.1	0.8	1.0	0.2	0 3	0.3
Transformer and CT Failure Risk	0.4	0.4	0.8	0.3	0.2	0.3	1.8	1 5	2.0
Facilities Maintenance	1.5	0.9	0.4	0.1	0.1	0.9	0.9	0 9	-
Switchgear	0.0	0.1	0.1	0.3	0.4	1.2	0.3	0 3	0.0
Oil CBs	0.0	0.3	0.1	0.2	0.2	0.1	0.6	0.6	0.5
Reactive Plant	0.0	0.0	0.1	0.0	-	-	-	-	1.6
Maintenance Support	0.1	0.1	0.1	0.2	0.6	0.2	0.3	0 3	0.3
Line Clearance Management	1.0	- 0.0	-	0.0	0.0	-	0.3	0.4	0.3
Civil Infrastructure at Stations	-	-	-	-	-	-	0.4	0.6	0.7
Subtotal	7.1	6.2	4.8	2.9	4.4	4.0	8.0	8 0	8.5
Others - Not proposed for next RCP	5.42	6.14	3 03	1.12	2 24	2.13	-	-	-
Total	**12.5**	**12.4**	**7.8**	**4.0**	**6.6**	**6.1**	**8.0**	**8.0**	**8.5**

Source: SP AusNet Opex model

330. At a specific program level, we have concerns about the following four programs:

- Tower corrosion - ground level
- Transformer and CT failure risk
- Transmission line hardware
- Replacement of tower steelwork

Tower corrosion – ground level

331. In the main on-site meetings, SP AusNet described to us the reasons why achievement of corrective asset works was lower than had been originally planned. This includes the need to deal safely with asbestos. We note the current levels of work on this program, which SP AusNet does not plan to increase within the current RCP and we are not persuaded that there is a reason why this program will step up from a level of $146,000 in 2013/14 to $1.8m coinciding with the commencement of the next RCP. We consider it more likely that the program will run at approximately the rate achieved over the past four years, and we propose an adjustment to this level, resulting in $1.2m in place of the $5.2m proposed.

Transformer and CT failure risk

332. In response to our interim findings presentation, SP AusNet referred us to supporting information indicating that $3.4m of the $5.3m proposed for this item is for transformer refurbishment work at RTS and WMTS, and which is being undertaken in conjunction with the major rebuilds of these stations. On further review of that information we note that these transformers are currently 48 years old and that the work is intended to

extend their lives[60]. From this supporting information we consider that this work is more appropriately capitalised and so we propose removing it from Asset Works opex. The remaining work ($1.9m over three years) would then be slightly more than the average annual level achieved over the previous four years, but would nevertheless appear to be reasonable.

Transmission line hardware and replacement of tower steelwork

333. From on-site information that we obtained, we consider that the proposed transmission line hardware and replacement of tower steelwork programs are best considered "provisions". While we are satisfied that SP AusNet has a properly identified and justified need for asset works in these areas, we are not convinced that the quantum of work or the unit costs for such work are well-developed at this stage.

334. In the current RCP, SP AusNet has provided information that indicates that it undertook 39% less work (in volume terms) but that it spent 85% less in doing this work, indicating that the work on each item was able to be de-scoped or that the costs were over-estimated initially. For tower steelwork, SP AusNet has advised that it undertook 7% less in volume terms, though there was a 96% lower cost incurred. SP AusNet has advised that this is because the work was undertaken as part of recurrent maintenance, but as a result of accounting for the work in this way SP AusNet has not been able to advise the cost incurred under this category and therefore it is clear that this was not used in building up the future estimate.

335. As advised previously, in the current RCP SP AusNet spent 45% less than it had proposed. We consider that its proposed program and estimates are more realistic for the next RCP, but that there is nevertheless a "provisional" element to the proposed budget and that the budget built-up from the aggregate of the proposed programs, is likely to have over-estimated what will actually be spent. We propose reducing the proposed opex by 25% to account for these considerations, a reduction of $0.5m.

Aggregate adjustment

336. The recommended line-item adjustments would retain each of these programs, but with a lower assumed expenditure level. In aggregate these adjustments would reduce the assumed Asset Works opex from the $24.6m total proposed over the three years, to $16.7m.

337. However, offsetting these reductions, we have (as stated in section 7.2) recommended re-categorising "tower painting" from an opex step change to an asset works program. This adds $9.9m to the asset works program, bringing it back up to a level of $26.6m, or an average of $8.9m p.a. This would be higher than the average of $8.2m p.a. incurred in the current RCP and considerably more than the average $6.1m p.a. incurred in the most recent four years.

338. On balance we propose allowing the aggregate proposed expenditure on asset works, which averages $8.2m p.a. However this is on the basis that it includes the tower painting work which SP AusNet has proposed (under recurrent maintenance step changes) averaging $3.3m p.a.

[60] Supporting document provided by SP AusNet along with RP: "Transformers – Asset Works program" - section "Transmission L Transformer Life Extension Program 2014-17"

339. Finally, bearing in mind the under-achievement of previously proposed work, we recommend that the AER seeks information from SP AusNet that as far as possible quantifies volume metrics for the proposed work, such that the work achievement can be assessed against the regulatory allowance over the course of the next RCP and to help inform the AER's determination for the subsequent RCP in three years' time.

7.4 Opex efficiency gains

340. We consider an estimate of the efficient level of opex, as is required under the NER, should take into account the continuation of efficiency improvements that can reasonably be expected. SP AusNet is forecasting a capex efficiency gain of 1.44% from improvements due to capital project management capability and governance. (RP P21 & P83).SP AusNet has a commitment to continuous improvement and, in our experience, greater efficiencies are achievable in opex than in capex.

341. The main opex benefits that we can identify would be expected to flow from SP AusNet's considerable strategic investments in IT. We have calculated that justification of this investment would imply an opex reduction of the order of $2.4m per year. This would represent approximately a 2.6% reduction in SP AusNet's proposed controllable opex. We consider this to be a reasonable proxy for continuous improvements generally, resulting in an opex budget that can be considered "efficient" in terms of the requirements of the Rules and conceptually allowing for efficiencies in opex in the same manner as the capex efficiency allowance that SP AusNet has proposed.

7.5 Recurrent opex – base and other adjustments

7.5.1 Choice of base year

342. Although we are concerned that the 2011/12 base year recurrent opex is $5m (11%) greater than was proposed[61] for this year, we consider it acceptable for base year purposes on the grounds of being "actual expenditure" and it is less than the average of recurrent opex in the preceding three years.

7.5.2 Escalator calculations

343. We have reviewed the escalator calculations, which we consider to be satisfactory. In accordance with our scope, we have not reviewed the proposed escalators themselves.

7.5.3 Group 3 roll-in adjustment

344. We consider the "group 3 roll-in adjustment" that SP AusNet has proposed is erroneous and should be based not on the change in relativity between the unregulated and regulated asset bases, but on the value of currently-unregulated assets to be rolled into the RAB (with associated opex) relative to the replacement cost value of the RAB. Further, we consider that different scaling factors should apply, with

[61] SP AusNet RRP, 2008

a very low scaling applied to corporate costs. We have estimated an adjusted allowance of $2.4m in aggregate over the three-year period, compared with $5.2m as proposed by SP AusNet. This is based on the following information:

- Relevant rolled in assets with a value of $105m;
- An estimate of the replacement value of the RAB of $5.7 billion;
- Resulting in group 3 assets in the period equivalent to 1.8% of the current volume of assets in the asset base;
- Scaling factors of 95% for field work, 25% for maintenance support and 10% for corporate expenditure.

7.5.4 Adjusting for asset works undertaken as recurrent opex in current period

345. SP AusNet advised that a number of tower steel members for which replacement is proposed under asset works, were replaced under recurrent maintenance in the current period. We estimate that an amount of $0.6m needs to be adjusted out of the base year, thereby effectively reducing next RCP recurrent opex by $1.8m.

7.5.5 Adjusting for opex implications of excluding proposed Enterprise Asset Management system

346. If the AER does not include the strategic enterprise asset management system in IT capex, then the “savings” of $0.8m that SP AusNet has estimated and allowed for, should be added back.

8 Contingent Projects

8.1 Overview

347. The concept of "contingent projects" is defined in the NER, and allows for the TNSP to submit projects, as part of a Revenue Proposal, that can be triggered by an event or circumstances that are pre-defined. Once triggered, there is then a further review and regulatory approval process for project costs, in which the AER may approve an amendment to the revenue determination.

348. Under NER 6A.8.1 (b) each forecast contingent project must satisfy four criteria. These criteria are:

- It must be reasonably required to be undertaken in order to achieve any of the capital expenditure objectives specified in NER 6A.6.7(a);
- It must not otherwise be provided for (either in part or in whole) in the total of the forecast capital expenditure;
- It must reasonably reflect the capital expenditure criteria specified in NER 6A.6.7(c) representing efficient costs of a prudent operator;
- It must exceed either $10million or 5% of the value of the maximum allowed revenue (MAR)[62], whichever is the larger amount.

349. As the ex-ante replacement capex forecast is intended to provide a reasonable forecast of expenditure that the business needs to manage its assets, triggers for contingent projects are expected to cover circumstances beyond these needs.

350. In the Revenue Proposal SP AusNet proposed three contingent projects. All three are for the replacement or rebuild of existing substations.

- [C-I-C]

[62] For SP AusNet, the MAR is $502.5m for the first year of the regulatory period.

[C-I-C]

- [C-I-C]

- [C-I-C]

351. Our assessment of each of the proposed contingent projects is provided below.

8.2 Findings

South Morang Transformer Replacement – Stage 2

352. The 330/220kV H1 and H2 transformers at South Morang were installed in the mid-1060s and have been in service for around 45 years. These are single-phase transformers. An assessment of supply risk and market impact of the failure of one of these transformers shows that it is efficient to proceed with the staged replacement of one H transformer bank (three single phase transformers) at South Morang Terminal Station in the coming regulatory period.

353. This Stage 1 project of replacement of the H2 transformers with a cost of $27.4m appears to be adequately justified.

354. SP AusNet have assessed that it will be economic to carry out Stage 2 to replace the H1 transformers in 2021-25 assuming that there is no failure prior to that. The cost of this is $28.85 million as this includes the purchase of three single-phase transformers.

355. Based on the information provided in the Revenue Proposal and on-site sessions our understanding was that SP AusNet has proposed that a contingent project be included to advance Stage 2 into the coming regulatory period if one of the new transformers should fail. Based on this information we considered that this proposed contingent project is not adequately justified because the existing transformers appear to be in reasonable condition.

356. Subsequent to the meeting with SP AusNet on the 30th May 2013, SP AusNet has clarified the trigger for this contingent project, as follows:

> *The trigger event for the South Morang contingent project is erroneously defined differently in the proposal document and Appendix 4G – Proposed Contingent Projects. The correct version is presented in the Appendix 4G as 'Failure of any*

phase or phases of either the H1 or H2 transformers at South Morang Terminal Station'.

357. The contingent project replacement capex appears to be driven by supply risk cost rather than transformer condition. Given this we consider that:

- A high level of reliability should be provided by the newly installed H2 transformer bank.
- Should one of the new H2 transformers fail, it should be replaced or repaired under guarantee.
- The old H2 bank will be retained as a cold spare. This will be able to be connected in place of H2 if it failed, or would provide cover for three failures of the single-phase units of the old H1 bank.

358. Our assessment of the real risk of a failure requiring Stage 2 to be advanced into the coming Regulatory period is that is a small probability and does not meet the first criterion under NER 6A.8.1 (b) of being reasonably required to be undertaken.

[C-I-C]

359. [C-I-C]

360. [C-I-C]

361. [C-I-C]

362. [C-I-C]

[C-I-C]

363. [C-I-C]

364. [C-I-C]

9 STPIS

9.1 Overview

365. In this section we provide our assessment of the values proposed for the next RCP by SP AusNet for the Service and Network Capability Components of the Service Target Performance Incentive Scheme (STPIS). The assessment addresses the questions posed within the TOR for the Technical Consultant.

366. We also provide an assessment of methodologies and procedures for monitoring and reporting against STPIS parameters utilised by SP AusNet.

367. For the assessment of SP AusNet's methodology the New Zealand Institute of Economic Research (NZIER) provided specialist statistical assessment and analysis. The following assessment of SP AusNet's methodology and our proposed alternative take into account NZIER's advice on the fitting of probability distributions and method for linking caps and collars to targets.

368. We have drawn on our team's extensive knowledge and experience in the construction, operation and maintenance of transmission networks to make an assessment of the assumptions used for expectation of economically prudent improvement versus maintenance of current performance.

9.2 SP AusNet's proposed STPIS parameters

369. In the Revenue Proposal, SP AusNet, has submitted proposed targets, caps and collars in respect of the recent Final Report, *Electricity Transmission Network Service Providers (TNSP), Service Target Performance Incentive Scheme (STPIS), December 2012.* As such SP AusNet is the first TNSP to participate in the newly revised STPIS.

370. The revised STPIS scheme provides SP AusNet with an incentive or penalty of 1% of MAR under the Service Component. For the Service Component, the December 2012 scheme measures performance against four parameters, as follows:

1) *Average Circuit Outage Rate – measures the rate of both unplanned (forced and fault) outages for the sub parameters of lines, transformers and reactive plant.*

2) *Loss of Supply Event Frequency – measure the frequency of outages across two parameters for loss of supply events for consumers.*

3) *Average Outage Duration – measures the outage duration for consumers on loss of supply events.*

4) *Proper Operation of Equipment - requires TNSPs to report on 'near miss' events such as failures of protection systems, material failure of the Supervisory Control and Data Acquisition (SCADA) system and incorrect operational isolation of primary and secondary equipment. No financial incentive is required to be associated with this parameter for this RP.*

371. SP AusNet has proposed a range of priority projects to improve network capability for the new Network Capability Incentive Parameter Action Plan (NCIPAP). SP AusNet is the first TNSP to utilise this parameter.

372. Chapter 6 of the Revenue Proposal contains SP AusNet's proposed targets, caps, collars and proposed projects for the above parameters.

9.3 Assessment of SP AusNet's method

373. SP AusNet has utilised the 'fitted' probability distributions recommended by Parsons Brinkerhoff for all the service component data, except for Proper Operation of Equipment, to establish its proposed caps and collars.

374. Our assessment of the proposed values for performance targets and caps and collars and compliance with NER and AER requirements is based on an assessment of the Parsons Brinkerhoff (PB) methodology and recommendations.

375. Our preferred method of fitting distributions is not the same as the one used by PB. We prefer the 'log-likelihood' method or a combination of this and other tests.[63] We base this view on experience using distributions and the fact that the K-S and A-D tests require more assumed knowledge about the data than the log-likelihood test.

376. Notwithstanding the above comment, there are a range of tests that can be applied to find the best fitting distribution and PB's use of 'fitted' probability distributions is an acceptable, if not preferred, method.

[63] This is a comparison of the statistical likelihood of a particular distribution given the data. This statistic is used only as a comparison measure - i.e. it has little information content as an absolute measure.

377. We have used the log-likelihood method to assess the distributions recommended by PB as a way of cross-checking their analysis. The log likelihood method will give somewhat different results to the methods used by the PB distribution.[64]

378. In making our evaluation we have sought simplicity i.e. the fewer 'parameters' required to describe the distribution the better. This is important with so few data points to work with.

379. In general, we found that the PB methodology used to fit the distributions was reasonable because:

- discrete distributions have been used to explain discrete data;
- continuous distributions have been used to explain continuous data;
- data which must logically be bounded at zero has been modelled using distributions bounded at zero;
- for discrete distributions, the Chi-squared test has been used to choose the best performing distribution;
- for continuous data, a distribution's fit is tested using both the Kolmogorov-Smirnov (K-S) test and the Anderson-Darling (A-D) test
  - The distribution with the best fit in both of the K-S and A-D tests is chosen or
  - If the data is concentrated in the middle of the distribution the K-S test is used to determine best fit or
  - If the data is concentrated in the tails the A-D test is used to determine best fit.

380. We also found that PB has applied the method consistently.

381. In annex A, we describe the recommendations of PB for each performance measure and provide our assessment of those recommendations. In our view, the majority of PBs recommendations are sound except the distribution chosen to describe the number of loss of supply events where system minutes exceeded 0.30 system minutes

9.4 Findings on STPIS

9.4.1 Assessment of Target Setting

382. Clause 3.2(g) of the STPIS Guideline sets out the basic requirement that proposed performance targets for the service component must be equal to the TNSP's average performance history over the most recent five years.

383. SP AusNet has selected to use the arithmetic mean as the average; which would be a reasonable and correct selection for normal and symmetrical distributions. Within asymmetrical distributions the use of the arithmetic mean does not provide a sound methodology by which to select caps and collars from within a fitted distribution to the

[64] Note that to conduct this analysis we, like PB, had to test a wide range of distributions to gauge which looked to be performing better. We also applied judgement around the kinds of processes that might reasonably be producing the data.

available data. Within asymmetric distributions the standard deviation does not provide useful information on the asymmetry.

384. Attempting to 'connect' the arithmetic mean by use of the standard deviation in the manner attempted by SP AusNet leads to its proposed use of 'disconnected' and non-meaningful asymmetric caps and collars. The current proposed caps and collars are not connected to the proposed performance targets by a sound methodology and are not appropriate.

385. For one-tailed (asymmetric) distributions we consider the appropriate and correct choice for the average of the distribution to be the 50th percentile or median point: it is the measure of central tendency which can be directly related to appropriately selected collars and caps from the distribution.

386. If SP AusNet's use of the arithmetic mean as the average was accepted, alternate caps and collars referenced to the performance targets by a demonstrated sound methodology would be required.

387. Alternate targets based on the use of the median as the average are set out in the table in the findings sub-section.

9.4.2 Loss of Supply Event Frequency Targets Adjustments

Adjustment of target for increased volume of capital works

388. Increased capital works only increases the risk of a loss of a supply event occurring if there is an increased requirement to operate the system with single contingency network configurations. Forecast increased volume of capital works is a very crude and not very accurate methodology to identify or predict this. This is particularly so when the measure of volume is by capital expenditure in total rather than by categories associated to plant groups.

389. The adjustment being sought by SP AusNet is due to the CBD rebuilds work alone. At the onsite sessions we asked SP AusNet if it expected that large volume of works for the CBD rebuilds would increase the need to operate in a single contingency network configuration. The answer was that it would not.

390. Normally, for control purposes, events that require working outside of normal security practices (ie. single contingency network configuration), are recorded. We consider that as the work and outages for the CBD rebuilds will need to be very accurately planned, therefore, a good understanding of the need, if any, to operate with single contingency network configurations would be established. Any adjustment to the target should be made by estimating the effect of the planned requirements against the average actual incidents that occurred in the past period on a year-by-year basis.

391. We do not consider the requirement for any adjustment has been adequately demonstrated or justified.

Rounding Applied to Targets

392. SP AusNet presents a case for rounding the Number of events to 0.05 system minutes based on the premise that this provides an incentive for small performance

improvements. As discussed previously we propose that the median is used for the average, measure of central tendency, and to determine the targets. On this basis rounding is not required.

Assessment of Proposed Caps and Collars

393. Clause 3.2(e) of the STPIS specifies that the proposed caps and collars must be calculated by reference to the proposed performance targets and using a sound methodology. These may result in symmetric or asymmetric incentives for the TNSP.

394. As SP AusNet have not identified objectives for each target and the associated cap and collar the appropriateness of the caps and collars cannot be linked to stated objectives.

395. In the RP SP AusNet states that:

> *This proposal adopts caps and collars that are two standard deviations below and above the historical average respectively. However, where this methodology results in the proposed cap being an impossible outcome (for example, the number of events is less than zero), an amount equal to one standard deviation from the target is substituted.*

396. Seeking to set caps and collars at plus or minus two standard deviations to the historic arithmetic mean as the performance target, as SP AusNet has done, is only applicable and a sound methodology when the historic data can be fitted to a symmetrical distribution. There is no logical basis for applying this methodology to the parameters when all have an asymmetrical (skewed) distribution.

397. We presume that the concept of seeking to set a performance target for caps and collars at plus or minus two standard deviations to the historic arithmetic mean is based on the need to capture a significantly large part of the probable outcomes and an equal number of probable outcomes on either side of the 'target' selected as a point of central tendency.

398. The nearest equivalent to achieving this for asymmetrical (skewed) distributions is to select the median (50th percentile) as the performance target and use the 5th and 95th percentile for the cap and collar. Our recommendations are based on this approach.

9.4.3 Network Capability Component

399. SP AusNet has proposed 16 projects totalling $4.823 million as its Network Capability Incentive Parameter Action Plan (NCIPAP). SP AusNet is the first TNSP to utilise this new STPIS parameter.

400. We confirm that, as required the NCIPAP that SP AusNet has included in the Revenue Proposal (appendix 6B), contains a:

- List of every transmission circuit and injection point on the network, and the reason for the limit for each; and
- List of priority projects to be undertaken during the forthcoming regulatory control period to improve the limit of the transmission circuits and injection points listed above.

401. Because AEMO plans the transmission network in Victoria, SP AusNet prepared the NCIPAP jointly with AEMO. SP AusNet has noted that; *due to the limited time available to SP AusNet and AEMO to prepare the NCIPAP, the benefits analysis of the proposed priority projects will be provided by AEMO in the form of a public submission to this Revenue Proposal in May 2013.*

402. As the benefits analysis is used by to prioritise the proposed projects we have limited our review to a 'sense check' of the NCIPAP project list and judgement on whether each appears to the fit the criteria.

403. The projects in the NCIPAP mainly address system limitations that are arising because of network configurations that are giving rise to constraints. These projects include improved switching capability, resetting protection relays and minor assert reconfigurations. There are also a number of zero cost projects for updating asset rating in the RADAR database.

404. Also included in the list is a project to upgrade the Hazelwood – Loy Yang No.1, No.2 and No.3 500kV circuit's System Overload Control Scheme (SOC) to enable AEMO to utilise the capacity benefits available from dynamic line rating. With a price tag of $2,000 this project should deliver a high value return from this small investment.

405. Based on the information contained in Appendix 6B of the Revenue Proposal we consider all projects tin SP AusNet's NCIPAP are compliant with the requirements and valid.

9.5 Recommendations on STPIS parameters

406. We consider that the statistical distributions used by SP AusNet are not the best available for the intended purpose and that different distributions should be used. This view has been supported by the expert advice received from NZIER.

407. We recommend that the EMCa proposed targets and caps and collars in the following table are adopted by the AER in their draft decision.

Table 23: STPIS

Parameter	Sub-Parameter	PB Distribution	EMCa Distribution	SP AusNet Proposed Target	EMCa Proposed Target	SP AusNet Proposed Cap	EMCa Proposed Cap	SP AusNet Proposed Collar	EMCa Proposed Collar
Average Circuit Outage Rate	Line outage – fault	Log-logistic	**Log-logistic**	25.9	**24.9**	7.9	**14.8**	43.9	**42**
	Transformer outage – fault	Pearson5	**Inverse gamma**	16.1	**14.1**	7.6	**7.4**	33.1	**31.7**
	Reactive plant outage – fault	Log-logistic	**Log-logistic**	32.5	**32**	19.7	**23.4**	45.3	**43.8**
	Line outage – forced	Pearson5	**Inverse gamma**	14.9	**14.7**	11.5	**12.3**	18.3	**17.7**
	Transformer outage – forced	Weibull	**Weibull**	12	**12.1**	5.2	**6.2**	18.8	**17.6**
	Reactive plant outage – forced	Rayleigh	**Rayleigh**	14.8	**13.6**	7.2	**3.7**	30	**28.3**
Loss of Supply Event Frequency	No. events > 0.05 system minutes	Negative binomial	**Negative binomial**	3	**1**	1	**0**	7	**6**
	No. events > 0.30 system minutes	Integer uniform	**Poisson**	1	**1**	0	**0**	3	**2**
Average Outage Duration	Average Outage Duration	Exponential	**Exponential**	98	**67.9**	0	**5**	293.9	**293.5**
Proper Operation of Equipment	Failure of protection system	n/a	**n/a**	n/a	**n/a**	n/a	**n/a**	n/a	**n/a**
	Material failure of SCADA	Normal	**Poisson**	1	**0**	0	**0**	3	**2**
	Incorrect operational isolation of primary or secondary equipment	n/a	**n/a**	n/a	**n/a**	n/a	**n/a**	n/a	**n/a**

Source: SP AusNet (as proposed) and EMCa analysis

Appendices

Annex A: Assessment of Parsons Brinkerhoff recommendations on STPIS

410. The following paragraphs provide a summary of our assessment on each component of Parsons Brinkerhoff's (PB) recommendations to SP AusNet.

Average outage duration

411. An exponential distribution has been recommended by PB. We consider that this recommendation is sound.

412. Whilst our analysis suggests that a 'generalized pareto' distribution may provide a better fit, this distribution requires the estimation of 3 parameters so does not pass our test for simplicity.

Loss of supply event frequency

No. of events > 0.05 system minutes

413. A negative binomial distribution has been recommended by PB. We consider that this recommendation is sound and one that we would most likely have recommended if in the same position as PB.

414. However, we do not agree with values calculated by PB for this distribution (using the @RISK software). The parameter values of the distribution seem to imply a distribution that accommodates values less than one, which are infeasible. Our analysis suggests a Negative Binomial distribution with parameter values p = 1.76 (2dp) and r = 0.47 (2dp). These parameter values imply a mean of 1.5 and a standard deviation of 1.7.

No. of events > 0.30 system minutes

415. A discrete (integer) uniform distribution has been recommended by PB. We consider that this is not a sound choice. The uniform distribution admits only those values within the values in the data – unless PB have specified some other number for the maximum value possible which is the only parameter needed to specify a uniform distribution. Our analysis suggests the use of the Poisson distribution is appropriate as this distribution admits values above the range found in the data. PB had also considered the binomial distribution but this requires more parameters than the Poisson distribution and additional 'prior' information.[65]The use of a Poisson distribution implies a mean (lambda) equal to 0.8 and a standard deviation of 0.9.

Average circuit outage rate

416. SP AusNet notes that the Average Circuit Outage Rate parameter is not, and should not be interpreted as, a traditional 'Outage Rate' measure. This is because the numerator and the denominator of the definition are expressed in different units.

417. We take the view that to express this as a percentage, as identified in the STPIS, is incorrect due to the fact that any one circuit may have one or more events on it within

[65] This trade-off doesn't matter a great deal anyway. As the number of 'trials' rises the binomial distribution approaches the Poisson distribution.

a year. The numerator is in the unit of events per year and the denominator is the number of circuits applicable in any one year.

418. Without seeking to express as a percentage the value provides a measure or index of nominal or average events per circuit per year. In multiplying by 100 this would 'normalise' it to per 100 circuits; although we are not clear that brings any real benefit to it as an index or measure.

419. We consider that it could only be a percentage if the limit of events in any one year on any circuit had a 'binary' position of 1 or 0.

Outage rate – lines

Faults

420. The Log Logistic distribution is recommended by PB. We consider that this is a sound choice. We found candidate distributions that fit somewhat better according to our preferred measure of fit but the difference between these and the PB approach is trivial.[66]

Forced

421. The 'Pearson5' or 'inverse gamma' distribution is recommended by PB. We consider that this is a sound choice.

Outage rate – reactive plant

Faults

422. PB recommends the use of the Log Logistic distribution, we accept this recommendation. Our preferred measure of fit, the 'Burnbaum Saunders', or 'Inverse Gaussian' distributions, perform better but the difference is trivial.

Forced

423. A 'Rayleigh' distribution has been recommended by PB. We consider that this is a sound recommendation. Our analysis suggests that a 'generalized pareto' distribution may provide a better fit but this distribution requires the estimation of 3 parameters so is probably just 'over-fitted'.

Outage rate – transformer

Faults

424. The 'Pearson5' or 'inverse gamma' distribution is recommended by PB. We consider that this is a sound recommendation.

Forced

425. The 'Weibull' distribution is recommended by PB and we accept this recommendation. Our preferred measure of fit, the 'Extreme Value' distribution, performs better but the difference is trivial.

[66] A 'generalized pareto' distribution performs best according to the criterion of maximised log-likelihood – by quite some margin. However this distribution requires 3 parameters and prior information/assumptions. Other distributions also performed a little better than the log-logistic distribution, e.g. the 'inverse Gaussian', but the improved fit was trivial.

Proper Operation of Equipment

Material Failure of SCADA

426. SP AusNet did request PB to fit a probabilistic distribution for this parameter. It would appear SP AusNet have chosen and are proposing the use of a normal distribution. We cannot understand why this distribution was chosen and have found no basis for its choice. Its use admits values below zero. Also, it is not a discrete distribution which would normally be used to describe event data.

427. We consider that in this regard the choice of distribution is not sound and should not have been considered under the methodology used by PB.

428. We recommend the use of a Poisson distribution for describing SCADA failure events.

Annex B: Capex and Opex trends

Figure 35: Capex – Detailed trending by category (RRP 2008 v current RCP Actual/Estimate)and as proposed for next RCP

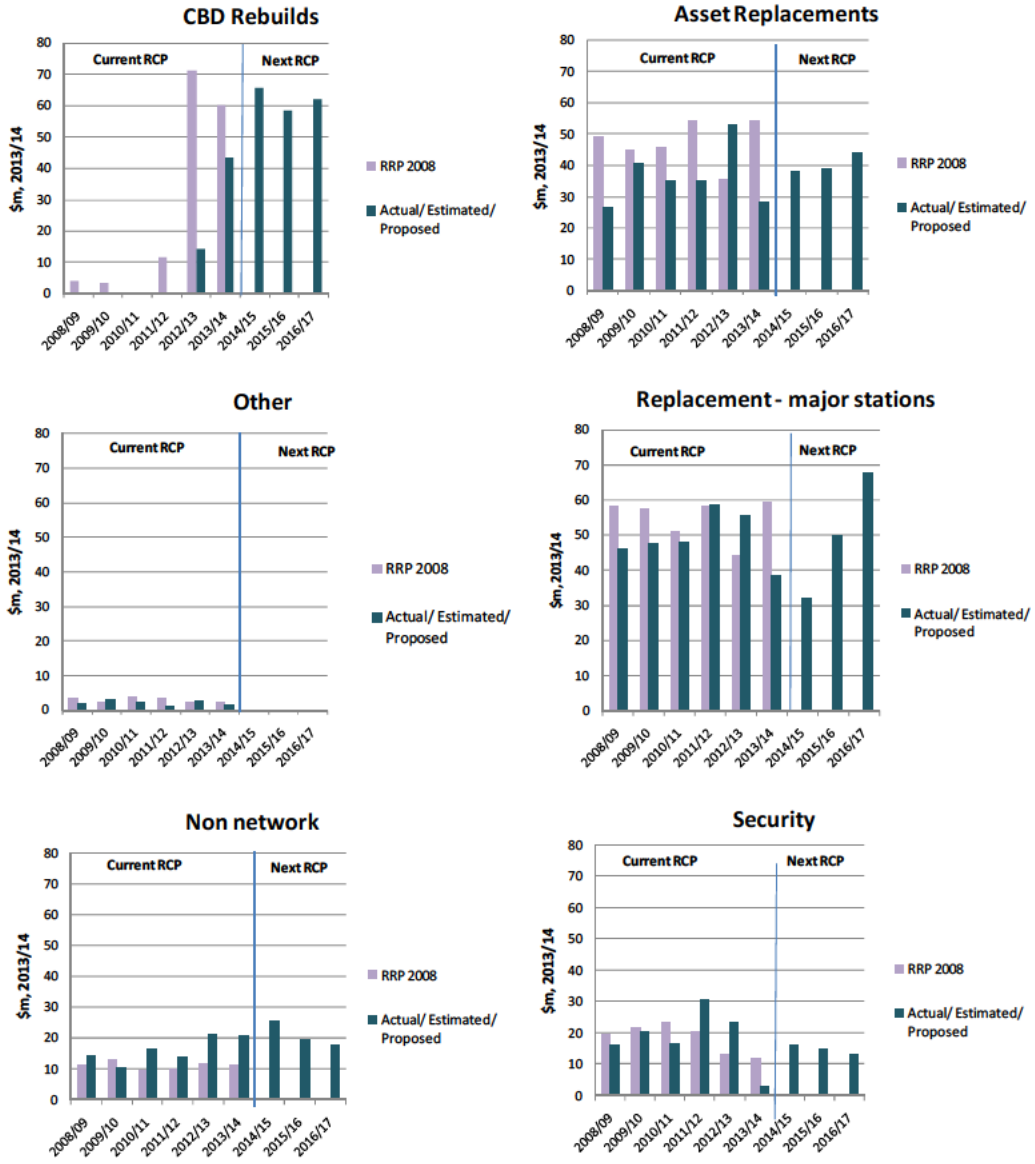
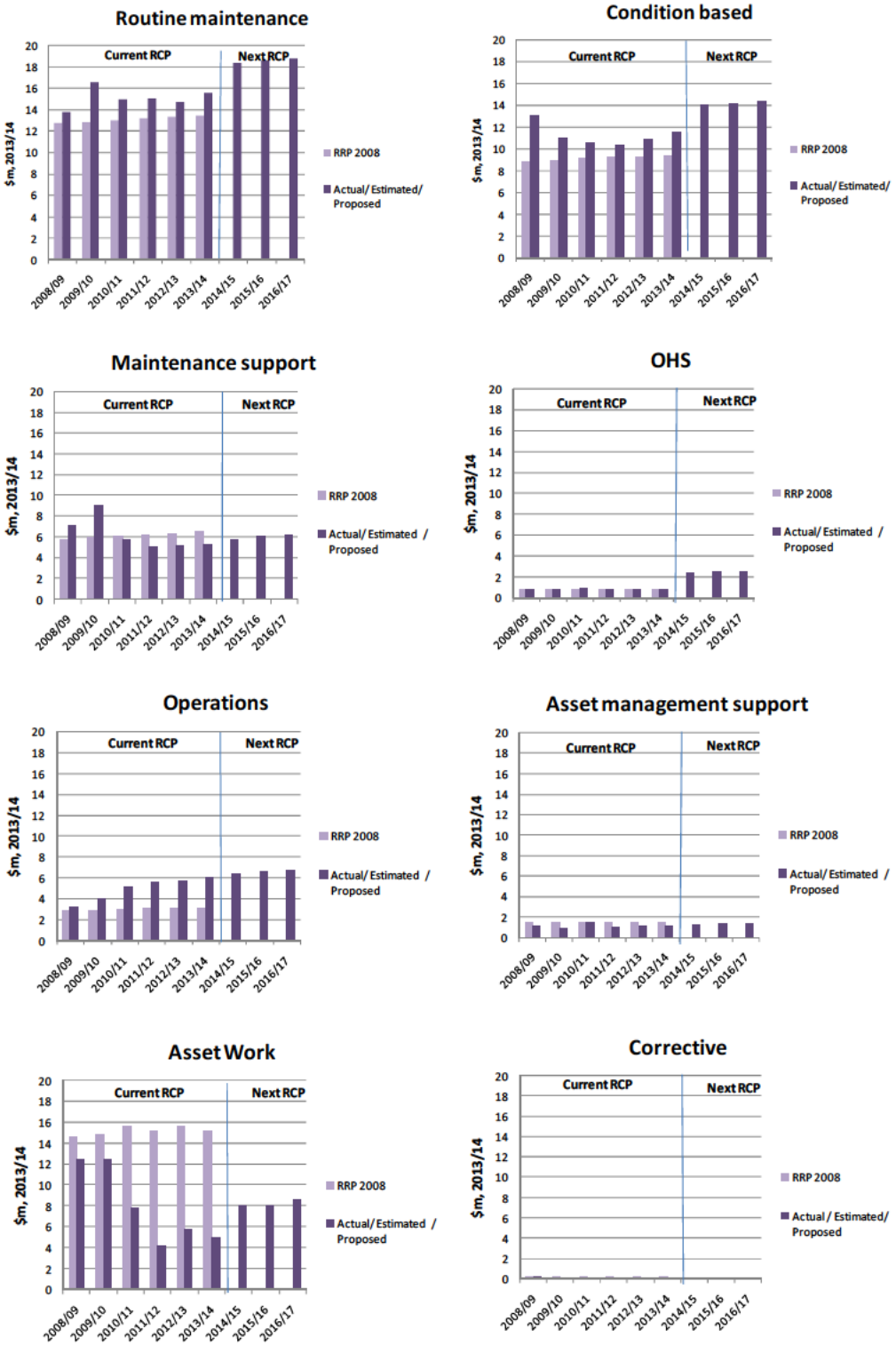
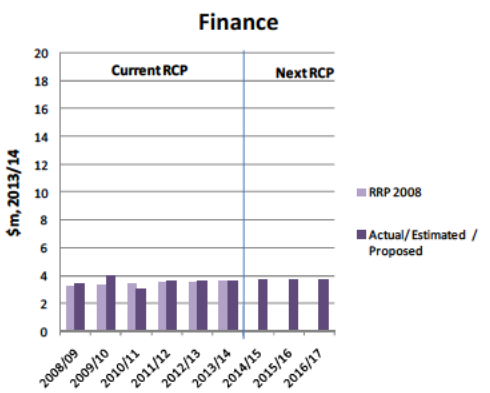
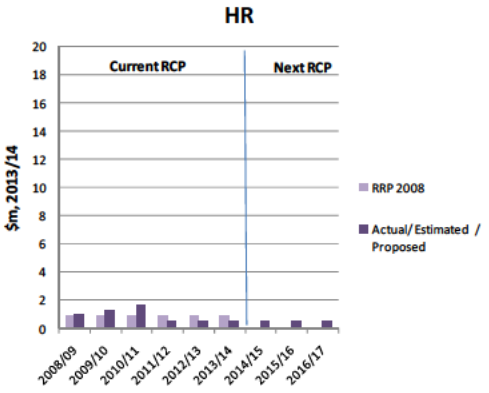
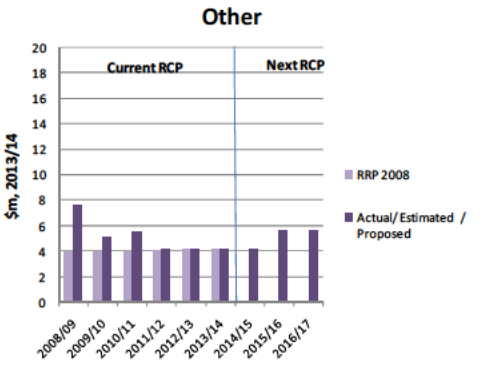


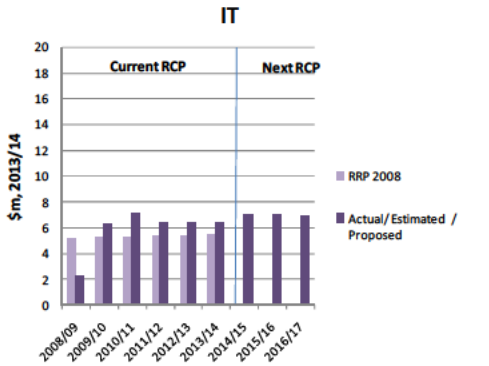
Figure 36: Opex – Detailed trending by category – Current RCP (RRP 2008 vs. current RCP Actual/current Estimate) and as proposed for next RCP

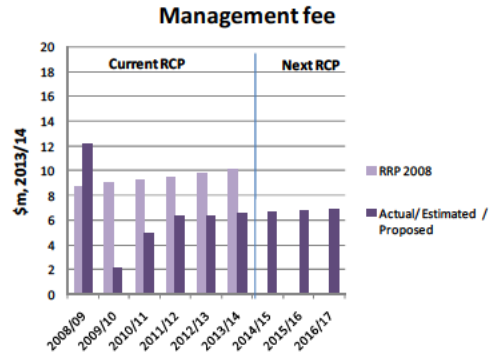



Finance
Current RCP
Next RCP
$m, 2013/14
RRP 2008
Actual/ Estimated / Proposed
2008/09
2009/10
2010/11
2011/12
2012/13
2013/14
2014/15
2015/16
2016/17


HR
Current RCP
Next RCP
$m, 2013/14
RRP 2008
Actual/ Estimated / Proposed


Other
Current RCP
Next RCP
$m, 2013/14
RRP 2008
Actual/ Estimated / Proposed


IT
Current RCP
Next RCP
$m, 2013/14
RRP 2008
Actual/ Estimated / Proposed


Management fee
Current RCP
Next RCP
$m, 2013/14
RRP 2008
Actual/ Estimated / Proposed

Annex C: Current RCP capex project variance

Table 24: Programs

$m, 2013/14

Programs		Proposed cost	Actual Total	Variance	%
EA2	response capability for primary equipment failures	9.9	2.3	- 7.6	-77.0%
EA5	replacement of post type CT's	28.1	18.0	- 10.1	-36.0%
EA6	replacement of 66 kV CB's	4.1	5.6	1.5	37.3%
EA8	Surge Arrestor replacement program	8.0	3.9	- 4.2	-51.8%
EA11	Response capability for Communications equipment	2.7	1.6	- 1.1	-40.1%
EA12	installation of OPGW	40.4	37.3	- 3.0	-7.5%
EA13	installation of Radio communication links	7.7	2.9	- 4.8	-62.7%
EA15	Oil containment at stations	14.6	11.4	- 3.3	-22.4%
EA16	replacement of station air conditioners	1.7	0.6	- 1.2	-68.0%
EA17	replacement of station hydrant systems	14.2	4.4	- 9.7	-68.7%
EA18	response capability for undefined works	6.8	3.2	- 3.6	-53.3%
EA2	response capability for lines	2.2	2.6	0.3	13.8%
EA24	replacement of insulators and fittings	34.6	34.9	0.2	0.7%
EA25	replacement of capacitor banks	6.6	1.1	- 5.5	-83.1%
EA25	replacement of shunt reactors	2.9	0.7	- 2.2	-74.4%
EA26	replacement of SVC thyristors and controls	25.0	12.0	- 13.0	-52.0%
EA28	synchronous condenser refurbishment	4.4	4.0	- 0.4	-10.1%
EA33	Fall restraints on towers	43.6	27.1	- 16.5	-37.9%
EA35	response capability for secondary equipment	6.5	0.1	- 6.4	-98.2%
EA36	replacement of station controls	10.9	15.6	4.7	43.4%
EA37	replacement of station AC&DC supplies	7.2	8.3	1.1	15.5%
EA38	replacement of station EHV protection systems	12.0	41.1	29.1	242.7%
EA39	replacement of station HV protection systems	5.4	4.4	- 1.0	-19.0%
EA40	replacement of energy metering	0.3	0.1	- 0.1	-44.0%
EA42	installation of security cameras	11.9	0.1	- 11.7	-98.8%
EA42	installation of station security fences	12.5	11.6	- 0.9	-7.3%
EA17	works to satisfy Insurance underwriters	5.8	0.8	- 5.1	-87.1%
EA43	replacement of transformer bushings	3.3	1.6	- 1.7	-52.4%
EA44	response capability for transformer failures	2.8	3.2	0.5	16.9%
EA45	replacement of station service supplies	0.7	0.5	- 0.1	-17.6%
EA46	transformer refurbishment	1.7	7.5	5.8	341.8%
EA47	transformer replacement	31.3	54.8	23.5	75.1%
EA42	station access control	0.0	0.2	0.2	778.4%
	Total	**370.0**	**323.5**	**- 46.5**	**-12.6%**

Source: EMCA analysis from SP AusNet capex model

Table 25: Projects

$m, 2013/14

Projects		Proposed cost	Actual Total	Variance	%
EA3	replacement of bulk oil CB's at DDTS	6.4	9.8	3.4	53.7%
EA4	Stage 2 development at HOTS	8.0	7.7	- 0 3	-4.3%
EA7	complete refurbishment of ROTS	13.6	11.5	- 2.1	-15.4%
EA10	Redevelopment of BLTS	57.2	49.8	- 7.4	-13.0%
EA20	Refurbishment of GTS	23.1	26.6	3 5	15.2%
EA21	Refurbishment of HWPS	42.1	20.0	- 22.1	-52.5%
EA22	Refurbishment of HWTS	22.7	13.5	- 9 2	-40.5%
EA23	Refurbishment of KTS	46.4	38.2	- 8 2	-17.8%
EA51	Refurbishment of MTS	1.0	2.4	1.4	147.0%
EA30	Redevelopment of RWTS	33.7	31.4	- 2 3	-6.9%
EA48	refurbishment of TTS	50.0	54.4	4.4	8.7%
EA19	Refurbishment of GNTS	24.0	24.6	0.6	2.5%
	Total	**328.1**	**289.6**	**- 38.4**	**-11.7%**

Source: EMCa analysis from SP AusNet capex model

Table 26: Roll In/ Roll Out

$m, 2013/14

Roll Out		Proposed cost	Actual/ Estimate
EA1	replacement of 22 kV bays	13 3	-
EA9	replacement of 500 kV CB's	4 9	-
EA11	Installation of OPGW associated controls	0.7	-
EA14	Land Management	0 9	-
EA14	mitigation of noise from stations	0 9	-
EA27	replacement of reactive switchgear	1.7	-
EA31	upgrade station earthing installations	3.0	-
EA32	mitigation methods for EMF standards	2 3	-
EA34	management of secondary systems	10 2	7.2
EA41	replacement of station and control centre SCADA	33.6	0.1
Total		**71.4**	**7.4**

$m, 2013/14

Roll In	Proposed cost	Actual/ Estimate
Continuing program for communications equipment	0	4.0
BTS Rebuild	0	0.2
BATS Rebuild	0	0.6
BETS Rebuild	0	1.6
SHTS Rebuild	0	1.0
RCTS Rebuild	0	0.7
HOTS Rebuild stage 1	0	0.1
MBTS Rebuild	0	0.3
TGTS Rebuild	0	0.1
JLTS CB and CT replacements	0	0.0
HOTS Rebuild stage 2	0	-
Tower/Conductor replacements	0	64.4
SVTS Rebuild	0	0.0
HTS Rebuild	0	1.5
Safety Compliance	0	0.8
New category - 220kv CB replacement	0	0.5
New category - Oil CB Replacement Program	0	-
New category - replacement of CTs, VTs & CVTs	0	-
New category - Civil infrastructure	0	-
New category - Communications safety and security	0	-
Total	**-**	**75.9**

Source: EMCa analysis from SP AusNet capex model

Annex D: Addendum re WMTS

Supplementary briefing paper on WMTS following additional information provided by SP AusNet (to 24th July 2013)

Purpose

429. The purpose of this supplementary briefing is to provide the Australian Energy Regulator (AER) with EMCa's findings following receipt and review of additional information provided by SP AusNet in response to the AER 46 and AER 57 information requests. In particular, EMCa has been asked to advise the AER if there are any changes in the recommendations relevant to West Melbourne Terminal Station (WMTS) to that provided in EMCa's Technical Report.

Background

430. EMCa undertook its analysis and prepared the present report in April and May 2013, and submitted its Draft to the Australian Energy Regulator (AER) on 14June 2013. The report included EMCa's findings and recommendations on SP AusNet's proposed rebuild of the West Melbourne Terminal Station, based on information provided in SP AusNet's Revenue Proposal, at onsite meetings held from 18 to 21 March 2013 and in responses to subsequent information requests. Our assessment in the Technical Review is contained in section5.2.2 of the Draft Technical report

431. Following submission of the Draft of this report, SP AusNet provided additional information on 18 June and 8 July 2013 on aspects of the WMTS project. The additional information was substantial with 306 pages of documentation and two Excel workbooks contained in the following:

- Response SP AER46 – WMTS Follow up (18/06/13);
- BECA WMTS Options Development Report;
- WMTS Planning Estimate;
- AIS Top Down estimate Excel workbook;
- GIS Top Down estimate Excel workbook;
- Response SP AER57 – WMTS AIS GIS Follow Up (08/07/13);
- West Melbourne Terminal Station Redevelopment Appraisal;
- BECA Appraisal of WMTS GIS and AIS Redevelopment options;
- Heatherton TS Rebuild GIS and AIS Single Line Diagrams.

432. The following sections of this briefing paper summarise EMCa's response to the subsequent additional information provided by SP AusNet and advises changes to the conclusions that could be considered by the AER based on this information.

AIS option assessment

433. The additional information demonstrates to the assessment that SP AusNet has undertaken, of the AIS option. The options assessed include a number of AIS and AIS/GIS options and included reasonably detailed sequence diagrams sufficient to determine that AIS replacement is technically and practically achievable and the process required to undertake a like-for-like replacement in terms of technology.

434. The BECA WMTS Options Development Report indicates that the AIS case has many more stages than GIS options, thus indicating additional complexity and duration. Also there are many more outages required which would likely delay the work as these would need to be taken in low loading periods. However the number of protection changes is less for AIS which reduces the risk of outages caused by human error.

435. The BECA report provides a summary of the various arguments in favour of the GIS option. Arguments in favour of GIS are:

- Reduced complexity of carrying out the project;
- Reduced outage risk and costs;
- The high criticality of WMTS in the Melbourne network;
- The difficulty of getting outages which are more for the AIS option;
- Reduced duration of the project;
- Reduced consenting risk and delay;
- Reduced human safety risk with less work around live equipment;
- Future expansion capability.

436. Considering all the additional material, we conclude that:

- Rebuilding using AIS is feasible;
- The construction using all GIS is preferable from an engineering perspective because it has significantly lower risk and has considerable benefits above those provided by AIS (as listed above);
- The final choice should take into account the additional cost of the GIS approach.

437. EMCa's review team considers that the GIS rebuild is preferable to AIS so long as the cost difference between the options is sufficiently narrow to indicate that the additional costs of GIS justify the benefits. Our main concern, as expressed in our draft Technical Review report, has been with the costings presented for the AIS and GIS options.

Cost difference between GIS and AIS

438. The additional information provided cost estimates for the AIS and GIS options. The following table provides a summary of the cost for each of the options assessed in the Planning Estimate. Option 8 reflects the numbers that were included in the Revenue Proposal. Option 9 reflects the comparable AIS alternative. Costs are based on top down typical bay and component prices.

Table 27: Cost difference between GIS and AIS

Option	2	1	3	9	7	8
220kV	AIS	GIS	GIS	AIS	GIS	GIS
66kV	A/G	A/G	GIS	A/G	A/G	GIS
Number Transformers	3	3	3	4	4	4
Transformer MVA	225	225	225	150	150	150
SP50 Cost ($m)	148	156	161	131	144	148
Plan permit years	2.5	1.5	1.0	2.5	1.5	1.0
Construct years	3.0	2.5	2.0	3.0	2.5	2.0

Source: SP AusNet Planning Report

439. It can be seen that (comparing options 8 and 9):

- SP AusNet's estimate is that the presented GIS option is $17m more expensive than the comparable AIS option;
- The AIS option is assessed to take 5.5 years to complete, versus 3 years for GIS.

440. In the main body of this report, we expressed concerns at the disparity between the costs for project components, compared with other GIS projects such as Heatherton. The AIS and GIS top down estimates provided by SP AusNet do not provide explanations for the project components that have unusually high costs compared to Heatherton TS, and only breaks down the costings into the various stages.

441. However, the additional information provided by SP AusNet in its response to AER 57 explains that the AIS/GIS cost ratio for HTS is lower than WMTS because HTS:

- Has 9 switch bays for GIS and 6 bays for AIS; and
- Has sufficient spare land to allow new switch bays to be constructed before decommissioning of old equipment.

442. At a qualitative level, this provides some explanation of the costs differences of the levels seen in the WMTS and HTS cost estimates. The information identifies that the WMTS AIS/GIS cost ratio of 44% reflects:

- The implications of the constrained site, which produce significant supply risk'; and
- Sacrificial work involving temporary network facilities ($24.0m on P50).

443. In the additional information SP AusNet also notes that the gap between the AIS and GIS options has reduced due to a decrease in GIS component prices seen for the Brunswick TS. It is unclear however whether there may also have been a decrease in price for AIS switchgear.

444. In the recently-provided information, SP AusNet states that the gap between AIS and GIS 220kV equipment is $5m. However the RP figures showed a gap of $19.2m. The

reduction from $19.2m to $5m, then should reflect into the RP numbers, i.e. it implies a saving of $14.2m for the GIS option. On this basis GIS would be only around $3m more than AIS and, if these estimates could be relied on, then the advantages of GIS would seem to outweigh this small cost premium. However the continual shifting of these numbers leaves us with little confidence in the reasonableness of these estimates for the purposes of the revenue determination.

445. We also have remaining concerns regarding the AIS estimates, for example the costs of the sacrificial work and temporary network facilities and risk related components appear to be unduly high and do not reflect any recovery or reuse of materials

Revised findings and recommendations

446. Following review of the additional information, EMCa:

- Supports the redevelopment of the WMTS due to age and condition of most of the equipment;
- Considers that there are benefits provided by GIS rebuild above those provided by AIS;
- Finds that the cost difference between AIS and GIS has not been clearly established, therefore it is unclear whether the extra cost of GIS is sufficiently low as to justify the benefits provided by GIS;
- Considers that the cost estimate in the RP for a GIS rebuild should be reduced by $14.2m;
- Reconfirms that for the purposes of the pricing decision, the redevelopment project should be assumed to be deferred by one year to provide a more gradual build-up of activity of the WMTS project following the RTS project.

447. EMCa considers that resolution of a reasonable cost for this project will require the AER to have sufficient opportunity to review the basis for the cost estimates for the respective AIS and GIS options, with a satisfactory reconciliation of the differences. This review should include comparisons with cost estimation assumptions for other AIS and GIS projects.

Annex E: Resumes

Paul Sell

Paul Sell is an energy economist, specialising in energy markets and market reforms. He has over 30 years' experience, which includes providing major advice on restructuring, on deregulation, on the design and implementation of electricity and gas markets and on network regulatory arrangements in Australasia. He has worked extensively with energy utilities, governments, energy regulators and energy market agencies.

Career summary

- Managing Director of Energy Market Consulting associates (EMCa), Sydney, NSW
- Vice President of Cap Gemini Ernst & Young, Global Services Unit (GSU), Sydney, NSW
- Partner of Ernst & Young Consulting, based in Sydney, NSW
- Consultant/Manager/Senior Manager/Principal of Ernst & Young Consulting , Wellington, New Zealand
- Economist in NZ Ministry of Energy, Planning and Forecasting Division Wellington, New Zealand

Expertise

- Electricity and gas utility network pricing, regulation and associated cost analysis
- Energy utility analyses including investment decisions and investment justification processes, energy forecasting and planning studies, and business modelling
- Electricity and gas wholesale markets design and operations
- Energy utility sector reform, restructuring and deregulation policies
- Retail competition in energy markets

Bill Heaps

Bill Heaps is Managing Director of Strata Energy Consulting Limited. He has over 30 years' experience in electricity utility engineering, management and consulting roles.

Bill is an electrical engineer with senior management experience in energy utilisation, distribution, retail, transmission and power generation. He has recently held three influential advisory group chairmanship roles for the New Zealand Electricity Commission and currently chairs the Investment Advisory Group for the Electricity Authority. Bill has also been Director of Orion Group Limited, one of New Zealand's largest electricity distribution businesses.

Career summary

- Managing director of Strata Energy Consulting
- General Manager (Commercial Services) at Transpower, New Zealand's electricity transmission and system operating company
- General Manager (Geothermal) of the Electricity Corporation of New Zealand (ECNZ)
- General Manager Energy Brokers New Zealand

Expertise

- **Wholesale electricity market** – Expertise in the design, governance, regulation and operation of electricity markets
- **Electricity Generation** – experienced in power generation plant management and investment planning
- **Electricity transmission networks** – experienced in the provision of transmission services, including pricing and revenue, contracts, asset management systems and performance
- **Electricity distribution** – Experienced in distribution company governance, strategy and policy development and distribution business processes
- **Retail electricity markets** – Expertise in retail market design and operation, including market processes, price risk management, metering, reconciliation and information systems regulation, rules and governance
- **Electricity Utilisation –** experienced in the use of load management techniques in major industrial manufacturing plants and commercial buildings

Stephen Lewis

Stephen Lewis is an electrical engineer who has over 30 years of electricity supply industry experience. His previous career with National Grid plc spanned the UK, the USA, Australia and South America.

Stephen is currently a Director of MainPower New Zealand Ltd., and a Trustee and Chair of Community Energy Action.

Up until August 2006, Stephen was the Commercial Director for National Grid Australia during the final stages of the Basslink HVDC interconnector project between Tasmania and Victoria. Prior to this, Stephen was a Vice President of National Grid USA and headed the transmission business covering the New England and New York states.

Career summary

- Associate consultant with Strata Energy Consulting
- Director of MainPower New Zealand Ltd
- Trustee and Chair of Community Energy Action
- Commercial Director for National Grid Australia
- Vice President of National Grid USA

Expertise

- **Electricity transmission** – Experienced in transmission governance, business management systems and operations, mergers and acquisitions, asset management and integration of processes and systems
- **Electricity distribution** – Experienced in distribution company governance, strategy and policy development and distribution business processes

Dave Frow

Dave Frow is a former Chief Executive Officer of the Electricity Corporation of New Zealand (ECNZ), with seven years' experience in this role which included responsibility for electricity transmission. Dave steered the company through the period of industry structural and market reform, to the creation of the separate transmission company and competitive electricity generation companies. Dave is former Chairman of Transpower (New Zealand's national electricity transmission company), a former Director of Unison Networks Ltd (an electricity distribution company) and former Director of ETEL Ltd (providing electrical transformers).

Dave has provided international strategic management consulting advice in a range of industries, including postal, harbours, electricity and manufacturing.

Dave holds a degree in engineering from the University of Natal South Africa and is a graduate of the Harvard Business School Advanced Management Programme. He is a fellow of the Institute of Professional Engineers (IPENZ).

Career summary

- Chief Executive Officer of the Electricity Corporation of New Zealand (ECNZ)
- Chairman of Transpower
- Director of Unison Networks Ltd
- Director of ETEL Ltd

Expertise

- International strategic management consulting advice in a range of industries, including postal, harbours, electricity and manufacturing.

Mark de Laeter

Mark de Laeter is an electrical engineer with 30 years' experience in all aspects of the electricity industry, ranging from executive to line management positions in Western Power, a Top 500 Australian company with over 5,000 personnel.

Mark is a Senior Associate of EMCa, and is based in Perth.

Career Summary (all at Western Power)

- General Manager Networks at Western Power, the government trading enterprise responsible for managing the distribution and transmission network in the south west of Western Australia.
- General Manager Customer Service which, in addition to his responsibilities as the GM Networks, included accountability for all service offerings to Western Power's 1 million customers and for engineering design
- General Manager Asset Management – transmission & distribution
- Manager Asset Integration - responsible for transmission asset management, engineering design, and project management
- Manager Regional Power Procurement - securing Power Purchase Agreements with private generators
- Construction Services Manager – responsible for transmission substation and line construction and maintenance

Expertise

- Electricity transmission and distribution planning
- Electricity network access
- Asset management practices
- Project management
- Advanced metering infrastructure
- Electricity operations management
- Customer service and community engagement

Choon Yen Chee – Research analyst

Choon Yen Chee is an analyst and qualified accountant. He has experience with preparing cost/benefits models and regulatory cost projection models, including for the Victorian smart metering program, for electricity networks' technical reviews and demand forecast reviews. In this role he collated data from information provided by the utilities, prepared spreadsheet models, audited models prepared by others, prepared graphs and tables for reporting purposes and audited data within reports.

Career Summary

Choon Yen is a Research Analyst with EMCa. He began his career as an external auditor with Deloitte Malaysia.

Expertise

- Financial auditing
- Electricity cost analysis, pricing and regulation
- Modelling of electricity utility budgets and regulatory revenue allowances

Glossary

AARR	Aggregate Annual Revenue Requirement
AER	Australian Energy Regulator
AEMO	Australian Energy Market Operator
AIS	Air Insulated Switchgear
BLTS	Brooklyn Terminal Station
CAPEX	Capital Expenditure
CBD rebuilds	Central business district rebuilds
DD	Draft Decision
DNSP	Distribution Network Service Provider
EAM/ ERP upgrade	Enterprise Asset Management / Enterprise Resource Planning
EBSS	Efficiency Benefit Sharing Scheme
EDPR	Electricity Distribution Price Review
EMCa	Energy Market Consulting associates
GAAR	Gas Access Arrangements Review
GIS (SF6)	Gas Insulated Switchgear
HWPS	Hazelwood Power Station
ICT	Information and Communications Technology

IT	Information Technology
KTS	Kyneton Terminal Station
MAR	Maximum allowed revenue
NCIPAP	Network Capability Incentive Parameter Action Plan
NZIER	New Zealand Institute of Economic Research
NER	National Electricity Rules
OPEX	Operating Expenditure
RAB	Regulatory Asset Base
RCP	Regulatory Control Period
RCM	Reliability Centered Maintenance
RIT-T	Regulatory Investment Test for transmission
PB	Parsons Brinkerhoff
RP	SP AusNet's Revenue Proposal
RTS	Richmond Terminal Station
SCADA	Supervisory Control and Data Acquisition
STPIS	Service Target Performance Incentive Scheme
SVTS	Springvale Terminal Station

Strata	Strata Energy Consulting Limited
TOR	Terms of Reference for Technical Consultants
TNSP	Transmission Network Service Provider
WMTS	West Melbourne Terminal Station
VCR	Value of Consumer Reliability