VENCORP REVENUE RESET

An independent review

Prepared for

AUSTRALIAN ENERGY REGULATOR

PB Quality System:

Document Reference:	VENCorp2008Reset_v3_0.doc
Report Revision :	3_0
Report Status :	Final
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Date Issued :	8 October 2007

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EXECUTIVE SUMMARY

The Australian Energy Regulator (AER), in accordance with its responsibilities under the National Electricity Rules (Rules)[1], is required to conduct an assessment of the appropriate revenue determination to be applied to the prescribed transmission services provided by SP AusNet (formerly SPI PowerNet) from 1 April 2008 and VENCorp from 1 July 2008. The previous revenue cap reviews for SPI PowerNet and VENCorp (both 2003–2007/08) were conducted by the Australian Competition and Consumer Commission's (ACCC). The AER assumed responsibility for the regulation of transmission revenues in the National Electricity Market from the ACCC on 1 July 2005.

PB has been engaged by the AER to conduct a review of VENCorp in support of the AER undertaking these revenue determination assessments. The overall objective of this review is to undertake an assessment of the past (*committed*) and forecast (*planned*) expenditure proposals associated with augmentation of the transmission system, and the forecast opex — as submitted to the AER by VENCorp. The review of VENCorp capital expenditure extends to investment in augmentation (reinforcement) only. Capital expenditure associated with replacement and refurbishment of the shared transmission is planned and executed by SP AusNet (SPA).

The expenditure reviewed in this report is the augmentation capex which is initiated by VENCorp for the period from 1 January 2003 to 30 June 2008 (the current regulatory period) — the committed augmentation expenditure assessment; and that for the forthcoming 6-year period from 1 July 2008 to 30 June 2014 (the next regulatory period) — the planned augmentation expenditure assessment. The (efficient and prudent) augmentation capex may be subsequently included in the SPA regulatory asset base (RAB).

SCOPE

In this independent review of the VENCorp expenditure proposals PB considers, examines and provides its expert opinion, on the following key submission items and expenditure categories.

- committed network augmentation capital expenditure over the current regulatory period
- planned network augmentation capital expenditure in respect of the next regulatory period
- forecast operational expenditure for VENCorp
- capital governance framework and the VENCorp planning process.

The review of these items takes full account of the unique arrangements in Victoria between SPA and VENCorp.

PB'S APPROACH TO THE REVIEW

This 'multi-pronged' approach to the review of VENCorp has combined the following key elements:

- a review of VENCorp's governance framework and investment decision-making (planning) policies
- comparative analysis of augmentation costs (intra business)[2]
- a review of unit costs (obtained from detailed project reviews)
- a detailed examination of a selection of projects, both planned and committed ('bottom-up')
- PB's experience and views of the SPA capex (planned and committed)
- PB's direct experience of other network businesses (including TNSP reviews).

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1 The National Electricity Rules, Chapter 6A.

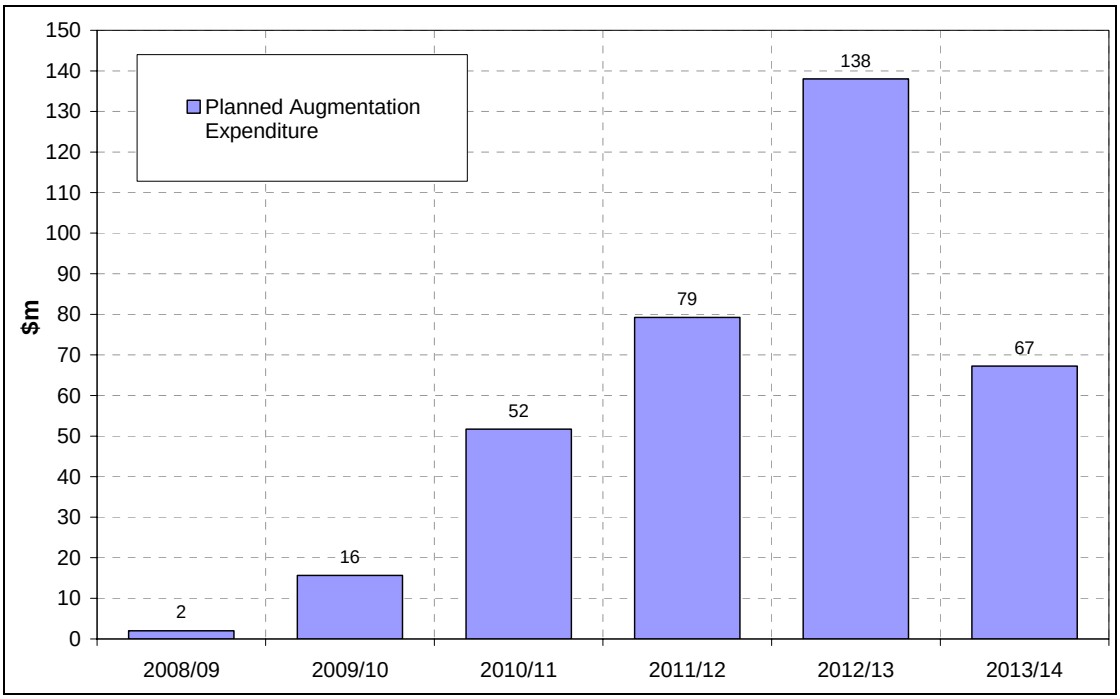
2 PB has undertaken a separate review of the SP AusNet revenue reset proposal which includes some comparative analysis and benchmarking of the combined Victorian transmission business (i.e. including VENCorp) – "*SP AusNet Revenue Reset, An Independent Review, PB, July 2007", Section 2.*

Through this approach PB has developed an independent view on the VENCorp proposals which it believes is robust, credible and defensible.

VENCORP'S PROPOSAL

The VENCorp proposal for planned augmentation expenditure is summarised in Figure E1

Figure E1 – VENCorp's planned augmentation expenditure



Source: PB using Table 7.8, page 33, VENCorp Electricity Revenue Cap Proposal, 1 July 2008 to 30 June 2014.

Through its comprehensive review of the VENCorp revenue reset proposal and the VENCorp organisation, governance and planning processes, PB has been able to formulate the following key conclusions:

COMMITTED NETWORK AUGMENTATION CAPITAL EXPENDITURE

PB has undertaken a detailed review of a selection of five VENCorp committed augmentation projects. This has led to the following conclusions.

- VENCorp has demonstrated a justifiable need for all committed augmentation expenditure
- All projects examined demonstrated strategic alignment with the requirements of the NER and guided by the application of the regulatory test to VENCorp's probabilistic planning approach
- Analysis of the alternatives, and the selection of the preferred alternative was reasonable and prudent
- VENCorp has reasonably demonstrated that the preferred alternative was the most efficient alternative
- Most projects examined demonstrated that project timing reasonably optimal
- Project documentation was generally appropriate for the projects examined

- Compliance with VENCorp's augmentation planning and governance processes was demonstrated by the project documentation
- VENCorp's role in project implementation was demonstrated to be consistent with prudent asset management and good industry practice
- In all projects examined, the implemented costs were reasonable given the projects scope
- VENCorp has been prudent and efficient in regards to the management of its committed augmentation expenditure
- VENCorp's committed augmentation expenditure over the period 2002/3 to 2007/08 was timely, reasonable, and efficient.

PLANNED NETWORK AUGMENTATION CAPITAL EXPENDITURE

Following its review of a selection of projects proposed for inclusion in VENCorp's planned capex provisions, and in the context of the unique regulatory arrangements in Victoria where the main purpose of VENCorp's capex forecast is to provide a 'best endeavours' indication of the most likely forward investments, PB has been able to draw the following conclusions:

- The scenario-based approach is suitable for the purposes of capturing extremes in transmission development plans
- The 'indicative probabilistic' forecasting approach lacks transparency and does not directly relate to VENCorp's project justification and approval process
- VENCorp appears not to have accounted for inter-dependencies in augmentation projects
- PB believes that there is likely to be some systemic advancement in the timing of projects presented by VENCorp
- PB found that the documentation and technical data supporting proposed projects was limited
- VENCorp has not fully considered the significant asset replacement program proposed by SPA
- PB recommends a high level adjustment to reduce VENCorp capex to efficiency levels similar to historical experience
- PB recommends VENCorp's 25% contingency factor be removed from its forecast.

Following its review of the subsequent update information, PB's view is that:

- VENCorp must formalise its final position and, in practical terms, this should account for the new demand and energy forecast as published in the 2007 APR
- Increases in VENCorp's project costing estimates requires further review
- The additional information provided does not materially influence PB's original recommendations.

FORECAST OPERATIONAL EXPENDITURE

PB has undertaken a review of VENCorp's forecast opex. A review of the past opex and been used to inform this process and to help PB develop an independent view on the prudence and efficiency of VENCorp's opex proposals. Following our review of the opex proposal, PB has arrived at the following conclusions.

- There has been a historical pattern of under expenditure in operational and planning expenditures compared to the annual forecasts which we believe will continue if the VENCorp opex and planning forecasts are accepted

- PB believes that VENCorp's forecast operational and planning expenditure for the next regulatory period should be forecast by escalating the adjusted 2006/07 total forecast expenditure by the four year average annual increase in expenditure up until 2006/07.

CAPITAL GOVERNANCE FRAMEWORK AND THE PLANNING PROCESS

As part of the review, and through the detailed project reviews, PB has examined the governance framework and planning processes associated with VENCorp's augmentation investment decisions. PB has been able to make the following observations regarding VENCorp's governance framework and planning processes

- VENCorp has a business structure to appropriately support its network augmentation, investment approval, and decision-making processes

- VENCorp's governance framework and capex and opex approvals process are both sound and appropriate for a government entity of the nature of VENCorp

- In general, the VENCorp planning process is comprehensive, well structured and typical for infrastructure planning of this type

- The market benefits approach and the probabilistic planning criteria represent a sound methodology and is likely to lead to the efficient provision of transmission services

- VENCorp's medium to long–term planning methodology does not fully accommodate the regulatory review process

- In general VENCorp and its stakeholders appear to have a clear and well established understanding of the various roles and responsibilities of parties

- VENCorp's dependence on SPA for project cost estimates may limit its understanding of up–to–date market conditions associated with materials and labour costs.

1. INTRODUCTION

In this section of the report we provide some background to the review, together with an overview of the requirements of the engagement in the context of the Victorian transmission arrangements and describe the PB approach to the work. We also set out details of the structure of this report.

1.1 BACKGROUND TO THE REVIEW

The Australian Energy Regulator (AER), in accordance with its responsibilities under the National Electricity Rules (Rules)[3], is required to conduct an assessment of the appropriate revenue determination to be applied to the prescribed transmission services provided by SP AusNet (formerly SPI PowerNet) from 1 April 2008 and VENCorp from 1 July 2008. The previous revenue cap reviews for SPI PowerNet and VENCorp (both 2003–2007/08) were conducted by the Australian Competition and Consumer Commission's (ACCC). The AER assumed responsibility for the regulation of transmission revenues in the National Electricity Market from the ACCC on 1 July 2005.

VENCorp submitted its revenue proposal and proposed negotiating framework to the AER on 1 March 2007. The AER conducted a preliminary examination of VENCorp's proposal, as required by the Rules[4]. Additional information was submitted by VENCorp on 1 May 2007 to satisfy the requirements of the AER's Submission Guidelines and the Rules.

As part of the inquiry, the AER has engaged the services of PB Strategic Consulting[5] (PB) to undertake a review of VENCorp's committed (past) and planned (forecast) augmentation expenditure — including its planning and investment decision-making process and its forecast operational expenditure (opex).

1.2 PROJECT OBJECTIVE

PB has been engaged by the AER to conduct a review of VENCorp in support of the AER undertaking these revenue determination assessments. This work involves conducting a review of, and providing advice to the AER on, VENCorp's augmentation expenditure and opex.

PB is aware of the requirements of the Rules placed on the AER[6]. In undertaking its review, PB has employed a proven methodical approach, which addresses each of the specific items in the AER terms of reference. This approach is described in more detail in Section 1.4.1 of this report.

The overall objective of this review is to undertake an assessment of the past (*committed*) and forecast (*planned*) expenditure proposals associated with augmentation of the transmission system, and the forecast opex — as submitted to the AER by VENCorp. This has enabled PB to formulate an independent view on the prudence and efficiency of the past expenditure and also the reasonableness of that proposed for the forthcoming regulatory period. The review of VENCorp capital expenditure extends to investment in augmentation (reinforcement) only. Capital expenditure associated with replacement and refurbishment of the shared transmission is planned and executed by SPA. The (unique) relationship between VENCorp and SPA is described in more detail in Section 1.3[7].

3 The National Electricity Rules, Chapter 6A.

4 Ibid — clause 6A.11.1.

5 Formerly known as 'PB Associates'.

6 Including the recent amendments to Chapter 6A released on 16 November 2006.

7 The review of SPA's expenditure proposals is subject to a separate regulatory review by the AER and is addressed in a separate PB report.

The expenditure reviewed in this report is the committed augmentation expenditure which is initiated by VENCorp for the 5 $^{1}/_{2}$-year period from 1 January 2003 to 30 June 2008 (the current regulatory period); and that for the forthcoming 6-year period from 1 July 2008 to 30 June 2014 (the next regulatory period) — the planned augmentation expenditure assessment. The (efficient and prudent) augmentation expenditure may be subsequently included in the SPA regulatory asset base (RAB).

It is intended that the results and conclusions of this review by PB will assist the AER in its obligation to determine the regulated revenue requirements associated with both VENCorp's forward transmission augmentation planning and with the committed augmentation capex for potential inclusion in SPA's RAB.

Process and project timetable

The PB review timeline, and its coordination with the AER timetable, is shown in Table 1-1. A more detailed description of the PB element of the review process is set out in Section 1.4.1.

Table 1-1 – Project timetable

Action	Date
VENCorp submit revenue proposal to AER	28 Feb 2007
PB appointed by AER	March 2007
Public forum	10 May 2007
PB draft report to AER	13 July 2007
VENCorp comment on PB draft report[8]	27 July 2007
PB final report to AER	3 Aug 2007
AER to release its draft decision (and publication of PB report)	31 Aug 2007
AER to release its final decision	31 Jan 2008

1.3 OVERVIEW AND CONTEXT

This section provides an outline of the transmission arrangements in Victoria, provides some background of VENCorp (and SPA), and describes the regulatory context within which the PB review has taken place.

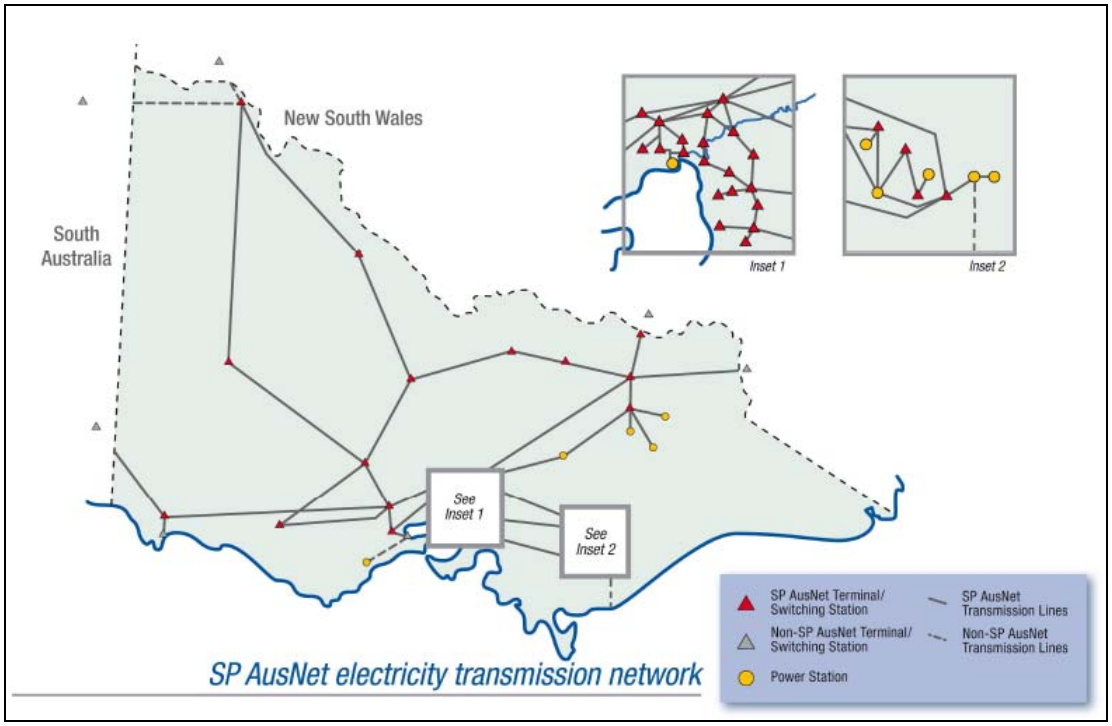
1.3.1 Transmission in Victoria

Victoria's transmission arrangements are unique within the National Electricity Market (NEM). SPA owns, operates and maintains the vast majority of the high voltage transmission system and provides bulk transmission services to VENCorp under a network agreement and as a licensed Transmission Network Service Provider (TNSP).

The Victorian electricity transmission network is a key strategic asset servicing Australia's second largest economy and the NEM. SPA report that its transmission network serves in excess of 1.8 million households and 280,000 businesses transferring over 45 million megawatt-hours (i.e. 45 GWh) of energy annually over its transmission wires. The SPA geographic electricity transmission region is shown in Figure 1-1.

[8] This initial review of PB's report by VENCorp is limited to comments on errors of fact and confidentiality.

Figure 1-1 – The Victorian electricity transmission area



Source: SP AusNet revenue proposal document

About SPA

SPA is a major energy network business that owns and operates key (regulated) electricity transmission and distribution assets located in Victoria, Australia. SPA also owns and operates a gas distribution network in Victoria. The SPA assets include the following:

- a 6,574 kilometre electricity transmission network indirectly servicing all electricity consumers across Victoria
- an electricity distribution network delivering electricity to approximately 580,000 customer supply points in an area of more than 80,000 square kilometres of eastern Victoria
- a gas distribution network delivering gas to approximately 510,000 customer supply points in an area of more than 60,000 square kilometres in central and western Victoria.

1.3.2 The role of VENCorp

VENCorp is the monopoly provider of shared transmission network services in Victoria, acquiring bulk network services from SPA and from other service providers under network agreements[9]. VENCorp is responsible for planning and directing augmentation to the shared network as an independent entity. VENCorp is a not-for-profit organisation and does not own transmission assets itself. SPA continues to plan, design and build customer connections to the shared network (e.g. load and generation connections).

[9] SPA is presently responsible for the provision of virtually all of TNSP services to VENCorp with other TNSPs providing a small percentage of contestable transmission services to VENCorp.

The separation of the network asset owner (SPA and others) from the investment decision-maker (VENCorp) in this way is unique within the NEM. In other Australian states the transmission business has responsibility for planning and augmentation, as well as for the replacement, refurbishment and maintenance of ageing assets[10].

While VENCorp does not own transmission assets, its revenue cap has been determined in accordance with the Victorian derogation in Part A of Chapter 9 of the NER[11].

The arrangements support the model of having multiple transmission network owners with the aim of promoting competitiveness. Significant value augmentations are procured on a competitive basis. In this regard, SPA competes with other third-party transmission network service providers for the right to construct, own and operate the augmentation assets. Any transmission services provided by SPA on a competitive (contestable) basis are deemed to be a non-regulator transmission service and such services are not subject to economic regulation under Chapter 6A of the Rules.

Where augmentations are not suitable for procurement on a competitive basis, such as where there is a high level of integration with the existing (shared) interconnected network, then VENCorp (or a distribution business) may request that SPA provides the augmentation on a non-contestable basis. Where a service is deemed to be non-contestable, then this will be included in the Network Agreement[12] (between VENCorp and SPA). PB understands, through discussions with VENCorp and SPA, that the derivation of charges for non-contestable services follows the established building block revenue model.

For the purposes of determining VENCorp's total revenue requirement, all of VENCorp's forecast capex is converted into planned augmentation charges based on expected annual expenditure profiles.

Asset roll-in

Under the Rules, SPA can propose that augmentation assets commissioned during the historical period and associated with the provision of non-contestable services — as initiated by VENCorp or other businesses — are rolled into the SPA RAB. The value of those assets which SPA is proposing should be rolled into its RAB on 1 April 2008 is $118m, and nine of the projects making up this amount have been initiated by VENCorp[13].

The relationship between the main parties in the Victorian electricity transmission arrangements is given in Figure 1-2. The diagram shows that except for providing connections to the network, SPA has no contractual interface with the users of the transmission network. The commercial arrangements for the provision of network services and the corresponding payment of Transmission Use of System Charges (TUoS) are established between VENCorp and the network users (distributors and generators).

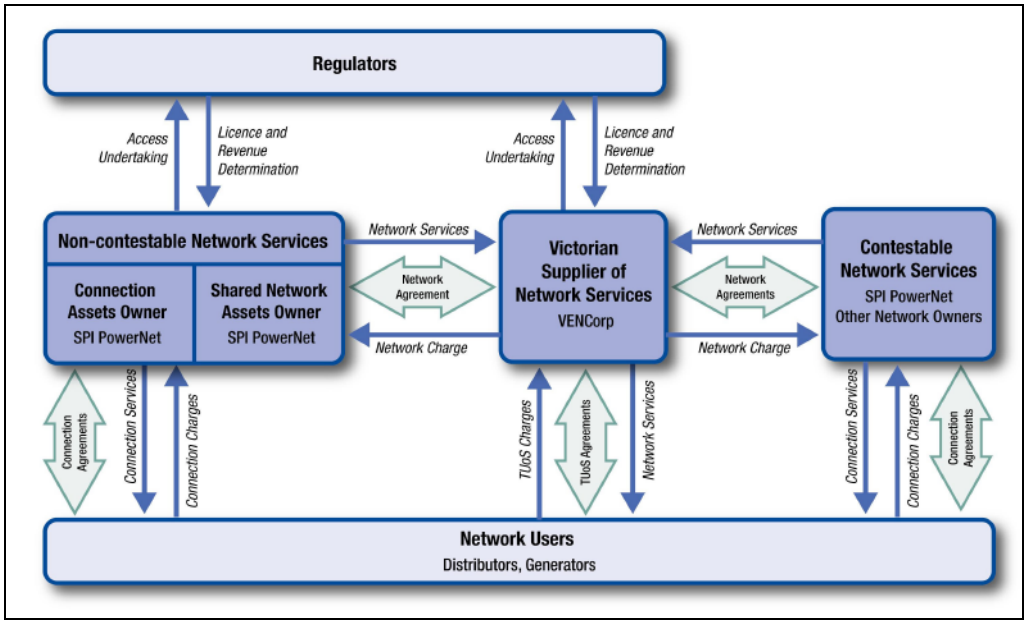
10 PB notes that the Electricity Supply Industry Planning Council (ESIPC) in South Australia has some responsibility for overseeing the planning activities of the South Australian electricity transmission business, ElectraNet.

11 PB has also been engaged by the AER to undertake a (concurrent) review of the forecast opex, past and forecast replacement (and refurbishment) capex and capital governance framework associated with SPA. This review is the subject of a separate PB report.

12 In respect of connection services, the provision of any connection assets on a non-contestable basis.

13 Table 6.3, VENCorp Electricity Cap Proposal, page 24.

Figure 1-2 – Contractual relationships under the Victorian transmission arrangements



Source: SP AusNet revenue proposal document

1.3.3 Changes since the last VENCorp revenue determination

In December 2002 the ACCC, in accordance with its responsibilities under the then national electricity code (NEC), finalised its decision on the appropriate revenue cap to apply to the Victorian electricity transmission network, owned and operated by SPI PowerNet (subsequently to become SPA) and planned by VENCorp. This decision outlined the maximum revenues that may be earned by VENCorp for the period from 1 January 2003 to 30 June 2008[14].

In making this (2002) decision, the ACCC set transmission revenues at the beginning of the regulatory period based on its consideration of required levels of network investment during the period in question. A review of the investments during the period 1 January 2003 to 30 June 2008 forms a part of this review by PB and the AER.

1.3.4 The regulatory framework and process

In accordance with the Victorian jurisdiction NER derogations (Chapter 9), the forecast expenditure arrangements for VENCorp differ from that for SPA. In the case of SPA, the business is provided with an incentive-based (CPI-X) framework, with the establishment of a revenue cap to apply to SPA for the regulatory period (of at least 5 years). An asset-base roll-forward equation is used to adjust the value of the RAB to reflect depreciation and capital expenditure within the period. Under the revised (ex–ante) regulatory framework, the focus is placed on providing capital investment efficiency incentives to SPA at the start of the regulatory period.

The determination of VENCorp's maximum allowable aggregate revenue (MAAR) for (the next regulatory period) for augmentation capex (initiated by VENCorp), is based on the value of contracts (network agreements) associated with the provision of both contestable and non-contestable transmission services. This cost-neutral approach applied to VENCorp is distinctly different to the efficiency incentives provided to SPA under the ex–ante framework.

[14] The decision also outlined the revenue allowance that may be earned by SPA for the five and a half year period from 1 January 2003 to 31 March 2008.

1.4 APPROACH TO THE WORK

In this section we provide an overview of the methodology used by PB in this review and the limits to, and exclusions from, the work. We also set out the structure of the report and provide details on the presentation of expenditure amount in the report.

In this independent review of the VENCorp expenditure proposals, PB has considered, examined and provided its expert opinion, on the following key submission items and expenditure categories.

- committed network capital expenditure (capex) over the current regulatory period (augmentation)
- planned network capex (augmentation)
- forecast operational expenditure (opex) for VENCorp
- capital governance framework and the VENCorp planning process.

The review of these items has taken full account of the unique arrangements in Victoria between SPA and VENCorp. In reviewing and in developing our recommendations associated with these items, PB has adopted the methodology — described in high-level terms set out below.

1.4.1 PB methodology (high level)

The approach adopted by PB is both well established and proven, and recognises the benefits of a methodology which examines the expenditure proposal in a number of different ways. This multi-dimensional approach combines a high-level ('top-down') assessment with a detailed ('bottom-up') assessment of a number of (carefully) selected projects and expenditure items. Our approach also includes a review of the governance processes and planning policies employed by VENCorp in making its investment decisions.

In summary, the PB multi-pronged approach to the review of VENCorp has combined the following key elements:

- a review of VENCorp's governance framework and investment decision-making (planning) policies
- comparative analysis of augmentation costs (intra business)
- a review of unit costs (obtained from detailed project reviews)
- a detailed examination of a selection of projects, both planned and committed ('bottom-up')
- PB's experience and views of the SPA capex (planned and committed)
- PB's direct experience of other network businesses (including TNSP reviews).

Each of these elements of the PB methodology is described more fully below.

Review of VENCorp's governance framework and planning policies

An important part of the PB review is a review of the governance framework within which VENCorp makes its investment decisions. The culture of the business can have a major impact on the way in which the business develops its augmentation plans. PB has examined the structure, strategies, policies, processes and procedures adopted by VENCorp in the development of its expenditure proposals, and has used the outcome of this review to reach an independent view on the robustness and appropriateness of the VENCorp proposal.

In undertaking our review, we have also considered the interface between VENCorp and SPA with a view to determining whether, in the view of PB, there is effective coordination between the two organisations[15].

PB's review of the VENCorp internal arrangements is set out in Section 2.

Comparative analysis (intra business)

In the experience of PB, the underlying drivers associated with the expenditure on a large and complex electricity transmission network are seldom simple and are often affected by a number of local and project specific issues. This usually means that conclusions which result from the direct comparison with other projects, at other times, need to be drawn with care. Nevertheless, PB believes that this 'top-down' comparative analysis between different VENCorp projects (at different times) — both committed and planned — provides an extremely valuable high-level 'sense-check' — often providing focus and direction for more detailed analysis and review. PB believes that this represents an important element of the development of an independent view of prudence and efficiency.

Detailed project reviews

The detailed project reviews are a key aspect of the PB approach and provide a 'bottom-up' assessment of selected elements of the proposed expenditure program. Most of the detailed project review analysis undertaken by PB as part of this review is associated with augmentation capex — although our review has also focused on specific elements of the opex.

The detailed review and assessment of a selection of specific projects has enabled us to:

- confirm (or otherwise) adherence with VENCorp's own investment decision making and governance framework
- obtain a detailed understanding of the project in order to ascertain the robustness and reasonableness of the proposed project costs
- identify items which have some systemic, or generic, characteristics or qualities which may lead to adjustments across the wider capex program
- gain an understanding of the prevailing business culture and attitudes.

PB's findings following its detailed review of selected projects are described in Sections 3.8 and Section 4.13 of this report.

The PB experience of other TNSP expenditure plans

In undertaking a review of the VENCorp expenditure proposals, the PB project team has drawn on its experience of expenditure reviews of network businesses in general, and electricity transmission businesses in particular. While most of this team expertise will manifest itself in each of the main 'prongs' of the approach described above, the direct experience of the team in transmission price resets add an additional value dimension to the methodology.

The multi-faceted approach described above aims to reflect an economic and pragmatic balance between the effort required to undertake the independent review, and the robustness and credibility of the review findings and recommendations.

15 A full review of the merits (or otherwise) of the Victorian arrangements for electricity transmission is outside of the scope of this expenditure proposal review.

1.4.2 Review process

The process adopted by PB in undertaking this review is summarised by the steps below.

1. introductory ('kick-off') meeting with AER and VENCorp[16]
2. meetings between PB and VENCorp to discuss opex[17]
3. meetings between PB and VENCorp to discuss planning criteria, application of the regulatory test and processes for augmentation investment decision-making[18]
4. VENCorp advised of projects selected for detailed review and scrutiny[19]
5. several meetings between PB and VENCorp to discuss and agree information requirements[20]
6. further on-site meetings with VENCorp on governance framework and planning processes
7. VENCorp provided a draft reconciliation of its revenue proposal against its 2007 Annual Planning Report[21]
8. internal analysis and deliberation by PB
9. production of independent draft review report.

The PB process set out above has been completed in a time of approximately 3 months.

An issues register was established to log questions and queries

A register was established as a means of formally recording issues and questions which arose during the review process to record all of the questions and ensure that responses are logged and outstanding queries tracked. VENCorp took responsibility for maintaining and issuing the register (to both AER and PB) on a weekly basis.

Following the submission of VENCorp's revenue proposal[22], and the subsequent submission of additional information at the request of AER[23], PB sought further information from VENCorp as part of its review of the proposals, principally through meetings and additional (formal) questions. These were duly recorded on the issues register.

VENCorp must satisfy the AER that its proposal meets the requirements of the Rules

Under the new Chapter 6A framework for transmission determinations, PB understands that the onus is on the TNSP to positively satisfy the AER that its proposal meets the requirements of the Rules. The AER must not approve a proposal if it is not so satisfied. This review by PB aims to assist the AER making its determination in this respect.

16 Friday 23 March 2007 at AER offices in Melbourne. This included a summary presentation to AER and PB (by VENCorp) of the expenditure proposals.

17 Meeting held at VENCorp offices on 5 April 2007.

18 Meetings held at VENCorp offices on 16 and 17 April 2007.

19 Projects were selected jointly by PB and AER.

20 PB held discussions and corresponded direct with VENCorp over several weeks in order to clarify, discuss and agree the information required by PB to undertake its review as per its terms of reference with the AER.

21 VENCorp's draft reconciliation was received by PB on 02 July 2007. The outcome of PB's review of this (significantly) revised reconciliation is presented in Section 4.14 ('subsequent 2007 APR update').

22 1 March 2007.

23 The AER conducted the preliminary examination of VENCorp's proposal required under clause 6A.11.1 of the NER. Additional information was sought from VENCorp by 30 April 2007 to satisfy the requirements of the AER's Submission Guidelines and the NER.

It is important to note that the onus is not on PB, nor the AER, to 'extract' information from VENCorp in order to undertake its review; rather that VENCorp is obliged to provide sufficient information for the purposes of supporting its expenditure claims[24]. In this report PB aims to clearly identify any elements of PB's conclusions that are based on gaps, omissions or inadequacies in the information that has been provided by VENCorp.

1.4.3 Validity of expenditure figures

Following the submission of its proposal, VENCorp submitted additional information following a formal request by the AER. PB commenced its review on the basis of the expenditure figures contained within this proposal.

During the review by PB, and as a result of the detailed project examinations and discussions with relevant experts within the business, VENCorp has, in many cases, significantly revised the basis for much of its planned augmentation. Any such departures from the original proposals are highlighted in the appropriate section of this report.

Representation of costs

In accordance with the AER's submissions requirements (and the VENCorp proposal), the following standards have been adopted for the representation of expenditure amounts.

- all historical (committed augmentation) expenditure amounts are presented in nominal terms[25]
- all forecast (planned augmentation) expenditure amounts are presented in real terms (2007/08).

1.4.4 Limits to, and exclusions from, the work

The work undertaken by PB is limited to an independent review of the VENCorp *expenditure* proposals. The work undertaken by PB does not aim to address issues associated with WACC, depreciation (including economic, or standard, asset lives), conversion of expenditure to charges or transmission use of system prices. The scope of PB's work also excludes deliberations on tax and interest during construction. PB's review includes an assessment of the VENCorp process for the review of its contestable and non-contestable augmentation plans

1.5 REPORT STRUCTURE

Section 1of this report sets out the background to this review by PB, the objectives and the PB approach to the work. In Section 2 we describe VENCorp's internal arrangements for augmentation planning and investment decision making. The committed and planned expenditure is reviewed in Sections 3 and 4 respectively – this includes a detailed review of a number of selected projects from the VENCorp proposal. Section 5 provides details of PB's review of the VENCorp opex proposal. PB's findings and conclusions are set out in the final section of this report.

[24] PB not asking for information does not, in itself, represent an omission by PB in its responsibilities to provide the AER with an (independent) view on the prudence and efficiency of the levels of expenditure proposed by the businesses.

[25] The historical period is from 1 January 2003 to 31 March 2008.

2. REVIEW OF INTERNAL ARRANGEMENTS

In this section of the report we describe and review the VENCorp governance framework and the augmentation investment decision-making processes.

2.1 THE VENCORP ORGANISATION

VENCorp is a medium-sized state government-owned entity employing about 100 people within Victoria's privatised energy sector. Day-to-day operation is overseen by a Chief Executive Officer (CEO), who reports to a Board of directors, who are responsible to the Minister for Energy and Resources.

At the time of VENCorp's proposal, the organisation was structured around four General Managers reporting to the CEO. Given the various roles performed by VENCorp, around 25% of full-time equivalent staff are allocated to the regulated electricity business and predominantly they report to the General Manager, Development.

2.2 GOVERNANCE FRAMEWORK

Corporate governance deals with the set of policies, processes, and regulations affecting the way in which a business is directed and administered. It is a multi-faceted subject that captures issues ranging from accountability and stakeholder relationships through to a focus on economic efficiencies and optimisation.

In this section we briefly describe and evaluate VENCorp's internal organisation, policies and procedures as they relate to the ongoing development of the Victorian transmission network and the management of the associated expenditure. The purpose of this evaluation is to confirm that VENCorp's augmentation expenditure justification and investment processes are effective in ensuring that its regulated allowance is sufficient to meet its legal and regulatory obligations, but at the same time ensure that unnecessary or inefficient expenditure is avoided.

Being a statutory authority established under the *Gas Industry (Further Amendment) Act 1997*, VENCorp is governed by a Board of ten directors (including the Chairman) appointed by the Governor in Council. Board members are independent or drawn from participants in the gas and electricity industries. The organisational structure, with four General Managers reporting to a Chief Executive Officer and the Board is representative of the other businesses in the electricity industry, and is structurally reflective of most major businesses.

VENCorp has four Board Committees covering Audit and Risk, Remuneration, Safety and Emergency Management, and Policy Development. PB has been provided with documentation relating to VENCorp's key policies, processes, and delegations, and has found these documents to provide clear information relevant to the governance of VENCorp's electricity network augmentation processes.

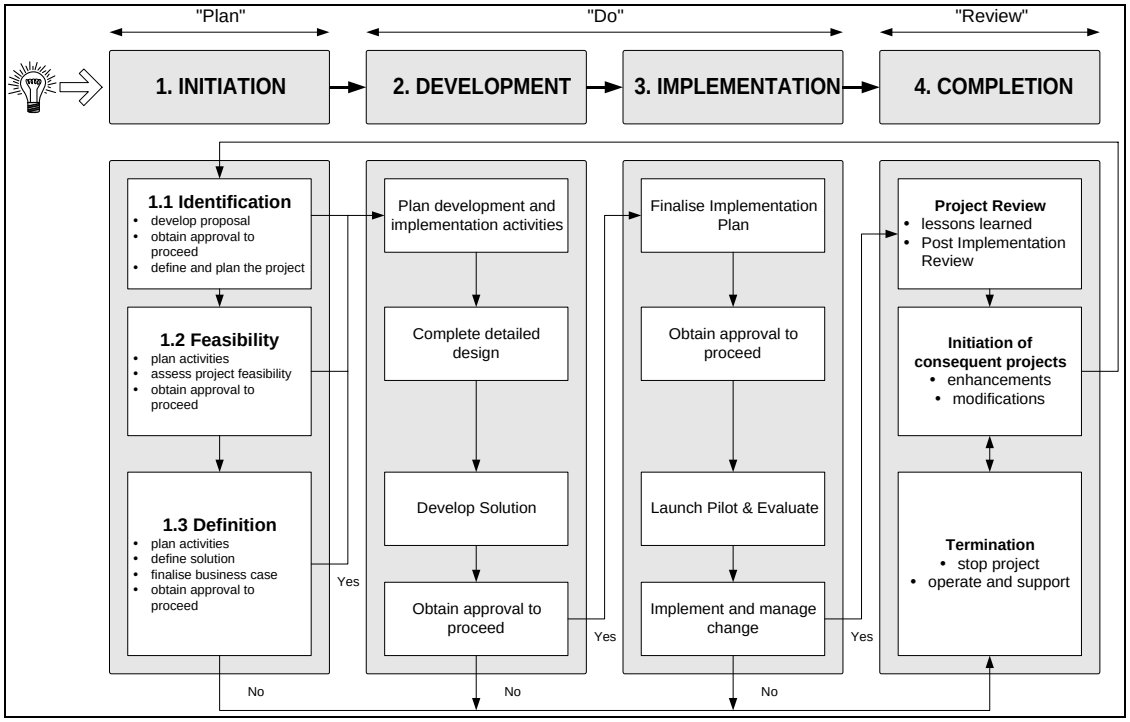
VENCorp has corporate objectives explicitly requiring it to deliver its transmission network services and perform its functions in a commercially neutral and cost-effective (value-maximising) manner. It is also required by its transmission licence to competitively tender for transmission services which exceed a pre-defined value.

2.2.1 The augmentation process

Broadly, VENCorp's framework for governance of augmentation expenditure is broken down into several stages which is controlled by VENCorp's policies and punctuated with various points of approval. Figure 2-1 shows a general overview of VENCorp's augmentation project process from the perspective of management of the overall project. From the business process perspective, governance framework can also be described in terms of the various

process steps. This perspective is adopted in the following sections which outline the governance framework arrangements employed by VENCorp[26].

Figure 2-1 – Overview of VENCorp's project implementation process



Source: Page 4. CP 007 PROJECT MANAGEMENT FRAMEWORK. VENCorp. Issue 1 June 2001

VENCorp has provided a number of detailed internal process maps to support its project implementation process, highlighting inputs, interactions between business units, decision making-points and outputs.

Planning and project identification

VENCorp's planning process functions to identify network constraints and potential alternatives to address those constraints. This process is carried out in accordance with the requirements of the NER, to produce the Electricity Annual Planning Report (EAPR). A major element of this process is VENCorp's application of the market benefits limb of the regulatory test to identify the most economically efficient alternative. The criteria that govern this process are documented in VENCorp's published Electricity Planning Criteria. VENCorp also has a Project Framework and Risk Management Guidelines that require the development of a project plan and a risk assessment for each project. These framework documents are subject to the review and approval of the Project Manager, General Manager, and VENCorp's Risk Manager respectively.

In order for any project to proceed beyond the planning stage, internal management, CEO and Board approval is required. In addition, the approval process is audited in accordance with VENCorp's Internal Audit Program (last audited in 2006).

Further details of VENCorp's planning and project identification process is covered in Section 2.3.

Project approval

As discussed above, once the requirements of the regulatory test have been met (including the various degrees of public and industry consultation), senior management, the CEO or the Board may provide approval to proceed with the project in accordance with VENCorp's

26 Page 7. VENCorp Electricity Revenue Cap Application 1 July 2008 – 30 June 2014. VENCorp. 2007.

Delegation of Authority Policy[27]. The CEO can approve up to $1m of project costs with Board approval required for project costs above $1m. In general, any unbudgeted capex or opex requires approval from the Board or one of its committees. Terms and Conditions of the project contracts require CEO and Board approval, with the Board being informed of all significant projects.

Procurement of network services

All proposed transmission network augmentation projects are defined as contestable or non-contestable in accordance with the Essential Services Commission (Victoria) Guideline No. 18. Subject to approval to proceed permissions (see Project approval above), tender documentation for contestable works is issued in accordance with VENCorp's Tendering Policy and Procedure. Tender submissions are evaluated in accordance with this procedure, and are also subject to VENCorp's Probity Plan. An independent Probity Auditor is also used to check all tender evaluation processes. In addition, for high cost or risk projects, a senior management Steering Committee oversees the risk review, tendering and procurement processes.

Contract negotiation

VENCorp's Board has a set of approved terms and conditions of contract that are used to support negotiations for service contracts for contestable works. All proposed contracts are subject to review by VENCorp's legal council and contracts are signed by the CEO subject to Board pre-approval. A similar process is used for non-contestable works that involve a services contract with the incumbent asset owner SPA.

Project/Contract monitoring and reporting

Once project implementation commences, VENCorp holds regular progress meetings with all project and contract parties. These meetings are minuted, and reports are provided to VENCorp's Board on a regular basis. For significant projects, separate monthly progress reports are provided to the Board, while for all other projects, progress is reported through monthly CEO reports. The Board also receives a Monthly Risk Management Summary which reviews of the status of VENCorp's risks.

2.2.2 Contestable versus non-contestable works

Generally, network services are defined as either *contestable* or *non-contestable* works. In determining what works are contestable and non-contestable, VENCorp applies ESC Guideline No. 18. This guideline stipulates that network services are contestable where the expected cost of a project is anticipated by be greater than $10m. The primary exception to this is in the situation where the assets involved in the project are not separable from the existing network infrastructure owner's assets (mostly SP AusNet). Where the assets are integral, then the work is deemed to be non-contestable.

VENCorp does structure projects such that there are both contestable and non-contestable project elements in order to maximise exposure to the competitive market (e.g. the Latrobe Valley to Melbourne Line Upgrade project). Where project works are classified as contestable, VENCorp follows a competitive tendering process that includes senior management and board oversight through a steering committee. Non-contestable works are subject to quotation by the relevant network infrastructure owner.

2.2.3 Governing processes and documentation

From the above outline, it can be seen that VENCorp employs a number of processes through which its corporate governance is achieved. The key elements of this governance arrangement are discussed briefly below:

[27] CP 002 – VENCorp Delegations of Authority Policy. VENCorp. Issue 4 April 2004.

Governance structure

VENCorp's governance structure consists of policy and procedure documentation, as well as management, committee, Board, and auditor oversight. As a Victorian Government entity, VENCorp is ultimately responsible to the Minister for Energy and Resources, and consequently is subject to the same level of scrutiny and audit as other government entities. The Board of 10 directors is responsible for governance oversight, policy, and the organisations strategic direction. To assist the Board with these responsibilities, four committees have been established:

- an Audit and Risk Committee which is responsible for audits (internal and external) and assessing the adequacy of accounting, financial, and operating controls. The Committee also reviews compliance matters and monitors VENCorp's risk management framework
- a Remuneration Committee which is responsible for ensuring senior executive remuneration is applied in line with Victorian Government policy, and provides quality assurance relating to the integrity and probity of VENCorp's remuneration policies and practices
- a Safety and Emergency Management Committee which is responsible for ensuring that VENCorp complies with its responsibilities for safety and management of industry emergencies, as well as for compliance with safety regulations
- a Policy Development Committee which, amongst other gas related matters, is responsible for providing strategic advice and recommendations in regard to electricity market development, as well as review of the service levels provided to participants.

The Board also provides senior management delegations under a Deed of Delegations.

The VENCorp senior management structure consists of a CEO who reports to the Board, and four General Managers who report to the CEO. Within this management framework, the Project Steering Committee, Probity Auditor, and VENCorp's legal council also provide governance controls which support the management framework. In addition, VENCorp employs management and board reporting to inform this governance structure.

Key governance documents

There are a number of documents that set out the details and processes employed by VENCorp within its governance structure. In particular:

- the requirements of the NER, Victorian Electricity System Code and VENCorp's Electricity Planning Criteria that set out the network technical requirements that VENCorp has responsibility to maintain through its planning role
- VENCorp's Risk Management Guidelines that provide a risk management structure for all of VENCorp's operations
- ESC Guidelines No.18 that provides critical definitions in relation to the treatment of contestable and non-contestable works.
- VENCorp's Tendering Policy and Procedure ensures that sound contracting and purchasing principles are applied that are consistent with the Victorian Government Purchasing Board policies and procedures
- VENCorp's Probity Plan supports the achievement of an equitable, justifiable and sound procurement process
- VENCorp's Project Management Framework provides a structured approach to the management of VENCorp's projects
- VENCorp's position descriptions which outline responsibilities and accountabilities

- VENCorp's Delegations of Authority Policy outlining financial and human resource delegations
- VENCorp's Board approved standard Terms and Conditions of contract provide a basis for the negotiation of services contracts that are acceptable to VENCorp.

These documents support VENCorp's governance structure, and form the basis upon which VENCorp's transmission augmentation projects are developed, justified, approved and managed. Consequently, they play and important role in assessing the prudence and efficiency of VENCorp's augmentation expenditure.

2.3 VENCORP AUGMENTATION PLANNING PROCESS

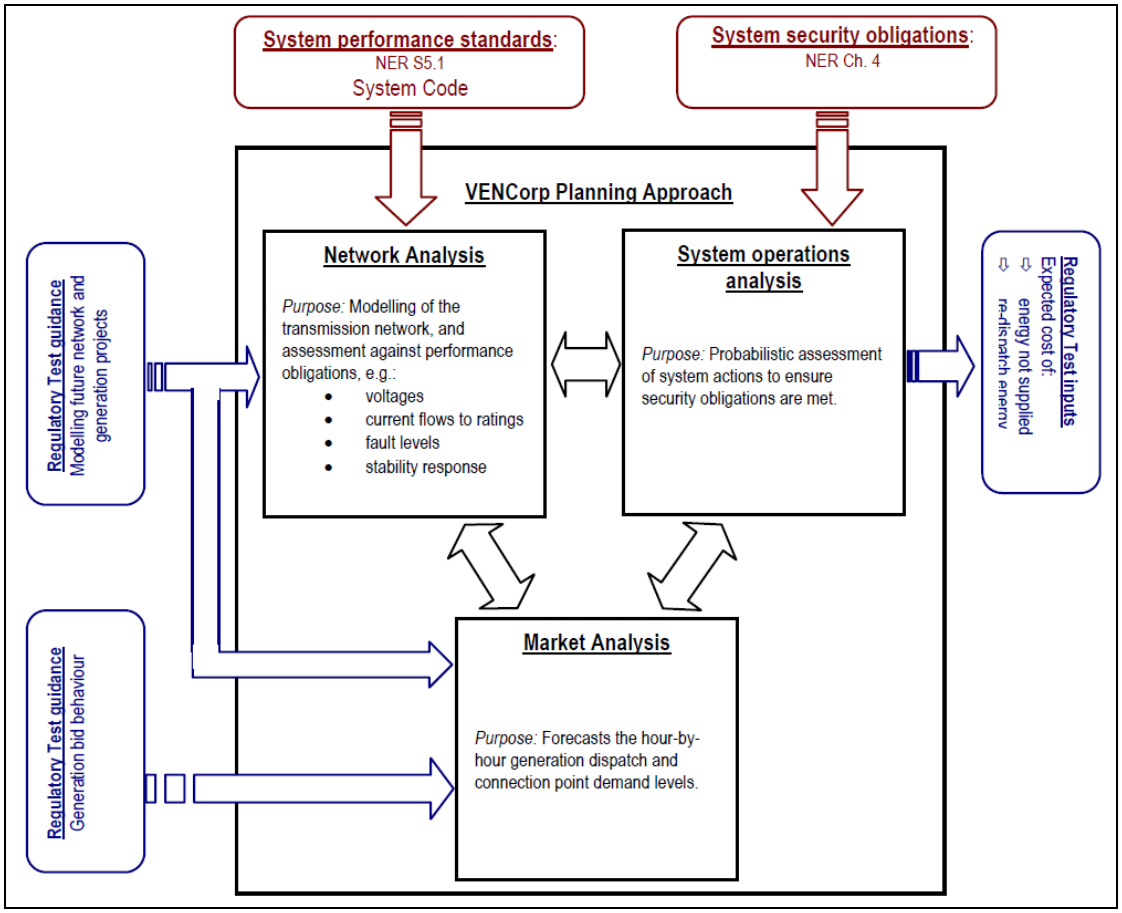
VENCorp's role within the NEM is unique. Being an independent planner of Victoria's electricity transmission network without any ownership of assets, VENCorp focuses exclusively on the need for network augmentation works and investment decisions. Consistent with other TNSP's, VENCorp has adopted a planning approach that satisfies the network performance standards and security requirements of the NER, as well as its specific licence obligations and the Victorian Electricity System Code. Essentially this means that VENCorp's planning is focused on ensuring that:

- network security is maintained
- plant ratings are not exceeded
- the network performance requirements of Schedule 5.1 of the NER are met.

Specifically, the objective of VENCorp's planning process is to ensure that these technical network standards are maintained at all times – especially the time of system peak demand and with critical transmission elements and generators unavailable – and in an economic manner, which includes allowing for the possibility of load shedding. To ensure that this objective is achieved in the most economic way, VENCorp employs the market benefits limb[28] of the regulatory test, which stipulates that an option must maximise the expected net present value of market benefits when compared with a number of alternative options and timings in a majority of reasonable scenarios. This approach requires the technical analysis of the network and its operation, as well as market analysis. VENCorp also employ a rigorous public and industry consultation process as required by the NER in order to ensure transparency. Figure 2-2 shows a conceptual overview of VENCorp's planning process, its key elements and their interactions.

[28] As opposed to the reliability limb of the regulatory test which predominantly focuses on a least cost planning approach to ensure compliance with a defined reliability standard.

Figure 2-2 – Overview of VENCorp's planning process



Source: Page 15. VENCorp Electricity Revenue Proposal 1 July 2008 – 30 June 2014. VENCorp. 2007.

In general, VENCorp's planning arrangements involve a progressive refinement process, that commences with the identification of a network constraint[29] (or connection requirement[30]), and finishes with the implementation of a solution to the identified constraint. This refinement process runs over the 10-year planning horizon, and can be summarised as involving:

- demand forecasting and network analysis (at the forecast demand level) to identify potential network constraints
- investigations to identify transmission augmentation, demand management, and other alternatives to address the identified constraints given the wholesale market environment and competitive and non-regulated provision of generation capacity
- conducting the economic evaluation of the possible alternatives (regulatory test) in order to identify the alternative (and its timing) that maximises the net present value of the market benefit
- progression of the selected alterative to implementation through VENCorp's competitive tendering, procurement and implementation processes.

It is important to understand the timeframe of this process as it impacts on the nature and availability of information over the planning cycle. The first step of the overall process (i.e. constraint identification) can be carried out many years prior to the identification and investigation of alternatives. Using a scenario-based approach over the 10-year planning

29 In this overview, network constraint is used generally to encompass all possible limitations within the network and is not limited purely to the technical definition of network constraint.

30 Network Service Providers (NSPs) and connection applicants must adherer to the processes set out in the NER when seeking a new connection to the transmission network. VENCorp's role is to facilitate network connections by providing advice on issues associated with augmentation requirements.

timeframe, the potential constraint (once identified) is essentially monitored through the annual planning review process until the timing of the constraint is such that, if it is to be addressed, action needs to be taken[31]. At this time, the remaining three steps of the above process (i.e. identify alternatives, conduct regulatory test, and procurement and implementation) are actioned. As a consequence of this, in the early stages of the planning timeframe, only very general or conceptual information is available. It is not until the final few years of the planning timeframe (typically 2 or 3 years based on typical transmission development project timeframes) that the detailed information regarding alternatives, costs, or proposed project implementation are known. That is, specific details of the alternative to address the potential constraint are only known within a few years of implementation.

Broadly, the process commences with demand forecasting and deterministic network analysis which form the basis for identification of potential constraints. The results of the demand forecasting and network analysis processes are documented annually in VENCorp's Electricity Annual Planning Report (EAPR) as required under Clause 5.6.2A of the NER. In general the EAPR addresses:

- the energy and maximum demand forecasts used as the basis of the network analysis
- forecast constraints and network performance issues
- future connection point planning proposals
- analysis of network augmentation proposals.

The objective of the annual network planning review process is to highlight the adequacy of the (shared) transmission network to meet demand and energy growth over the 10 year planning timeframe and raise industry awareness of potential constraints. Effectively the annual reports form the first stages of VENCorp's public consultation regarding investment needs. Hence the initial output of this planning process is essentially the identification and characterisation of potential network constraints and the process does not define specific future development plans for the network unless they are apparent in the short term.

Having identified the network constraints through the annual network planning review process, detailed investigations are carried out to identify possible alternatives to address these constraints. The alternatives identified are then assessed under the market benefits limb of the regulatory test, which demonstrates which alternative maximises the net present value of the market benefit (i.e. the benefit to all NEM participants). VENCorp considers the benefits associated with transmission investment can be:

- a reduction in the amount of expected un-served energy
- a reduction in the total fuel cost of generation in the NEM
- a reduction in transmission losses
- deferral of capital or operational expenditure
- a reduction in ancillary service costs.

To quantify these benefits, VENCorp applies a probabilistic planning approach over the first 5 years of the planning timeframe. VENCorp's probabilistic planning essentially evaluates the transmission element loading and constraint risks[32] on an hour by hour basis. This approach accounts for uncertainty in supply reliability considering the likelihood of the failure or outage occurring at critical times, demand variation, forecasting inaccuracies (error), and supply variations (e.g. generation patterns, network capacity, availability).

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31 That is, the lead time to address the constraint is the time it takes to progress through the reaming three elements of the above process (i.e. identify alternatives, conduct regulatory test, and procurement). At this time action would need to be taken in order to address the potential constraint, if the constrain t was to be avoided (mitigated).

32 Except cases where VENCorp is required to meet a performance standard under Schedule 5.1 of the NER.

To address the potentially large number of market development scenarios likely, and to capture the variation of key modelling parameters, VENCorp uses a market simulation package that replicates the operation of the National Electricity Market Dispatch Engine (NEMDE), based on predefined generation bidding patterns, random generation failures[33], and a detailed regional network model including inter-regional transfer limits with relevant inter and intra-regional loss factors. This model produces a range of information that enables VENCorp to build a comprehensive time-based picture of the risks associated with its identified transmission constraints and allows a framework for the benefits of various augmentation alternatives to be assessed against 'do nothing' and other network or non-network option. VENCorp typically adopts Short Run Marginal Cost bidding strategies to quantify how alleviating constraints can reduce production fuel costs, and a system wide composite Value of Customer's Reliability (VCR, measured in $/MWh) to quantify a value of loss of supply to customers.

Given the resource intensive nature of VENCorp's detailed probabilistic approach to project justification and the increasing uncertainty as planning horizons extend, VENCorp only applies its probabilistic planning methods to the first 5 years of the planning timeframe. To supplement this, and to address longer term planning issues, VENCorp undertakes a more generalised 'indicative' probabilistic assessment informed by network analysis based on the demand forecast and deterministic assessment across a range of the expected generation patterns in year 10 of the planning timeframe. Hence, over the first 5 years of the planning timeframe increasingly detailed information is available about potential network constraints and solutions, while over latter years, only general information about the potential constraints are available.

Through its planning approach, VENCorp aims to achieve an economic balance between the cost of removing network constraints, and the cost of exposure to those constraints. That is, VENCorp attempts to ensure that network augmentation only takes place when the augmentation costs are less than the associated reduction in the market value of energy at risk[34] or other market benefits.

Once the preferred alternative is identified through the application of the regulatory test and associated public consultation[35], and the appropriate documentation processes are complete, the preferred alternative can then be progressed to implementation through VENCorp's procurement and implementation processes.

2.4 COORDINATION WITH SPA AND CONNECTED PARTIES

In order to develop and implement pragmatic, effective and efficient augmentation projects that address the long-term needs of VENCorp and its stakeholders, it is important for VENCorp to pay careful attention to the needs and requirements of SPA and the connected parties. This is particularly the case given the Victorian transmission arrangements, where the responsibility for asset management and replacement is undertaken by SPA and other asset owners.

VENCorp deals with this in a systematic manner and on a project-by-project basis. It consults with SPA at various stages of its project planning and implementation processes through regular joint planning, operational or project based meetings to ensure that economies of scale and replacement opportunities are captured where relevant. More typically than not, SPA is likely to drive co-ordinated works by capturing incremental augmentation as part of its replacement works. The benefits of such an approach are two fold: project delivery costs can be minimised and the network performance is enhanced by minimising the number of outages required to carry out project works.

33 Capturing the need to undertake monte-carlo modelling to arrive a statistically relevant outcome.

34 Energy at risk is the amount of energy that may not be supplied due to a network constraint.

35 For new small network augmentations (less than $10m), the APR can form the basis of public consultation.

Asset failure risk and the condition of plant plays an important aspect in VENCorp's indicative probabilistic planning process, and up to date information on SPA assets is critical.

To minimise the risk that VENCorp would have to augment a recently replaced piece of equipment, it provides SPA with high-level functional specifications of plant to ensure that replacements projects implicitly capture VENCorp's mid- to long-term strategic development plans for the shared electricity transmission network.

VENCorp's specifically deals with SPA at each step of its project implementation process as follows:

- during the initiation phase, VENCorp seeks preliminary cost estimates from SPA for defined project scopes, irrespective of whether the project is likely to be contestable or not, so that it can undertake its feasibility planning
- during the development stage, VENCorp confirms technical feasibility of development options with SPA and initiates co-ordination and allocation of works into contestable and non-contestable components (with SPA assisting in defining interface arrangements) after the justification process is complete
- during the implementation stage, VENCorp will enter into contractual negotiations with respect to non-contestable works and the two businesses will track project progress and co-ordinate system outages
- during the completion stage, VENCorp will interact with SPA to ensure contestable and non-contestable works interact appropriately and that project feedback is reflected back into planning processes (such as project outturn cost for future estimating purposes).

2.5 PB COMMENTS AND CONCLUSIONS

As part of our high-level review of VENCorp's internal arrangements (and as informed through our detailed committed network augmentation expenditure project reviews), PB makes the following observations regarding VENCorp's governance framework:

- typical of a well-governed, integrated business, VENCorp has a business structure and has established a number of committees to appropriately support its network augmentation, investment approval, and decision-making processes
- having regard to documentation presented relating to VENCorp's key policies, processes, and delegations, PB has found these documents to provide clear information relevant to the governance of VENCorp's electricity network augmentation processes
- PB has not identified any significant changes in VENCorp's governance framework over the current regulatory period
- PB is of the view that VENCorp's governance framework and capex and opex approvals process are both sound and appropriate for a government entity of the nature of VENCorp
- VENCorp's dependence on SPA for preliminary project cost estimates for both contestable and non-contestable works may limit its understanding of up–to–date market conditions for electrical plant, labour and minor projects, particularly for non-contestable works. Further advice from third parties may capture some efficiency gains and assist with planning processes.

PB highlights that VENCorp's governance framework has been assessed with particular focus on its project approval and justification processes. This framework is less relevant to the medium to longer term constraint forecasts and planned augmentation capex, which in the case of VENCorp is theoretical and aimed purely at informing the market of potential investment.

PB makes the following observations regarding VENCorp's planning processes:

- in general, the planning process is well structured and typical for infrastructure planning of this type – that is, such a process would be applied by the majority of planning jurisdictions throughout the world
- the project justification and approval process addresses regulatory obligations contained within the Regulatory Test and the need for industry consultation
- VENCorp appropriately reverts to market based outcomes as part of its tender processes to differentiate and identify the preferred network alternative, which maximises the net market benefits
- the planning criteria adopted is generally comprehensive and transparent and has been tested against stakeholder expectations, however the specific treatment of various demand and energy forecasts could be more clearly described
- the planning criteria and energy at risk approach facilitates the evaluation and application of low cost network solutions such as wind monitoring and the use of automatic control schemes, evidenced through VENCorp's widespread application of such alternatives
- PB has not identified any material changes to either the planning criteria or justification process used by VENCorp over the current regulatory period or assumed to occur over the outlook period
- the market benefits based approach coupled with probabilistic planning criteria and determination of energy at risk through detailed application of a market simulation model, represents a sound methodology, which PB considers is in the area of best practice and is likely to lead to efficient network investment
- the medium to long term planning process and use of an 'indicative probabilistic' approach, while meeting the key objectives of the NER and the Victorian Code, does not fully accommodate the regulatory review process, particularly over periods beyond the first three years of VENCorp's planning timeframe where the lack of transparency introduces review process difficulties. In PB's view, this leads to projected outcomes that do not efficiently and accurately reflect likely investment decisions towards the end of the 2007/08 to 2013/14 regulatory period after giving due consideration to VENCorp's current planning criteria
- the unique arrangement of competitively sourcing long-term transmission network services through contestability provisions (coupled with the market benefits approach and probabilistic planning criteria) is likely to result in the efficient provision of such services if they are of high value.

PB makes the following observations regarding VENCorp's co-ordination with other parties:

- the separation of responsibility for augmentation and asset management (replacement) of transmission services in Victoria appears to have resulted in each organisation (VENCorp and SPA) being highly focused on their respective functions, and given these clear accountabilities ensures that both business perform their roles effectively
- in general VENCorp and its stakeholders appear to have a clear and well established understanding of the various roles and responsibilities of parties in the unique Victorian arrangements. This is informed through regular joint planning meetings and through operational and project meetings
- historically, there is evidence that VENCorp has coordinated augmentation and replacement by justifying the advanced replacement of a number of circuit breakers as part of its historical project
- as part of VENCorp's outlook, it does not appear to have captured SPA's significant replacement program of works in its medium to long term planning forecasts, and this implies VENCorp has overstated its augmentation capex requirements

- while VENCorp interacts with SPA on a regular basis, through its review, PB has been unable to identify strong evidence that VENCorp applies up–to–date asset failure rate analysis, as advised by SPA, the asset owner and manager. PB notes that probability of asset failure plays a critical role in the application of VENCorp's planning criteria and that VENCorp adopts a generic failure rate and repair time for lines and transformers, coupled with sensitivity analysis of key assumptions.

3. REVIEW OF COMMITTED NETWORK AUGMENTATION

This section addresses the detailed review of a suite of five VENCorp historical and committed network augmentation projects selected in consultation the AER (see Section 3.1 for details). These detailed reviews consider the prudence of the expenditure with regard to Section 5.4 of the DRP[36] as well as Appendix B of the SRP[37]. In particular this involves a systematic examination of the critical decisions made when selecting and delivering investments to ensure that the investment process was consistent with good industry practice. Specifically:

- was a justifiable need for the investment demonstrated
- was the proposed alternative the most efficient investment to meet the demonstrated need (assuming the need for investment is recognised)
- was the proposed alternative developed, and if not, whether any differences reflect decisions that are consistent with good industry practice.

For each detailed review, an analysis of each of these matters is presented, along with consideration of the project timing and cost. Each review consists of the following sections:

- summary/overview — a brief outline of the project and its development
- drivers (need or justification) — a summary of the documented needs as presented in the supplied project documentation
- strategic alignment and policy support — a brief consideration of any documented alignment of the project with VENCorp's strategy, overarching policies, plans, and applicable National Electricity Rule (NER) or statutory requirements
- alternatives — a summary of the options considered to meet the identified need as presented in the project documentation supplied
- timings — presents an overview of the project's timing
- PB analysis — presents a brief discussion of the views formed by PB in assessing the supplied project documentation, focusing in particular on prudence of the investment
- costs — presents a summary of the project costs along with PB's view of these costs
- conclusion — a brief summary of the main views formed by PB.

The following section presents an overview of the projects selected for review. Following this are the detailed project reviews.

3.1 SELECTION OF PROJECTS FOR DETAILED REVIEWS

In conjunction with the AER, PB selected five historical and committed network augmentation projects in the historical period for detailed review. Table 3-1 presents the list of selected projects, and gives a brief outline of the reason for project selection.

36 ACCC, Draft statement of principles for the regulation of transmission revenue, May 1999.

37 ACCC, Statement of principles for the regulation of transmission revenue, December 2004.

Table 3-1 – Selected historical and work in progress network augmentation projects

Augmentation type	Augmentation description
Large network asset	Rowville 1,000 MVA 500/220 kV A2 transformer and fault level mitigation
Large network asset	Latrobe Valley to Melbourne 4th 500 kV line upgrade project, associated work for 1,000 MVA transformer at Cranbourne
Small network augmentation	South-East Metropolitan Reinforcement Project (Rowville to Richmond No. 1 & 4 220 kV line termination plant Upgrade)
Small network augmentation	Murraylink Regulation Project
Minor network augmentation	Modification to Dederang Bus Splitting Scheme

3.2 ROWVILLE A2 TRANSFORMER AND FAULT LEVEL MITIGATION

In the 2004 Electricity Annual Planning Report, VENCorp identified constraints in the supply arrangements to the east and south-east Melbourne metropolitan area. As part of the proposal to address these constraints the Rowville 1,000 MVA 500/220 kV A2 transformer and fault level mitigation project was implemented with an anticipated completion in September 2007[38]. This project is part of a group of projects to up-rate a number of transmission lines, as well as a project to upgrade the line terminations of the Rowville to Richmond line.

3.2.1 Summary/overview[39]

The east and south-east Melbourne metropolitan area contains approximately 35% of Victoria's electricity demand. In the 2004 Electricity Annual Planning Report, VENCorp identified constraints in supplying this area, and further studies confirmed the need to augment supply.

Based on VENCorp medium economic growth forecasts, system constraints were identified during the summer of 2007/08 in the supply arrangements for the east and south-east Melbourne metropolitan area. The identified constraints were forecast to grow considerably over the planning horizon, with over 40% of the annual load growth forecast from 2004/05 to 2005/06 to be in the east and south-east metropolitan area. This area is supplied via transformers at Rowville and Cranbourne that are critical to the operation of the meshed network.

To address the identified constraints VENCorp identified a number of projects:

- Thomastown to Ringwood 220 kV Transfer Capacity Upgrade — Tower Replacements — a line uprating project
- Thomastown to Templestowe 220 kV Transfer Capacity Upgrade — Tower Replacement — a line uprating project
- Latrobe Valley to Melbourne 220 kV Transfer Capacity Upgrade — Wind Monitoring — a line uprating project

38 Attachment 4; VENCorp Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014; VENCorp, 2007. Sections 3 and 4; Final Report New Large Network Asset Additional 500/220kv Transformation to Support Melbourne Metropolitan Load Growth; VC, July 2005.

39 Final Report New Large Network Asset Additional 500/220kv Transformation to Support Melbourne Metropolitan Load Growth; VC, July 2005.

- Rowville to Richmond 220 kV Transfer Capacity Upgrade — Termination Upgrade — a project to upgrade line terminations (reviewed in this report).

In addition, the Rowville A2 Transformer and Fault Level Mitigation project was also proposed. The Rowville Transformer project involves the installation of a 500/220 kV, 1,000 MVA transformer at Rowville Terminal Station, as well as switchyard extensions that include the advanced replacement of a number of circuit breakers at Rowville and East Rowville Terminal Stations. This project has both contestable and non-contestable components, as the works are integrated with the existing assets of both Rowville Transmission Facility Pty Ltd and SPI PowerNet Pty Ltd.

In October 2005, the VENCorp Board endorsed the Rowville Transformer project at a total NPV of [redacted] including a [redacted] contingency for foreign exchange and scope changes during the project[40].

3.2.2 Drivers (need or justification)[41]

VENCorp's 2004 Annual Planning Report forecast system constraints would occur during summer 2007/08 in the supply arrangements to the east and south-east Melbourne metropolitan area. This assessment was based on VENCorp's medium economic growth scenario, derived from the Distribution Business and Major Customer terminal station forecasts. These forecasts were diversified to the total system peak demand, and scaled to match the National Institute of Economic and Industry Research's (NIEIR's) aggregate Victorian forecast.

The identified constraints involve excessive power flows on both the Rowville and the Cranbourne 500/220 kV transformers, driven predominantly by expected load growth in the east and south-east Melbourne metropolitan area. The total demand supplied by the Rowville and Cranbourne terminal stations is approximately 35% of the Victorian summer peak demand, and the Rowville and Cranbourne transformers are critical to the supply arrangements. Further constraints were also identified to occur after an outage of either of these transformers. All the identified constraints were forecast to grow considerably over the planning horizon, and it was assessed that from summer 2007/08 onwards, if no action was taken, that the loading on these critical transformers would exceed their capability. Short-term loading on these transformers was also assessed to exceed capacity from 2009/10.

As plant may be damaged under the identified loading conditions, and with no network switching or generation opportunities available to address the loading constraints, load shedding would be required. If nothing is done to alleviate the identified constraints, then from 2007/08:

- if the Rowville A1 transformer failed during the summer peak, around 540 MW of load shedding may be required, with a possible further 700 MW required to secure the network . The value of unserved energy from such an event was estimated by VENCorp to be around $1.2m per annum.
- if the Cranbourne A1 transformer failed during the summer peak, about 1,030 MW of load shedding may be required, with a possible further 100 MW required to secure the network. The value of unserved energy from such an event was estimated by VENCorp to be around $1.8m per annum.

40 Victorian Energy Networks Corporation; Submission for Board; Item for Decision - Metropolitan Transformers Contract Approval; Date of Meeting: 24 October 2005.

41 Final Report New Large Network Asset Additional 500/220kv Transformation to Support Melbourne Metropolitan Load Growth; VENCorp, July 2005.

3.2.3 Strategic alignment and policy support

VENCorp's planning of the shared network is based on the application of part (b) of the regulatory test, under which planning proposals must maximise the net present value of the market benefit. VENCorp also applies a probabilistic planning approach, which does not seek to provide 100% reliability of the network after a single credible contingency. This approach is based on the Value of Customer Reliability ($29,600 per MW) adopted by the Victorian power industry.

VENCorp also applies the requirements of the NER to maintain the system in both a satisfactory and a secure operating state. This essentially ensures that all plant is operating below its thermal capability, and that where a credible contingency occurs the network will remain in a satisfactory state, with return to a secure state within 30 minutes. In addition, VENCorp applies other specific requirements of the NER[42].

3.2.4 Alternatives

In addressing the identified need, VENCorp considered a number of alternatives, concluding as follows[43]:

Do nothing

If no action is taken, then from summer 2008/09 onwards the expected loading on the Rowville and Cranbourne transformers will exceed their capability. This would result in load shedding in order to avoid plant damage, as no network switching or generation rescheduling opportunities exist. The resulting load shedding would involve about 540 MW to 1,030 MW of load, with a possible further 100 MW to 700 MW required to secure the network. VENCorp has estimated the expected value of unserved energy to be around $1.2 to $1.8m. VENCorp did not consider this alterative to be acceptable, and this alternative was not recommended.

Install a new transformer

Installation of a new 500/220 kV transformer in the east or south-east metropolitan network was considered at:

- Rowville Terminal Station
- Cranbourne Terminal Station
- Ringwood Terminal Station
- South Morang Terminal Station.

Other alternative sites were also considered, but none were found to be feasible. VENCorp considered this alternative in detail, with a full cost benefit analysis. Based on this analysis, the installation of a new 500/220 kV transformer at Rowville Terminal Station was the recommended alternative.

Implement an automatic control scheme

Implementation of an automatic control scheme was considered impractical due to its complexity and its limited impact on the identified constraints. Hence this alternative was not considered further.

42 Section 6; Final Report New Large Network Asset Additional 500/220kv Transformation to Support Melbourne Metropolitan Load Growth; VENCorp, July 2005.

43 Sections 7 to 17; Final Report New Large Network Asset Additional 500/220kv Transformation to Support Melbourne Metropolitan Load Growth; VENCorp, July 2005.

Non-network options

Demand side participation, or embedded generation alternatives were considered. However, they were not regarded as being technically or commercially feasible, as the reliability of these alternatives would have to be equivalent to the proposed network options. Additionally, these alternatives would need to offer a capacity of 1,000 MVA in 2005/06, growing to 1,700 MVA in 2009/10, and this was not considered feasible. No further consideration was given to these non-network alternatives.

Table 3-2 shows a summary of the cost–benefit analysis presented by VENCorp in the final report for this project. In summary, the analysis concluded that the installation of a new transformer at Rowville in the east or south-east metropolitan network, offered the greatest economic benefit. The estimated capital cost of this alternative was expected to be $37.2m ± 25%, and with commissioning in September 2007 it was estimated that the average present value of gross market benefit was $117.6m[44].

Table 3-2 – Summary of alternatives cost–benefit analysis ($000,000)

Alternative	Exp. energy at risk	Market benefit	Total cost	Transformer deferral	Net market benefit
Do nothing	(144)	—	—	—	—
Install a new transformer at Rowville	—	141	(32)	2.9	112
Install a new transformer at Cranbourne	—	139	(29)	—	111
Install a new transformer at Ringwood	—	117	(29)	1.5	90
Install a new transformer at South Morang	—	104	(33)	2.9	68

Source: Page 48. Final Report, New Large Network Asset, Additional 500/220kv Transformation to Support Melbourne Metropolitan Load Growth. VENCorp July 2005.

In 2005 a report was submitted to the VENCorp Board recommending the preferred alternative. At the October 2005 VENCorp Board meeting, approval was given for the Rowville Transformer project at a total NPV of [redacted] including a [redacted] contingency for foreign exchange and scope changes during the project[45].

3.2.5 Timings

The timing of the Rowville transformer project was based on the medium economic growth scenario in VENCorp's 2004 Annual Planning Report. In summary, the forecast demand from summer 2007/08 is such that excessive power flows will occur on both the Rowville and Cranbourne transformers. This analysis showed that the optimal timing (maximum market benefits) was when the project was commissioned for summer 2008/09. However, VENCorp considered commissioning prior to summer 2007/08 was prudent on the basis that VENCorp was forecasting system normal constraints over summer 2008/09 and hence the risk of project delays was not considered tolerable given the marginal reduction in market benefit in bringing the project forward 12 months ($0.9m). Consequently, VENCorp recommended implementation prior to summer 2007/08.

44 Victorian Energy Networks Corporation, Submission for Board Item for Decision - South-East Metropolitan Reinforcement Project; VENCorp, 18 February 2005.

45 Victorian Energy Networks Corporation, Submission for Board Item for Decision - South-East Metropolitan Reinforcement Project; VENCorp, 18 February 2005.

The project documentation provided by VENCorp demonstrates the following sequence of events leading up to approval of this project:

- Board approval to proceeds was granted on 18 February 2005
- call for Expression of Interest was issued on 11 May 2005
- Application Notice for New Large Network Asset was issued in June 2005
- Final Report for New Large Network Asset Additional 500/220 kV Transformation to Support Melbourne Metropolitan Load Growth was issued in July 2005
- Invitation to Tender was issued on 25 July 2005
- a request for quotation for non-contestable services was issued to SPI Powernet on 16 August 2005
- Board approval for the Metropolitan Transformers Contract was given on 24 October 2005
- the Network Services Agreements with SPI Powernet were signed on 2 December 2005.

The project is expected to be completed in September 2007.

3.2.6 PB analysis

Having undertaken a detailed review of the project documentation, the following section sets out PB's view of the prudence of this committed augmentation expenditure.

Clear need

The project documentation provided by VENCorp identifies that under the medium economic growth scenario, the forecast demand from summer 2007/08 was expected to exceed the rating of the Rowville and the Cranbourne transformers. Given the expected load growth, and the critical function of these transformers in supplying the east and south-east Melbourne metropolitan area, PB is of the view that a justifiable need was identified.

Strategic alignment

The project documentation makes note of VENCorp's criteria that have been applied to this project. While no specific references are made to VENCorp strategies, overarching policies or plans, it is clear that the overarching principles are based on the requirements of the NER, and guided by the application of the regulatory test to VENCorp's probabilistic planning approach. Hence, PB is of the view that VENCorp has demonstrated alignment of this project with VENCorp's overarching principles.

Alternatives

In order to address the identified need, VENCorp investigated a range of alternatives. PB has considered the range of alternatives examined and is if the view that alternatives identified were reasonably comprehensive and practical solutions to address the identified need. Furthermore, PB is of the view that the analysis of the alternatives, and the selection of the preferred alternative (a new transformer at Rowville), was reasonable and prudent. The project documentation showed that the preferred alternative had an estimated average present value of gross market benefit of $117.6m. PB is of the view that the preferred alternative was the most efficient alternative of those identified to meet the stated need.

Timings

The timing of the Rowville and Richmond line termination upgrade project was based on the medium economic growth scenario forecast contained in the 2004 Annual Planning Report. The project documentation presents the information for each of the 10%, 50% and 90% probability of exceedance forecasts, and bases the constraint discussion and the analysis of

the do nothing alternative on this information. However, the document fails to clearly present the actual forecast demand that was ultimately used in the constraint analysis, and it is left to readers to recreate this information for themselves.

PB is of the view that this lack of explicit documentation of the essential information that forms the very basis of the identified need, and the consequent project timing, represents poor disclosure practice. It is noted that the forecast used by VENCorp in identifying the need and the project timing was derived from distribution business forecasts 'which were diversified to the aggregate system peak and scaled to match the National Institute of Economic and Industry Research's (NIEIR's) aggregate Victorian forecast'[46]. In addition, VENCorp concluded that while the analysis showed that the optimal timing (maximum market benefits) for project commissioning was for summer 2008/09, that the project should be commissioned prior to summer 2007/08. This was on the basis that forecast system normal constraints over summer 2008/09 were not tolerable if the project was delayed, and particularly in light of the marginal reduction in market benefit to bring the project forward 12 months.

PB accepts VENCorp's view of the forecast demand from summer 2007/08, and the rating impact on the Rowville and Cranbourne transformers. Hence given the nature of the forecast development, and the application of the forecast under VENCorp's probabilistic planning approach, PB is of the view that the project implementation timing of prior to summer 2007/08 was reasonable.

Governance process

In general, the project documentation provided showed that VENCorp's augmentation planning processes were followed, and that the documentation demonstrates that VENCorp's governance process was followed. While PB is of the view that some elements of the detailed information are lacking, and possibly some documents that should have been provided were not (i.e. scope change documentation — see below), PB is nonetheless of the view that VENCorp has complied with its augmentation planning and governance processes.

Prudent asset management and good industry practice

During February 2007 VENCorp reported to its Board that a scope change had occurred and that an additional 220 kV circuit breaker replacement was required. The approximate additional capital cost of $980k was estimated. No documentation was provided by VENCorp in regards to the need for this additional circuit-breaker replacement. It was also reported that there have been some equipment supply delays that at the time were seen as posing a risk to the project's implementation timing. However, the Board report concluded that the project remains on target for completion by 30 September 2007, and is within the approved project budget[47]. While VENCorp has not provided any documentation in relation to the need for the additional replacement circuit breaker, PB is of the view that this represents a relatively minor scope change. However, PB is also of the view that VENCorp should ensure that scope change documentation is maintained as part of its regulatory compliance documentation. Notwithstanding this issue, and the equipment delay problems, PB is of the view that VENCorp's role in the project implementation (as demonstrated by the project documentation), is consistent with prudent asset management and good industry practice.

3.2.7 Costs

On the 28 October 2005, the VENCorp Board approved the Rowville A2 Transformer project with a total NPV cost of [redacted][48]. Subsequently, on 2 December 2005, VENCorp signed network services agreements with SP AusNet (SPA) for the delivery of contestable and non-

46 Footnote on page 10; Final Report New Large Network Asset Additional 500/220kv Transformation to Support Melbourne Metropolitan Load Growth; VENCorp, July 2005.

47 Agenda Item No. 14; Victorian Energy Networks Corporation Submission for Board (Item for Noting). Meeting of 16 February 2007.

48 Including a contingency allowance.

contestable services in relation to this project. This acceptance was based on the terms and conditions of the Additional Network Services Agreement, with a 30-year term and would be 'rolled into' SPA's regulated asset base from April 2008. The scope of works for this project is understood to be:

- installation of a 500/220 kV, 1,000 MVA transformer at Rowville Terminal Station
- extension of the Rowville Terminal Station 500 kV switchyard to include two new bays and four new circuit breakers and associated plant
- extension of the Rowville Terminal Station 220 kV switchyard to include three new circuit breakers and associated plant
- the advanced replacement of 14 circuit breakers at both the Rowville and East Rowville Terminal Station 220 kV switchyards to allow for increased fault levels.

In the February 2007 VENCorp Board report it was stated that:

> *… the total NPV cost to approximately [redacted] compared to the approved budget amount of [redacted] (which include an allowance for foreign exchange and variations). The total capital cost remains well below the maximum capital amount of [redacted] justified under the regulatory test.*

Given the complex brownfield nature of the project scope (see above), and the voltages and types of equipment involved, PB is of the view that the total augmentation cost of [redacted] (as submitted[49]) is reasonable for this project.

3.2.8 Conclusion

The Rowville A2 transformer and fault level mitigation project is part of a group of projects planned to address constraints in the supply arrangements to the east and south-east Melbourne metropolitan area. PB has reviewed the project information provided by VENCorp and has formed the following views:

- that a justifiable need was identified given that the expected load growth was likely to exceed the rating of the these critical transformers
- that no specific references are made to VENCorp strategies, overarching policies or plans in the supplied project documentation; however, it is clear that the overarching principles are based on the requirements of the NER, and guided by the application of the regulatory test to VENCorp's probabilistic planning approach
- that the range of alternatives identified were reasonably comprehensive and practical solutions, and that the analysis of the alternatives, and the selection of the preferred alternative (install new transformers), was reasonable and prudent
- that it was demonstrated that the preferred alternative was most beneficial to meet the identified need, and that the preferred alternative was the most efficient alternative of those identified
- that the lack of explicit documentation of the actual forecast demand ultimately used in the constraint analysis represents poor disclosure practice
- that the project implementation timing prior to summer 2007/08 was reasonable
- that VENCorp has complied with its augmentation planning and governance processes as demonstrated by the project documentation provided, although some detail information was lacking
- that VENCorp's role in the project implementation was consistent with prudent asset management and good industry practice

[49] Page 48. VENCorp Electricity Revenue Proposal 1 July 2008 – 30 June 2014. VENCorp, 2007.

- that the proposed committed augmentation cost of [redacted] is reasonable in light of the complex brownfield nature of the project, the voltages and types of equipment involved, and the project scope.

3.3 LATROBE VALLEY TO MELBOURNE LINE UPGRADE

Constraints between the Latrobe Valley and Melbourne on the 500 kV transmission network have been identified since the 1995 Annual Planning Review. The Latrobe Valley to Melbourne Line Upgrade project addresses this constraint through the conversion of the fourth 220 kV line to 500 kV, and the installation of a new transformer at Cranbourne Transmission Substation. Part of this project was completed in December 2004, with the non-contestable component expected to be completed in November 2008[50].

3.3.1 Summary/overview[51]

In the 1970s and 1980s four 500 kV transmission lines were built between the Latrobe Valley and Melbourne. In order to optimise asset utilisation and defer additional transformation requirements, one of these four lines has operated at 220 kV since commissioning. However, Victoria's load has grown significantly since the construction of these lines, as has the installed generation capacity in the Latrobe Valley. Since the 1995 Annual Planning Review, VENCorp has identified constraints on this transmission network.

Victoria's transmission system is heavily dependent on the 500 kV network from the Latrobe Valley to Melbourne. While the network's capacity is sufficient to transport existing and proposed generation capacity (including Basslink), with all 500 kV transmission lines in service, an outage on one of these lines can constrain Latrobe Valley generation due to voltage collapse, or thermal and transient stability limitations. This would constrain NEM operations, and could result in load shedding. Additionally, losses on the fourth 220 kV line are comparatively high, and the line is under-utilised in terms of its design capacity.

The Latrobe Valley to Melbourne Line Upgrade project addresses this constraint, and provides increased capacity to accommodate load growth and increased Latrobe Valley generation capacity. The project involves the conversion of the 220 kV line to 500 kV, and the installation of a new transformer at Cranbourne.

This project has both contestable and non-contestable components, as elements of the project are integrated SPA's assets.

In June 2003, the VENCorp Board gave approval for the negotiation and letting of contracts for the Latrobe Valley to Melbourne Line Upgrade project, at an expected capital cost of [redacted] (non-contestable costs were only a [redacted] estimate at this stage). The contestable component of the Latrobe Valley to Melbourne Line Upgrade project was completed in December 2004, with the non-contestable component expected to be completed in November 2008.

50 Consultation Paper, Optimising the Latrobe Valley to Melbourne Electricity Transmission Capacity, VENCorp, February 2002. Attachment 4; VENCorp Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014; VENCorp, 2007.

51 Consultation Paper, Optimising the Latrobe Valley to Melbourne Electricity Transmission Capacity; VENCorp, February 2002. Victorian Energy Networks Corporation Submission for Board Item for Decision - Fourth 500 KV Line Upgrade Project Tender Recommendation and Approval to Proceed; VENCorp, 23 June 2003.

3.3.2 Drivers (need or justification)[52]

The Latrobe Valley to Melbourne 500 kV transmission network provides a major interconnection between Victoria's main generation centre and the main load centre in Melbourne. The network also provides a vital link with the NEM. Approximately 85% of Victoria's generation capacity is located in the Latrobe Valley and, as Victorian's demand grows, so too does the dependence on the Latrobe Valley generation. Due to the low cost of brown coal, NEM demand for the Latrobe Valley generators also remains very high.

Victoria's load has grown significantly since the construction of the Latrobe Valley to Melbourne 500 kV transmission lines, as has the Latrobe Valley-installed generation capacity. Since the 1995 Annual Planning Review, VENCorp has identified constraints on this transmission network.

While the existing capacity of the 500 kV network is sufficient to support the existing generation (with all plant in service), significant generation constraints can occur following planned or forced outages. The capacity of this network to support demand, as well as Victorian export limits, is based on a combination of thermal, voltage collapse, and transient stability limits. Additionally, transmission losses on the 220 kV line are significant and increasing, due to both new generation and forecast load growth. This line is also under-utilised in terms of its design capacity.

3.3.3 Strategic alignment and policy support

VENCorp's planning of the shared network is based on the application of part (b) of the regulatory test, under which planning proposals must maximise the net present value of the market benefit. VENCorp also applies a probabilistic planning approach that does not seek to provide 100% reliability of the network after a single credible contingency. The particular criteria applied under VENCorp's probabilistic planning approach are outlined in Appendix 3 of the Technical Report — Optimising the Latrobe Valley to Melbourne Electricity Transmission Capacity (VENCorp, February 2002). In addition, VENCorp applies the requirements of the NER, and has specific licence criteria that also apply[53].

3.3.4 Alternatives[54, 55]

In addressing the identified need, VENCorp considered a number of alternatives and concluded as follows[56]:

Do nothing

This alternative involves not addressing the identified constraint. This alterative was not considered appropriate as leaving the constraint unresolved was forecast to result in the energy at risk increasing considerably. This alternative was not recommended but was analysed for comparison with other alternatives.

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52 Section 3; Technical Report - Optimising the Latrobe Valley to Melbourne Electricity Transmission Capacity; VENCorp, February 2002.

53 Section 3; Consultation Paper - Optimising the Latrobe Valley to Melbourne Electricity Transmission Capacity; VENCorp, February 2002.

54 Sections 5 – 7. Economic Evaluation - Optimising the Latrobe Valley to Melbourne Electricity Transmission Capacity. VENCorp. February 2002.

55 Sections 4 – 8. Technical Report - Optimising the Latrobe Valley to Melbourne Electricity Transmission Capacity. VENCorp. February 2002.

56 As the proposed work was part of the first stage, and as subsequent work may change the constraint on the Rowville to Richmond. Hence in the analysis VENCorp estimated the ongoing annual benefit of the alternatives as 50% of 2006/07 gross annual benefit.

Line termination upgrade

Upgrading the line terminations involves upgrades on three existing Latrobe Valley to Melbourne 500 kV lines. This upgrade would increase the thermal capacity of these lines. This alternative was analysed and found to be the third best alternative. It was not recommended.

Rowville option

This alternative involves the conversion of the fourth 220 kV line to 500 kV, and the installation of a new 1,000 MVA, 500/220 kV transformer at Rowville. Analysis of this alternative showed it to have the highest benefit and hence this option was recommended. As this alternative was only marginally better than the Cranbourne option (see below), it was recommended that both alternatives be tendered and a selection made once the costs had been further defined.

Cranbourne option

This alternative involves the conversion of the fourth 220 kV line to 500 kV, and the establishment of a new terminal station at Cranbourne, as well as the installation of a 1,000 MVA, 500/220 kV transformer. Analysis of this alternative showed it to have the second-highest benefit and hence this option was recommended. As this alternative was only marginally better than the Rowville option (see above), it was recommended that both alternatives be tendered and a selection made once the costs had been further defined (see also Rowville option above).

Fifth 500 kV line option

This alternative involves the construction of a new 500 kV line from the Latrobe Valley to Melbourne, while the existing 220 kV and 500 kV line arrangements are maintained. Analysis of this alternative showed it to have no positive market t benefit and it was not recommended.

Non-network alternatives

This alternative includes Demand Side Management (DSM) and/or additional generation to the west of the Latrobe Valley to Melbourne corridor. These alternatives were examined and it was concluded that the while these alternatives deliver some benefits, they do not maximise the net benefit and hence were not recommended.

Table 3-3 shows a summary of the cost–benefit analysis prepared for this project. In summary, the analysis concluded that the Rowville option had the greatest benefit and hence this option was recommended. However, it was also recommend that the Cranbourne option be tendered to enable a more detained assessment of the cots to be made. This was the case as the benefits of these theses alternatives were only marginally different.

Table 3-3 – Range of net market benefits for alternatives ($000,000)

Alternative	Estimated median capital cost	Estimated range of net benefits
Termination upgrade	2.6	0.5 to 12.4
Rowville option	23.8	0.0 to 21.9
Cranbourne option	35.9	(5.6) to 18.3
Fifth 500 kV line	71	(32.4) to (6.0)

Source: Section 5.8. Economic Evaluation - Optimising the Latrobe Valley to Melbourne Electricity Transmission Capacity. VENCorp. February 2002.

Subsequent to this analysis VENCorp revised its economic assessment due information received as a result of the tendering process. This information resulted in significant changes in the costs of the various alternatives and in 2003 VENCorp revised its economic analysis of the options. The results of the revised economic analysis are shown in Table 3-4.

Table 3-4 – Revised range of net market benefits for alternatives ($000,000)

Alternative	Estimated median capital cost	Estimated range of net benefits
Termination upgrade	5	2.2 to 6.4
Rowville option	38	0.2 to 12.7
Cranbourne option	42	3.6 to 15.6
Fifth 500 kV line	85	(28.0) to (14.5)

Source: Update on the Economics of Optimising the Latrobe Valley to Melbourne Electricity Transmission Capacity. VENCorp. April 2003.

Based on this revised analysis VENCorp concluded that conversion of the fourth 220 kV line to 500 kV, with an additional 1,000 MVA 500/220 kV transformer at Cranbourne is the highest benefit alternative. It was further concluded that the optimum timing for this project was December 2004.

In June 2003 a report was submitted to the VENCorp Board recommending the preferred alternative (Cranbourne option) be implemented at a total estimated cost of [redacted] (non-contestable costs were only a [redacted] estimate at this stage). It was noted in this report that the economic evaluation has shown that the project was justified at an NPV cost of up to [redacted] using a $10,000 cost of un-served energy, and up to [redacted] if the (then) proposed $29,600 cost of un-served energy was used.

At the June 2003 meeting, the Board approved VENCorp to enter into contracts with a total project cost (including variations) not greater than $42m (June 2003 dollars, excluding GST).

3.3.5 Timings

The timing of the Latrobe Valley to Melbourne Line Upgrade project was based on an assessment of the affects of various discount rates on the optimum timing. In addition, the timing impacts of a number of other factors were also considered in determining the optimal implementation date.

Table 3-5 presents the analysis conducted by VENCorp to assess the impact of various discount rates on the economically optimal timing. For rates between 6% and 10% the impact is a deferral of 3 years from an optimal timing of 2004/05 to an optimal timing of 2007/08.

Table 3-5 – NPV for various project timings – Cranbourne option

Commissioning year	NPV ($M) benefits of the Cranbourne option		
	6% discount rate	8% discount rate	10% discount rate
2004/05	11.0	6.1	1.8
2005/06	10.5	6.2	2.6
2006/07	9.6	6.0	2.9
2007/08	8.7	5.6	3.0
2008/09	7.5	5.0	2.9

Source: Update on the Economics of Optimising the Latrobe Valley to Melbourne Electricity Transmission Capacity. VENCorp. April 2003.

In addition to this analysis, the other factors noted by VENCorp that impact on the optimal timing are:

- additional security benefits provided by the Cranbourne option that would tend to advance the timing
- planned works by Texas Utilities and United Energy were to commence at the Cranbourne site in mid-2003. Economies were expected for the Cranbourne option where these works proceed with a similar timeframe
- the planning permit for the Cranbourne development required development completion within 2 years of commencement. With works commencing in mid-2003, the Cranbourne option needed to be completed by mid-2005 to avoid seeking an extension to the planning permit.

Based on this analysis VENCorp determined that the optimal timing for the Cranbourne option was 2004/05.

The project documentation provided by VENCorp demonstrates the following sequence of events leading up to approval of this project:

- consultation paper, technical report, and economic evaluation was issued in February 2002
- Invitation to Tender was issued in April 2003
- economic evaluation update issued in April 2003
- Board approval to proceed was given on 23 June 2003
- a Network Services Agreement was signed on 24 July 2003.

The contestable potion of this project (the major portion) was completed in December 2004, with the non-contestable component (minor component) expected to be completed in November 2008.

3.3.6 PB analysis

Having undertaken a detailed review of the project documentation, the following section sets out PB's view of the prudence of this committed augmentation expenditure.

Clear need

The project documentation provided by VENCorp identifies that constraints between the Latrobe Valley and Melbourne on the 500 kV transmission network have been identified since the 1995 Annual Planning Review. While this network is sufficient to support existing generation capacity, significant constraints can occur following planned or forced outages. Additionally, transmission losses are significant and increasing, and capacity utilisation was identified as an issue. Given that the Latrobe Valley to Melbourne 500 kV transmission network is a critical network within the NEM, and the nature of the constraints identified by VENCorp, PB is of the view that a justifiable need was identified.

Strategic alignment

The project documentation makes note of VENCorp's criteria that have been applied to this project. While no specific references are made to VENCorp strategies, overarching policies or plans, it is clear that the overarching principles are based on the requirements of the NER, and guided by the application of the regulatory test to VENCorp's probabilistic planning approach, and VENCorp's licence conditions. Hence, PB is of the view that VENCorp has demonstrated alignment of this project with VENCorp's overarching principles.

Alternatives

In order to address the identified need, VENCorp investigated a range of alternatives. PB has considered the range of alternatives examined, and is of the view that alternatives identified were reasonably comprehensive and practical solutions to address the identified need. Furthermore, PB is of the view that the analysis of the alternatives, and the selection of the preferred alternative (Cranbourne option), was reasonable and prudent. The project documentation showed that the preferred alternative had an estimated range of net market benefit of $3.6m to $15.6m. Hence PB is of the view that the preferred alternative was the most efficient alternative of those identified to meet the stated need.

Timings

The timing of the Latrobe Valley to Melbourne Line Upgrade project was based on an assessment of the affects of various discount rates on the optimum timing. In addition, the timing impacts of a number of other factors were also considered in determining the optimal implementation date. The project documentation presents this analysis of the timing, and concludes that the optimal timing for the Cranbourne option was 2004/05. The documentation also notes that the contestable potion of this project (the major portion) was completed in December 2004, with the non-contestable component (minor component) expected to be completed in November 2008. PB has considered the VENCorp analysis and is of the view that the project implementation timing of December 2004 was economically optimal.

Governance process

In general, the project documentation provided showed that VENCorp's augmentation planning processes were followed, and that the documentation demonstrates that VENCorp's governance process was followed. Hence PB is of the view that VENCorp has complied with its augmentation planning and governance processes.

Prudent asset management and good industry practice

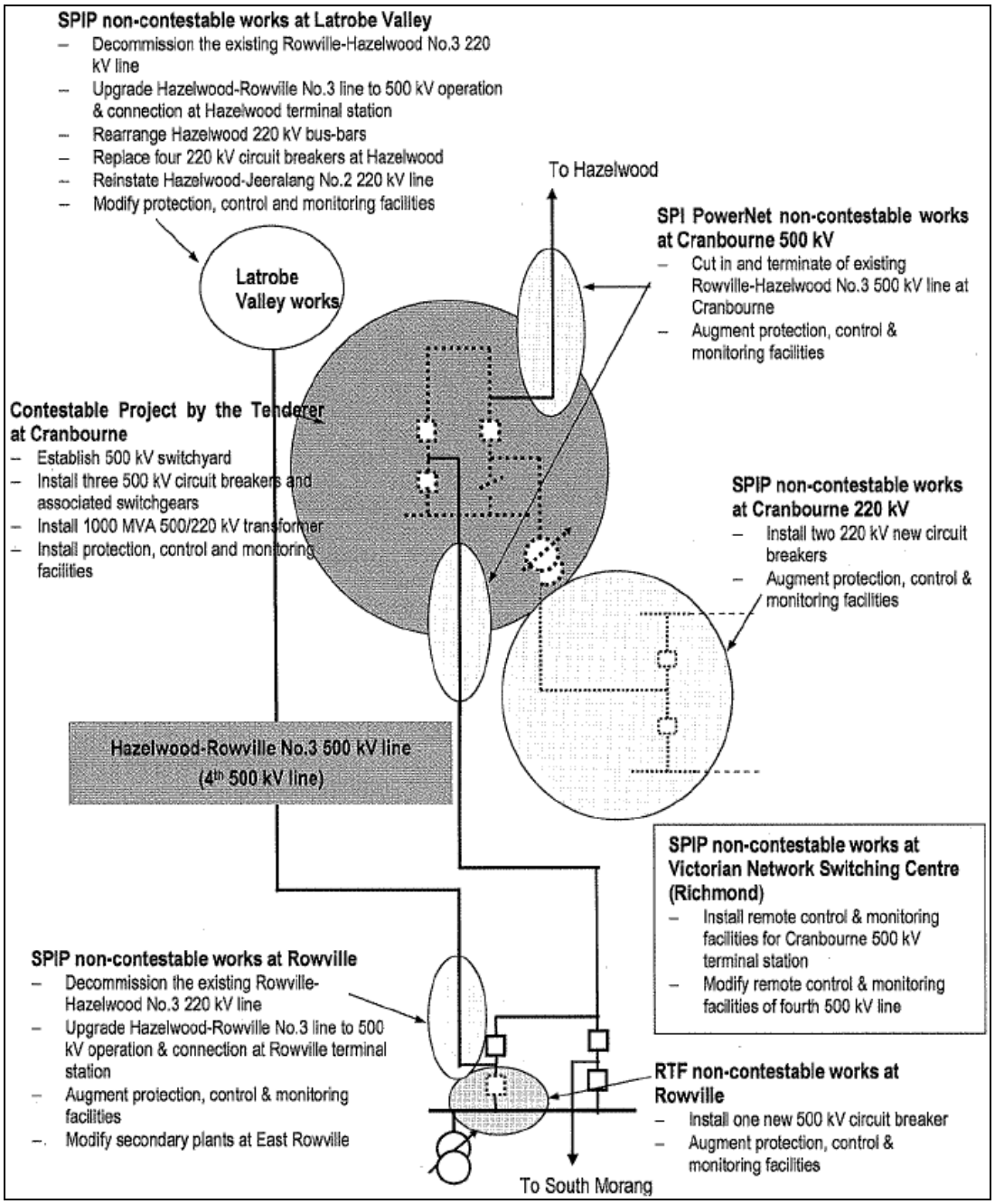
The project documentation demonstrates that VENCorp followed its governance process for the implementation of a project of this type. Moreover, VENCorp analysis of the alternative, and its approach to selecting the preferred alternative and project timing were, in PB's view, appropriate. Project implementation documentation also suggests that VENCorp's

management of the project implementation was, in PB's view, consistent with prudent asset management and good industry practice.

3.3.7 Costs

On the 23 June 2003, the VENCorp Board approved the Latrobe Valley to Melbourne Line Upgrade project at a total cost of [redacted] (non-contestable costs were only a [redacted] estimate at this stage). This cost is understood to consist of the provision of contestable and non-contestable network services as indicated in Figure 3-1.

Figure 3-1 – SPA asset management process



Source: Victorian Energy Networks Corporation - Submission for Board Item for Decision - Fourth 500 kV Line Upgrade Project Tender Recommendation and Approval to Proceed. VENCorp. 23 June 2003.

Prior to implementation of the project, operational assessments revealed switching and fault level issues required additional works. While the original project cost was estimated at [redacted] (non-contestable costs were only a [redacted] estimate at this stage), the fault level

works would require an additional [redacted] (approximately). VENCorp determined that the cost of the additional fault level works were within the scope of the original regulatory test that had showed the project was justified at an NPV cost of [redacted] if a $10,000 cost of unserved energy was used, and up to [redacted] if the (then) proposed $29,600 cost of unserved energy was used.

Given the brownfield nature of the project scope (see above), and the voltages and types of equipment involved, PB is of the view that the total submitted augmentation cost of $48.8m (as submitted figure[57]) is reasonable for this project.

3.3.8 Conclusion

The Latrobe Valley to Melbourne Line Upgrade project addresses constraints on the 500 kV transmission network between the Latrobe Valley and Melbourne. PB has reviewed the project information provided by VENCorp and has formed the following views:

- that a justifiable need was identified give the critical nature of this 500 kV network within the NEM and the nature of the constraints identified
- that no specific references are made to VENCorp strategies, overarching policies or plans in the supplied project documentation; however, it is clear that the overarching principles are based on the requirements of the NER, VENCorp's licence requirements, and are guided by the application of the regulatory test to VENCorp's probabilistic planning approach
- that the range of alternatives identified were reasonably comprehensive and practical solutions, and that the analysis of the alternatives, and the selection of the preferred alternative (Cranbourne option), was reasonable and prudent
- that it was demonstrated that the preferred alternative was most beneficial to meet the identified need, and that the preferred alternative was the most efficient alternative of those identified
- that the project implementation timing of December 2004 was economically optimal
- that VENCorp has complied with its augmentation planning and governance processes as demonstrated by the project documentation provided
- that VENCorp's role in the project implementation was consistent with prudent asset management and good industry practice
- that the cost of [redacted] is reasonable in light of the brownfield nature of the project, the voltages and types of equipment involved, and the project scope.

3.4 SOUTH-EAST METROPOLITAN REINFORCEMENT PROJECT (ROWVILLE TO RICHMOND LINE TERMINATION PLANT UPGRADE)

In the 2004 Electricity Annual Planning Report, VENCorp identified constraints in the supply arrangements to the south-east metropolitan area. This project was named the South-East Metropolitan Reinforcement Project, and was completed in 2006. As part of this project, the need to augment the 220 kV transfer capacity between Rowville and Richmond was identified, and the Rowville to Richmond line termination plant upgrade project was implemented. This project was completed in summer 2005/06[58].

57 Pages 50, 51. VENCorp Electricity Revenue Proposal 1 July 2008 – 30 June 2014. VENCorp. 2007.

58 Victorian Energy Networks Corporation, Submission For Board Item For Decision - South-East Metropolitan Reinforcement Project; VENCorp, 18 February 2005.

3.4.1 Summary/overview

The south-east metropolitan area contains approximately 35% of Victoria's electricity demand. The Richmond Terminal Station (RTS) supplies Melbourne's CBD and surrounding inner eastern suburbs. In the 2004 Electricity Annual Planning Report, VENCorp identified constraints in the supplying this area, and further studies have confirmed the need to augment supply.

The South-East Metropolitan Reinforcement project involves two stages. The first stage involved up-rating of a number of 220 kV transmission lines in 2006, while the second stage involves installation of a new power transformer by summer 2007/08. The Rowville to Richmond line termination plant upgrade project is a small network augmentation that forms part of this larger program of works, and involves the upgrades of line terminations through replacement of a circuit breaker and four isolators at Rowville. This enables the Rowville to Richmond 220 kV lines to be up-rated from 465 MVA to 586 MVA (a 26% increase).

As the project is primarily associated with improving SPA's assets, VENCorp determined that project was non-contestable.

In February 2005, the VENCorp Board endorsed the South-East Metropolitan Reinforcement project on the bases that (among other conditions) the total costs were no more than [redacted].

3.4.2 Drivers (need or justification)[59]

The medium economic growth scenario in the 2004 Annual Planning Report forecast total load Victorian load growth from 2005/06 to 2006/07 to be 270 MW. At system peak in 2005/06, the ROTS load was forecast to be 16.5% of Victorian total demand, due largely to growth in the eastern metropolitan area of Melbourne. This trend was forecast to continue over the 5-year planning period. Based on this forecast, the rating of the Rowville to Richmond 220 kV line was expected to be exceeded under certain network configuration, generation, and outage conditions.

VENCorp's analysis suggested that if this situation was left unresolved, the energy at risk for the identified constraint was expected to increase considerably over the planning period. VENCorp conducted detailed simulations of the identified constraints and determined that the expected value of energy at risk in 2005/06 would be $335,000 and $424,500 in 2006/07.

3.4.3 Strategic alignment and policy support

VENCorp's planning of the shared network is based on the application of part (b) of the regulatory test, under which planning proposals must maximise the net present value of the market benefit. VENCorp also applies a probabilistic planning approach that does not seek to provide 100% reliability of the network after a single credible contingency. This approach is based on Value of Customer Reliability ($29,600 per MW) adopted by the Victorian power industry.

VENCorp also applies the requirements of the NER to maintain the system in both a satisfactory and a secure operating state. This essentially ensures that all plant is operating below its thermal capability, and that should a credible contingency occur the network will remain in a satisfactory state, with return to a secure state within 30 minutes. In addition, VENCorp will also apply other specific requirements of the NER, and its licence conditions.

[59] Sections 4 and 6; VENCorp Consultation Notice Small Network Augmentation Rowville To Richmond Transfer Capacity Upgrade; VENCorp, 24 March 2005.

3.4.4 Alternatives

In addressing the identified need, VENCorp considered a number of alternatives, and concluded[60]:

Do nothing

The do-nothing alternative allows the identified constraints to remain. If the constraint is left unresolved, the energy at risk was forecast to increase considerably over the planning horizon. This alternative was analysed for comparison with other alternatives, and was not recommended.

Line termination upgrade

Upgrading the line terminations at Richmond and Rowville achieves a rerating of the line from 465 MVA to 586 MVA (26% increase). This option was subject to economic analysis and was recommended as the preferred alternative.

Installation of a third line

Installation of a third ROTS to RTS 220 kV line requires the acquisition of line easements and feeder bays at both Richmond and Rowville, as well as possible replacement of other existing plant. As the cost of this alternative, and the related property acquisition issues, were considered excessive, the alternative was not considered further.

Automatic control scheme

An automatic control scheme was noted as only being control applicable to infrequent constraints, and where the energy at risk does not grow rapidly. This is not the case for the Rowville to Richmond line contingency. In addition, load shedding would be required, and VENCorp does not consider load shedding in the metropolitan area an acceptable long-term arrangement. On this basis, this alternative was not considered further.

Non-network options

Non-network options that address the identified constraint may involve considerable load shedding under certain low probability events at times of moderate to high demand. VENCorp determined that any non-network options, such as demand side participation or embedded generation, would need a capacity of 400 MW or greater at RTS, and would need to be as reliable as a network solution to be viable. Hence, VENCorp was of the view that no feasible non-network option would be available within the required timeframe. On this basis, this alternative was not considered further.

In summary, VENCorp's analysis suggests that the estimated capital cost of uprating the line terminations was expected to be $1.25m ± 25%, while the present value of gross market benefit was estimated at $2.7m. As the estimated NPV of the market benefit for the preferred alternative was [redacted], and all other identified options were found to have excessive costs, or were not believed to be feasible, VENCorp recommended uprating the line terminations at Rowville and Richmond as the preferred alternative.

In 2005 a report was submitted to the VENCorp Board recommending the preferred alternative. At the February 2005 VENCorp Board meeting, approval was given as submitted for the up-rating of Rowville and Richmond the line terminations[61].

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60 As the proposed work was part of the first stage, and as subsequent work may change the constraint on the Rowville to Richmond. Hence in the analysis VENCorp estimated the ongoing annual benefit of the alternatives as 50% of 2006/07 gross annual benefit.

61 Victorian Energy Networks Corporation, Submission For Board Item For Decision - South-East Metropolitan Reinforcement Project; VENCorp, 18 February 2005.

3.4.5 Timings

The timing of the Rowville and Richmond the line terminations upgrade project was based on the medium economic growth scenario in the 2004 Annual Planning Report. In summary, the forecast demand from 2005/06 was expected to exceed the rating of the Rowville to Richmond 220 kV line under certain network configuration, generation, and outage conditions. Hence implementation of the preferred alternative was required prior to the summer of 2005/06.

The project documentation provided by VENCorp demonstrates the following sequence of events leading up to the acceptance of SPA's offer to undertake this project:

- Board approval was granted in February 05
- a request for firm offers was sent to SPA on 4 March 2005
- VENCorp executive authorisation was given on 24 March 2005
- the consultation notice was issued on 24 March 05
- SPA's offer was accepted by VENCorp on 30 May 2005.

The project was completed in summer 2005/06.

3.4.6 PB analysis

Having undertaken a detailed review of the project documentation, the following section sets out PB's view of the prudence of this committed augmentation expenditure.

Clear need

The project documentation provided by VENCorp identifies that under the medium economic growth scenario, the forecast demand from 2005/06 was expected to exceed the rating of the Rowville to Richmond 220 kV line under certain network configuration, generation, and outage conditions. Given the expected load growth, and the role of the 220 kV lines in supplying the south-east Melbourne metropolitan area, PB is of the view that a justifiable need was identified.

Strategic alignment

The project documentation makes note of VENCorp's criteria that have been applied to this project. While no specific references are made to VENCorp strategies, overarching policies or plans, it is clear that the overarching principles are based on the requirements of the NER, and guided by the application of the regulatory test to VENCorp's probabilistic planning approach. Hence, PB is of the view that VENCorp has demonstrated alignment of this project with VENCorp's overarching principles.

Alternatives

In order to address the identified need, VENCorp investigated a range of alternatives. PB has considered the range of alternatives examined, and is of the view that the alternatives identified were reasonably comprehensive. Furthermore, PB is of the view that the analysis of the alternatives, and the selection of the preferred alternative (line termination upgrade), was reasonable and prudent. The project documentation showed that the preferred alternative had an estimated market benefit NPV of $1.5m, and hence it was demonstrated that this alternative was most beneficial to meet the identified need. PB is of the view that the preferred alternative was the most efficient alternative of those identified to meet the stated need.

Timings

The timing of the Rowville and Richmond line termination upgrade project was based on the medium economic growth scenario forecast contained in the 2004 Annual Planning Report. The project documentation presents the information for each of the 10%, 50% and 90% probability of exceedance forecasts, and bases the constraint discussion and the analysis of the do-nothing alternative on this information. However, the document fails to clearly present the actual forecast demand that was ultimately used in the constraint analysis, and it is left to the readers to recreate this information for themselves. PB is of the view that this lack of explicit documentation of the essential information that forms the very basis of the identified need, and the consequent project timing, represents poor disclosure practice. It is noted that the forecast used by VENCorp in identifying the need and the project timing was derived from distribution business forecasts, 'which were diversified to the aggregate system peak and scaled to match the National Institute of Economic and Industry Research's (NIEIR's) aggregate Victorian forecast'[62]. Given the nature of the forecast development, and VENCorp's application of the forecast under VENCorp probabilistic planning approach, PB is of the view that the implementation timing of this project in 2005/06 was reasonable.

Governance process

In general, the project documentation provided showed that VENCorp's augmentation planning processes were followed, and that the documentation demonstrates that VENCorp's governance process was followed. While PB is of the view that some elements of the detailed information are lacking, and some documents that should have been provided were not (i.e. project implementation documentation — see below), PB also acknowledges the minor nature of this project, and that the documentation is accordingly brief. Hence, PB is of the view that VENCorp has complied with its augmentation planning and governance processes.

Prudent asset management and good industry practice

VENCorp did not provide any project implementation documentation. However the scope of works indicated by the project documentation is appropriate for works to improve the transmission line rating (see scope of works below), and hence PB is of the view that the project is consistent with prudent asset management and good industry practice.

3.4.7 Costs

On 30 May 2005 VENCorp accepted an SPA offer for the delivery of the Rowville and Richmond line termination upgrade project at a total capital cost of $1.5m. This acceptance was based on the terms and conditions of the Additional Network Services Agreement, with a 45-year term, and would be 'rolled into' SPA's regulated asset base from April 2008. The scope of works for this project is understood to be:

- replacement of one 220 kV circuit breaker
- replacement of four 220 kV isolators
- installation of one 220 kV Capacitive Voltage Transformer (CVT)
- removal of all plant limiting the loading of these circuits below 2000A.

Given the brownfield nature of the project scope (see above), and the voltages and types of equipment involved, PB is of the view that the total augmentation cost of $1.5m (as submitted[63]) is reasonable for this project.

62 Page 7; VENCorp Consultation Notice Small Network Augmentation Rowville To Richmond Transfer Capacity Upgrade; VENCorp, 24 March 2005.

63 Page 48. VENCorp Electricity Revenue Proposal 1 July 2008 – 30 June 2014. VENCorp. 2007.

3.4.8 Conclusion

The Rowville and Richmond line termination upgrade project is part of a larger program of works planned to address constraints in the supply arrangements to the south-east metropolitan area. PB has reviewed the project information provided by VENCorp and has formed the following views:

- that a justifiable need was identified give that the expected load growth was likely to exceed the rating of the Rowville to Richmond 220 kV line
- that no specific references are made to VENCorp strategies, overarching policies or plans in the supplied project documentation; however, it is clear that the overarching principles are based on the requirements of the NER, and guided by the application of the regulatory test to VENCorp's probabilistic planning approach
- that the range of alternatives identified were reasonably comprehensive and that the analysis of the alternatives, and the selection of the preferred alternative (line termination upgrade), was reasonable and prudent
- that it was demonstrated that the preferred alternative was most beneficial to meet the identified need, and that the preferred alternative was the most efficient alternative of those identified to meet the stated need
- that the implementation timing of the project in 2005/06 was reasonable
- that VENCorp has complied with its augmentation planning and governance processes as demonstrated by the project documentation provided, although some detail information was lacking
- that the project is consistent with prudent asset management and good industry practice as the scope of works is appropriate for improving the transmission line rating
- that the cost of $1.50m is reasonable in light of the brownfield nature of the project, the voltages and types of equipment involved, and the project scope.

3.5 MURRAYLINK REGULATION PROJECT

Murraylink is an essential element of the national electricity grid as it provides a connection between Red Cliffs terminal station in Victoria and Monash substation in South Australia. The Murraylink regulation project enhances the transfer capacity of the link through the provision of reactive support for the transmission network[64]. This project was completed in January 2006[65].

3.5.1 Summary/overview

Murraylink provides a critical transmission link between Victoria and South Australia. In October 2003, the ACCC approved conversion of this interconnector to a prescribed service. As part of this decision, the ACCC approved augmentations to the Victorian shared transmission network. These augmentations were required to allow Murraylink to achieve a transfer capacity of 220 MW during peak periods. Prior to the implementation of the Murraylink regulation project, this capacity was limited to about 110 MW during peak times.

64 Section 1 and 2; Final Report - New Large Network Asset In Victorian Shared Transmission Network For Murraylink Conversion To A Prescribed Service; VENCorp, 1 March 2004.

65 Attachment 4; VENCorp Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014; VENCorp, 2007.

The Murraylink regulation project involves the provision of reactive support for the Victorian transmission network. In particular the project involves[66]:

- new capacitor banks at Horsham, Kerang, Moorabool and Red Cliffs
- modifications to existing capacitor banks at Ballarat, Horsham and Red Cliffs
- schemes for very fast run back of Murraylink following outages on transmission elements.

Reactive power requirements in the Victorian network were such under peak load, with a 220 MW Murraylink transfer, voltages in the network decline and the reactive support capacity reaches its limits. Murraylink regulation project addresses these constraints and enables Murraylink to operate within its reactive capability under normal peak load conditions[67].

The Essential Services Commission (Victoria) approved treating the Murraylink augmentation works as non-contestable, and they were procured under the processes set out in VENCorp's Electricity Transmission Licence, with the costs being recovered through regulated Transmission Use of System (TUoS) charges[68].

In March 2004, the VENCorp Board endorsed the Murraylink regulation project at an estimated total cost of $10.7m.

3.5.2 Drivers (need or justification)

The ACCC approved Murraylink's conversion to regulated status on the basis of a transfer capacity of 220 MW being achieved under peak demand conditions. However, under peak demand conditions and with Murraylink transferring 220 MW, voltages in the Victorian network would decline as the networks reactive support capacity reaches its limits.

At Victorian peak load, Murraylink transfer depends on a number of other network elements. Following an outage, the network would be subject to overload and/or voltage collapse. Additionally, fault levels on the Victorian network are relatively low, and this creates harmonic problems between load centres. Where the Murraylink transfer issues are addressed using additional capacitor banks, then further harmonic problems arise such that the resulting levels are not within the requirements set out in the Australian Standards (i.e. AS/NZS 61000.3.6).

3.5.3 Strategic alignment and policy support

No references were found in the Murraylink regulation project documentation to any of VENCorp's strategies, overarching policies or plans. Additionally, no reference was made to the requirements of the NER in relation to the need, or recommended alternative.

3.5.4 Alternatives

In addressing the identified need, VENCorp considered a number of alternatives, and concluded[69]:

66 Page 5; Final Report - New Large Network Asset In Victorian Shared Transmission Network For Murraylink Conversion To A Prescribed Service; VENCorp, 1 March 2004.

67 Section 1 and 2; Final Report - New Large Network Asset In Victorian Shared Transmission Network For Murraylink Conversion To A Prescribed Service; VENCorp, 1 March 2004.

68 Page 1; Submission For Board Item For Circular Resolution - Shared Network Augmentations For Murraylink Regulation; VENCorp, 15 March 2004.

69 Section 2; Final Report - New Large Network Asset In Victorian Shared Transmission Network For Murraylink Conversion To A Prescribed Service; VENCorp, 1 March 2004.

Additional static VAR compensators

The use of additional static VAr compensators (SVCs) requires 200 MVAr located across three locations. However, fast-acting reactive support is not required, as Murraylink and other existing facilities provide sufficient response. Additionally, as the estimated cost was about $25m this alternative was not considered further.

Construct an additional transmission circuit

The construction of an additional transmission circuit would require a new 400-km-long transmission line. As the expected cost of this line would be around $80m, and with no other significant benefits, this option was considered to be uneconomic and was not considered further.

Additional capacitors and a Murraylink fast run back scheme

This alternative involves the installation of new capacitor banks, and modifications to existing capacitor banks. A scheme to enable the fast runback of Murraylink transfer is also required following an outage condition. This alternative met all the technical requirements, and was recommended.

In considering the additional capacitors alternative (alternative 3), VENCorp identified a range of installation locations. VENCorp concluded that the optimal combination of capacitors involved the installation of new capacitor banks at Horsham, Kerang, Moorabool and Red Cliffs, with modifications to existing capacitor banks at Ballarat, Horsham and Red Cliffs. This arrangement was recommended on the following basis:

- it provided acceptable reactive margins
- it provided additional reactive support to the Geelong area (which was noted as being of benefit beyond 2005)
- it was the lowest cost option that met all the requirements.

As part of the 2003 Murraylink determination, the ACCC approved augmentations to the Victorian shared transmission network (on the basis of VENCorp estimates), and included a capital cost of $15m in the regulatory test analysis. The ACCC was satisfied that the proposed augmentation works satisfied the regulatory test.

In 2004, a report was submitted to the VENCorp Board recommending the preferred alternative. At the March 2004 VENCorp Board meeting, approval was given for the Murraylink regulation project as submitted[70].

3.5.5 Timings

The timing of the Murraylink regulation project was based on the conversion of Murraylink to regulated status, and the need to achieve a 220 MW transfer capacity under peak demand conditions. The ACCC regulatory test was based on commissioning the Victorian shared transmission network augmentations in January 2005. However VENCorp and the ACCC agreed that April 2005 was a more realistic timeframe.

The project documentation provided by VENCorp demonstrates the following sequence of events in undertaking this project:

- application notice issued on 9 January 2004
- final report issued on 1 March 2004
- Board approval to proceed given on 22 March 2004

[70] Submission For Board Item For Circular Resolution - Shared Network Augmentations For Murraylink Regulation; VENCorp, 15 March 2004

- SPI Powernet Offer accepted on 10 May 2004
- contract execution with SPI Powernet was recommended on 3 June 2004
- execution of an Additional Network Services Agreement with SPI Powernet was undertaken on 4 June 2004.

The project was completed in January 2006.

3.5.6 PB analysis

Having undertaken a detailed review of the project documentation, the following section sets out PB's view of the prudence of this committed augmentation expenditure.

Clear need

The project documentation provided by VENCorp identifies that in order to achieve the required Murraylink transfer capacity of 220 MW of under peak demand conditions, additional reactive support is needed. Furthermore, if this constraint was addressed using additional capacitors, then harmonic levels would not be maintained within the requirements of the applicable Australian Standard. Given the nature of the interconnector, and the associated load flows, PB is of the view that a justifiable need was identified.

Strategic alignment

The project documentation makes no reference to VENCorp's strategies, overarching policies or plans. Additionally, no reference was made to the requirements of the NER in relation to the need or recommended alternative. Hence, PB is of the view that VENCorp has not demonstrated alignment of this project with VENCorp's overarching principles.

Alternatives

In order to address the identified need, VENCorp investigated a range of alternatives. PB recognises that any solution to the meet the identified need would have to achieve voltage stability and not overload network elements under applicable system states. PB has considered the alternatives examined, and is of the view that the alternatives identified were reasonably comprehensive given the specific nature of the identified need. However, while the analysis of the alternatives was quite limited, given the scale of the project, PB is of the view that this analysis, and the selection of the preferred alternative, was reasonable and prudent. The project documentation demonstrated that the preferred alternative was the least-cost alternative, and hence PB is of the view that the preferred alternative was the most efficient alternative of those identified to meet the stated need.

Timings

The timing of the Murraylink regulation project was based on the conversion of Murraylink to regulated status, and the need to achieve a 220 MW transfer capacity under peak demand conditions. In the project documentation VENCorp note that the regulatory test was based on commissioning in January 2005; however, agreement was reached with the ACCC that April 2005 was more realistic. Ultimately the project was completed in January 2006. It is not clear from the project documentation provided what drove the timing of January 2005, as implementation was anticipated 12 months from execution of the services agreement[71]. It is noted that the services agreement with SPI PowerNet was dated 4 June 2004. However, the supplied project documentation does seem to imply that the project timing was related to the ACCC's agreed timing of the Murraylink conversion to regulated status. PB is of the view that the timing of the project should have been explicitly documented, as timing is intrinsically linked to the projects costs and benefits, and hence the project's ultimate justification. As the justification for the actual project timing is not clear, it is difficult for PB to conclude that the

[71] Victorian Energy Networks Corporation - Submission for Board - Item for Circular Resolution - Shared Network Augmentations for Murraylink Regulation. VENCorp. 15 March 2004.

implementation timing of this project was reasonable. However, where it is accepted that the timing was a result of the timing of the Murraylink conversion to regulated status, then PB is of the view that the project implementation timing can be considered optimal.

Governance process

In general, the project documentation provided showed that VENCorp's augmentation planning processes were followed, and that the documentation demonstrates that VENCorp's governance process was followed. While PB is of the view that some elements of the detailed information are lacking (i.e. implementation timing — see Timings above), PB is nonetheless of the view that VENCorp has complied with its augmentation planning and governance processes.

Prudent asset management and good industry practice

The process followed by VENCorp in the implementation of this project was in accordance with VENCorp's governance processes. Moreover, PB is of the view that the selected alternative was most efficient alternative of those identified to meet the stated need. Hence, notwithstanding the apparent lack of documented clarity regarding the projects implementation timing, PB is of the view that VENCorp's role in the project's implementation is consistent with prudent asset management and good industry practice.

3.5.7 Costs

On 4 June 2004 VENCorp accepted an SPA offer for the delivery of the Murraylink regulation project at a total capital cost of $10.38m. This acceptance was based on the terms and conditions of the Additional Network Services Agreement, with a 45-year term for the capacitor works, and 20 years for the associated runback scheme. VENCorp's project documentation notes that these services would be 'rolled into' SPA's regulated asset base from April 2008. The scope of works for this project is understood to be[72]:

- new capacitor banks at Horsham, Kerang, Moorabool and Red Cliffs
- modifications to existing capacitor banks at Ballarat, Horsham and Red Cliffs
- schemes for very fast run back of Murraylink following outages on transmission elements.

Given the brownfield nature of the project scope, as well as the voltages and types of equipment involved, PB is of the view that the total augmentation cost of $10.38m (as submitted[73]) is reasonable for this project.

3.5.8 Conclusion

The Murraylink regulation project provides reactive support for the Victorian transmission network in order to enable Murraylink to achieve the required transfer capacity of 220 MW under peak demand conditions. PB has reviewed the project information provided by VENCorp and has formed the following views:

- that a justifiable need was identified given the requirement to achieve the full Murraylink capacity under peak demand conditions
- that VENCorp has not demonstrated alignment of this project with VENCorp's overarching principles as the project documentation makes no reference to VENCorp's strategies, overarching policies or plans
- that the alternatives identified were reasonably comprehensive given the specific nature of the identified need (reactive support)

[72] Page 5; Final Report - New Large Network Asset In Victorian Shared Transmission Network For Murraylink Conversion To A Prescribed Service; VENCorp, 1 March 2004.

[73] Page 48. VENCorp Electricity Revenue Proposal 1 July 2008 – 30 June 2014. VENCorp. 2007.

- that the selection of the preferred alternative was reasonable and prudent
- that the preferred alternative was the most efficient alternative of those identified to meet the stated need, given that this alternative was the least cost of those identified to meet the stated need
- that the project implementation timing can be considered optimal where it is accepted that the actual timing resulted from the timing of the Murraylink conversion to regulated status
- that VENCorp has complied with its augmentation planning and governance processes as demonstrated by the project documentation provided, although some detail information was lacking
- that the project implementation was consistent with prudent asset management and good industry practice
- that VENCorp's role in the project's implementation is consistent with prudent asset management and good industry practice
- that the cost of $10.38m is reasonable in light of the scope of the project, its brownfield nature, as well as the voltages and types of equipment involved.

3.6 MODIFICATION TO DEDERANG BUS SPLITTING SCHEME

The Dederang Bus Splitting Scheme (DBUSS) project was identified in VENCorp's 2004 Electricity Annual Planning Report. The project involves modifying an exiting control scheme at Dederang to improve the transfer capacity from NSW/Snowy under a transformer outage condition. This project was completed in December 2004[74] at a cost of $37,340[75].

3.6.1 Summary/overview

The DBUSS scheme is an arrangement to split Dederang buses under a 330 kV line outage at the time of high import from the NSW/Snowy, and hence allow higher imports than would otherwise be possible.

The import capacity depends on the amount of Southern Hydro generation, and with lower levels of generation, the import into Victoria is also reduced. With the drought, Southern Hydro's generating capacity is limited in the summer months under expected peak import demand. Under these conditions, the reduction of import capability is expected to be several hundred MW. VENCorp was approached by NEMMCO concerning this scenario, and the option of extending the DBUSS scheme to split the Dederang buses was proposed[76].

As the project involves modifications to an exiting control scheme associated SPA's assets, VENCorp determined that project was non-contestable.

In September 2004, the VENCorp Board endorsed the DBUSS project at a total estimated cost up to $150,000 under the terms and conditions of the existing Network Services Agreement[77].

74 Attachment 4; VENCorp Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014; VENCorp, 2007. Note that this date appears to be an error. See Section 3.6.5 for details.

75 Memo to Chief Executive Officer from General Manager Development; Subject Small Network Augmentation, Modifications to DBUSS Scheme. VENCorp. 6 April 2005.

76 Page 1; Request for Estimate/Offer - Non-Contestable Project, Modification to DBUSS Control Scheme to provide DDTS transformer overload control; VENCorp, Unknown date.

77 Recommendation Chief Executive Officer, Small Network Augmentation Modifications to DBUSS Scheme; VENCorp, 6 April 2005.

3.6.2 Drivers (need or justification)

The import capacity across the NSW/Snowy interconnector is reduced at times of low generation levels from Southern Hydro generation at Dederang. With the drought, Southern Hydro's generating capacity is limited in the summer months under expected peak import demand. Under these conditions the reduction of import capability is expected to be several hundred MW. NEMMCO expressed concern over this scenario, and approached VENCorp to seeking a solution[78].

3.6.3 Strategic alignment and policy support

No references were found in the DBUSS project documentation to any of VENCorp strategies, overarching policies or plans. Additionally, no reference was made to the requirements of the NER in relation to the need or recommended alternative. However, the project documentation did make reference to NEMMCO's concerns.

3.6.4 Alternatives

No alternatives, options analysis, financial analysis, or economic analysis was found in the DBUSS project documentation as supplied by VENCorp. However, in the VENCorp Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014, it notes in Appendix 4[79]:

> *The DBUSS control scheme was economic justified was based on a probabilistic assessment and satisfied the Regulatory Test (see 2004 EAPR), maximising the net present value of the market benefits with regard to a number of alternative projects, timings and market scenarios.*

3.6.5 Timings

The timing of the DBUSS project was based on NEMMCO's view that the summer capacity of the NSW/Snowy interconnector was adversely impacted at times of expected peak import demand by the lower levels of generation expected due to the drought conditions.

The project documentation provided by VENCorp demonstrates the following sequence of events leading up to the acceptance of SPA's offer to undertake this project:

- Board approval was granted in September 2004
- VENCorp executive authorisation was given on 6 April 2005
- SPA's offer was accepted by VENCorp on 6 April 2005.

Based on the documentation provided by VENCorp, it appears that the DBUSS project was implemented in May 2005[80]. However, in VENCorp's Electricity Revenue Cap Proposal, it notes that the project was completed in December 2004[81].

78 Page 1; Request for Estimate/Offer - Non-Contestable Project, Modification to DBUSS Control Scheme to provide DDTS transformer overload control; VENCorp, Unknown date.

79 Page 50; VENCorp Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014; VENCorp, 2007.

80 VENCorp Document No. PCR/DDTS/21. 14 February 2005.

81 The date given in VENCorp's Electricity Revenue Cap Proposal seems to be in error, as the project documentation dates mostly post date December 2004.

3.6.6 PB analysis

Having undertaken a detailed review of the project documentation, the following section sets out PB's view of the prudence of this committed augmentation expenditure.

Clear need

The project documentation provided by VENCorp identifies that the capacity of the NSW/Snowy interconnector is reduced at times of low levels of Southern Hydro generation. With the drought, NEMMCO was of the view that capacity would likely be limited in the summer months during times of expected peak demand. Given the critical nature of the interconnector within the NEM, and the degree to which the interconnector capacity could be constrained at peak demand times, PB is of the view that a justifiable need was identified.

Strategic alignment

The project documentation makes no reference to VENCorp's strategies, overarching policies or plans. Additionally, no reference was made to VENCorp's licence requirements, or the requirements of the NER in relation to the need or recommended alternative, other than reference to NEMMCO raising concerns. However, while it is clear that the project documentation does not demonstrate alignment of this project with VENCorp's strategies, overarching policies or plans, PB recognises that the scope of works for this project is quite limited, and hence documentation is accordingly brief.

Alternatives

No alternatives, options analysis, financial analysis, or economic analysis was found in the DBUSS project documentation as supplied by VENCorp. However, it is acknowledged that VENCorp did make reference to an economic justification based on consideration of a number of alternative projects[82]. However, PB has not been supplied with any documentation related to the consideration of alternatives or economic justification of this project. Hence PB is not able to conclude that that the analysis of the alternatives, and the selection of the preferred alternative, was reasonable and prudent, or that the preferred alternative was the most efficient alternative of those identified to meet the stated need.

Timings

The timing of the DBUSS project was based on NEMMCO's view that the summer capacity of the NSW/Snowy interconnector was adversely impacted at times of expected peak import demand by the lower levels of Southern Hydro generation during drought conditions. However, the project document supplied by VENCorp fails to document the timing needs. PB is of the view that the project timing need should be explicitly addressed by VENCorp as timing is intrinsically linked to the projects costs and benefits, and hence the projects justification.

PB acknowledges that VENCorp has made reference to an economic justification[83], and that this justification should address the projects optimal timing. However, PB has not been supplied with any documentation related to the consideration of project timing. Consequently, PB is unable to conclude that the implementation timing of this project in was reasonable. It should be noted however, that the benefits of this project (high interconnector capacity at times of high demand) are quite considerable, and the cost is very low. Hence it is likely that timing is not of any practical significance in an economic justification.

Governance process

In general, the project documentation provided was limited, although it did demonstrate that VENCorp's augmentation planning processes were followed, and that the documentation demonstrates that VENCorp's governance process was followed. While PB is of the view that

82 Page 50; VENCorp Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014; VENCorp, 2007.

83 Page 50; VENCorp Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014; VENCorp, 2007.

some elements of the detailed information are lacking, and possibly some documents that should have been provided were not (i.e. alternative analysis and timing information), PB also acknowledges the minor nature of this project, and that the documentation is accordingly brief. Hence, PB is of the view that VENCorp has complied with its augmentation planning and governance processes.

Prudent asset management and good industry practice

As documentation relating the alternatives considered, the justification of the selected alternative, and the timing of the project's implementation has not been supplied by VENCorp, PB is not able to conclude that the implementation of this project was consistent with prudent asset management and good industry practice.

3.6.7 Costs

In April 2005, VENCorp accepted an SPA offer for the delivery of the DBUSS project at a total capital cost of $37,340. This acceptance was based on the terms and conditions of an existing Additional Network Services Agreement, as this project involved the modification of an existing protection scheme. The scope of work for this project is understood to involve modifications to the protection logic of the exiting protection scheme.

Given the scope and nature of this project, PB is of the view that the total cost of $37,340 is reasonable for this project.

3.6.8 Conclusion

The DBUSS project involved modifying an existing control scheme to improve the NSW/Snowy interconnector transfer capacity. PB has reviewed the project information provided by VENCorp and has formed the following views:

- that a justifiable need was identified given the identified capacity constraint, and the critical nature of the interconnector within the NEM
- that while the project documentation does not demonstrate alignment of this project with VENCorp's strategies, overarching policies or plans, the scope of works for this project is quite limited, and hence documentation is accordingly brief
- that it cannot be concluded that the analysis of the alternatives, and the selection of the preferred alternative, was reasonable and prudent, or that the preferred alternative was the most efficient alternative of those identified to meet the stated need, as no alternatives, options analysis, financial analysis or economic analysis were found in the project documentation[84]
- that it cannot be concluded that the implementation timing of this project was reasonable, as the project document supplied by VENCorp does not document the project's timing needs
- that the project's timing should be explicitly addressed in the project documentation as timing is intrinsically linked to the project's costs and benefits, and hence the project's justification[85]
- that VENCorp has complied with its augmentation planning and governance processes as demonstrated by the project documentation provided, although some detail information was lacking
- that it cannot be concluded that the implementation of this project was consistent with prudent asset management and good industry practice as documentation

[84] It is however acknowledged that VENCorp did make reference to an economic justification based on consideration of a number of alternative projects (see page 50 of VENCorp's Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014).

[85] PB acknowledges that VENCorp references an economic justification that should address the projects optimal timing (page 50 of VENCorp's Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014).

relating the alternatives considered, the justification of the selected alternative, and the timing of the project's implementation has not been supplied by VENCorp

- that the project capital cost of $37,340 is reasonable in light of the project's scope.

3.7 CONCLUSION

This section presented a selection of five detailed committed augmentation project reviews. Table 3-6 shows an overview of the review undertaken in the context of VENCorp's overall committed augmentation expenditure.

Table 3-6 – Overview of detailed project reviews

	Review metrics
Total number of projects	18
Total number of projects reviewed	5
% of projects reviewed	28%
Total cost of projects	$150.3m
Total cost of projects reviewed	$96.4m
% of total costs reviewed	64%

Source: PB analysis

The detailed reviews undertaken by PB form part of a broader review of VENCorp that serves to inform PB's views when considering the prudence and efficiency of VENCorp's commented augmentation expenditure. Accordingly, while the detailed reviews form an essential element of this approach, they must be considered within the context of this overall review. Within this broader context the main findings of the detailed committed augmentation project reviews can be summarised:

- in all cases examined, a justifiable need was identified
- no specific references are made to VENCorp strategies, overarching policies or plans in the supplied project documentation. However, it is clear in the majority of projects examined that the overarching principles are based on the requirements of the NER, and guided by the application of the regulatory test to VENCorp's probabilistic planning approach. In other cases the project scope (and cost) was very limited, and the documentation was accordingly brief
- in most cases the range of alternatives identified were reasonably comprehensive and practical solutions and that the analysis of the alternatives, and the selection of the preferred alternative was reasonable and prudent. In one case (DBUSS) this could not be concluded as the relevant documentation was not provided[86]
- in all cases it was reasonably demonstrated that the preferred alternative was the most beneficial of those examined to meet the identified need, and that the preferred alternative was an efficient alternative
- in most cases the project implementation timing was demonstrated in the available documentation to be reasonably optimal. However, in two cases (Murraylink, and DEBUSS) the documentation supplied did not address project timing[87]

[86] It is however acknowledged that VENCorp did make reference to an economic justification for the DBUSS project based on consideration of a number of alternative projects (see page 50 of VENCorp's Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014).

[87] In the case of the DEBUSS project it is acknowledged that VENCorp did make reference to an economic justification that may have addressed timing issues. This was not supplied however (see page 50 of VENCorp's Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014).

- project documentation was in general appropriate for the projects examined. However some information was lacking particularly in relation to demand forecasts, and project timing information
- VENCorp has complied with its augmentation planning and governance processes as demonstrated by the project documentation provided, although in most cases some detail information was lacking
- in most cases it was demonstrated that VENCorp's role in the project implementation was consistent with prudent asset management and good industry practice. However, in the case of the Rowville and Richmond line termination upgrade project, and the DBUSS project, PB was not able to make this conclusion as documentation was lacking in relevant details (e.g. project timing), or project implementation documentation was not provided[88]
- in all cases it was concluded that the implemented project costs were reasonable given the nature and scope of the project.

Overall, while the detailed reviews did identify a number of issues, these essentially related to the quality of the documentation (missing information, documents not supplied), as opposed to the project itself. However, on the balance of the information provided, and in the broader context of the overall review, PB is of the view that it is likely that VENCorp has been prudent and efficient in regards to the management of its committed augmentation expenditure, and has followed its planning and governance processes.

3.8 PB RECOMMENDATION (COMMITTED AUGMENTATION)

PB has considered the prudence and efficiency of VENCorp's committed augmentation expenditure through a broad-based assessment that includes detailed review of a selected number of projects. Based on the information provided by VENCorp, as well as PB's investigations and assessments, it is PB's view that VENCorp's committed augmentation expenditure over the period 2002/3 to 2007/08 was timely, reasonable, and efficient.

PB has considered the cost of committed augmentation proposed by VENCorp, and recommends the values as shown in Table 3-7.

Table 3-7 – VENCorp committed augmentations ($m)

<Table deleted for reasons of confidentiality>

[88] PB acknowledges that these projects are minor in nature and that the documentation is accordingly brief.

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4. REVIEW OF PLANNED NETWORK AUGMENTATION

In this section, PB provides a high-level overview of VENCorp's proposed forecast capex allowance, which forms the basis of its 'planned augmentation charges' outlined in its proposal; we review a selection of network-related projects captured within the forecast allowance; we consider and evaluate the need, timing, scope and costs associated with these projects; and then make recommendations on the appropriateness of their inclusion in the forecast allowance. PB also extends its analysis and recommendations from the detailed projects reviews through to the remaining programme, as appropriate.

4.1 SUMMARY

Given VENCorp's status as an independent, not-for-profit transmission network service provider (TNSP) in Victoria and the monopoly provider of shared electricity transmission services, its forecast capex and the resultant planned augmentation charges are theoretical and serve purely to provide an indication of the most likely outcomes at this point in time. The forecasts will not be used to establish actual TUoS prices[89], as VENCorp will only recover costs which have been justified, approved and contracted for in accordance with its planning criteria and governance arrangements. VENCorp is not influenced by the efficiency based incentive mechanism built into the ex-ante regulatory framework that is used for other regulated TNSPs. These arrangements are captured in the provisions for the Victorian jurisdictional derogation contained in Chapter 9 of the NER, and the following discussion on forecast network augmentation must be considered in this context.

VENCorp has identified six key drivers influencing its planned expenditure levels over the forecast period. These are all associated with maintaining efficient and appropriate levels of transmission transfer capacity to ensure supply to end use customers or the efficient dispatch of generation, and include:

- increasing load (demand and energy) forecasts
- the location, timing and quantity of new generation
- asset failure risk
- objectives to reduce transmission losses
- mitigating the impacts of increasing fault levels
- compliance obligations associated with legislation, rules and regulations.

VENCorp is forecasting a total capital expenditure amount of $354m (real 07/08) over the 6-year period 2008/09 to 2013/14, which is around $59m per annum[90]. This expenditure is related to augmentation[91] of the Victorian shared transmission network[92] and has been categorised into either 'must do'[93], 'scenario'[94] or 'other event' driven works, as shown in

89 TUoS prices will be set based on VENCorp's committed projects, which include projects for which contracts were entered into prior to NER regulation and others that have passed the regulatory test and board approval processes within VENCorp.

90 The total capital expenditure amount of $354m is the probabilistic weighted capex, based on a range of scenarios modelled.

91 Augmentation is defined in the National Electricity Rules as 'works to enlarge a network or to increase the capability of a network to transmit or distribute active energy'.

92 The Victorian shared transmission network is defined in the Victorian System Code as the electricity transmission system (generally at nominal voltage levels of 66kV or above) and excludes connection assets.

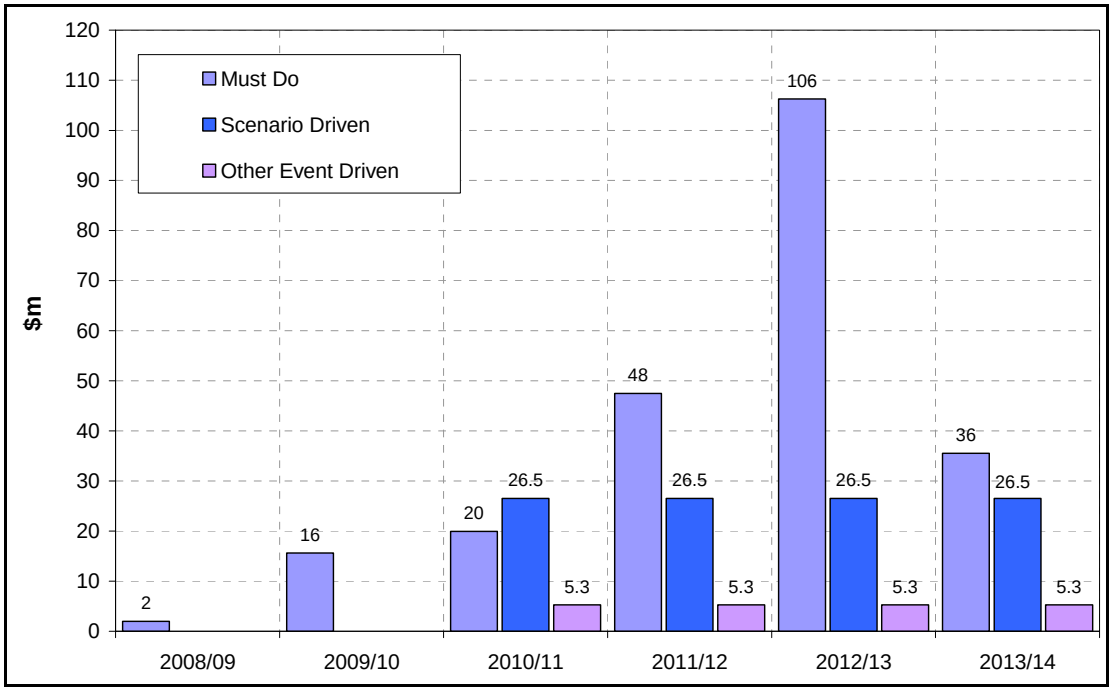
93 The 'must do' projects align with the 'Load driven augmentations' described in Attachment 5 of VENCorp's proposal.

94 The 'scenario' projects align with the 'Generator driven augmentations' described in Attachment 5 of VENCorp's proposal.

Figure 4-1. This is comparable to the nominal expenditure in the current five and a half year regulatory period of $140m (real 07/08).

It is also noted that VENCorp's forecast capex is presented on an 'as commissioned' basis, given that it is converted to annual 'planned augmentation charges', and then included in VENCorp's determination of its total revenue requirement.

Figure 4-1 – VENCorp's forecast capex proposal categorised by project type



Source: PB using VENCorp's submission 'VEN_DOCS-#194410-v9-Capex_Forecast.XLS'

The most noticeable characteristic of Figure 4-1 is the large increase in 'must do' expenditure, culminating in a peak annual expenditure of $106m in 2012/13. VENCorp is expecting to spend only $18m on augmentation between now and summer 2010/11. A further observation is that 'scenario' and 'other event' driven capex is evenly spread across the final 4 years of the regulatory period.

The 'must do' capex is associated with increasing demand forecasts and includes projects such as the installation of new transformers and switchgear in substations, minor upgrades to increase the transfer capability between stations, the installation of wind monitoring on lines to increase operational ratings and the placement of reactive support to improve voltage control.

The 'scenario' capex depends on the location, timing and quantity of new generation required to support the increasing load growth, and has been established using a number of deterministic generation development scenarios to arrive at a weighted capex allowance to capture potential works required. This capex includes a whole range of investment options ranging from building new lines and terminal stations to the installation of fault-limiting devices and reactive support.

The 'other event' capex is specific to a single project initiated by a connected party and associated with the major upgrade of a metropolitan transmission line.

4.2 DEMAND FORECASTS UNDERPINNING AUGMENTATION PLANS

Demand and energy forecasts are a key input used by VENCorp to inform its estimate of shared transmission network augmentation requirements. The forecasts used by VENCorp for the purposes of its revenue cap proposal are those contained within its 2006 Annual

Planning Review (APR), and these are consistent with those presented in NEMMCO's Statement of Opportunities 2006.

VENCorp has focused its assessment strongly on the medium economic growth 10% probability of exceedance (PoE) peak summer demand conditions. The summer period is the most critical with respect to transmission capability and planning requirements because of the two-fold impacts of the increase in demand (associated with air-conditioning) and the decrease in network transfer capability.

At a high level[95], the methodology adopted by VENCorp as part of its forecasting process has been to engage the National Institute of Economic and Industry Research (NIEIR) to prepare independent electricity and demand forecasts using its integrated multi-purpose econometric model. The key economic inputs are Victorian gross state product (GSP), industry output projections and forecasts of population, dwelling stocks, household disposable income, electricity and gas prices and wide-scale (government) energy policy and initiatives. Temperature sensitivity of load, and air-conditioning sales are considered in detail. NIEIR also undertakes back-casting exercises to test the accuracy of summer demand forecasts. VENCorp reconciles the top-down forecasts provided by NIEIR with bottom-up terminal station forecasts submitted on an annual basis by the Victorian distribution businesses and other connected parties

The forecasts cover a 10-year planning period and three economic growth scenarios — high (optimistic), medium (most likely) and low (pessimistic). Within each of these economic growth scenarios there are three sub-scenarios that capture the long run average weather conditions; namely 10% PoE, 50% PoE and 90% PoE conditions where the 10% PoE conditions represent extreme ambient weather scenarios that increase electricity demand and the 50% PoE conditions represent typical weather and demand scenarios. In all, there are nine sets for summer and winter peak demand forecasts, plus a set for energy consumption. The APR 2006 forecasts included the most recent information from distribution network service providers (DNSPs) and major customers from the summer 2005/06 and winter 2005 periods, and are shown in Table 4-1.

Table 4-1 – Victorian summer maximum demand forecasts – medium economic growth

Year	10% PoE		50% PoE		90% PoE	
	MW	Growth (MW, %)	MW	Growth (MW, %)	MW	Growth (MW, %)
2006/07	10,234	—	9,421	-—	8,981	—
2007/08	10,473	239, 2.3%	9,627	206, 2.2%	9,170	189, 2.1%
2008/09	10,683	210, 2.0%	9,805	178, 1.8%	9,331	161, 1.8%
2009/10	10,819	136, 1.3%	9,914	109, 1.1%	9,424	93, 1.0%
2010/11	10,990	171, 1.6%	10,057	143, 1.4%	9,553	129, 1.4%
2011/12	11,163	173, 1.6%	10,203	146, 1.5%	9,684	131, 1.4%
2012/13	11,415	252, 2.3%	10,428	225, 2.2%	9,894	210, 2.2%
2013/14	11,627	212, 1.9%	10,613	185, 1.8%	10,065	171, 1.7%
2014/15	11,837	210, 1.8%	10,802	189, 1.8%	12,243	178, 1.8%
2015/16	12,076	239, 2.0%	11,020	218, 2.0%	10,449	206, 2.0%

Source: PB using VENCorp's 2006 APR

Observations from Table 4-1 indicate that:

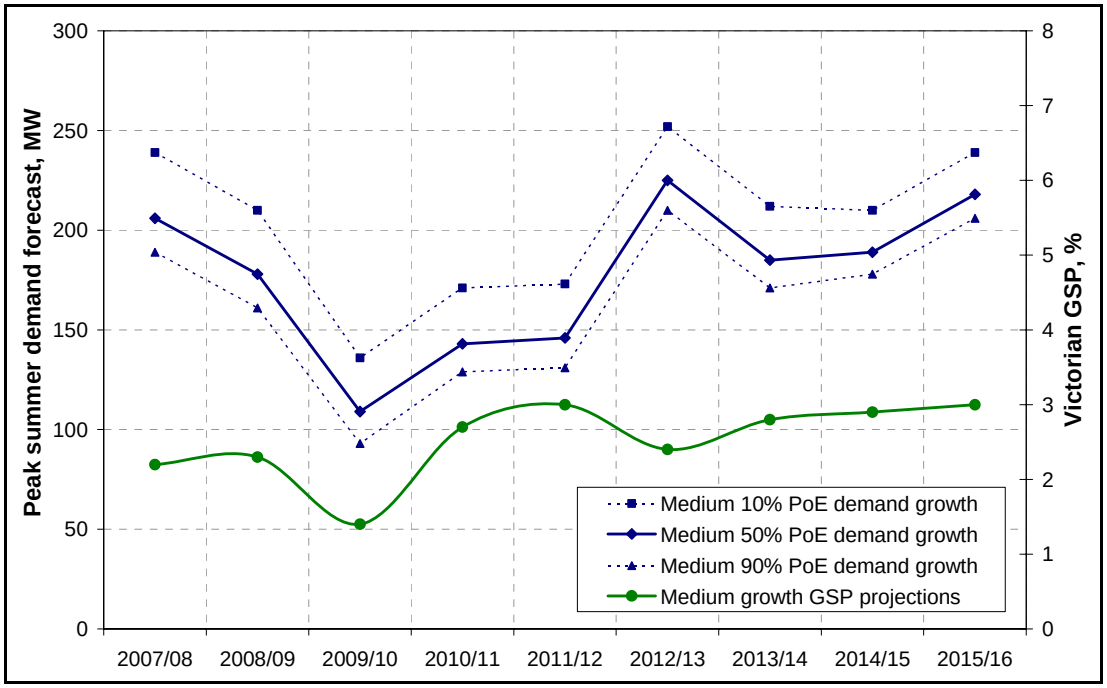
- annual summer demand growth averages at around 180 MW (1.8%), with a maximum of 252 MW (2.3%) and a minimum of 93 MW (1.0%). These growth characteristics are shown over time for the medium economic scenario in Figure

95 Further details are provided Appendix A (Page 105) of VENCorp's 2006 APR

4-2, where it can be seen that there is a reasonably strong correlation with Victorian GSP projections (except in 2012/13)

- the increase in the 10%, 50% and 90% PoE demand over the 2007/08 to 2013/14 6-year regulatory period is 1,154 MW, 986 MW and 895 MW, respectively
- the 10% PoE forecasts are on average 940 MW (9%) higher compared with the 50% PoE forecasts, and the 50% PoE forecasts are on average 510 MW (5%) higher compared with the 90% PoE cases, indicating that the Victorian summer demand is highly sensitive to ambient temperature[96]
- the 2013/04 50% PoE demand is less than the 2008/09 10% PoE, indicating that the influence of temperature sensitivity approximates 5 years of load growth under average temperature conditions.

Figure 4-2 – Victorian peak demand growth and GSP forecasts

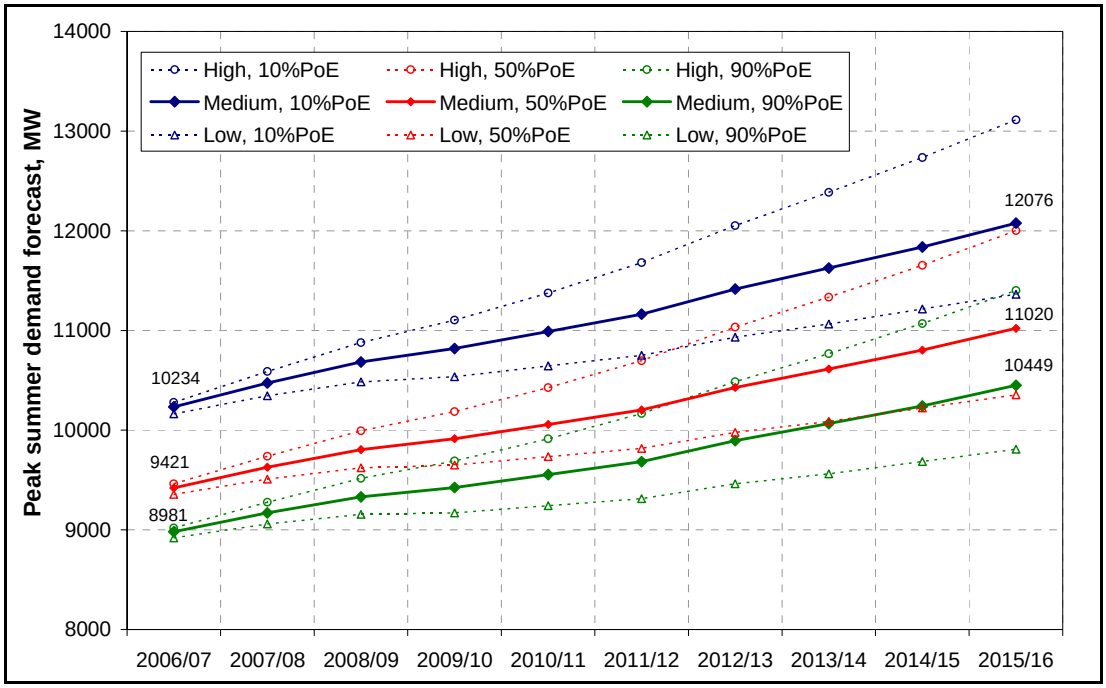


Source: PB using VENCorp's 2006 APR

The difference in peak summer demand forecast across different economic growth forecasts is presented in Figure 4-3, where it can be observed that the temperature sensitivity is much more influential compared to economic growth forecasts, especially in the short to medium term. In the longer term, the compounding effect of economic growth begins to have a greater influence on the varying range of demand forecasts.

96 This is characteristic of the high penetration of airconditioning load and the relatively high demand drawn by these devices.

Figure 4-3 – Victorian peak demand growth and GSP forecasts



Source: PB using VENCorp's 2006 APR

4.3 GENERATION FORECASTS UNDERPINNING AUGMENTATION PLANS

Subsequent to the demand and energy forecasts process, VENCorp undertakes a process to evaluate the supply–demand balance in Victoria to determine the extent of new generation capacity that is required over the outlook period. This is reflective of the process undertaken by NEMMCO as part of the Statement of Opportunities (SOO).

The inputs and outcome of this assessment are presented in Table 4-2, where it is seen from the sixth column that a cumulative amount of 1,423 MW is required in 2012/13 to ensure sufficient reserve levels are preserved under the 10% PoE summer demand forecast conditions.

Table 4-2 – Load-flow scenarios modelled by VENCorp to produce its revenue cap forecast

Year	Demand (10% PoE, medium)	Reserve level	Demand + Reserve	Total supply	Additional generation required
2006/07	10,234	765[2]	10,999	10,969[1]	30
2007/08	10,473	765	11,238	10,969	269
2008/09	10,683	765	11,448	10,969	479
2009/10	10,819	765	11,584	10,969	615
2010/11	10,990	765	11,755	10,969	786
2011/12	11,163	765	11,928	10,969	959
2012/13	11,415	765	12,180	10,969	1,211
2013/14	11,627	765	12,392	10,969	1,423
2014/15	11,837	765	12,602	10,969	1,633
2006 APR (2015/16)	12,450	765	13,215	10,969	2,246

Note 1, this assumes 8,569MW of Victorian generation plus 1,800MW import from NSW, plus 600MW from Tasmania.

Note 2, the reserve level to be shared across Victoria and South Australia, to ensure frequency standards are maintained following loss of generation and to ensure the long run average annual customer demand at risk of not being supplied is no more than 0.002% of the annual regional energy consumption.

Source: PB using VENCorp's 2006 APR

Effectively, VENCorp has developed its revenue cap application assuming 1,500 MW of new cumulative generation will be installed prior to summer 2013/14 (when the supply demand balance is out of equilibrium by 1,423 MW).

The specific location, timing and quantities of this new generation will have a material impact on the need to invest across the shared transmission network. To capture the range of potential investment, VENCorp has adopted a relatively simple scenario-based approach to generation development. It has assumed four scenarios based on its views of the most likely sites for new generation, as informed through its understanding of the Victorian electricity and gas industries and the interaction it has with parties interested in connecting to the shared network. The scenarios modelled by VENCorp in its 10-year development planning, as extended to its revenue cap forecast, are summarised in Table 4-3.

Table 4-3 – Generation development scenarios

Scenario	Description	Increase in Latrobe Valley generation	Increase in South West generation	Increase in import from NSW	Increase in import metro or state grid generation	TOTAL
Scenario 1	Latrobe Valley	1,200	—	—	300	1,500
Scenario 2	South West	200	700	—	600	1,500
Scenario 3	Import	600	—	600	300	1,500
Scenario 4	Metro	300	—	—	1,200	1,500

Source: VENCorp submission, Page 5
VEN_DOCS-#210011-v8-Report_on_forecast_capital_works_for_Rev_cap_application.DOC

VENCorp advises that while these scenarios aim to capture the extremes of new generation development, and therefore the extremes of transmission investment scenarios, they are only representative and actual outcomes may vary.

VENCorp has assumed an equal weighting across the four scenarios so that the expenditure in each case is adjusted by a factor of 25% and then summated to arrive at an overall probabilistic scenario based expenditure.

4.4 PROCESS TO FORECAST PLANNED AUGMENTATION EXPENDITURE

The process and methodology adopted by VENCorp to forecast its revenue cap over the period 2007/08 to 21013/14 is consistent with that used in 2002 when preparing its 2003 to 2006/07 forecast.

The capital projects forecast over the 2007/08 to 2013/14 regulatory period have been primarily based on the information published in Chapter 7, the Ten Year Outlook (TYO) of VENCorp's 2006 Electricity Annual Planning Review (EAPR) as published in June 2006, supplemented by the best available information at the time of the preparation of the application in October 2006.

VENCorp advises that the purpose of the TYO is to provide and indication of potential network constraints and augmentation requirements, and to identify possible easement requirements or new terminal stations over the long term outlook.

The process adopted by VENCorp to forecast its TYO and revenue cap follows a relatively simplistic approach. VENCorp creates a series of load-flow cases that simulate the operation of the interconnected transmission system under various conditions, specifically as outlined in Table 4-4.

Table 4-4 – Load-flow scenarios modelled by VENCorp to produce its 10-year outlook plan and its revenue cap forecast

Year	Demand	Scenario	Condition	Generation scenario
2008/09	10,685	10% PoE, Medium	All plant in service	Existing only
2008/09	10,685	10% PoE, Medium	Nine prior outages	Existing only
2010/11	11,100	10% PoE, Medium	All plant in service	Latrobe Valley, 180 MW
2010/11	11,100	10% PoE, Medium	All plant in service	High import, 2,500 MW
2010/11	11,100	10% PoE, Medium	All plant in service	South West, 700 MW
2010/11	11,100	10% PoE, Medium	All plant in service	Metro, 800 MW
2013/14	11,800	10% PoE, Medium	All plant in service	Latrobe Valley, 860 MW
2016/17	12,500	10% PoE, Medium	All plant in service	Latrobe Valley, 1,550 MW

Source: VENCorp submission, Page 22
VEN_DOCS-#210011-v8-Report_on_forecast_capital_works_for_Rev_cap_application.DOC

VENCorp then undertakes a series of deterministic automated AC contingency studies to produce ranked lists of plant loadings under the snapshot outage conditions. These results, and the thermal[97] and voltage limit constraints identified, form the primary insight into the need for augmentation.

97 Assuming 40degC ambient conditions and 0.6m/s wind speed.

With respect to its planned augmentation expenditure, and notwithstanding the (limited) information in the 2006 APR, VENCorp has not presented a detailed technical or economic assessment for the projects in the first three years of the regulatory period[98], and has not undertaken a detailed technical or economic assessment for the projects in the last two years. In accordance with its published planning criteria and market benefits approach, such detailed assessments incorporate hour by hour load-flow assessments informed through the simulation of NEMDE[99]. The hour by hour transmission flows then quantify the extent of energy at risk under outage conditions and coupled with the probability of critical plant outages — the expected value of energy at risk is calculated using a predefined Value of Customer Reliability. The benefits of reduced expected energy at risk, plus any reduction in transmission losses or savings in fuel costs are compared against the augmentation cost in an economical present value analysis. Do nothing is a valid outcome, if the present value of the cost of augmentation exceeds the present value of the constraints.

VENCorp has not attempted to undertake the resource intensive and time-consuming process outlined in its planning criteria for each and every project in the outlook period. In particular, for the last three years of the outlook period (2010-11 – 2013/14), it has used the deterministic based and ranked plant loadings from its snapshot load flows and its previous experience from its detailed probabilistic based analysis to implement an 'indicative probabilistic' approach to its revenue cap forecast. The outcome of this approach is that the projects and their timings (where identified) are indicative only, and may be subject to considerable variations should any of the vast array of input assumptions used in the detailed assessment change. Detailed application of VENCorp's full probabilistic approach may also result in material variation to identified projects and their timing.

Furthermore, VENCorp has not modelled any of the proposed projects as part of its technical load-flow analysis and has not explicitly captured any interdependencies between the proposed projects. As an example, VENCorp has not described how it has considered the impacts or materiality of how a project proposed in 2010/11 affects a project proposed in subsequent years. Practically, an augmentation of the network is likely to defer the need for further investment or have no impact on the timing of other projects at all.

4.5 HIGH LEVEL OUTCOMES OF FORECASTING PROCESS

VENCorp's forecast capex amount includes 32 separate projects[100] over the 6-year 2008/09 to 2013/14 regulatory period. These projects have been categorised in accordance with Table 4-5.

Table 4-5 – Summary of the planned augmentation projects proposed by VENCorp

Project category	Number of projects	Total expenditure $m (real 07/08)	Total expenditure %	Key driver for expenditure
Must do	13	227	64	Load growth
Scenario	18	106[1]	30	Generation
Other event	1	21	6	Load transfer
TOTAL	32	354	100	

Note 1, weighted expenditure

Source: PB using VENCorp's submission 'VEN_DOCS-#194410-v9-Capex_Forecast.XLS'

The thirteen 'must do' projects identified by VENCorp are summarised in Table 4-6.

98 The proportion of planned augmentation capex in the first three years is 20% of the total over the five year period.

99 The National Electricity Market Dispatch Engine.

100 Note a number of these projects are larger, staged programs of work driven by the same need, for example the works to install reactive support in the stage grid area.

Table 4-6 – Proposed capex for 'must do' projects

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
1,000 MVA metro transformer	—	—	—	—	43.8	—	43.8
220 kV Malvern to Heatherton cable	—	—	—	—	43.8	—	43.8
Minimum reactive support in metro area[1]	—	5.0	5.0	5.0	5.0	5.0	25.0
SVC in state grid area[2]	—	—	—	25.0	—	—	25.0
Minimum fault limiting devices in metro area	—	3.8	3.8	3.8	3.8	3.8	19.0
Line terminations and monitoring equipment in metro area	—	3.8	3.8	3.8	3.8	3.8	19.0
220 kV line uprating	—	—	—	3.8	1.3	11.9	17.0
Line terminations and monitoring equipment in state grid area	—	2.5	2.5	2.5	2.5	2.5	12.5
Minimum reactive support in state grid area[3]	—	—	2.5	2.5	2.5	2.5	10.0
220 kV development at South Morang	—	—	—	—	—	6.3	6.3
220 kV line wind monitoring	—	0.6	2.4	—	—	—	3.0
DSM and QOSM[4] required by NEMMCO	2.0	—	—	—	—	—	2.0
Moorabool and Geelong station upgrade	—	—	—	1.3	—	—	1.3
TOTAL	2.0	15.7	20.0	47.7	106.5	35.8	227.7

Note 1, accounts for between 500MVAr and 2000MVAr of reactive support

Note 2, driven by wind generation in the state grid

Note 3, accounts for between 200MVAr and 600MVAr of reactive support

Note 4, Dynamic System Monitors (DSM's) and Quality of Supply Monitors (QOSM's)

Source: PB analysis and VENCorp submission 'VEN_DOCS-#194410-v9-Capex_Forecast.XLS'

Five of the thirteen 'must do' projects (38% by value) are characterised by generalised and equal allowances spread over a number of years.

By specifying a project as 'must do', VENCorp implicitly suggests that the timing is independent of the quantity, timing and location of new generation required over the outlook period; however, the timing is indicative only and subject to further detailed assessment

The eighteen 'scenario' driven projects are summarised in Table 4-7, where a '1' in the appropriate row indicates that the projects is required in the specified scenario. For example the 'additional reactive support in the state grid' project is required in the Latrobe valley, the South West and the Metro scenarios only.

Table 4-7 – Proposed capex for 'scenario' driven projects

Project	Latrobe Valley	South West	Import	Metro	Expenditure $m (real 07/08)	Weighted expenditure $m (real 07/08)
Fourth 330/220 kV transformer at Dederang	1	1	1	1	13.8	13.8
Additional reactive support in state grid	1	1	1		5	3.8
Fifth 500/220 kV transformer at Hazelwood	1	1		1	27.5	20.6
Fourth 500 kV line Loy Yang to Hazelwood	1		1		37.5	18.8
Upgrade terminations and CBs at Hazelwood	1		1		7.5	3.8
Additional reactive support in metro	1				25	6.3
New 500 kV TS at Mortlake		1			15	3.8
Third 330/220 kV transformer at South Morang			1		25	6.3
Series comp. + shunt cap bank Wodonga/Dederang			1		15	3.8
330 kV line uprate South Morang to Dederang + series compensation			1		9.3	2.3
Series comp. on 220 kV line Eildon to Thomastown			1		8.8	2.2
220 kV line uprate to 90deg Bendigo to Shepparton			1		6.3	1.6
Phase angle transformer on 220 kV line Bendigo to Shepparton			1		6.3	1.6
150 MVAr cap bank at Wodonga			1		5	1.3
220 kV line uprate to 70deg Eildon to Thomastown			1		3	0.8
Additional SVC in state grid area				1	25	6.3
Additional fault limiting devices in metro area				1	25	6.3
Fault limiting devices in state grid area				1	12.5	3.1
TOTAL	116.3	61.3	142.3	103.8	272.3	
Weighted TOTAL	29.1	15.3	35.6	25.9		105.9

Source: PB using VENCorp's submission 'VEN_DOCS-#194410-v9-Capex_Forecast.XLS'

Given the simplistic approach adopted by VENCorp to forecast scenario driven projects, no specific project timing has been suggested for any of the eighteen projects. Rather, VENCorp has spread the weighted total expenditure of $105.9m evenly across the last 4 years of the regulatory period as none of these projects are expected to be required prior to 2010/11.

VENCorp has also included a single event driven project, triggered by the distribution business initiated prospect of transferring load from Richmond terminal station to Malvern[101] terminal station. The timing for this is likely to be beyond 2010, and VENCorp has included an allowance of $21.3m for shared augmentation purposes and spread this amount evenly across the final 4 years of the regulatory period.

4.6 SELECTION OF PROJECTS FOR DETAILED REVIEWS

The role of detailed project reviews is to test the investment framework and the internal planning procedures within VENCorp from a bottom-up perspective. The importance of the detailed reviews is to understand each step throughout the decision-making process using practical examples rather than generalised references and substantiate that a consistent approach has been adopted across the various project categories. To put this in the context of VENCorp's processes, it is recognised that VENCorp has adopted a pragmatic and simplified approach to its long-term forecast as opposed to the detailed and time consuming application of its probabilistic and market-modelling-based planning criteria, which is reserved for formal Regulatory Test applications as part of its short-term planning and commitment to infrastructure investment. The forecast projects presented by VENCorp are indicative in both timing and scope, particularly towards the end of the 2013/14 regulatory period.

PB has selected five forecast (planned) projects for detailed review. The selection process for the forecast projects has been coordinated with that for the historical projects and has captured the materiality of the cost; the defined project categories and drivers; the project location and affected parties; and the timing of the expenditure.

The five projects selected are summarised in Table 4-8.

Table 4-8 – Selection of planned augmentation projects for detailed review

Project category	Project description	Key driver for expenditure	Total expenditure $m (real 07/08)
Must do	1,000 MVA, 500/220 kV transformer in metro area	Load growth	43.8
Must do	Minimum reactive support in state grid area	Load growth	10.0
Must do	Line terminations and monitoring equipment in metro area	Load Growth	18.8
Scenario driven	Fourth 330/220 kV transformer at Dederang	Increase in import capability	13.8
Scenario driven	Fourth 500 kV line from Loy Yang to Hazelwood	New generation	37.5
TOTAL			123.9

Source: PB analysis

The selection of forecast capex projects for detailed review includes all project categories and drivers except the one off 'other event', and covers 16% of the program by the number of projects (32 in total) and 30%[102] of the program by the weighted value of projects ($354m).

101 Malvern terminal station is currently I the final stages of being rebuilt as part of SPA's asset management/replacement of works.

102 The 30% figure is derived by applying the appropriate weighting factors to the scenario driven capex.

4.7 1,000 MVA 500/220 KV TRANSFORMER IN METROPOLITAN AREA

This project involves the augmentation of key transformer capacity serving the metropolitan areas of Melbourne at a cost of $43.8m (real 07/08) to be commissioned prior to the summer period in 2012/13, as shown in Table 4-9.

Table 4-9 – Proposed capex for transformer in metro area

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
VENCorp proposal	—	—	—	—	43.8	—	43.8

Source: VENCorp's submission 'VEN_DOCS-#194410-v9-Capex_Forecast.XLS'

This project ranks as the (equal) largest planned expenditure item and accounts for 12.4% of VENCorp's total proposed network-related capex.

4.7.1 Project overview

There will be nine[103] key transformers supplying the extended Melbourne metropolitan area by 2007/08. The units are located across four sites (Cranbourne, Rowville, South Morang and Keilor) and effectively these units transform power from the 500 kV transmission level to 220 kV[104]. The combined nominal rating of these units is 7,650 MVA.

This project is aimed at increasing the capacity of this key transformation supplying the Melbourne metropolitan area and minimising the risk and consequences associated with planned and forced outages of these units. Under extreme loading conditions, the transformer capacity may constrain the amount of load supplied to Melbourne.

The project scope involves the greenfield establishment of a new 500 kV switchyard at one of either of two existing terminal station sites, the installation of a 1,000 MVA transformer and connections into the existing 220 kV switchyards.

4.7.2 Drivers (need or justification)

VENCorp has advised that the primary need for transformer capacity augmentation in the metropolitan area is general load growth. This is captured at a high level by the increase in the 10% PoE and 50% PoE, medium economic scenario peak summer Scheduled[105] demand forecasts of 944 MW and 808 MW, respectively, over the period 2008/09 to 2013/14. This represents an average annual increase of between 189 MW (1.7%) and 162 MW (1.6%). Based on the detailed point of connection demand forecasts in Appendix B of VENCorp's 2006 APR, the metropolitan terminal stations[106] account for around 60%[107] of the total Victorian demand.

The issues associated with limited metropolitan transformer capacity have been a long standing characteristic of the Victorian shared network as evidenced by the installation of a

103 After the pending commissioning of a second transformer at Rowville in September 2007.

104 Utilising an intermediate voltage of 330kV at South Morang.

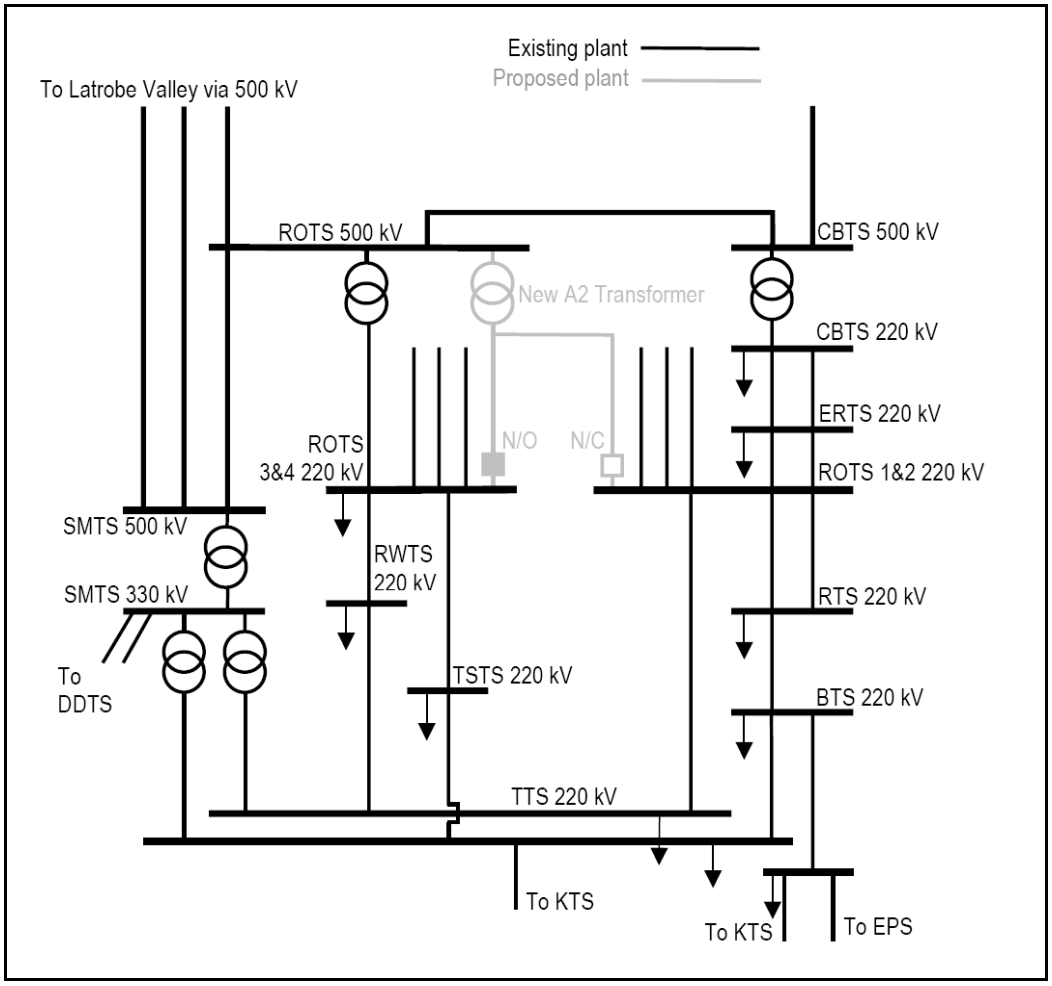
105 PB notes that Native demand forecasts (as introduced in the 2007 APR) are higher than Scheduled demand forecasts as used in the 2006 APR and that flows on the transmission network become increasingly dependant on the location and connection of new unscheduled generation.

106 Defined as Heatherton, Malvern, Tyabb, Richmond, West Melbourne, Brooklyn, Altona, Brunswick, Cranbourne, East Rowville, Fisherman's Bend, Keilor, Richmond, Ringwood, Springvale, Templestowe and Thomastown.

107 Calculated using the assumption of a 0.98 diversity factor applied to the coincident peak summer demand forecasts in Appendix B of the 2006 APR.

1,000 MVA transformer at Rowville in 1998, another at Cranbourne in 2004 and a second unit at Rowville scheduled for commissioning in September 2007. It is noted that the Cranbourne transformer was primarily installed to account for the removal of a roughly equivalent 220 kV injection point at the same time and as part of the Latrobe Valley to Melbourne transmission upgrade project. The network configuration as of September 2007 is represented in Figure 4-4.

Figure 4-4 – Supply to Melbourne from the Latrobe Valley and South Morang

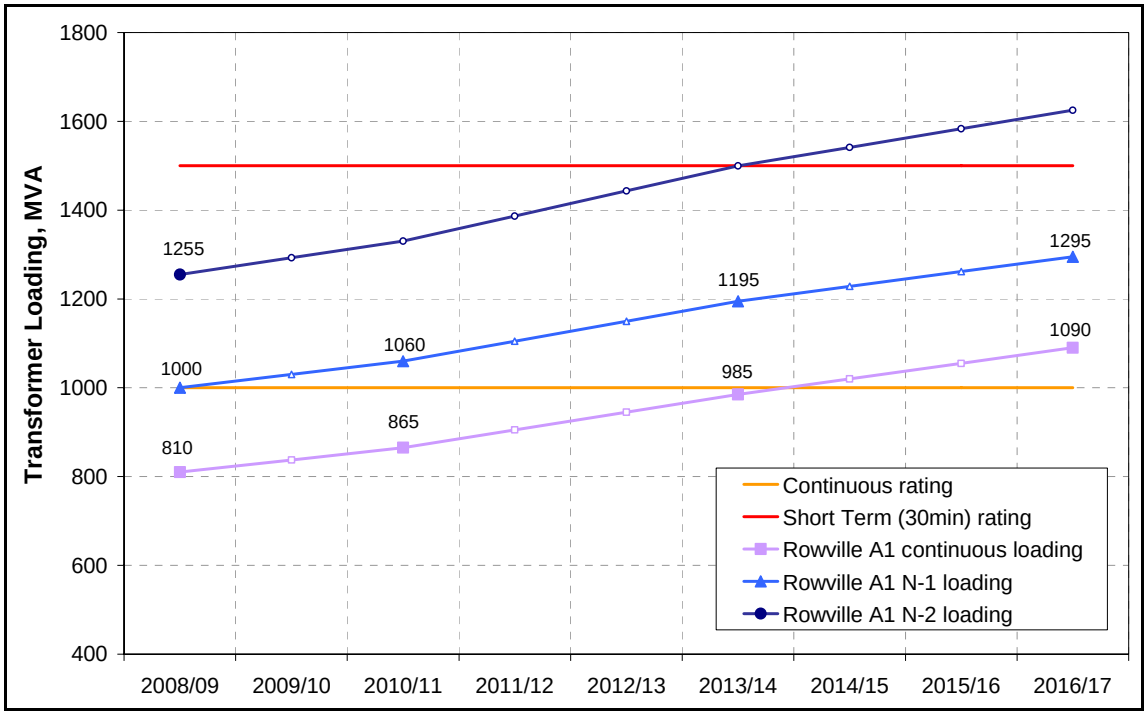


Source: VENCorp Final Report, Additional 500/220kV transformation to support Melbourne metropolitan load growth, June 2005

VENCorp has advised that outage of either a Rowville, Cranbourne or South Morang Terminal Station transformer can overload the remaining units and the underlying 220 kV network connecting these major injection points.

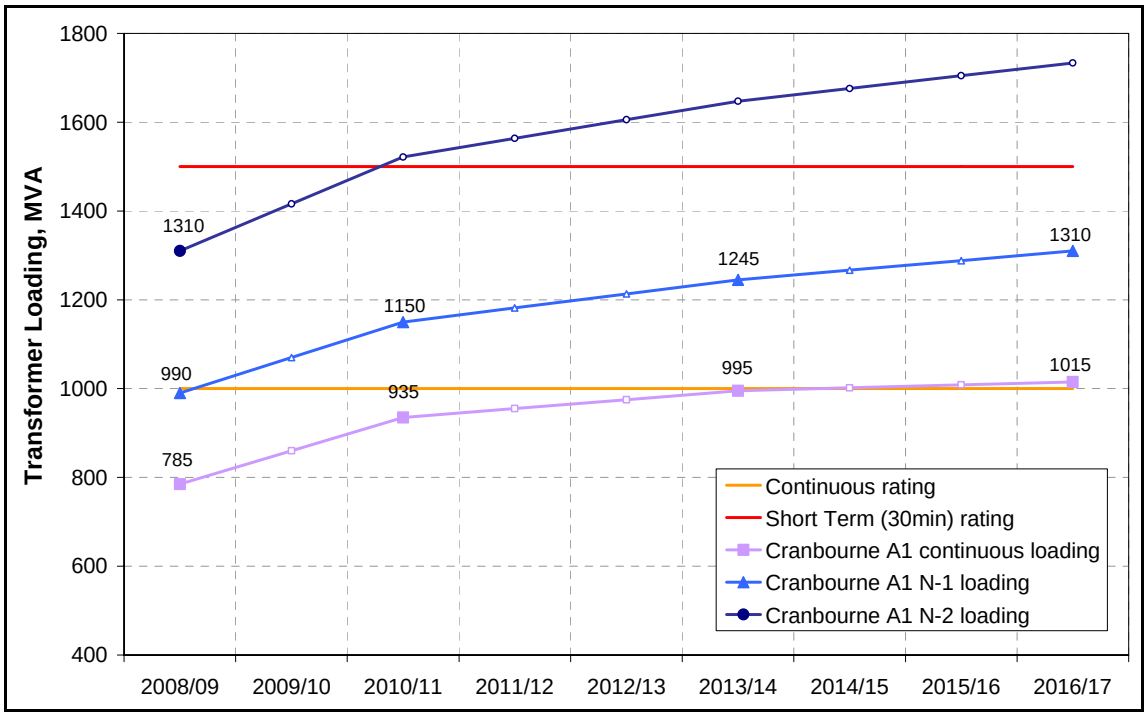
To support the need for transformer capacity augmentation, VENCorp has presented the system normal, N-1 and N-2 loading on these critical transformers for the 10% PoE conditions based on the Latrobe Valley generation scenario, as shown in Figure 4-5 to Figure 4-7. These results are based on the 2006 APR demand forecasts, and it is noted that only data points with solid markers have been presented by VENCorp, with the remainder inter/extrapolated by PB for the purposes of this presentation.

Figure 4-5 – VENCorp's forecast flows on the Rowville A1 transformer



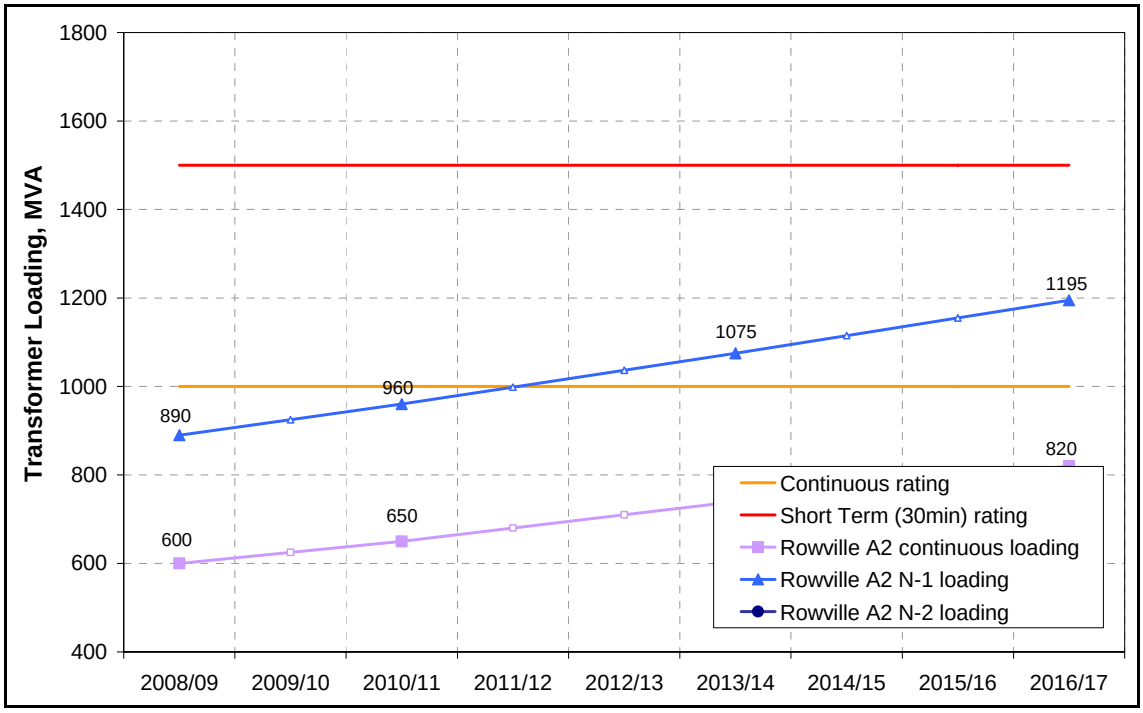
Source: PB analysis and VENCorp submission, Page 15
VEN_DOCS-#210011-v8-Report_on_forecast_capital_works_for_Rev_cap_application.DOC

Figure 4-6 – VENCorp's forecast flows on the Cranbourne A1 transformer



Source: PB analysis and VENCorp submission, Page 15
VEN_DOCS-#210011-v8-Report_on_forecast_capital_works_for_Rev_cap_application.DOC

Figure 4-7 – VENCorp's forecast flows on the Rowville A2 transformer



Source: PB analysis and VENCorp submission, Page 15
VEN_DOCS-#210011-v8-Report_on_forecast_capital_works_for_Rev_cap_application.DOC

For the representative conditions, the key observations from Figure 4-5 to Figure 4-7 are:

- in 2008/09 flows are most critical on Rowville A1, followed by Cranbourne A1 and then Rowville A2
- the Cranbourne transformer is subject to very high growth between 2008/09 and 2010/11; however, this attenuates strongly beyond 2013/14
- after 2008/09, single transformer outages can cause loading greater than continuous rating on both the Rowville A1108 and Cranbourne A1109 units — using a deterministic N-1 planning criteria, augmentation would be required prior to 2009/10, and based on VENCorp's application of probabilistic planning this represents the earliest time at which augmentation may be required
- in 2014/15 the system normal loading on both Rowville A1 and Cranbourne A1 will exceed each units continuous rating, which represents a scenario that all the forecast demand cannot be supplied and that this is likely to be the latest point at which augmentation is needed based on VENCorp's probabilistic planning criteria.

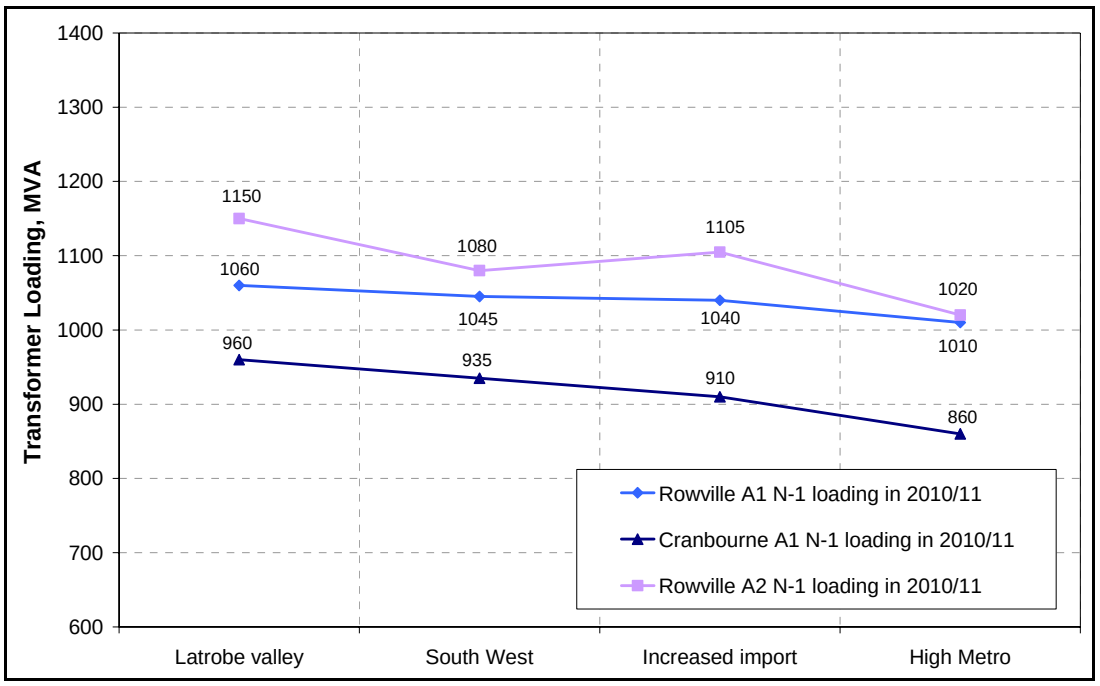
VENCorp has also advised that the loadings on the critical transformers are not very sensitive to the location of future generation. This is represented in Figure 4-8, where it can be seen that the loading on the critical transformers does not vary significantly.

In particular, it is noted from Figure 4-8 that the Latrobe Valley generation scenario is the worst case with respect to loading on the critical metropolitan transformers and the three other scenarios will all alleviate the loading (by anywhere from 1.4% to 11%) and act to defer future augmentation requirements.

108 Potentially overloaded for outage of the South Morang H2 transformer.

109 Potentially overloaded for outage of the Rowville A2 transformer.

Figure 4-8 – VENCorp's forecast flows on the critical transformers as affected by new generation



Source: PB analysis and VENCorp submission, Page 15
VEN_DOCS-#210011-v8-Report_on_forecast_capital_works_for_Rev_cap_application.DOC

4.7.3 Strategic alignment and policy support

Given the 'indicative probabilistic' nature of VENCorp's forecast for the purposes of its revenue cap proposal, this project does not directly reflect the likely outcome of VENCorp's application of its planning criteria or its investment approval and governance processes.

In a general sense, the need for additional metropolitan transformer capacity augmentation was envisaged as part of VENCorp's public consultation undertaken by in July 2005[110], where a tentative timing of 2012/13 was presented based on excessive system normal loading of 103.2%. This outcome was subject to the implementation of VENCorp's preferred option of a second 1,000 MVA, 500/220 kV transformer at Rowville, which is committed and scheduled for completion in September 2007. The future timing was associated with a Victorian 10% PoE peak summer demand under the medium economic growth scenario of 12,348 MW in 2013/14.

VENCorp's 2006 APR[111] envisages the need for future 500/220 kV metropolitan transformation in the metropolitan area in by 2012/13.

In December 2005, VENCorp procured a spare 500/220 kV single-phase transformer, which is located at Moorabool Terminal Station and is technically compatible with the units at Moorabool, Rowville and Cranbourne. This strategic spare aims to minimise the outage duration for any failures of transformers at these locations.

4.7.4 Alternatives

VENCorp has considered a single generic scope for the augmentation required in 2012/13 at two different locations — Templestowe (TSTS) or Ringwood (RWTS) Terminal Stations. It has advised that alternative options and locations will be considered as part of its detailed

110 Section 10.2, page 45, VENCorp Final Report, New Large Network Augmentation, Additional 500/220kV Transformation To Support Melbourne Metropolitan Area, July 2005.

111 Section 7.6.4, page 88.

assessment. Furthermore, as part of 2006 APR, VENCorp has also indicated that the location of any new transformation will be sited to maximise the benefits and minimise costs having regard to the impact on fault levels, thermal loading on existing assets and reliability and security of supply.

4.7.5 Timings

Given the results of the preliminary technical studies as presented in Section 4.7.2, and prior to undertaking a detailed probabilistic assessment, VENCorp considers the most likely timing for further augmentation of the metropolitan transformation capacity lies within the range 2008/09 and 2014/15, and that this is a 'must do' project independent of the timing, location or magnitude of new generation covered by the scenarios considered. Based on its experience and understanding of the operation of Victorian transmission network, it has selected an indicative timing of summer 2012/13 for commissioning of the next major metropolitan transformer.

4.7.6 PB Analysis

Apart from the contents of VENCorp's revenue cap proposal and its published APR's, and notwithstanding the specific and reactive responses received regarding our requests for further information, VENCorp presented very limited documentation on this constraint. There appeared to be no specific planning report readily available, which made a detailed and transparent review of VENCorp's 'indicative probabilistic' planning approach difficult. To a large extent, this is explained by the likely timing of augmentation towards the end of the next regulatory period.

At a high level, given the critical role played by the major 500/220 kV transformers at Rowville, Cranbourne and South Morang in supporting the Melbourne metropolitan load centre, and the numerous outages that could result in thermal overloads, PB is of the view that a justifiable need has been established for investigate further augmentation.

However, in PB's opinion this need must be considered more thoroughly in the context of VENCorp's detailed application of its probabilistic planning criteria and the likelihood, consequences and duration of the failures envisaged. The outages leading to the overloads are all associated with transformers that are relatively new and reliable, except the 40-year-old units at South Morang. The Cranbourne A1 transformer is effectively 2.5 years old, the Rowville A1 unit is around 8 years old, and the Rowville A2 unit will be commissioned in September 2007. It is not clear how VENCorp has considered the condition or reliability of the critical transformer units as part of its preliminary analysis or how it will treat this as part of any future detailed assessment[112]. Furthermore, each of these units has a strategic spare available that will minimise any extended outages and minimise the exposure to transmission constraints. Each of these aspects is particularly relevant given the probabilistic nature of the planning criteria applicable, where the failure rate and mean time to repair are both decisive in determining the Value of Expected Unserved Energy[113], against which capex is justified. In PB's view, the likelihood of major failure of any of the critical transformers at Rowville, Cranbourne or South Morang, given their age-related condition, is particularly low. Further, the forced outage duration is expected to be restricted to weeks, as opposed to months given the availability of spares, and the prospect of transmission constraints or other related consequences over peak summer periods is very low. VENCorp has not presented any indication of the level of expected energy at risk or how this will grow over the outlook period. Given the materiality of the augmentation solution proposed on the revenue cap proposal, PB would expect that a more detailed technical assessment had been undertaken and documented for this constraint.

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112 It is noted from PB's review of SPA's detailed transformer risk model that the South Morang and existing Rowville transformer are amongst the lowest ranked units in the model – reflecting their very good condition.

113 Reference is made to section 7.2.1 and 7.3.1 on pages 17 and 20, respectively of the VENCorp Final Report, New Large Network Augmentation, Additional 500/220kV Transformation To Support Melbourne Metropolitan Area, July 2005.

As part of our detailed review, and with respect to the transformer loadings presented by VENCorp to support the proposed augmentation timing of 2012/13, PB has noted three key matters:

- the load-flow case used to represent summer 2013/14 reflects a Victorian demand level of 11,800 MW and this is more consistent with the scheduled (as opposed to native) 10% PoE forecast conditions in 2014/15 rather than 2013/14. The use of 11,800 MW for native demand in 2013/14 in this manner implies the timing proposed may be aggressive subject to the assumptions made about the location and dispatch of non-scheduled generation
- the 10% PoE forecast is considerably higher than the 50% PoE conditions[114.] Effectively, under the 50% PoE scenario, the timing of augmentation may be deferred as much as 5 years compared with the 10% PoE cases. Given VENCorp's treatment of these demand forecast scenarios[115] as part of its planning criteria and historical project justifications, it is PB's opinion that any timing based indicatively on the 10% PoE scenario alone will be materially advanced compared to the probabilistically weighted outcome
- while acknowledging that the critical transformer loading is 'relatively' insensitive to the location of new generation, Figure 4-8 shows that the Latrobe Valley generation scenario presented by VENCorp is clearly the worst case and, given the equal likelihood attributed to the four generation scenario's by VENCorp - there is a greater chance the loading on the critical transformers will be reduced. Effectively this project is primarily driven by load growth but also reasonably influenced by generation development since the timing of the project is towards the end of the regulatory period when a considerable quantity of new generation will be required.

Given these three key observations, coupled with the expected high reliability and availability of the critical transformers, PB considers the timing proposed by VENCorp is not prudent and a more likely timing for augmentation of the metropolitan transformer capacity is beyond the 2008/09 to 2013/14 regulatory period. This is based on PBs application of an 'indicative probabilistic' approach that most closely aligns with VENCorp's detailed probabilistic planning criteria and the application of its criteria when justifying the committed expenditure associated with the second Rowville 1000 MVA (A2) transformer. We consider a more representative timing is most likely to be prior to summer 2014/15 and that VENCorp's proposed timing is partial to the deterministic study outcomes. It is PB's view that VENCorp has not demonstrated the timing of 2012/13 is reasonable, prudent or economical.

With respect to VENCorp's presentation of alternatives, PB considers this has been somewhat limited given the high value of the proposed project. To some extent this is also reflective of a project that is envisaged towards the end of the regulatory period; however, in PB's opinion a more concerted effort to identify additional alternatives and test the feasibility of proposed options is warranted. In particular, in addition to the sites considered by VENCorp, PB expects that options including augmentation of the transformer capacity at either South Morang[116] or Cranbourne maybe justified given the opportunities to reduce development costs through the use of existing switchgear and plant. PB also acknowledges that both the Templestowe and Ringwood sites introduce additional diversity with respect to 500 kV injection points in the metropolitan area, and that given the high local demands[117] and the 500 kV lines that traverse the sites, these are practical and reasonable options to consider.

114 Representing increased ambient temperature sensitivity. A peak summer demand level of 10,800MW is representative of both the 2008/09 10% PoE level and the 2014/15 50% PoE level.

115 Refer to probabilistic weighted approach of {1/3:1/3:1/3} for {10%PoE:50% PoE:90% PoE} scenarios on Section 5, page 10 of the VENCorp Final Report, New Large Network Augmentation, Additional 500/220kV Transformation To Support Melbourne Metropolitan Area, July 2005.

116 Possibly the co-ordinated replacement/augmentation of the existing, aging South Morang H1 and H2 units with larger ones, to capture efficiencies of using existing 330kV and 220kV infrastructure.

117 The 10% PoE peak summer demand forecasts at Templestowe and Ringwood in 2008/09 are 340MW and 580MW, respectively.

VENCorp has not presented any load-flow studies simulating the projects proposed in order to verify the technical feasibility or the benefits of the investment.

4.7.7 Costs

The cost proposed by VENCorp for this project is based on a preliminary feasibility estimate of $35m and the inclusion of a 25% contingency to arrive at a total allowance of $43.8m. This estimate has been established based on a simple desktop review of the proposed scope of works and the costs of recent projects of similar scope.

The scope of works includes the installation of one 1,000 MVA 500/220 kV transformer of similar design to those recently installed at Cranbourne and Rowville, a greenfield 500 kV switchyard including 3 x 500 kV CBs, plus 2 x 220 kV CBs for the low voltage connections, and an appropriate control room housing the appropriate protection, control and monitoring systems.

In PB's opinion, and as informed through the detailed review of actual costs associated with the Cranbourne and Rowville developments undertaken by VENCorp over the last 3 years, PB considers the preliminary feasibility estimate of $35m is a reasonable and efficient planning allowance to account for the expected contestable and non-contestable works proposed at Ringwood or Templestowe. In particular, we note that it has not been evident through our review that VENCorp has confirmed the technical feasibility of the proposed option via detailed load-flow modelling. Without the insight of this assessment, the costing process is particularly theoretical. With respect to this estimate, we consider the 25% contingency factor is an inappropriate inclusion and this matter is discussed further in Section 4.13.3.

4.7.8 Conclusion

VENCorp has outlined the critical role that key 500/220 kV transformers play in supporting electricity demand in metropolitan Melbourne. There are a number of outages that, while being highly unlikely and of short duration, may result in transmission constraints and loss of supply under the high demand conditions forecast towards the end of the 2008/09 to 2013/14 regulatory period.

PB considers that there is a need for transformer capacity augmentation, as evidenced by the recent installation of units at Cranbourne and Rowville, but that the prudent timing associated with this need is beyond the 2008/09 to 2013/14 regulatory period. This conclusion has drawn from the approach VENCorp has used as part of its regulatory test application for the committed expenditure for the second Rowville (A2) transformer. On this basis, PB recommends that no allowance is made for a new 1000 MVA 500/220 kV transformer in the metropolitan area as part of VENCorp's revenue cap. This recommendation is presented in the Table 4-10. In PB's opinion the earlier timing proposed by VENCorp is very much a worst case scenario that is not a reasonable reflection of an indicative probabilistic approach that closely aligns with VENCorp's detailed application of its current planning criteria.

Table 4-10 – Recommended capex for transformer in metro area

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
VENCorp proposal	—	—	—	—	43.8	—	43.8
Proposed variation	—	—	—	—	(43.8)	—	(43.8)
PB recommendation	—	—	—	—	—	—	—

Source: PB analysis

4.8 MINIMUM REACTIVE SUPPORT IN STATE GRID

This project involves the staged installation of shunt capacitor banks across a number of locations within the Victorian state grid[118] at a combined cost of $10.0m (real 07/08). The capacitors are to be progressively installed between 2010/11 and 2013/14, as shown in Table 4-11.

Table 4-11 – Proposed capex for reactive support in state grid

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
VENCorp proposal	—	—	2.5	2.5	2.5	2.5	10.0

Source: VENCorp's submission 'VEN_DOCS-#194410-v9-Capex_Forecast.XLS'

This project accounts for 2.8% of VENCorp's total proposed network related capex.

4.8.1 Project overview

Shunt capacitor banks are a source of reactive power, which is generally consumed by loads and transmission plant such as transformers and transmission lines. When the supply of reactive power and the demand of reactive power are not balanced, the consequence is reduced voltage levels. This is particularly the case after contingency events, where the reactive power losses can become very high. In the state grid area of Victoria, transmission lines are very long and have low surge impedance loading[119], meaning that at time of peak demand it is very difficult to maintain the required reactive power balance. VENCorp (like other TNSPs) is obliged to maintain voltage levels and reactive margins within defined standards in accordance with the Victorian System Code and the National Electricity Rules.

To meet the required standards, VENCorp foresees the need to install a '2 x 25 MVAr', step-switched 66 kV shunt capacitor bank in each year from 2010/11to 2013/14, at various locations in the state grid.

4.8.2 Drivers (need or justification)

VENCorp has advised that the primary need for this expenditure is to maintain voltage stability[120] to meet its 10% PoE demand forecasts. The forecast capex is a general allowance, and is highly dependent on the amount of new (if any) generation is installed in regional Victorian and the market-driven power flows between Victoria, South Australia and New South Wales.

VENCorp has not presented any specific technical studies to support the proposed capacitor banks, but has made general reference to its determination of the Maximum Supportable Victorian Demand, which is 10,685 MW from 2008/09 and beyond. No references have been made to critical contingencies in the state grid, or the locations of unacceptable voltage drops or reactive margins.

118 The Victorian stage grid network generally refers to regional terminal stations and their interconnecting lines including Moorabool, Terang, Ballarat, Horsham, Red Cliffs, Bendigo, Kerang, Shepparton, Glenrowan and Dederang.

119 Surge impedance loading (kV_{L-L}^2 / (sqrt(L/C))) for a transmission line is defined as the power flow measured in MW at which capacitive charging equals reactive losses – loading above this level incurs reactive power losses and voltage drops, whereas loading below this level results in a reactive power gains and voltage increases.

120 Voltage stability is the term used to represent the need to maintain voltages within target levels or to maintain reactive power margins at specific locations in order to preclude voltage instability/collapse.

In addition to the $2.5m per annum over the 4 years from 20010/11 to 2013/14 for reactive support in the state grid, VENCorp is also forecasting as part of other projects:

- 'must do' expenditure of $25m for an SVC in the state grid in 2011
- 'must do' expenditure of $25m for reactive support in the metropolitan area in even instalments across the 5 years 2009/10 to 2013/14
- an additional 'scenario driven' expenditure of $25m for an SVC in the state grid sometime between 20010/11 and 2013/14 under the high metropolitan and state grid generation scenario
- an additional 'scenario driven' expenditure of $25m for reactive support in the metropolitan area sometime between 20010/11 and 2013/14 under the Latrobe Valley generation scenario
- an additional 'scenario driven' expenditure of $5m for reactive support in the state grid area sometime between 20010/11 and 2013/14 under three of the four generation scenarios.

4.8.3 Strategic alignment and policy support

VENCorp has advised that the need for reactive support in the state grid is strategically aligned to the studies supporting its Vision 2030 report, which indicated that around 1,000 MVAr of switched capacitor banks and fast controlled reactive sources (SVCs) may be required[121] in the regional network.

Given the 'indicative probabilistic' nature of VENCorp's forecast for the purposes of its revenue cap proposal, this project does not directly reflect the likely outcome of VENCorp's application of its planning criteria or its investment approval and governance processes.

4.8.4 Alternatives

VENCorp has not specifically considered any alternatives to the shunt capacitor banks in the state grid area, but advises that alternative options (including connection point power factor correction and new lines and transformers), plus various locations will be considered as part of its detailed assessment.

VENCorp advises that the detailed application of its planning criteria and the application of the market benefits limb of the Regulatory Test, ensures that the 'do-nothing' option will prevail until a network alternative returns a higher market benefit.

4.8.5 Timings

VENCorp has presented no supporting evidence to verify the proposed timing of expenditure, or how it may change as demand forecasts increase or decrease.

Generally, the timing of the augmentation investment is directly linked to the growth in 10% PoE summer demand, and is 'must do' and therefore required independent of the location, timing and magnitude of new generation covered by VENCorp's generation scenarios. For every 1 MW the demand forecast exceeds the pre-determined Maximum Supportable Victorian Demand, VENCorp advises the overall reactive requirements increase by around 1.65 MVAr. VENCorp has not detailed how it has determined '2 x 25 MVAr', step-switched 66 kV capacitor banks should be installed in the state grid in each year from 2010/11 to 2013/14 and how this addresses the Maximum Supportable Victorian Demand issue, nor how this is the optimal outcome.

[121] Section 4.7.2, Page 71, VENCorp, Vision 2030.

4.8.6 PB analysis

As part of PB's review of VENCorp's forecast of reactive needs, the key observation is the lack of detailed technical assessment to support the level of expenditure. VENCorp has adopted a high-level approach and developed a general program of reactive planting works that appears to reflect a worst-case scenario. Given this approach, it follows that VENCorp has not presented any studies to indicate the technical or economical benefits of its forecast expenditure. On this basis, and notwithstanding that there is forecast load growth in the state grid, PB has not been able to identify a clear deterministic or indicative probabilistic need for expenditure for reactive support in the state grid based on the information presented by VENCorp.

As a minimum, PB would expect a list of critical contingencies to be presented to support the technical needs, and a summary of the voltage, reactive loss and/or reactive margins at critical locations.

Further to this, as part of the approval of its current revenue cap[122], VENCorp had identified $26m for augmentation associated with reactive support. Over the current regulatory period, the need for the reactive support was displaced by a number projects[123]. Without any evidence to the contrary, and no information to suggest that VENCorp has developed sequential load-flow cases to represent the progressive benefits of its augmentation proposals, PB considers the same principle is likely to occur across the 2007/08 to 2013/14 regulatory period and recommends only a minor allowance be made for one shunt capacitor in the final year of the regulatory period to account for the point in time at which it is most difficult to forecast accurately and the point at which it is most likely a capacitor will be economically justified using VENCorp's detailed planning criteria.

4.8.7 Costs

The cost proposed by VENCorp for this project is based on a preliminary feasibility estimate of $2m per '2 x 25 MVAr', step-switched 66 kV capacitor bank and the inclusion of a 25% contingency to arrive at a total allowance of $10.0m. This estimate has been established based on a generalised scope of works as part of a desktop review and the costs of recent contestable projects of similar scope.

The scope of works includes the installation of four '2 x 25 MVAr', step-switched 66 kV shunt capacitor banks with suitable series reactors, and they are of a similar design to those recently installed at Horsham and Kerang as part of the Murraylink regulation project.

In PB's opinion, and as informed through the review of actual costs associated with the capacitor bank installations completed recently by VENCorp and unit costs within PB's internal benchmarking database, PB considers the feasibility estimate of $8m is a reasonable and efficient allowance to account for the four 66 kV shunt capacitor banks. We consider the 25% contingency factor is an inappropriate inclusion given the nature of the preliminary feasibility estimate, and this matter is discussed further in Section 4.13.3.

4.8.8 Conclusion

VENCorp has proposed a range of capacitor bank installations in the state grid network to ensure voltage stability is maintained in the event of critical contingencies. VENCorp has not supported this proposal with any technical or economical references, and has not presented any precedent expenditure that will support the extent of investment. Furthermore, VENCorp has not presented a coordinated and systematic business case to highlight how the multiple reactive support projects in both the state grid and metropolitan areas integrate with one another and how they provide and optimal, rationalised outcome to support to forecast demand levels.

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122 ACCC Decision, 11 December 2002.

123 A capacitor bank at Rowville, works associated with the regulation of Murraylink, and the completion of the Latrobe Valley to Melbourne project.

Without further evidence of the need for investment, PB recommends a general allowance for one shunt capacitor bank in the state grid, as shown in Table 4-12.

Table 4-12 – Recommended capex for reactive support in the state grid area

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
VENCorp proposal	—	—	2.5	2.5	2.5	2.5	10.0
Proposed variation	—	—	(2.5)	(2.5)	(2.5)	(0.5)	(8.0)
PB recommendation	—	—	—	—	—	2.0	2.0

Source: PB analysis

4.9 LINE TERMINATIONS AND MONITORING EQUIPMENT IN METROPOLITAN AREA

This project involves the staged installation of primary and secondary equipment across a number of locations within Victorian metropolitan terminal stations[124] at a combined cost of $18.8m (real 07/08). The proposed expenditure is not prescriptive and is a general allowance across the 5-year period 2009/10 to 2013/14, as shown in Table 4-13.

Table 4-13 – Proposed capex reactive support in state grid

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
VENCorp proposal	—	3.8	3.8	3.8	3.8	3.8	19.0

Source: VENCorp's submission 'VEN_DOCS-#194410-v9-Capex_Forecast.XLS'

This project accounts for 5.3% of VENCorp's total proposed network-related capex.

4.9.1 Project overview

The transfer capability within and between terminal stations can be restricted by the thermal ratings of various pieces of primary or secondary plant. In the past, VENCorp has found it to be economically efficient to replace specific pieces of equipment in order to increase the overall transfer capacity between terminal stations. Typically, VENCorp has augmented individual circuit breakers, isolators, earth switches, current transformers, primary connections, bus-bars, protection plant and instrumentation plant in a piecemeal manner for this purpose.

VENCorp has also adopted the practice of installing contemporary automatic control schemes to monitor power flows and allow transfer levels to be increased in the knowledge that should a low probability, high consequence event occur the system will be maintained in a satisfactory operating state. This capex project also makes allowance for these schemes to be implemented.

The allowance forecast by VENCorp is non-prescriptive and does not have a defined scope of work.

124 The Victorian metropolitan network generally refers to terminal stations and their interconnecting lines including Rowville, East Rowville, Cranbourne, Springvale, Heatherton, Malvern, Richmond, Brunswick, South Morang, Thomastown, Ringwood, Templestowe, Keilor, West Melbourne, Brooklyn, Fisherman's Bend, Newport and Altona.

4.9.2 Drivers (need or justification)

The underlying driver for this augmentation is operational thermal constraints that arise with general load growth.

VENCorp has not presented any specific technical studies to support the proposed augmentations, but has made general reference to its historical expenditure where it has undertaken five minor augmentation projects in the metropolitan area since June 2004. No references have been made to forecast critical contingencies in the metropolitan area, or the locations of unacceptable thermal limits.

In addition to the $3.8m per annum over the 5 years from 2009/10 to 2013/14 for upgrades in the metropolitan area, VENCorp is also forecasting as part of other projects:

- non-prescriptive 'must do' expenditure of $12.5m for thermal upgrades in the state grid across the five years 2009/10 to 2013/14
- some prescriptive 'must do' expenditure of $1.3m for connection upgrades in the state grid area at Moorabool and Geelong
- some prescriptive 'must do' expenditure of $8.8m for line and connection upgrades in the metropolitan area at West Melbourne, Keilor, Fisherman's Bend, Rowville and Springvale in either 2012/13 or 2013/14
- some prescriptive 'must do' expenditure to install wind monitoring on the Rowville–Malvern, Rowville–Richmond and Springvale–Heatherton lines in 2010/11.

4.9.3 Strategic alignment and policy support

VENCorp has advised that the need for thermal upgrades is to ensure that the power system is operated within limits at all times.

Given the 'indicative probabilistic' nature of VENCorp's forecast for the purposes of its revenue cap proposal, this project does not directly reflect the likely outcome of VENCorp's application of its planning criteria or its investment approval and governance processes.

4.9.4 Alternatives

As VENCorp's approach has been to forecast a non-prescriptive allowance for thermal upgrades in the metropolitan area, it has not identified any network or non-network alternatives.

VENCorp advises that the detailed application of its planning criteria and the application of the market benefits limb of the Regulatory Test, ensure that the 'do-nothing' option will prevail until a network alternative returns a higher market benefit.

4.9.5 Timings

VENCorp has presented no supporting evidence to verify the proposed timing of expenditure, or how it may change as demand forecasts increase or decrease. The expenditure is classified as 'must do', and therefore independent of the timing, location or magnitude of new generation.

4.9.6 PB analysis

As part of PB's review of VENCorp's forecast of line terminations and monitoring equipment in the metropolitan area, the key observation is the lack of detailed technical assessment to support the level of expenditure. VENCorp has adopted a high-level approach and developed a general program of augmentation works that appears to reflect a worst-case scenario.

Given this approach, it follows that VENCorp has not presented any studies to indicate the technical or economical benefits of its forecast expenditure. However, given VENCorp's historical approach to upgrade selected pieces of equipment to increase thermal limits, it is feasible there will be an unforeseen need to continue this practice over the forthcoming regulatory period. Coupled with the proposed and existing wind-monitoring installations, piecemeal upgrades of equipment can be a pragmatic and economic approach to increasing thermal constraints.

As part of SPA's management and replacement of ageing and poor condition assets, it is proposing to rebuild 10 terminal stations and six of these are metropolitan based[125]. It has also just rebuilt Malvern and Brunswick metropolitan terminal stations. Furthermore, it also has a number of programs to replace specific assets such as circuit breakers and current transformers at various sites. Given the wide-scale use of modern equivalents as part of these rebuilds (which results in increased thermal capability of plant), and the lack of evidence that VENCorp has captured and considered SPA's significant program of works into its augmentation planning, PB has formed the opinion that there is some need for piecemeal upgrades in the metropolitan area, but that VENCorp is likely to have materially overstated its expenditure requirements.

Given the lack of detailed technical studies supporting VENCorp's forecast capex for this project, it is difficult to determine an appropriate expenditure requirement. Nevertheless, PB recommends the allowance for line terminations and monitoring equipment in the metropolitan area is reduced by 50% to account for VENCorp's the lack of recognition of SPA's replacement works. This reduction has been based on the principle of reducing the annual allowance to a level that is much more reflective of historical project spends[126]. PB considers this is a likely to be a conservative reduction given the extent of SPA's works and that VENCorp has separately:

- identified some specific metropolitan upgrades
- already undertaken a number of similar metropolitan upgrades in recent years[127]
- identified that the load and energy growth over the outlook period is less than that over the current period
- not specifically highlighted one example of a piece of equipment that it is likely to augment as part of this project, even in the earliest year of forecast expenditure of 2009/10.

4.9.7 Costs

Without a prescriptive scope of works specified by VENCorp, PB has not been able to determine the efficiency or appropriateness of the $15m +25% forecast expenditure. The use of a 25% contingency factor is discussed further in Section 4.13.3.

Given PB's findings that the underlying needs for piecemeal upgrades will have diminished, and when considering VENCorp's committed expenditure projects (where the costs of the 3-4 similar projects were all between $2m and $0.3m), the allowance proposed by VENCorp of $3.8m per annum does not seem reasonable or appropriate.

4.9.8 Conclusion

VENCorp has not presented a clear or specific need for expenditure associated with line termination upgrades or monitoring equipment in the metropolitan area. However, at a high level and consistent with past practice by VENCorp, PB recognises that piecemeal upgrades of limiting plant can economically reduce the impacts of some transmission constraints.

125 Brooklyn, Keilor, Richmond, Ringwood, Thomastown and West Melbourne.

126 Rowville to Springvale and Rowville to Richmond termination upgrades.

127 Rowville to Richmond, Thomastown to Templestowe, Thomastown to Ringwood, Rowville to Springvale line upgrades, and the Rowville A1 transformer CB upgrade.

PB considers VENCorp has overstated its expenditure requirements by not recognising the widespread replacement program proposed by SPA, and proposed a reduction of 50% to VENCorp's unsubstantiated expenditure allowance, as shown in Table 4-14.

Table 4-14 – Recommended capex for metro area line terminations and monitoring equipment

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
VENCorp proposal	—	3.8	3.8	3.8	3.8	3.8	19.0
Proposed variation	—	(1.9)	(1.9)	(1.9)	(1.9)	(1.9)	(9.4)
PB recommendation	—	1.9	1.9	1.9	1.9	1.9	9.6

Source: PB analysis

4.10 FOURTH 330/220 KV TRANSFORMER AT DEDERANG

This project involves the augmentation of key transformer capacity at Dederang Terminal Station at a cost of $13.8m (real 07/08). The timing of the expenditure is not specific, and is subject to the need to increase Victoria's import capacity from NSW. VENCorp has spread the allowance evenly across the 4-year period 2010/11 to 2013/14, as shown in Table 4-15.

Table 4-15 – Proposed capex for fourth Dederang transformer

Weighted expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
VENCorp proposal	—	—	3.45	3.45	3.45	3.45	13.8

Source: VENCorp's submission 'VEN_DOCS-#194410-v9-Capex_Forecast.XLS'

This project accounts for 3.9% of VENCorp's total proposed network related capex.

This is also a scenario-based project that occurs in all four of the scenarios considered.

4.10.1 Project overview

Dederang Terminal Station is situated in the north-east of Melbourne close to the border between Victoria and NSW. It is a critical terminal station at which five 330 kV and five 220 kV transmission lines are switched. At present, there are three 330/220 kV transformers at this site, which play an important role as a source of supply to northern Victoria.

Under outage conditions, and especially when the market-dispatched generation output from Southern Hydro units is low, the transformer capacity can restrict Victoria's ability to import power from NSW. Consequentially, at times of peak demand there may be a supply shortfall and load shedding may be required to maintain adequate reserve margins.

VENCorp is proposing to install a fourth 330/220 kV transformer at Dederang to minimise the impacts of the thermal constraints at Dederang.

4.10.2 Drivers (need or justification)

VENCorp has advised that this project will be required if the import capability from NSW is increased beyond the existing nominal level of 1,900 MW by 180 MW or more. The key driver is the thermal limitations imposed by the ratings of the existing three transformers at Dederang.

These three transformers at Dederang are labelled as the H1, H2 and H3 units, respectively and have ratings and characteristics as shown in Table 4-16.

Table 4-16 – Characteristics of existing Dederang transformers

Transformer	Continuous rating [MVA]	Short time rating [MVA]	Type	Age
Dederang H1	225	315	3 x 1-phase	42–46 years
Dederang H2	340	400	3 phase	5 years
Dederang H3	240	400	3 phase	27 years

Source: VENCorp submission, Page 17
VEN_DOCS-#210011-v8-Report_on_forecast_capital_works_for_Rev_cap_application.DOC and SP AusNet

To support the need for a fourth transformer, VENCorp has presented a number of load-flow studies under system normal and outage conditions. As shown in Table 4-17**,** the most critical contingency is outage of the new H2 unit, which causes high loading on the older and lower capacity H1 and H3 units.

Table 4-17 presents the 2008/09 10% PoE peak summer demand condition (medium economic growth) transformer loading levels, with an import level from NSW of 1900 MW.

Table 4-17 – Forecast loading on existing Dederang transformers in 2008/09

Unit	N-0 loading – % of continuous rating	N-1 loading – % of short time rating	N-1 loading – % of continuous rating	N-2 loading – % of short time rating	N-2 loading – % of continuous rating
Dederang H1	80	84	116	146	204
Dederang H2	60	74	82	—	—
Dederang H3	81	72	115	118	196

Source: PB analysis and VENCorp submission, Page 17
VEN_DOCS-#210011-v8-Report_on_forecast_capital_works_for_Rev_cap_application.DOC

Table 4-17 indicates that loading on the H1 unit is most critical (slightly higher than loading on H3), and that after a critical (N-1) outage import from NSW will need to be reduced to alleviate the loading down from around 116%. Should a subsequent (N-2) outage occur, a significant reduction in import will be required given the very high forecast loading levels.

Importantly, these loading levels are presented based on high generation at Kiewa and Eildon. With reduced generation at these locations the import capability maybe reduced from its nominal level of 1,900 MW to as low as 1,200 MW, indicating a very high sensitivity to the local generation.

To show the sensitivity of transformer loading to import levels, VENCorp has also presented the 2010/11 10% PoE peak summer demand (medium economic growth) transformer loading for 1900 MW and 2500 MW import levels, as shown in Table 4-18. The N-0 and N-1 loading on the H1 transformer increases by around 35 MVA (16%) and 50 MVA (16%), respectively, given the 600 MW increase in import from NSW.

Table 4-18 – Forecast loading on existing Dederang transformers in 2010/11

Transformer	N-0 loading – % of continuous rating, 1,900 MW import	N-1 loading – % of short time rating, 1,900 MW import	N-0 loading – % of continuous rating, 2,500 MW import	N-1 loading – % of short time rating, 2,500 MW import
Dederang H1	80	84	96	100
Dederang H2	60	74	71	86
Dederang H3	81	72	96	85

Source: PB analysis and VENCorp submission, Page 17
VEN_DOCS-#210011-v8-Report_on_forecast_capital_works_for_Rev_cap_application.DOC

As part of its asset management and replacement programme, SPA is proposing to replace the limiting Dederang H1 transformer with a new three-phase 340 MVA (continuous) unit prior to summer 2008/09.

4.10.3 Strategic alignment and policy support

The high-level objective of this expenditure is associated with minimising the cost of dispatch in the Victorian region by maximising the available import capacity from NSW. Increasing import capability maximises supply competition and drives down costs, as well as ensuring the overall supply–demand can be met at higher load levels.

VENCorp has not presented any documentation to PB regarding the material inter-regional network impacts of this project, or discussions with Transgrid as to whether the NSW transmission network can accommodate the increased import capabilities delivered by the project.

Given the 'indicative probabilistic' nature of VENCorp's forecast for the purposes of its revenue cap proposal, this project does not directly reflect the likely outcome of VENCorp's application of its planning criteria or its investment approval and governance processes.

4.10.4 Alternatives

VENCorp has not presented any network or non-network alternatives against which the fourth Dederang transformer is to be assessed.

Prior to any investment decision, VENCorp's detailed application of the market benefits limb of the Regulatory test coupled with its use of a Value of Customer Reliability implicitly includes the 'do-nothing' option until a network alternative returns a higher positive market benefit.

4.10.5 Timings

The installation of a fourth transformer at Dederang has been categorised as a scenario dependent project by VENCorp. It is, however, forecast to be required in all four of the scenarios presented, irrespective of the timing, location and quantity of new generation or supply sources in Victoria. VENCorp has not attempted to forecast a specific commissioning date for this project, and for the purposes of its revenue cap proposal has evenly spread the capex across the last four years of the 2007/08-2013/14 regulatory period.

VENCorp advises that the detailed application of its planning criteria and the application of the market benefits limb of the Regulatory Test, ensure that the 'do-nothing' option will prevail until a network alternative returns a higher market benefit.

4.10.6 PB analysis

The preliminary technical information VENCorp has presented with respect to the transformer thermal constraints at Dederang does not establish a clear need for installation of a fourth transformer, especially in the light of SPA's proposal to replace the H1 unit with one of higher capacity. While the constraint is apparent, a solid indicative probabilistic business case is not evident. There is no explanation of the expected energy at risk or how the value of this is likely to grow in the future. In addition, VENCorp has not explicitly indicated how it has or will incorporate the availability of a spare transformer at Dederang in its analysis, or the replacement project envisaged by SPA.

In particular, PB can see no basis for the inclusion of this project in the three scenarios that do not include increased import capability from NSW, and we therefore propose to exclude this project from the three generation scenarios that retain the 1900 MW import level. In discussions with VENCorp, this position has been accepted and VENCorp has subsequently updated its planned augmentation capex to remove the project from the three scenarios that do not include increased import from NSW. This is captured in Table 4-19.

Table 4-19 – Updated capex for fourth Dederang transformer project

Weighted expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
Original VENCorp proposal	—	—	3.45	3.45	3.45	3.45	13.8
Adjustment	—	—	(2.59)	(2.59)	(2.59)	(2.58)	(10.35)
Updated VENCorp proposal	—	—	0.86	0.86	0.86	0.87	3.45

Source: PB analysis and VENCorp's submission 'VEN_DOCS-#194410-v9-Capex_Forecast.XLS'

For the remaining scenario, and under the conditions of the load flow studies presented, VENCorp indicates that in 2010/11 and with the import level from NSW increased from 1,900 MW to 2,500 MW, constraints on import or load shedding will only be required after a critical outage, and then only to return the system to a satisfactory and then secure operating state. Therefore the need for augmentation will be dictated by the probability of the event occurring, and the energy at risk under VENCorp's detailed simulation of market conditions.

Given the information presented in VENCorp's APR discussions, the flow on the Dederang transformers is highly dependent on generation dispatch from Southern Hydro generators (and to a lesser extent on export to South Australia via Murraylink). With the ongoing drought conditions and its potential impacts on this critical generation, the need for transformer augmentation may become more critical. Augmentation of the Dederang H1 transformer capacity or installation of a fourth unit will increase the acceptable operating envelope enforced by the existing thermal limits of the Dederang transformers.

VENCorp has not clearly indicated how it has coordinated its augmentation requirements with the replacement of the H1 unit, as proposed by SPA as part of its regulated asset management program of works. In PB's view the replacement of the H1 unit and the installation of a fourth unit are not independent projects. Replacement of the H1 unit with a higher capacity transformer is likely to capture efficiencies for both parties and be the most efficient single project. On this basis, PB considers it will be prudent to allow some expenditure for the replacement of the H1 unit for both SPA and VENCorp who will each receive benefits form such a co-ordinated project. Without a detailed assessment of the benefits of a reduction in asset failure risk and maintenance costs to SPA and the augmentation benefits to VENCorp, PB proposes to allow 50% of the H1 replacement project expenditure to each of the businesses to reflect that the economic benefits are likely to be evenly shared. PB considers the most likely timing for this development is prior to summer 2012/13 when an increase in import is most likely and that given the asset failure risk benefits, the investment is likely to be required in all four of VENCorp's generation

development scenarios. In practice, PB considers VENCorp and SPA should prepare a coordinated business case that captures the augmentation benefits, the reduction in asset failure risk and the reduction in maintenance costs within one detailed economical assessment.

4.10.7 Costs

The cost proposed by VENCorp for this project is based on a preliminary feasibility estimate of $11m and the inclusion of a 25% contingency to arrive at a total allowance of $13.8m. This estimate has been established based on a desktop review and the costs of recent projects of similar scope outlined explicitly in advice from SPA to support VENCorp's 2006 APR.

The scope of works includes the installation of one 340 MVA, 330/220 kV transformer switched by one new 330 kV circuit breaker and two new 220 kV circuit breakers. PB considers this scope is efficient and reasonable based on the existing switching configuration at Dederang.

In PB's opinion, and as informed through our review of the benchmark costs associated with transformer installations, we consider the feasibility estimate of $11m is a reasonable and efficient allowance for the defined scope. We consider the 25% contingency factor is an inappropriate inclusion given the nature of the preliminary planning estimate, and this matter is discussed further in Section 4.13.3.

4.10.8 Conclusion

With the information presented by VENCorp, PB considers there is insufficient evidence of the need for transformer capacity augmentation at Dederang. However, given SPA's proposal to replace one of the ageing and poor condition units, PB considers there is likely scope to coordinate a combined replacement/augmentation project towards the end of the regulatory period, as shown in Table 4-20.

Table 4-20 – Recommended capex for fourth Dederang transformer project

Weighted expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
VENCorp proposal	—	—	0.86	0.86	0.86	0.87	3.45
Proposed variation	—	—	(0.86)	(0.86)	4.14	(0.87)	1.55
PB recommendation	—	—	—	—	5.0	—	5.0

Source: PB analysis

4.11 FOURTH 500 KV LINE FROM LOY YANG TO HAZELWOOD

This project involves the construction of a new transmission line at a cost of $37.5m (real 07/08). The timing of the expenditure is scenario-based and not specific, and is subject to potential increases in the amount of generation connected at 500 kV in the Latrobe Valley. VENCorp has spread the weighted allowance evenly across the 4-year period 2010/11 to 2013/14, as shown in Table 4-21.

Table 4-21 – Proposed capex for the 4th 500kV line

Weighted expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
VENCorp proposal	—	—	4.7	4.7	4.7	4.7	18.8

Source: VENCorp's submission 'VEN_DOCS-#194410-v9-Capex_Forecast.XLS'

This project accounts for 5.3% of VENCorp's total proposed network related capex.

This scenario-based project is forecast to occur in two of the four scenarios considered.

4.11.1 Project overview

At present, there is approximately 3,940 MW[128] of nominal supply capacity connected to the 500 kV buses at Loy Yang Power Station Switchyard (LYPS), located in the Latrobe Valley. This supply capacity is transmitted to Hazelwood Terminal Station (the key aggregating station in the Latrobe Valley) via three 500 kV transmission lines.

The transfer capacity of the existing lines is well matched to the current supply capacity. Under outage conditions, and when there is dependence on the peaking plants at Valley Power and import from Tasmania via Basslink, the line capacity can restrict generation output. This constraint will be compounded should any additional generation be installed upstream of the constraint.

The scope of works includes installation of a fourth 500 kV line between Loy Yang and Hazelwood switched by three new 500 kV circuit breakers and associated plant in order to minimise future generation constraints and the consequential impacts of increased fuel costs or load shedding should alternative generation sources be unavailable.

4.11.2 Drivers (need or justification)

VENCorp has advised[129] that this project will be required if new generation exceeding 500 MW is installed in the Latrobe Valley and connected at 500 kV and upstream of the Loy Yang to Hazelwood lines. The key driver is the thermal limitations imposed by the ratings of the existing three 500 kV lines. The thermal rating of each Loy Yang to Hazelwood lines is around 3,000 MVA at 40degC ambient temperatures. Under existing and simulated peak generation conditions (and accounting for local power station auxiliary loads), the flows on each line are shown in Table 4-22.

Table 4-22 – Forecast loading on Loy Yang to Hazelwood 500 kV lines

Transformer	N-0 loading on each of the three circuits - % of 3,000 MVA	N-1 loading on each of the three circuits - % of 3,000 MVA	N-2 loading on each of the three circuits - % of 3,000 MVA
Existing supply capacity (3,940 MW)	38	57	114
Forecast supply capacity (3,940 MW + 500 MW)	44	65	131

Source: PB analysis and VENCorp submission, Page 18
VEN_DOCS-#210011-v8-Report_on_forecast_capital_works_for_Rev_cap_application.DOC

128 Comprised of Loy Yang A, Loy Yang B, Valley Power and Basslink import.

129 VENCorp APR 2006, section 7.6.1, page 87.

These figures suggest that with the current supply capacity and given a prior outage (N-1 condition) around 800 MW of generation would need to be constrained in order to ensure the network remained in a secure operating state[130]. This constraint would increase to around 1,350 MW with the forecast increase in supply capacity.

4.11.3 Strategic alignment and policy support

The high-level objective of this expenditure is associated with minimising the cost of dispatch in the Victorian region by minimising transmission constraints to generation connected in the Latrobe Valley. Increased supply competition drives down fuel costs, as well as ensuring the overall supply–demand can be met at higher load levels.

Given the 'indicative probabilistic' nature of VENCorp's forecast for the purposes of its revenue cap proposal, this project does not directly reflect the likely outcome of VENCorp's application of its planning criteria or its investment approval and governance processes.

4.11.4 Alternatives

VENCorp has not presented any network or non-network alternatives against which the fourth Loy Yang to Hazelwood line is to be assessed.

Prior to any investment decision, VENCorp's detailed application of the market benefits limb of the Regulatory test coupled with its use of a Value of Customer Reliability, implicitly includes the 'do-nothing' option until a network alternative returns a higher market benefit.

4.11.5 Timings

The installation of a fourth 500 kV transmission line between Loy Yang and Hazelwood has been categorised as a scenario-dependent project by VENCorp. It is forecast to be required in two of the four scenarios modelled. VENCorp has not attempted to forecast a specific commissioning date for this project, and for the purposes of its revenue cap proposal has evenly spread the capex across the last four years of the 2007/08-2013/14 regulatory period.

VENCorp advises that the detailed application of its planning criteria and the application of the market benefits limb of the Regulatory Test, ensure that the 'do-nothing' option will prevail until a network alternative returns a higher market benefit.

4.11.6 PB analysis

Given the extent of the potential overloads presented by VENCorp and the dependence on Latrobe Valley generation supplies under peak demand conditions, PB is satisfied there is a clear need for augmentation should new generation be connected at the 500 kV level at Loy Yang. This will particularly be the case should the new generation be characterised as a base load unit with a high load factor.

The generalised timing (spread across the 2010/11 to 2013/14 period appears reasonable for the two scenarios considered.

The alternative promulgated by VENCorp of a fourth 500 kV line is a logical and strategic outcome given the existence of the three 500 kV lines between Loy Yang and Hazelwood. PB highlights that in accordance with the relatively expensive cost of 500 kV line development, this option does captures long-term efficiencies should more generation be connected at Loy Yang. Given the long-standing coal and gas reserves available in this area, the 500 kV design appears prudent.

130 Defined as a condition under which the impacts of a further outage will result in the network assets remaining within design capability and therefore in a satisfactory state.

4.11.7 Costs

The cost proposed by VENCorp for this project is based on a preliminary feasibility estimate of $30m and the inclusion of a 25% contingency to arrive at a total allowance of $37.5m. This estimate has been established based on advice from SPA to support VENCorp's 2006 APR.

The scope of works includes the installation of 15 km of 3,150 MVA single-circuit 500 kV transmission line switched between Loy Yang and Hazelwood. One new 500 kV circuit breaker is required at Loy Yang and two new 220 kV circuit breakers at Hazelwood.

Based on the latest Victorian Main System Diagram[131], PB considers the proposed capex at Hazelwood is inefficient. There is a clear opportunity to implement this project using only a single 500 kV circuit breaker at Hazelwood[132] rather than two. This would result in a cost reduction in the order of $2m without any material reduction in the functional and operational performance of the assets, and PB recommends this adjustment be made.

In PB's opinion, and as informed through our review of the benchmark costs associated with 500 kV line development, we consider the adjusted feasibility estimate of $28m is on the high side of expectations but a reasonable and efficient allowance given the short line length. We consider the 25% contingency factor is an inappropriate inclusion given the nature of the preliminary planning estimate, and this matter is discussed further in Section 4.13.3.

4.11.8 Conclusion

PB concurs with VENCorp that in the likelihood of significant generation development upstream of the Loy Yang to Hazelwood 500 kV transmission lines, the need to augment the transfer capacity between these two points is clear, particularly if the development is base load generation. The timing of the work will be triggered by the generation development. PB has concluded the scope of works proposed by VENCorp is inefficient and recommends a minor adjustment to reduce 500 kV circuit breaker costs, whilst maintaining all key functions of the proposed augmentation. PB's recommendation is shown in Table 4-23.

Table 4-23 – Recommended capex for fourth Loy Yang to Hazelwood project

Weighted expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
VENCorp proposal	—	—	4.7	4.7	4.7	4.7	18.8
Proposed variation	—	—	(1.2)	(1.2)	(1.2)	(1.2)	(4.4)
PB recommendation	—	—	3.5	3.5	3.5	3.5	14.0

Source: PB analysis

4.12 CONCLUSIONS FROM DETAILED REVIEWS

PB has undertaken a detailed review of five projects within VENCorp's forecast (planned) augmentation proposal. The projects have covered all major project categories and comprise 30% of the weighted $354m value of the entire program of work.

131 NEMMCO SOO 2006, Appendix D, Page 22.

132 By single switching the fourth line to the No.1 500kV bus. Double switching has some minor benefits with respect to the ongoing maintenance of plant, however in PB's opinion the marginal operational benefits do not outweigh the material cost penalties. This conclusion is drawn in the context that one of the existing three lines is currently single switched at Hazelwood.

PB's general observations and opinions drawn from our detailed review include:

- the general approach adopted by VENCorp is consistent with that used during its 2002 proposal
- VENCorp has used the latest and most appropriate demand forecasts in its expenditure forecasting process, as sourced from the 2006 APR
- the scenario-based approach to generation development applied by VENCorp is suitable for the purposes of capturing extremes in transmission development plans and will most likely capture a reasonable range of transmission expenditure over the next regulatory period
- VENCorp's application of equal weightings for the four generation development scenarios is a reasonable assumption, and provides for a suitable probabilistically weighted expenditure forecast
- VENCorp adopts an 'indicative probabilistic' forecasting approach over medium to long term planning horizons. This approach does not directly relate to its detailed application of the probabilistic and market benefits based planning process used for project approvals. The approach is however pragmatic and relatively resource efficient
- the indicative probabilistic forecasting approach, together with the assumptions such as use of a 25% contingency factor, tend to produce an outcome that reflects VENCorp's intention to capture the upper end of its likely capex requirements[133]. Furthermore, the process lacks transparency and is heavily guided by the experience and judgement of specialist VENCorp staff
- VENCorp has adopted a simplistic and highly conservative approach to project cost estimating relying heavily on both SPA and its own previous experience. PB believes that the inclusion of a 25% contingency factor in all planning feasibility estimates is a direct result of this approach.
- VENCorp appears not to have accounted for inter-dependencies in augmentation projects. PB notes that the need for some projects can be removed as a result of the technical benefits associated with preceding projects.
- PB believes that there is likely to be some systemic advancement in the timing of projects presented by VENCorp, given its strong focus on 10% PoE temperature conditions only as part of its 10-year planning forecast
- it appears that only the (most likely) *medium* economic growth scenario has been used in forecasting process; there is no indication of how *high* or *low* economic growth forecasts are considered in the VENCorp planning process
- PB found that the documentation and technical data[134] to support the forecasting process and outcomes (particularly in respect of individual projects) was limited and was lacking in some cases
- only three[135] of the five projects are prescriptive and have a pre-defined scope of works. The other two projects are general allowances not supported by specific constraints
- in the development of transmission network augmentation options, PB believes that VENCorp has not fully considered the significant asset replacement program proposed by SPA. PB believes that this is likely to have resulted in VENCorp overstating its augmentation expenditure needs by making non-specific allowances for works that are likely to be common with the significant SPA replacement program, particularly given SPA's focus on replacements in the metropolitan area.

133 VENCorp has advised that it has deemed it appropriate to take the upper end of the cost estimates to limit the need to go back to the AER to seek inter-period adjustments (re-opening) of its revenue cap determination.

134 Such as lists of critical contingencies and plant being overloaded.

135 The metropolitan transformer, the 4th Dederang transformer and the 4th Loy Yang-Hazelwood line.

4.13 PB HIGH LEVEL ANALYSIS AND RECOMMENDATIONS (PLANNED AUGMENTATION)

In this section PB provides an overview of the findings from its detailed project reviews, presents high level analysis of matters affecting the entire planned augmentation forecast, and provides an overall recommendation on VENCorp's $354m forecast capex.

4.13.1 Detailed project reviews

As an outcome of our detailed review of five planned augmentation projects, PB has made material recommendations to reduce VENCorp's expected capex requirements. These recommendations are summarised in Table 4-24.

Table 4-24 – Recommended capex of projects under detailed review

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
500/220 kV metro transformer	—	—	—	—	43.8	—	43.8
Less amount to defer timing	—	—	—	—	(43.8)	—	(43.8)
Reactive support in state grid	—	—	2.5	2.5	2.5	2.5	10.0
Less amount for unsupported need	—	—	(2.5)	(2.5)	(2.5)	(0.5)	(8.0)
Line terminations and monitoring equipment in metro area	—	3.8	3.8	3.8	3.8	3.8	19.0
Less amount for unsupported need	—	(1.9)	(1.9)	(1.9)	(1.9)	(1.9)	(9.4)
Fourth Dederang 330/220 kV transformer	—	—	3.5	3.5	3.5	3.5	13.8
Less for modified timing	—	—	(3.5)	(3.5)	1.5	(3.5)	(8.8)
Fourth 500 kV line from Loy Yang to Hazelwood	—	—	4.7	4.7	4.7	4.7	18.8
Less for inefficient cost	—	—	(1.2)	(1.2)	(1.2)	(1.2)	(4.4)
Proposed capex — total	—	3.8	14.5	14.5	58.3	14.5	105.4
Recommended capex — total	—	1.9	5.4	5.4	10.4	7.4	31.0
Change in capex	—	1.9	9.1	9.1	47.9	7.1	74.4
Change in capex — %	—	50%	63%	63%	82%	49%	71%

Source: PB analysis

The quantity of PB's reduction is primarily driven by the deferral of the expensive capex works associated with installation of a 1,000 MVA 500/220 kV transformer in metropolitan Melbourne.

4.13.2 High-level review of planning outcomes

As part of its proposal, VENCorp has advised that the large increase in its planned augmentation expenditure compared with the current regulatory period is driven by three factors[136]:

- the increase in the relevant regulatory period from 5 to 6 years
- the increasing cost of augmentations driven by global demand for network assets

136 VENCorp Proposal, page vi.

- the nature of the supply–demand balance over the regulatory period in Victoria driving the need for new generation, which in turn drives augmentation expenditure.

Considering each of these points in turn, PB notes that:

- the current regulatory period is for a duration of 5.5 years and VENCorp's forecast and actual expenditure was $170m and $141m (nominal), respectively. The next regulatory period is for 6 years with planned expenditure of $354m (real 07/08). Ignoring the inaccuracy[137] by not converting the historical nominal costs to real, VENCorp's is proposing an average annual increase in expenditure of over 90% of what it actually spent (on average) over the previous period. In PB's view, the change in regulatory period duration is insufficient to explain the considerable increase in proposed expenditure
- from our detailed project reviews, it appears that, on balance, VENCorp's preliminary project feasibility estimates benchmark well against current plant material and labour costs, and as they are reasonably well informed by recent competitively sourced project expenditure — cost increases seen in the market for specialist electrical equipment and plant is captured in VENCorp's processes, and therefore explains some increase in expenditure forecasts
- PB considers the slow down in demand and energy forecasts in Victoria and the associated reduction in need for new generation over the outlook period — compared with the current period — is likely to reduce the need for augmentation expenditure.

PB also notes the comparison made (by VENCorp) of key annual demand and energy growth rates between the current and next regulatory period. These are summarised in Table 4-25.

Table 4-25 – Comparison of demand and energy forecasts

Forecast	2003-2007/08 regulatory period(2002 APR)	2007/08 to 2013/14 regulatory period (2006 APR)
Annual energy consumption growth rate, (medium economic growth)	1.5%	0.4%
10% PoE peak summer demand growth rate, (medium economic growth)	3.3%	1.7%
Six-year increase in 10% PoE peak summer demand	1,650 MW	1,150 MW
Forecast expenditure	$170m[1]	$354m[2]

Note 1, nominal

Note 2, real 2007/08

Source: PB analysis and VENCorp Proposal, page 26

Using the ratio of the 6-year increase in 10% PoE peak summer demand growth over the forecast expenditure, these figures suggest that VENCorp's proposal is approximately three times less efficient than its previous expenditure — $0.3m/MW compared with $0.1m/MW. This appears to be a considerable change in the capex requirements that is not directly supported by the generalised (non-specific), and to some extent un-substantiated, nature of the forecast capex and the detailed projects reviewed.

Some reasons for the difference are likely to be the diminishing returns in capex investment over time, the increased utilisation of 'over designed' transmission capacity that was apparent prior to the Victorian electricity industry reforms in the early 1990s, the observed increase in

137 The inaccuracy is expected to be relatively low given that all of the committed projects are programmed for completion after August 2005, and with many timed towards the back end of the control period.

electrical plant costs over recent years summarised simplistically as a transition from a buyers to a sellers market, and VENCorp's adoption of the 25% project cost contingency factor. Nevertheless, VENCorp is proposing to spend much more capital to provide for far less of an increase in forecast demand. This implies that if the proposed capex proceeds, the headroom[138] available in the transmission system at the end of the period will be significantly larger than that at the beginning, suggesting there is likely to be some opportunities to further optimise capex.

As a guide only, and in the context of a high level inter-business benchmark, the augmentation efficiency ratios for Powerlink Queensland[139] and ElectraNet SA[140] have been determined by PB using the same principles as that for VENCorp. These have been estimated as approximately $0.66m/MW for Powerlink and $0.49m/MW for ElectraNet. This suggests that VENCorp's augmentation capex is relatively efficient, as driven by its net market benefit and probabilistic based planning criteria.

4.13.3 Use of cost estimating contingencies

VENCorp's project cost estimating process relies heavily on its experience competitively tendering for transmission and non-network service provisions, plus specific advice from SPA for both contestable and non-contestable augmentation. To a large extent, PB observed the process lacks independent interaction, and VENCorp has presented no evidence that it has directly contacted manufacturers, other TNSPs or independent third parties in order to verify its project cost estimates. An outcome of this process is that VENCorp has access to high level (desktop) based estimates only, which tend to have an accuracy of ±25%.

VENCorp has advised that[141] it has adopted the estimates *plus* 25% for the purposes of its revenue proposal due to:

- the nature of the cost estimates that VENCorp receives from SPA, where VENCorp considers refining cost estimates over the entire outlook period to a more accurate degree would be an inappropriate and inefficient use of its (and SPA's) resources
- the form and nature of the regulatory arrangements for VENCorp, where it has intended to capture an upper limit of forecast expenditure and to limit application of the unique provisions that allow VENCorp to make inter-period adjustments and effectively re-open its revenue cap determination
- historical evidence that actual project costs have exceeded the central cost estimates.

The materiality of this approach is to increase the overall weighted expenditure by $71m (from $283m to $354m), which is an amount that substantially exceeds the most expensive project envisaged by VENCorp ($55m).

While PB appreciates each of these factors, we also highlight that nature of the estimating process also implicitly implies that costs could be reduced by 25% and that (as acknowledged by VENCorp) use of an updated costing database implicitly captures increases in projects costs. We consider the appropriate approach is to aim for the most accurate forecast as dictated by the central cost estimate and recommend the 25% contingency allowance be removed from VENCorp's revenue cap expenditure. This is particularly the case given the number and volume of non-prescriptive allowances that make up the expenditure forecast.

138 The margin between the systems utilisation levels and its designed transfer capability.

139 Based on its original revenue proposal for the period 1 July 2007 to 30 June 2012, (without consideration of the supplementary submission or AER determination).

140 Based on its revenue proposal for the period 1 July 2008 to 30 June 2013.

141 Email VENCorp to PB, 11 May 2007.

The impact of PB's recommendation on the use of the 25% contingency allowance is shown in Table 4-26.

Table 4-26 – Adjustment for removal of cost estimating contingency

Expenditure $m ('as spent', real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
Total proposed capex	2.0	15.7	51.75	79.45	138.25	67.55	354.7
Reviewed capex — projects	—	3.8	14.5	14.5	58.3	14.5	105.4
Balance of capex	2.0	11.9	37.25	64.95	79.95	53.05	249.3
25% reduction on balance of capex	(0.4)	(2.38)	(7.45)	(13.0)	(16.0)	(10.6)	(49.9)
Recommended total capex	1.6	11.42	35.2	57.36	74.36	49.84	230.4
Change in capex	0.4	4.28	16.55	22.09	63.89	17.71	124.3
Change in capex — %	20%	27%	32%	28%	46%	26%	35%

Source: PB analysis

4.13.4 Extension of findings to balance of forecast capex

Prior to determining a recommendation on the prudence and efficiency of the overall forecast capex program proposed by VENCorp, PB has given due consideration to a number of factors assessed as part of our review. Primarily, these factors will have the influence of reducing expectations of VENCorp's need for capex, and they include the following general findings:

- VENCorp drives for efficiencies in its investment decisions through use of probabilistic natured planning criteria coupled with the use of the market benefits limb of the Regulatory Test (which is generally accepted as being a higher hurdle for investment that the reliability/least cost planning limb). This as not been the process specifically adopted to inform VENCorp's view of the capex in the outlook period. In addition to these matters, the unique structure and framework of the Victorian electricity industry allows for contestability and competition for the provision of transmission services, providing further mechanisms to capture long term efficiencies
- based on a top-down intra-business assessment (Section 4.13.2), VENCorp's forecast capex appears quite aggressive when compared with its actual expenditure over the 2003 to 2007/08 regulatory period, indicating that the efficiency in investment is considerably reducing
- our assessment of the 25% contingency factor (refer to Section 4.13.3)
- all of the expenditure associated with our detailed and high-level review of VENCorp's committed (historical) augmentation capex over the period 2003 to 2007/08 was found to be timely, reasonable and efficient
- the processes and outcomes of VENCorp's operation and maintenance cost forecasts were generally found to be reasonable and efficient and required only minor downward adjustment
- our review of the governance, approvals processes and systems set in place by the VENCorp Board, which indicated a well-established and documented process leading to the final approval of capex and opex, and at a high level ensure good electricity industry practices are captured within VENCorp's electricity transmission planning functions.

In considering the specific mechanisms through which PB has recommended adjustments to SPA's project-related capex proposals, we consider these in turn and discuss the appropriateness of extrapolating the findings across the balance of the capex program:

- 1,000 MVA 500/220 kV metropolitan transformer, clear need but aggressive timing based on indicative probabilistic approach: PB identified a number of issues associated with the lack of transparency surrounding VENCorp's adoption of a project timing of 2011/12. These included the lack of explicit consideration of the 50% and 90% PoE demand forecasts, the relatively good condition and high reliability of the assets which would need to fail to cause the constraints, and the worst-case scenario presented by use the Latrobe Valley scenario only. To differing extents which can only be identified through detailed review, each of these issues can be directly related back to projects where VENCorp has adopted a specific project timing[142]
- reactive support in the state grid, no clear need identified: PB identified that VENCorp had not presented a clear need substantiated with reference to specific outages or pending limitations for the general allowance it had proposed. This was a material issue for PB given the high number of expenditure projects that appeared to be based on the same approach, indicating that our findings could be related back to a number of other projects[143]
- line terminations and monitoring equipment in the metro area, non-prescriptive allowance and lack of recognition of SPA's considerably replacement program of works: VENCorp appeared to overstate a generalised and non-specific need and did not appear to explicitly coordinate its requirements with those proposed by SPA. This is particularly the case given SPA's focus on works in the metropolitan terminal stations over the coming regulatory period. The findings could be reflected across all projects that had no clear scope of works defined[144]
- the fourth 330/220 kV transformer at Dederang, opportunities to coordinate augmentation and replacement works: Independently, PB has not been satisfied of the general need to augment the transformation capacity at Dederang based on the information presented by VENCorp. However, given SPA's proposal to replace the ageing and poor condition unit, there is scope to justify a combined augmentation/replacement project at prior to 2012/13. Given the specific nature of this finding it is not likely that the principle can be extrapolated to other projects without detailed review
- the fourth 500 kV line from Loy Yang to Hazelwood, inefficient scope of work: PB has identified that there is likely to be a more efficient design when connecting the new line so that the number of 500 kV circuit breakers can be reduced from three to two. It is possible that similar outcomes occur in other projects; however, without an exhaustive detailed review of all projects, recommendations for additional adjustments based on design efficiencies are not substantiated.

As part of our investigation, and given the relatively low number of overall projects proposed by VENCorp, PB has also identified some specific observations regarding projects not under detailed review. These are outlined as:

- the inclusion of the relatively high capex '220 kV cable Malvern to Heatherton' project ($43.8m) in 2012/13 appears to directly contradict the finding in the 2006 APR[145]. Further, it appears that any cheaper alternative such as a project utilising

142 This specifically refers to the 8 'must do' projects only (no scenario driven works) in Table 4-6 that do not represent general allowance spread across multiple years, and makes up for $142.2m (40%) of the total augmentation expenditure.

143 Applicable to the five 'must do' projects in Table 4-6 that do represent general allowances spread across multiple years, and make up for $85.5m (24%) of the total augmentation expenditure, plus the (weighted) $19.5m for scenarios driven projects associated with 'additional reactive support' and additional fault limiting devices in both the state grid and metro areas.

144 Ibid.

145 VENCorp APR 2006, Page 69.

overhead construction may be justified immediately. This appears to warrant an immediate detailed investigation as envisaged by VENCorp and highlights that the forecast capex is representative of an upper bound given current arrangements. Notwithstanding this review, in PB's opinion, a scope of works inclusive of the underground cable is not unreasonable given the highly developed urban topography of all likely routes between Malvern and Heatherton and the precedence set by the Richmond to Brunswick connection. The cost for the cable appears efficient and reasonable given the likely 220 kV ratings and arrangement.

- the (weighted) $31.3m for SVCs in the state grid appear to be directly attributable to 'shallow' connection costs associated with large-scale wind farm developments
- VENCorp appears to be highly focused on capturing planning efficiencies through the use of real time wind-monitoring and this is likely to defer expensive transmission line development
- there appear to be a number of 'must do' projects that are likely to be generation-scenario dependent in either timing or need (such as the various general allowances for line termination upgrades, reactive support and fault limiting devices
- in addition to the fourth Dederang transformer finding as part of the detailed reviews, there appear to be a number of scenario-dependent projects spanning multiple scenarios that are counter-intuitive, such as the need for additional reactive support in the state grid area and the additional 500/220 kV transformer at Hazelwood. In PB's view, it is likely that after a detailed review, the probabilistic weighting's applicable (and therefore associated capex) with some scenario driven projects could be revised down.

Given our findings, and in the context that VENCorp's has aimed to capture the upper end of its expenditure requirements to limit its re-visits to the AER to trigger re-opening provisions, we conclude that there is some scope to make some high-level adjustments to the balance of the capex forecast proposed by VENCorp to reflect what we consider to be an efficient and accurate forecast that more closely aligns VENCorp's historical practices and outcomes.

On this basis, and given that there have been no material changes to VENCorp's planning criteria and expenditure justification processes, PB considers the quantity of the recommended high level adjustment should be informed by VENCorp's historical expenditure efficiency. In accordance with analysis undertaken in section 4.13.2, we recommend a reasonable, prudent and efficient expenditure to demand growth ratio is $0.15m/MW (driven by the expected increase in the 10%PoE forecast demand growth). This is a reduction from a ratio of $0.3m/MW proposed by VENCorp, however we note it is still considerably higher (50%) than the ratio of $0.1m/MW proposed by VENCorp as part of its 2002 application. Generally, the increase compared to the 2002 level accounts for:

- the generalised approach adopted by VENCorp (of using non-specific allowances associated with constraint mechanisms in network regions), given the theoretical nature of the capex forecast
- inflation (labour and material) cost increases
- diminishing returns on previous capex investment (which is to be interpreted as VENCorp having already implemented the most effective and efficient projects as part of its historical development program)
- the encroachment into operational and planning margins with load growth (the lumpy nature of transmission investment in the short term)
- the specific circumstances of the increased technical complications of the generation development scenarios considered by VENCorp as part of its forecast.

These points highlight some of the limitations of using a high level intra-business benchmark, however given there have been and are forecast to be no material changes in the framework (particularly the planning criteria) underpinning transmission investment in the Victorian jurisdiction between 2003 and 2013, PB considers that expenditure/demand growth ratio is a reasonable indicator of the likely expenditure for the purposes of determining VENCorp's

revenue cap allowance. PB's recommendation ensures a much more consistent outcome between historical experience and expected investment. The materiality of PB's adjustment is a further reduction of $50m, which given the general timing of expenditure underpinning VENCorp's forecast has been modelled evenly across the final four years of the 2007/08 to 2012/13 regulatory period for simplicity[146], as presented in Table 4-27.

Table 4-27 – Recommended total network capex after detailed reviews

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
Total proposed capex	2.0	15.7	51.8	79.5	138.3	67.6	354.7
Reviewed capex — projects	—	3.8	14.5	14.5	58.3	14.5	105.2
Reduction in capex — projects	—	(1.9)	(9.1)	(9.1)	(47.9)	(7.1)	(74.4)
Recommended capex — projects	—	1.9	5.4	5.4	10.4	7.4	30.8
Balance of capex	2.0	11.9	37.25	64.95	79.95	53.05	249.5
25% cost contingency reduction on balance of capex	(0.4)	(2.38)	(7.45)	(13.0)	(16.0)	(10.6)	(49.9)
Adjusted total capex	1.6	11.4	35.2	57.4	74.4	49.8	230.4
High level adjustment	—	—	(12.5)	(12.5)	(12.5)	(12.5)	(50.0)
Recommended total capex	1.6	11.4	22.7	44.9	61.9	37.3	180.4
Change in capex	(0.4)	(4.3)	(29.1)	(34.6)	(76.4)	(30.2)	(174.3)
Change in capex — %	20%	27%	56%	44%	55%	45%	49%

Source: PB analysis

4.13.5 Recommended planned augmentation expenditure

As an outcome of our detailed project reviews, and two adjustments made to extrapolate findings to the balance of the capex forecast and to remove contingencies, PB's recommendation on an efficient and reasonable forecast capex for network augmentation investment is $174m, a reduction of 49% from the original proposal, as shown in Table 4-28.

Table 4-28 – Final recommendation for VENCorp total network capex

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
Proposed total capex	2.0	15.7	51.8	79.5	138.3	67.6	354.7
Recommended total capex	1.6	11.4	22.7	44.9	61.9	37.3	180.4
Adjustment to total capex	(0.4)	(4.3)	(29.1)	(34.6)	(76.4)	(30.2)	(174.3)
Adjustment to total capex %	20%	27%	56%	44%	55%	45%	49%

Source: PB analysis

The breakdown of the PB recommendations, by detailed project review, is provided in Table 4-29.

146 This approach is consistent with VENCorp having evenly spread its expenditure for scenario driven projects across the last four years and fact that 95% of VENCorp's planned augmentation expenditure occurs in these years.

Table 4-29 – Forecast planned augmentation capex

Expenditure $m ('as spent', real 07/08)	VENCorp submitted	Proposed variation	PB recommendation
100 MVA metro transformer	43.8	(43.8)	—
Reactive support in state grid	10.0	(8.0)	2.0
Line termination and monitoring in metro area	18.8	(9.4)	9.4
Fourth Dederang transformer	13.8	(8.8)	5.0
Fourth line from Loy Yang to Hazelwood	18.8	(4.4)	14.0
Total of reviewed projects	105.2	(74.4)	30.8
Balance of forecast capex	199.6	—	199.6
Removal of contingency	49.9	(49.9)	—
Adjustment for high level review	—	(50.0)	(50.0)
TOTAL	354.7	(174.3)	180.4

Source: PB analysis

4.14 SUBSEQUENT RECONCILATION — 2007 ANNUAL PLANNING REVIEW

VENCorp prepared its electricity revenue cap proposal for the 2007/08 to 2013/14 regulatory period primarily based on the forecasts and analysis contained in its 2006 Annual Planning Report (APR).

In June 2007, and in accordance with NER requirements, VENCorp published its 2007 APR.

In light of this most recent information, VENCorp advised[147] that it wished to reconcile its forecast for planned augmentation expenditure with information in the 2007 APR.

VENCorp provided its (draft format) reconciliation to PB[148] – pertaining to its forecast capex – in the form of a revised spreadsheet model, a letter from SPA concerning updated feasibility cost estimates and some targeted advice on the timing of new metropolitan transformer augmentation.

VENCorp has advised that its reconciliation has focused on revised technical analysis and cost updates. Specifically, the reconciliation does not account for the new demand and energy forecasts included in the 2007 APR[149].

The impact on the overall revenue cap of the reconciliation is a relatively small increase of $6m (from $354m to $360m, real 07/08), as shown in Table 4-30.

147 Meeting between AER, VENCorp and PB, Monday 02 July 2007

148 Email correspondence between PB and VENCorp 04/07/07, 06/07/07 and 11/07/07.

149 PB notes that there has been a significant reduction in Scheduled MD forecasts of around 450MW per annum on average across the 2007/08-2015/16 period, (2007 APR, page 29), as driven by a change in the forecasting methodology.

Table 4-30 – Overall impact of the APR 2007 reconciliation

	Project category	Number of projects	Total expenditure $ million (real 07/08)	Total expenditure %	Key driver for expenditure
Original proposal	Must do	13	227	64	Load growth
	Scenario	18	106	30	Generation
	Other event	1	21	6	Load transfer
TOTAL		32	354	100	
Draft reconciliation to 2007 APR	Must do	13	196	54	Load growth
	Scenario	18	132	37	Generation
	Other event	1	32	9	Load transfer
TOTAL		32	360	100	

Source: PB using VENCorp submission VEN_DOCS-#215183-v1-Capex_Forecast_update_-_post_2007_EAPR_publication.XLS

The observations from this table, coupled with a high-level review of the detailed project listing, indicate that:

- the generation development scenario assumptions (timing, size, locations and weightings) and the general methodology have not been modified
- VENCorp has maintained its application of a 25% contingency to its preliminary cost estimates
- for the 'must do' projects, while the overall number of projects remains the same and the expenditure has reduced, the number of individual line items has reduced from 40 to 30, with one new project being included and one project moving to the scenario-driven category
- for the 'scenario'-driven projects, while the overall number of projects remains the same and the expenditure has increased.

The impact of the reconciliation on projects under detailed review is shown in Table 4-31, where a 'P' in the second column represents the original proposed (weighted) capex profile, and a 'R' represents the reconciled (weighted) capex profile.

Table 4-31 – Impact of the APR 2007 reconciliation on individual projects

Expenditure $m (real 07/08)	P / R	08/09	09/10	10/11	11/12	12/13	13/14	Total
1,000 MVA metro transformer	P	—	—	—	—	43.8	—	43.8
	R	—	—	—	—	—	43.8	43.8
Minimum reactive support in state grid area	P	—	—	2.5	2.5	2.5	2.5	10.0
	R	—	—	3.1	3.1	—	3.1	9.3
Line terminations and monitoring equipment in metro area	P	—	3.8	3.8	3.8	3.8	3.8	19.0
	R	—	3.8	3.8	3.8	3.8	3.8	19.0
Fourth 330/220 kV transformer at Dederang	P	—	—	3.45	3.45	3.45	3.45	13.8
	R	—	—	1.65	1.65	1.65	1.65	6.6
Fourth 500 kV line Loy Yang to Hazelwood	P	—	—	4.7	4.7	4.7	4.7	18.8
	R	—	—	3.5	3.5	3.5	3.5	14.1
TOTAL	P	—	3.8	14.5	14.5	58.3	14.5	105.4
	R	—	3.8	12.1	12.1	9.0	55.9	92.8
Change in capex		—	-—	(2.4)	(2.4)	(49.3)	41.4	(12.6)
Change in capex — %		—	—	17%	17%	85%	-287%	12%

Source: PB analysis

4.14.1 Impacts on projects under detailed review

In the following section, and to the extent possible given the draft reconciliation presented by VENCorp, PB provides some high-level comments the new information presented for each of the projects under detailed review, and how this may impact our original recommendations.

1,000 MVA metro transformer

PB understands that VENCorp's draft reconciliation studies indicate that after application of a deterministic 'N-0' planning criteria, an additional eastern metropolitan transformer may be required by around 2016/17. This timing has not been verified as it is beyond the current planning horizon.

This deterministic timing has been refined given VENCorp's application of a different network configuration between the Latrobe Valley and Melbourne that aims to improve load sharing on the key metropolitan transformers.

On the basis of the new 'N-0' result, VENCorp considered it prudent to defer the timing of the transformer capacity augmentation in the 2007 APR to 'approximately 2014'. To allow for the project risk associated with such a major infrastructure asset, VENCorp considers it would be necessary to target commissioning in the first half of 2014. Therefore VENCorp has deferred the timing of the metro transformer in its reconciled revenue proposal from 2012/13 to 2013/14.

From PB's perspective, the outcome of VENCorp's new study work and changed input assumptions supports our original finding that the timing of 2012/13 is aggressive. Given the dependence of VENCorp's approach on the 10% PoE peak summer forecast, PB still maintains that the augmentation is not likely to proceed given reasonable consideration of the 50% demand forecasts, and the high reliability and good condition of the existing plant. PB acknowledges that the new study conditions have led to the timing being deferred by VENCorp as opposed to a variation to its original timing decision.

Minimum reactive support in state grid area

It appears that VENCorp has reduced the number of shunt capacitor banks it is proposing to install in the state grid under 'must do' conditions, yet the unit costs have increased by 25%. This outcome supports PB's assertion that VENCorp has overstated its reactive support requirements and does not affect our original recommendation.

Without detailed advice from VENCorp on the scope of works associated with each shunt capacitor bank installation, PB cannot test the efficiency of the reconciled expenditure.

Line terminations and monitoring equipment in metro area

VENCorp has not proposed any change to this allowance, and therefore PB has no basis to review its original recommendation.

Fourth 330/22 0kV transformer at Dederang

As part of its reconciliation, VENCorp has re-affirmed this project is only required in one of the four generation-development scenarios, thereby reducing its probabilistic weighting from 1 to 0.25. It has also advised that the project cost estimate has increased by 209% from $11m to $23m (excluding the 25% contingency).

PB has confirmed (from the advice provided by VENCorp) that the cost increase is attributable to increases in material and labour and an increase in the scope of works. PB has not had the opportunity to review the basis for the change of scope, but highlight that it appears to have been initiated by SPA as opposed to VENCorp. This matter requires further detailed review.

No information provided by VENCorp impacts on our original recommendation; however, we note that given VENCorp's market benefits approach to planning a material increase in project cost is likely to lead to deferral in project timings unless there has been a commensurate increase in the expected energy at risk.

Fourth 500 kV line Loy Yang to Hazelwood

The reconciliation provided by VENCorp modifies this project in two ways, the cost of the project increases considerably by 50% from $30m to $45m, and the need for the project is reduced so that it is required in one scenario rather than two (such that the applicable weighting reduces from 0.5 tom 0.25).

The increase in cost is likely to be the cause of the project being removed from 'scenario 3' (higher import) as this included only 600 MW of new generation in the Latrobe Valley.

Without a detailed review of the basis for the increase in project costs, PB is in no position to modify its original recommendation with respect to this project.

4.14.2 Changes in project cost estimates

A material change evident in VENCorp's revenue cap reconciliation is the project cost estimates. The changes are in raw[150] project costs increase on average by 26%, with a maximum of 360% and a minimum of -20%.

Applying VENCorp's original cost estimates to the new project timings and weightings reduces the expenditure required $66m from $360m to $294m. This matter, and the drivers behind the costs increases, must be examined in further detail.

[150] Prior to the 25% contingency being applied.

4.14.3 Conclusions

In addressing the matters raised by VENCorp as part of its reconciliation to the 2007 APR outcomes, PB concludes that:

- VENCorp must formalise its final position and, in practical terms, this should account for the new demand and energy forecast as published in the 2007 APR
- the increases apparent in VENCorp's project costing estimates requires further review on the basis of the materiality of the changes and the evidence that scope of works for some projects has been modified
- the additional information provided does not materially influence PB's original recommendations, except to note that expenditure drivers have diminished as evidenced by the deferral of key projects.

5. OPERATIONAL EXPENDITURE

VENCorp performs various statutory and non-statutory functions in the gas and electricity industries. One of VENCorp's core functions is the provision of shared electricity transmission network services in Victoria. As the monopoly provider of these services VENCorp is subject to economic regulation under the NER. It is required to submit to the AER forecasts of its statutory electricity transmission-related costs that are expected to be recovered through a combination of Transmission Use of System (TUoS) charges, settlement residues, charges to ElectraNet and interest and consultancy income, over the regulatory period commencing 1 July 2008.

The ownership, governance and organisational arrangements within the Victorian transmission sector are unique insofar that VENCorp is the only TNSP in Australia which is constituted as a not-for-profit organisation that does not own any transmission network assets. Its role is that of an independent transmission network planner and investment decision maker.

In reviewing the forecast operating and planning expenditures for VENCorp, we note that not only is VENCorp a not-for-profit organisation but has corporate objectives explicitly requiring that it deliver its services and perform its functions in a commercially-neutral and cost-effective (value-maximising) manner. It is also required by its transmission licence to competitively tender for transmission services which exceed a pre-defined value.

VENCorp contend that its operating and planning expenditures constitute less than 2% of transmission network charges in Victoria, which equates to approximately 0.1% of total delivered electricity costs to end use customers.

In this section we discuss, analyse and present our conclusions and recommendation on the forecast operating and planning expenditures VENCorp has included in its Revenue Proposal for the period 1 July 2008 to 30 June 2014.

In order to analyse the reasonableness of VENCorp's total forecast operating and planning expenditures, we carried out a review of historical expenditure patterns and five of the most significant cost categories in the current financial year.

5.1 HISTORICAL OPERATING AND PLANNING EXPENDITURES

VENCorp included a table in its Revenue Proposal indicating its historical actual and forecast operating and planning expenditures over the current regulatory period (Table 8.2). This has been reproduced as Table 5-1.

Table 5-1 – VENCorp historical operating and planning expenditures, excluding GST

Expenditure $m (nominal)	03/04	04/05	05/06	06/07	07/08
Actual	4.7	4.8	3.4	6.3	6.3
Forecast for period	5.5	5.7	6.0	6.1	6.2

Note: 2006/07 and 2007/08 are forecast (budgeted) rather than actual.

Source: VENCorp Proposal

VENCorp has advised that the actual costs shown in Table 5-1 are in nominal dollars whist the forecast costs are based on the ACCC 2002 Decision escalated using the ACCC's inflation forecasts of that Decision, which VENCorp advise is 2.04%.

For comparison and analysis purposes we have produced Table 5-2 which details the forecasts in the ACCC Victorian Transmission Network Revenue Caps 2003-2008 Decision of 11 December 2002, and the VENCorp actual operating and planning costs converted to real 2007/08 dollars. To convert the Decision's real 2002 forecasts into real 2007/08 dollars we have used the actual historical lagged all groups CPI, June quarter results and have assumed the Decision's forecasts are shown in real 2001/02 dollars. The VENCorp nominal annual costs were converted to real 2007/08 dollars using the same CPI results. We believe that using actual historical CPI, as opposed to the CPI forecast in the ACCC's 2002 Decision, to convert expenditures provides a more meaningful comparison between actual historical annual expenditures and the forecasts contained in the 2002 Decision as the actual CPI has an impact on the current costs for goods and services.

Table 5-2 – VENCorp historical operating and planning expenditures, excluding GST, in real 2007/08 dollars

Expenditure $m (real, 2007/08)	03/04	04/05	05/06	06/07	07/08
Actual	5.3	5.2	3.6	6.3	6.3
Forecast for period	6.4	6.5	7.0	7.0	7.2
Difference	(1.1)	(1.3)	(3.4)	(0.7)	(0.9)

Note: 2006/07 and 2007/08 are forecast (budgeted) rather than actual.

Source: PB analysis

The table shows that historically VENCorp has under spent compared to that forecast in the 2002 ACCC revenue cap decision. In 2005/06, this under expenditure was considerable being $3.4m in 2007/08 dollars.

5.2 FORECAST OPERATING AND PLANNING EXPENDITURES

VENCorp's Revenue Proposal sets out VENCorp's forecast operating and planning expenditures for the next regulatory period (Table 8.1). PB compared these with each line item in the operating and planning section of the VENCorp chart of accounts. These line items are detailed in Table 5-3.

We found that in the VENCorp Proposal (Table 8.1), Computing and Telecommunications are combined under the heading 'Computing', Communications, Consultancies and Contractors are combined under a single heading, and Contracted Services and Insurance have been combined under the heading of 'Contracted Services'.

Table 5-3 – VENCorp forecast operating expenditures, excluding GST

Expenditure $m (nominal)	08/09	09/10	10/11	11/12	12/13	13/14
Labour	2.94	3.07	3.18	3.36	3.48	3.62
Contracted services	0.04	0.05	0.05	0.05	0.05	0.05
Insurance	0.18	0.19	0.19	0.20	0.20	0.21
Computing	0.58	0.63	0.64	0.66	0.68	0.70
Telecommunications	0.05	0.05	0.05	0.05	0.05	0.05
Consultancies	1.05	1.10	1.12	1.17	1.20	1.24
Contractors	0.07	0.07	0.07	0.08	0.08	0.08

Expenditure $m (nominal)	08/09	09/10	10/11	11/12	12/13	13/14
Vehicles & travel	0.06	0.06	0.06	0.06	0.07	0.07
Occupancy	0.18	0.18	0.19	0.20	0.20	0.21
Administration costs	0.11	0.12	0.12	0.12	0.13	0.13
Depreciation & amortisation	0.12	0.13	0.13	0.13	0.14	0.13
Service department allocations	1.30	1.34	1.36	1.40	1.44	1.48
Total	6.69	6.98	7.17	7.47	7.71	7.98

Note: Totals may not add due to rounding
Source: VENCorp Proposal

To facilitate meaningful comparisons to both the historical costs and annual forecasts, Table 5-4 shows the operating and planning expenditure forecasts recast in real 2007/08 dollars. We have assumed CPI to be 3.0% per annum in converting the nominal values shown in Table 5-4 to real 2007/08 dollars.

Table 5-4 – VENCorp forecast operating expenditures, excluding GST, in real 2007/08 dollars

Expenditure $m (real, 2007/08)	08/09	09/10	10/11	11/12	12/13	13/14
Labour	2.85	2.89	2.91	2.98	3.00	3.03
Contracted services	0.04	0.05	0.05	0.04	0.04	0.04
Insurance	0.17	0.18	0.17	0.18	0.17	0.18
Computing	0.56	0.59	0.59	0.59	0.59	0.59
Telecommunications	0.05	0.05	0.05	0.04	0.04	0.04
Consultancies	1.02	1.04	1.02	1.04	1.03	1.04
Contractors	0.07	0.07	0.06	0.07	0.07	0.07
Vehicles & travel	0.06	0.06	0.05	0.05	0.06	0.06
Occupancy	0.17	0.17	0.17	0.18	0.17	0.18
Administration costs	0.11	0.11	0.11	0.11	0.11	0.11
Depreciation & amortisation	0.12	0.12	0.12	0.12	0.12	0.11
Service department allocations	1.26	1.26	1.24	1.24	1.24	1.24
Total	6.48	6.59	6.55	6.64	6.65	6.67

Note: Totals may not add due to rounding
Source: PB analysis

Table 5-4 shows that VENCorp has established 12 cost categories in its chart of accounts for operating and planning expenditures. Of these, the labour cost category is the only component of the forecast operating expenditures that has been escalated in real terms throughout the next regulatory period. The remaining cost categories are essentially constant throughout the period, implying that they have been escalated in line with CPI only.

5.3 ALLOCATION OF COSTS

PB has reviewed the allocation of costs to the regulated electricity business segment within VENCorp and the internal governance procedures relating to the approval and payment of invoices.

In relation to the allocation of costs, direct labour costs are allocated to the business segments via the use of timesheets. The timesheet process appears robust and provides suitable cost categories for the regulated electricity business segment.

Corporate costs are allocated via two methods. Computing Costs, Insurance, Occupancy Costs and Depreciation are allocated by the percentage of full-time equivalent staff (FTE) in each business segment. In the case of the regulated electricity business this equates to approximately 26%. The balance of corporate costs, collectively called the Service Department Allocations, is allocated directly to the individual business segments by using the time sheets.

For example, the costs associated with the telephone PABX are included in the corporate allocation, with the direct call costs directly charged to each business segment. In the regulated electricity business segment, these direct telecommunication costs are included in the 'telecommunications' cost category.

PB has formed the view that the allocation of costs between the business segments within VENCorp provides an appropriate allocation of costs to the regulated electricity business and that the costs attributable to the regulatory electricity business are booked to the appropriate accounts.

We have also reviewed the governance processes relating to the approval and payment of accounts within VENCorp. In general, all costs must be signed off by Level 1 managers (General Managers) prior to being processed for payment. Invoices for amounts above $10,000 must have CEO approval prior to processing. This approval process is normal procedure within most businesses but PB notes that the limit requiring CEO sign off is relatively low compared with most businesses including government-owned businesses in other jurisdictions.

While the invoice approval process is relatively standard business practice, VENCorp has an additional check in so far as the cheque drawn to pay the invoice is signed by the approving officer. Within VENCorp this means that all invoices and payment cheques are signed off by either the CEO or a General Manager. Monthly reports, broken down by business segment, are produced and reviewed by Management and the Audit Committee.

In PB's opinion, these processes indicate a high level of governance relating to the approval and payment of invoices and accounts.

5.4 REVIEW OF HISTORICAL EXPENDITURE

PB has reviewed VENCorp's overall historical operating and planning costs and in particular the significant under expenditure in 2005/06. Our discussions with VENCorp have indicated that this under expenditure is due primarily to two "one off" issues. The first is a significant under expenditure associated with labour costs due to an inability to fill vacancies within the organisation. This has resulted in actual labour costs being $1.7m below estimates (2005/06 dollars).

The second "one off" issue is that during 2005/06 the actual expenditure was lower as a result of a positive adjustment to VENCorp's defined benefit superannuation obligation. VENCorp was required to bring this to account under the International Financial Reporting Standards (IFRS). The defined benefit superannuation adjustment required under IFRS in 2005/06 was $1.2m and the defined benefit superannuation holiday in 2005/06 was $0.1m.

The total under expenditure compared to forecast in 2005/06 was $3.25m (real, 2007/08), while the under expenditure relating to staff vacancies within the organisation and the

superannuation holiday was $1.9m (real, 2007/08). We recommend revising the actual 2005/06 expenditure to account for these one off issues resulting in an adjusted expenditure for comparison purposes of $5.54m (real 2007/08 dollars).

In addition, PB requested a year to date statement of financial performance for the current 2006/07 financial year and this information shows the current under expenditure to be $0.719m (2006/07) as at February 2007. Hence, it appears as if the forecast for the 2006/07 year has also been overestimated. For comparison purposes we have assumed that this under expenditure will remain for the remainder of the year and have calculated a probable outcome of $5.59m (real 2007/08 dollars) for the 2006/07 financial year.

Table 5-5 shows the PB adjusted expenditures compared to those forecast for the period.

Table 5-5 – PB adjusted VENCorp historical operating and planning expenditures, excluding GST, in real 2007/08 dollars

Expenditure $m (real, 2007/08)	03/04	04/05	05/06	06/07	07/08
PB adjusted	5.26	5.24	5.54	5.59	6.30
Forecast for period	6.38	6.50	6.97	6.97	7.21
Difference	(1.12)	(1.26)	(1.43)	(1.38)	(0.91)

Note: 07/08 operating and planning forecasts have not been adjusted.
Source: PB analysis

5.5 REVIEW OF HISTORICAL EXPENDITURE BY CATEGORY

PB reviewed the 2006/07 year to date expenditures for the five most significant expenditure categories for the 2006/07 financial year. Our comments and analysis are detailed in the following sections.

The five cost categories that we reviewed in detail — Labour, Computing, Consultancies, Contractors and Service Department Allocations — account for approximately 80% of the forecast operational expenditures. We have also included general comments on the remaining seven cost categories, which comprise approximately 10% of the total forecast operational expenditure.

5.5.1 Labour

VENCorp have the equivalent of approximately 22 staff dedicated to the provision of shared electricity transmission network services in Victoria. The 'labour' cost category includes all the labour-related costs associated with their employment. It does not include the costs associated with the employment of temporary staff recruited from labour hire firms; these costs are included in the contractors and consultancies expenditure categories.

VENCorp's Revenue Proposal states that:

> *VENCorp is forecasting the cost of labour to increase by an average of 4.5 per cent per annum over the regulatory period. These costs are in line with VENCorp's Enterprise Bargaining Agreement and the estimated performance based increases.*

In order to assess the reasonableness of the labour costs proposed by VENCorp, PB sought an appropriate labour comparator. In its Revenue Proposal, VENCorp states that it is wholly owned by the Government of Victoria and is responsible to the Minister for Energy and Resources. In view of this statement we believe that the appropriate labour comparator is the Australian Bureau of Statistics (ABS) data on the Public Sector. In addition we have used the

ordinary time earnings data, as it is our understanding that most professionals working in the public sector do not receive overtime payments.

PB has calculated the average annual percentage increase in labour over the past 20 years for full-time employed, adult males, ordinary time earnings for the public sector. This has been calculated using the ABS Survey 6302.0; Average Weekly Earnings, Australia – Table 9, Average Weekly Earnings, Public Sector – Australia (Dollars) – Original. The average annual percentage increase using the data in this table is 4.95% nominal for the 20 years to February 2007. This long-term average is significantly higher than the growth over the last 12 months, which was 3.7% nominal for full-time adult males.

We have checked the average annual percentage labour increase used in the VENCorp expenditure modelling. Our calculations, based on the VENCorp forecasts converted into real 2007/08 dollars indicates that the average annual percentage increase is 1.03% real. Assuming an annual inflation rate of 3.00% this converts into a nominal rate of 4.03% per annum.

VENCorp stated in its Revenue Proposal that it has escalated labour at 4.5% nominal per annum or 1.50% real based on an assumed CPI of 3.00%. However, based on the data converted into real 2007/08 dollars, the calculated annual average escalation rate is 1.03% real, which approximates to 4.03% nominal based on an assumed CPI of 3.00%.

This actual escalation rate is lower than the average annual percentage increase in ordinary time earnings of full-time adult males over the past 20 years, namely, 4.95%, but higher than the percentage increase over the past 12 months, which was 3.7%. In view of this analysis we believe that the labour forecast included by VENCorp based on its forecast labour rate escalator for operating and planning expenditures appears reasonable.

5.5.2 Computing

The ‘computing’ cost category is used for computing costs which are directly attributable to the regulated electricity business. General computing costs are included in corporate costs and are allocated to the individual business segments on the basis of the number of FTEs in each business segment.

PB has analysed the year to date and annual statement of financial performance as at February 2007 to determine the appropriateness of the VENCorp 2006/07 operating and planning expenditures budget. This data indicates an over budgeting of costs for this expense category. The year to date data indicates actual expenditure is approximately 54% of budget, being $211,000 compared to a budget allowance of $394,000 (2006/07). The annual statement of financial performance indicates that the forecast year-end expenditure is expected to be approximately 75% of budget.

Based on this information, PB believes that VENCorp has over budgeted for direct computing costs in the 2006/07 financial year.

5.5.3 Consultancies

Expenditures in the ‘consultancies’ cost category relates to engagement of specialist consultants such as legal and specialist technical advice specifically relating to the regulated electricity business. For example, a consultancy firm was engaged to conduct a review of TUOS pricing methodology and legal advice was sought to review connection agreement conditions and the tender process.

In addition the expenditures associated with one-off projects, such as Vision 2030 and the easement review, are charged to this cost category.

PB requested additional information in relation to the composition of the 2006/07 budget as well as the expenditure to date. This information indicates that the annual budget for consultancies in 2006/07 is $1.091m. The year to date data indicates that expenditure on

consultancies as at February 2007 was $0.538m (2006/07) compared to a budgeted allowance of $0.777m (2006/07), a variance of $0.239m. On a straight line projection this under expenditure would equate to an annual under expenditure of $0.83m (real, 2007/08).

Based on this analysis, PB believes that VENCorp has over budgeted for consultancies in the 2006/07 financial year.

5.5.4 Service Department Allocations

Service Department Allocations are the balance of service costs excluding Computing Costs, Insurance Costs, Occupancy Costs and Depreciation and Amortisation which are directly allocated in proportion to the FTEs in each statutory business segment.

PB sought additional information from VENCorp to clarify which costs were included in this cost category and was advised that they comprised 50% labour, 20% consultancy and 10% Directors fees. In addition, VENCorp advised that the percentages have been historically relatively consistent. In the 2006/07 budget these costs are $560,000 for labour, $220,000 for consultancies and $110,000 for Directors fees.

The labour costs include a portion of the labour costs of the CEO and other staff in the corporate area including Finance, Risk Management, Human Resources, Communications, Safety & Emergency and Administration staff.

The consultancy costs include that proportion of the organisational wide consultancies applicable to the regulated electricity business. The consultancies include audit costs, legal costs, staff recruitment costs, and training costs.

The year to date information provided by VENCorp indicates that the costs booked to this cost category are approximately in line with budget; a small 4% over expenditure up until February 2007. The Annual Statement of Financial Performance indicates that forecast expenditure is also approximately in line with the 2006/07 budget.

5.5.5 Contractors

The ‘contractors’ cost category relates to the filling of short-term vacancies, such as those that occur between filling full-time positions. In PB’s experience, labour hire firms are generally used to provide the temporary staff for these positions. PB believes that temporary staff required for vacancies such as those associated with maternity leave are also included in this cost category.

Although the budget allocation to this cost category is relatively small, the 2006/07 year to date data indicates that there has been no expenditure in this cost category. While PB would expect that costs in this cost category would vary from year to year depending on staff movements, the absence of any expenditure indicates that this cost category has probably been over budgeted for the 2006/07 financial year.

5.5.6 Other cost categories

Expenditures in the remaining seven cost categories in Table 5-4 have been kept constant in real terms over the next regulatory period and individually compose only a very small percentage of the total operational expenditure. We have discussed each of these individual cost categories with VENCorp and are satisfied that the allowances individually appear reasonable but have formed the opinion that in aggregate are likely to be less than forecast. This view is supported by the historical expenditures compared to forecast contained in Attachment 7 of the VENCorp Application.

5.6 REVIEW OF FORECAST EXPENDITURE

PB has carried out a top down review of VENCorp's aggregate forecast operating and planning expenditures for the next regulatory period. We examined historical expenditures and trends as well as the expenditure forecast for 2007/08. We then compared the forecast expenditures against the actual and PB adjusted expenditures for the current period.

A comparison of actual and allowed forecast expenditures by operating and planning category, as detailed in Attachment 7 to the Revenue Proposal, shows that there is a consistent total annual under expenditure compared to allowed forecast expenditures. In addition, whilst several expenditure categories, such as Labour and Vehicles and Travel, exhibit under expenditure from year to year there is no evidence of a consistent trend in the annual under expenditures for these categories. Other expenditure categories exhibit random periods of under expenditure during the period reviewed, from January 2003 through to the February of 2006/07 financial year. Hence PB considers that the 2006/07 total forecast expenditure and the total expenditure forecast for 2007/08 are both likely to have been over estimated.

Based on the trends evident in Table 5-5 from 2003/04 through to 2006/07, we believe a reasonable projection for total expenditures for 2007/08 to be $5.67m and for 2008/09 to be $5.75m (real 2007/08 dollars). These projections are based on the average annual increase in operating and planning expenditure (as adjusted by PB) from 2003/04 through to 2006/07 namely, $0.08m. PB notes that the projected operating and planning costs for 2007/08 of $5.67m results in an under expenditure of $1.54m, which is consistent with the under expenditure evident in previous years.

PB has formed the view that as VENCorp has consistently over forecast operational and planning expenditures in the current regulatory period, its forecast operating and planning expenditures for the next regulatory period should be reduced to reflect this historical and current trend. Accordingly, we consider that the operating and planning forecast expenditure for 2008/09 be $5.75m (real 2007/08 dollars) which is PB's adjusted 2007/08 forecast expenditure plus $0.08m.

PB has not seen any evidence to support a step change in operating and planning expenditures for the next regulatory period. The VENCorp Proposal and our discussions with VENCorp support a business as usual approach to forecasting future operating and planning expenditures. Hence PB is of the view that the current small real annual increase in operational and planning expenditures evident in the current regulatory period are likely to continue throughout the next regulatory period. We therefore consider that the operating and planning forecast expenditures for the remaining years in the next regulatory period should be calculated by increasing the 2008/09 forecast expenditure by $0.08m real, year on year.

Based on our investigations of VENCorp's historical operational and planning expenditures we have formed the view that the historical actual expenditures in 2003/04 and the 2004/05 financial years as well as our adjusted expenditures for the 2005/06 and 2006/07 financial years represent prudent and efficient annual operating and planning expenditures.

In addition we note that the annual VENCorp forecast operating and planning expenditure categories for the next regulatory period are relatively constant from year to year with the exception of the Labour category. We are of the view that annual increases of $0.08m (2007/08 dollars) per annum for the next regulatory period will adequately cover VENCorp's total annual forecast increase in labour costs and provide forecast expenditures that are prudent and efficient.

5.7 PB CONCLUSIONS AND RECOMMENDATIONS

PB has reviewed the historical and forecast operating and planning expenditures in the VENCorp Revenue Proposal. PB found a consistent pattern of annual under expenditure compared to the allowed forecast and is of the view that this pattern will continue through to the end of the current regulatory period.

Our detailed review of five expenditure categories in 2006/07 financial year indicated instances of over budgeting compared to actual expenditure consistent with historical performance as shown in Attachment 7 of the Revenue Proposal. PB has therefore concluded that VENCorp's estimated full year expenditure for 2006/07 is not an efficient starting point on which to base forecast future operating and planning expenditures.

PB recommends that an appropriate cost base for forecasting operating and planning expenditures for the next regulatory period is $5.67m (2007/08). Furthermore, we recommend that the trend evident in the historical and PB adjusted operating and planning expenditures from 2003/04 through to 2006/07 be used to forecast the 2008/09 operating and planning expenditure, namely $5.75m (2007/08). PB also recommends operating and planning expenditures for the remaining years in the next regulatory period be the 2008/09 recommended expenditure plus annual increments of $0.08m (real 2007/08) compounded year on year. PB also believes that the adoption of it's recommendations would result in prudent and efficient forecasts for the next regulatory period.

The adoption of PB's recommendations would result in a total operational forecast expenditure of $35.70m over the next 6-year regulatory period, a reduction of $3.88m (real, 2007/08). The result is a 9.8% reduction in VENCorp's total forecast operating and planning expenditures over the next regulatory period, which we believe would result in prudent and efficient forecast operating and planning expenditures. Table 5-6 details PB's recommended annual and total expenditure over the next regulatory period.

Table 5-6 – PB recommended forecast operating and planning expenditures for 2008/09 to 2013/14

Expenditure $m (real, 2007/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
Submitted	6.48	6.59	6.55	6.64	6.65	6.67	39.58
Proposed variation	(0.73)	(0.76)	(0.64)	(0.65)	(0.58)	(0.52)	(3.88)
PB recommendation	5.75	5.83	5.91	5.99	6.07	6.15	35.70

Source: PB analysis

CONCLUSIONS

PB has been engaged by the AER to conduct a review of VENCorp in support of the AER undertaking these revenue determination assessments. This work involves conducting a review of, and providing advice to the AER on, VENCorp's capex and opex.

Through its assessment of the historical and forecast expenditure proposals for both capex and opex, PB has been able to formulate an independent view on the prudence and efficiency of the past expenditure and also the reasonableness of that proposed for the forthcoming regulatory period.

In this independent review of the VENCorp expenditure proposals, PB has considered, examined and provided its expert opinion, on the following key submission items and expenditure categories.

- committed network capital expenditure over the current regulatory period (augmentation)
- planned network capex (augmentation)
- forecast operational expenditure (opex) for VENCorp
- capital governance framework and the VENCorp planning process.

The review of these items has taken full account of the unique arrangements in Victoria between SPA and VENCorp.

The process adopted by PB in undertaking this review involved presentations, a series of meetings between PB and VENCorp to discuss detail on opex and capex, detailed technical reviews on a number of selected individual projects and internal analysis and deliberation by the PB team.

In this section we set out PB's key conclusions arising from the independent review of the VENCorp revenue proposal.

COMMITTED NETWORK AUGMENTATION CAPITAL EXPENDITURE

PB has undertaken a detailed review of a selection of five VENCorp committed augmentation projects. This has led to the following conclusions.

VENCorp has demonstrated a justifiable need for all committed augmentation expenditure.

PB conducted detailed reviews of 64% of all committed augmentation expenditure and found that in all cases examined VENCorp had demonstrated a justifiable need.

All projects examined demonstrated strategic alignment with the requirements of the NER and guided by the application of the regulatory test to VENCorp's probabilistic planning approach.

No specific references were noted in the projects examined to VENCorp's strategies, overarching policies or plans. However, it is clear in the majority of projects examined that the overarching principles are based on the requirements of the NER, and guided by the application of the regulatory test to VENCorp's probabilistic planning approach. In other cases the project scope (and cost) was very limited, and the documentation was accordingly brief.

Analysis of the alternatives, and the selection of the preferred alternative was reasonable and prudent.

In all projects examined (except one) the range of alternatives identified were reasonably comprehensive and practical solutions to meet the identified need, and that the analysis of the alternatives, and the selection of the preferred alternative was reasonable and prudent. In one case (DBUSS) this could not be concluded as the relevant documentation was not provided[151].

VENCorp has reasonably demonstrated that the preferred alternative was the most efficient alternative.

In all cases it was reasonably demonstrated that the preferred alternative was the most beneficial of those examined to meet the identified need, and that the preferred alternative was an efficient alternative.

Most projects examined demonstrated that project timing reasonably optimal.

In most cases the project implementation timing was demonstrated in the available documentation to be reasonably optimal. However, in two cases (Murraylink, and DEBUSS) the documentation supplied did not address project timing[152].

Project documentation was generally appropriate for the projects examined.

Project documentation was (in general) appropriate for the projects examined. However some information was lacking particularly in relation to demand forecasts, and project timing.

Compliance with VENCorp's augmentation planning and governance processes was demonstrated by the project documentation.

VENCorp has complied with its augmentation planning and governance processes as demonstrated by the project documentation provided, although in a few cases some detail information was lacking.

VENCorp's role in project implementation was demonstrated to be consistent with prudent asset management and good industry practice.

In most cases it was demonstrated that VENCorp's role in the project implementation was consistent with prudent asset management and good industry practice. However in the case of the Rowville and Richmond line termination upgrade project, and the DBUSS project, PB was not able to make this conclusion as documentation was lacking in relevant details (e.g. project timing), or project implementation documentation was not provided[153].

In all projects examined, the implemented costs were reasonable given the projects scope.

In all cases it was concluded that the implemented project costs were reasonable given the nature and scope of the project.

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151 It is however acknowledged that VC did make reference to an economic justification for the DBUSS project based on consideration of a number of alternative projects (see page 50 of VC's Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014).

152 In the case of the DEBUSS project it is acknowledged that VC did make reference to an economic justification that may have addressed timing issues. This was not supplied however (see page 50 of VC's Electricity Revenue Cap Proposal 1 July 2008 to 30 June 2014).

153 PB acknowledges that these projects are minor in nature and that the documentation is accordingly brief.

VENCorp has been prudent and efficient in regards to the management of its committed augmentation expenditure.

While the detailed reviews did identify a number of issues, these essentially related to the quality of the documentation (missing information, documents not supplied), as opposed to the project itself. However, on the balance of the information provided, and in the broader context of the overall review, PB is of the view that it is likely that VENCorp has been prudent and efficient in regards to the management of its committed augmentation expenditure.

VENCorp's committed augmentation expenditure over the period 2002/3- 2007/08 was timely, reasonable, and efficient.

PB has considered the prudence and efficiency of VENCorp's committed augmentation expenditure through a broad based assessment that includes detailed review of a selected number of projects. Based on the information provided by VENCorp, as well as PB's investigations and assessments, it is PB's view that VENCorp's committed augmentation expenditure over the period 2002/3 to 2007/08 was timely, reasonable, and efficient. PB has considered the cost of committed augmentation proposed by VENCorp, and recommends the values as shown in Table 3-7.

PLANNED NETWORK AUGMENTATION CAPITAL EXPENDITURE

PB has undertaken a detailed review of five projects within VENCorp's forecast (planned) augmentation proposal. The projects have covered all major project categories and comprise 30% of the weighted $354m value of the entire program of work. In the context of the unique regulatory arrangements in Victoria where the main purpose of VENCorp's capex forecast is to provide a 'best endeavours' indication of the most likely forward investments, PB's general observations and opinions drawn from our review include:

The scenario-based approach is suitable for the purposes of capturing extremes in transmission development plans.

VENCorp's selection of four generation development scenarios, and the respective weighting's applied, represent a reasonable approach that should capture the extremes of transmission augmentation expenditure.

The 'indicative probabilistic' forecasting approach lacks transparency and does not directly relate to VENCorp's project justification and approval process.

In PB's view, VENCorp's projected capex outcomes do not efficiently and accurately reflect likely investment decisions towards the end of the 2007/08 to 2013/14 regulatory period, in particular with respect to the timing of additional 1000 MVA 500/220 kV transformation in the metropolitan area, giving due consideration to VENCorp's current planning criteria.

VENCorp appears not to have accounted for inter-dependencies in augmentation projects.

Given the limited number of load flow studies prepared by VENCorp and the 'indicative probabilistic' approach adopted, it was not apparent how projects required in the early years of the regulatory period would influence the need and timing of subsequent projects.

PB believes that there is likely to be some systemic advancement in the timing of projects presented by VENCorp.

Given VENCorp focus on 10% PoE peak summer demand forecast, it is likely that the 'indicative probabilistic' approach adopted has tended to advance the timing of augmentation projects.

PB found that the documentation and technical data supporting proposed projects was limited.

VENCorp strongly referenced its 2006 APR and had limited information on specific projects capture in its medium to long term capex forecast.

VENCorp has not fully considered the significant asset replacement program proposed by SPA.

There was limited evidence that VENCorp had incorporated the significant replacement programme proposed by SPA, particularly with respect to developments in the metropolitan area, indicating that there was some scope for common capex.

PB recommends a high level adjustment to reduce VENCorp capex to efficiency levels similar to historical experience.

PB recommends an additional adjustment to VENCorp's proposed capex to reduce the expenditure efficiency of $0.15m/MW driven by the expected increase in the 10%PoE forecast demand growth. The materiality of this adjustment is a reduction of $50m.

PB recommends VENCorp's 25% contingency factor be removed from its forecast.

In order to target an accurate, rather than upper limit revenue cap, PB recommends removal of VENCorp's 25% contingency factor and this reduces the expenditure requirements by $50m.

Summary of planned expenditure recommendation

As an outcome of our detailed project reviews, and two adjustments made to extrapolate findings to the balance of the capex forecast and to remove contingencies, PB's recommendation on an efficient and reasonable forecast capex for network augmentation investment is $174m, a reduction of 49% from the original proposal, as shown in Table C1.

Table C1 – Final recommendation for VENCorp total network capex

Expenditure $m (real 07/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
Proposed total capex	2.0	15.7	51.8	79.5	138.3	67.6	354.7
Recommended total capex	1.6	11.4	22.7	44.9	61.9	37.3	180.4
Adjusted to total capex	0.4	4.3	29.1	34.6	76.4	30.2	174.3
Adjusted to total capex %	20%	27%	56%	44%	55%	45%	49%

Source: PB analysis

The breakdown of the PB recommendations, by detailed project review, is provided in Table 4-29.

Subsequent reconciliation

VENCorp prepared its electricity revenue cap proposal for the 2007/08 to 2013/14 regulatory period primarily based on the forecasts and analysis contained in its 2006 Annual Planning Report (APR).

In June 2007, and in accordance with NER requirements, VENCorp published its 2007 APR.

In light of this most recent information, VENCorp advised[154] that it wished to reconcile its forecast for planned augmentation expenditure.

The materiality of the reconcilitation on the overall revenue cap is a relatively small increase from $354m up by $6m to $360m (real 07/08).

In addressing the matters raised by VENCorp as part of its reconciliation to the 2007 APR outcomes, PB concludes that:

VENCorp must formalise its final position and, in practical terms, this should account for the new demand and energy forecast as published in the 2007 APR.

Increases in VENCorp's project costing estimates requires further review.

Additional information provided does not materially influence PB's original recommendations.

FORECAST OPERATIONAL EXPENDITURE

PB has undertaken a review of VENCorp's forecast opex. A review of the past opex and been used to inform this process and to help PB develop an independent view on the prudence and efficiency of VENCorp's opex proposals. Following our review of the opex proposal, PB has arrived at the following conclusions.

There has been a historical pattern of under expenditure in operational and planning expenditures compared to the annual forecasts which we believe will continue if the VENCorp opex and planning forecasts are accepted.

PB has reviewed the historical and forecast operational expenditures in the VENCorp Revenue Proposal and found a pattern of under expenditure in historical expenditure compared to that forecast. Whilst the extent of over-budgeting appears not to be consistent in many cost categories, in some expenditure categories, such as labour, vehicles and travel, the extent of under-spend has been consistent. PB has seen no evidence to suggest that this pattern will no continue.

PB believes that VENCorp's forecast operational and planning expenditure for the next regulatory period should be forecast by escalating the adjusted 2006/07 total forecast expenditure by the four year average annual increase in expenditure up until 2006/07.

We recommend that VENCorp's forecast annual opex expenditures be calculated by increasing PB's adjusted forecast 2006/07 total operational and planning expenditure by the average annual increase in historical and adjusted total operational and planning expenditures ($0.08m). We believe the current total expenditure trends will continue until the end of the next regulatory period.

Forecast opex cost summary

The adoption of PB's recommendations would result in a total operational forecast expenditure of $35.70m over the next 6 year regulatory period, a reduction of $3.88m (real, 2007/08). The annual and total recommended opex and planning expenditures for the next regulatory period are detailed in Table C2.

154 Meeting between AER, VENCorp and PB, Monday 02 July 2007

Table C2 – PB recommended forecast operating and planning expenditures for 2008/09 to 2013/14

Expenditure $m (real, 2007/08)	08/09	09/10	10/11	11/12	12/13	13/14	Total
Submitted	6.48	6.59	6.55	6.64	6.65	6.67	39.58
Proposed variation	(0.73)	(0.76)	(0.64)	(0.65)	(0.58)	(0.52)	(3.88)
PB recommendation	5.75	5.83	5.91	5.99	6.07	6.15	35.70

Source: PB analysis

CAPITAL GOVERNANCE FRAMEWORK AND THE PLANNING PROCESS

As part of the review, and through the detailed project reviews, PB has examined the governance framework and planning processes associated with VENCorp's augmentation investment decisions. PB makes the following observations regarding VENCorp's governance framework and planning processes:

VENCorp has a business structure to appropriately support its network augmentation, investment approval, and decision-making processes.

Typical of a well-governed, integrated business, VENCorp has a business structure and has established a number of committees to appropriately support its network augmentation, investment approval, and decision-making processes. Furthermore, having regard to documentation presented relating to VENCorp's key policies, processes, and delegations, PB has found these documents to provide clear information relevant to the governance of VENCorp's electricity network augmentation processes.

VENCorp's governance framework and capex and opex approvals process are both sound and appropriate for a government entity of the nature of VENCorp.

PB is of the view that VENCorp's governance framework and capex and opex approvals process are both sound and appropriate for a government entity of the nature of VENCorp.

In general, the VENCorp planning process is comprehensive, well structured and typical for infrastructure planning of this type.

In general, the planning process is well structured and typical for infrastructure planning of this type. In the experience of PB such a process would be applied by the majority of planning jurisdictions throughout the world.

The project justification and approval process addresses regulatory obligations contained within the Regulatory Test and also the need for industry consultation.

The market benefits approach and the probabilistic planning criteria represent a sound methodology and is likely to lead to the efficient provision of transmission services.

The planning criteria adopted is generally comprehensive and transparent and has been tested against stakeholder expectations, however the specific treatment of various demand and energy forecasts could be more clearly described.

The market benefits based approach coupled with a probabilistic planning criteria and determination of energy at risk through detailed application of a market simulation model, represents a sound methodology, which PB considers is in the area of best practice. Also, the unique arrangement of competitively sourcing long-term transmission network services through contestability provisions is likely to result in the efficient provision of such services.

VENCorp's medium to long–term planning methodology does not fully accommodate the regulatory review process.

The medium to long term planning process and use of an 'indicative probabilistic' approach, while meeting the key objectives of the NER and the Victorian Code, lacks transparency and introduces review process difficulties - particularly over periods beyond the first three years of VENCorp's planning timeframe where the expenditure forecast are material. In PB's view, this leads to projected outcomes that do not efficiently and accurately reflect likely investment decisions towards the end of the 2007/08 to 2013/14 regulatory period after giving due consideration to VENCorp's current planning criteria.

PB makes the following observations regarding VENCorp's co-ordination with other parties:

In general VENCorp and its stakeholders appear to have a clear and well established understanding of the various roles and responsibilities of parties.

In general VENCorp and its stakeholders appear to have a clear and well established understanding of the various roles and responsibilities of parties in the unique Victorian arrangements. This is informed through regular joint planning meetings and through operational and project meetings.

The separation of responsibility for augmentation and asset management (replacement) of transmission services in Victoria appears to have resulted in each organisation (VENCorp and SPA) being highly focused on their respective functions, and given these clear accountabilities ensure that both business perform their roles effectively

Historically, there is evidence that VENCorp has coordinated augmentation and replacement by justifying the advanced replacement of a number of circuit breakers as part of its historical project

As part of VENCorp's outlook, it does not appear to have captured SPA's significant replacement program of works in its medium to long term planning forecasts, and this implies VENCorp has overstated its augmentation capex requirements

While VENCorp interacts with SPA on a regular basis, through its review, PB has been unable to identify strong evidence that VENCorp applies up–to–date asset failure rate analysis, as advised by SPA, the asset owner and manager. PB notes that probability of asset failure plays a critical role in the application of VENCorp's planning criteria

VENCorp's dependence on SPA for project cost estimates may limit its understanding of up–to–date market conditions associated with materials and labour costs.

VENCorp's dependence on SPA for preliminary project cost estimates for both contestable and non-contestable works may limit its understanding of up to date market conditions for electrical plant, labour and minor projects, particularly for non-contestable works. Further advice from third parties may capture some efficiency gains and assist with planning processes.