PB ASSOCIATES

REVIEW OF CAPITAL EXPENDITURE

SPI PowerNet Revenue Cap Application

Prepared for

THE AUSTRALIAN COMPETITION & CONSUMER COMMISSION

PB Associates *Quality System:*

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SECTIONS

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EXECUTIVE SUMMARY

This report presents the results of a review of SPI PowerNet's regulatory Revenue Cap Application in respect of Capital Expenditure. This review has been undertaken by PB Associates for the ACCC, concurrently with reviews of operating and maintenance expenditure and the regulated asset base. These reviews have not been detailed audits. The main results of this review are as follows:

- The capital expenditure information in the SPI PowerNet submission has been thoroughly prepared and is material to the application, although it is generally presented at such a high level that additional information has had to be requested to clarify the basis for capital expenditure and related issues.

- PB Associates considers that SPI PowerNet have comprehensive and effective procedures in place for Asset Management, although a 2001 consultants report on Asset Management identified deficiencies and recommended possible improvements. SPI PowerNet are progressively implementing recommendations from this report to enhance their overall asset management.

- The 1994 jurisdictional valuation of the Victorian transmission network assets defined economic lives for the transmission system components. Based on these lives, many major parts of the SPI PowerNet network have reached or are approaching the end of their economic and useful lives. PB Associates considers that SPI PowerNet have presented a capital expenditure programme realistically reflecting the future needs for replacement and refurbishment.

- Capital expenditure during the current regulatory period has mostly been at a much lower level than that proposed for the next period. However, there has been a significant increase in the financial year 2002. Taking into account the age profile of major assets such as switchgear, it is considered that a major capital expenditure programme could possibly have started earlier and reached a higher level in 1999 or 2000, although SPI PowerNet have identified several factors driving the recent steep increase in the annual rate of expenditure. A detailed study of equipment reliability would be required to determine whether an earlier major increase would have been justified.

- After a brief review of the types of major capital expenditure projects proposed during the regulatory period, PB Associates concluded that projects planned are justified and appropriate. The financial year 2004 was also selected randomly for closer review of project content. The proposed expenditure in 2004 appears to be justified and at a realistic level.

- SPI PowerNet have planned the introduction of new technology and integrated systems to replace existing, relatively old, discrete systems. This particularly applies in the fields of control and monitoring and is also related to SPI PowerNet's acquisition of the Victorian Network Switching Centre. Although systems planned are new and are not equivalents to old technologies, PB Associates considers that it is generally no longer appropriate to use the old technologies. It is therefore considered that SPI PowerNet's strategy and capital expenditure plans for these systems replacements to be appropriate. The systems should facilitate improved operation and maintenance.

1. INTRODUCTION

The Australian Competition & Consumer Commission (Commission), in accordance with its responsibilities under the National Electricity Code (Code), is conducting an inquiry into the appropriate revenue cap to be applied to the non-contestable elements of the transmission services provided by the Victorian transmission network, SPI PowerNet, from 1 January 2003. The Commission expects to release a draft decision in August 2002.

SPI PowerNet has submitted an application to the Commission setting out its view of the appropriate expenditure over the regulatory period 1 January 2003 to 31 March 2008[1]. PB Associates has been engaged to review this application in respect of the following areas that are pertinent to establishing an appropriate revenue cap:

- The value of the assets used by SPI PowerNet to supply non contestable transmission services;
- SPI PowerNet's capital expenditure (CAPEX) requirement over the regulatory period;
- SPI PowerNet's operational expenditure (OPEX) requirement over the regulatory period;

This report is a review of SPI PowerNet's capital expenditure requirement over the regulatory period. The other reviews referred to above are contained in separate PB Associates' reports. It should be noted, that due to the electricity industry structure in Victoria, SPI PowerNet is not responsible for augmentations and its capital expenditure relates only to the replacement and refurbishment of its existing assets.

A review of capital expenditure is required to assist the Commission in assessing the performance of SPI PowerNet relative to the requirements of the Code. In particular, Part B of Chapter 6 of the Code requires, inter alia, that:

- in setting the revenue cap, the Commission must have regard to the potential for efficiency gains in expected operating, maintenance and capital costs, taking into account the expected demand growth and service standards; and
- the regulatory regime seeks to achieve an environment that fosters efficient use of existing infrastructure, efficient operating and maintenance practices and an efficient level of investment.
- in this context, the review needs to inform the Commission on the adequacy, efficiency and appropriateness of the capital expenditure forecast in SPI PowerNet's revenue cap application as being necessary to meet its present and future transmission service obligations.

[1] SPI Power's Revenue Cap Application for the period 1 January 2003 to 31 March 2003.

2. PB ASSOCIATES REVIEW PROCESS.

2.1 OVERVIEW

PB Associates initially reviewed SPI PowerNet's submission, which covered all main topics at a high level. SPI PowerNet supported their submission with presentations covering the following topics:

Operating and Maintenance Expenditure

Regulatory Asset Base

Capital Expenditure

SPI PowerNet also provided additional documents in response to specific queries and requests for further information.

PB Associates notes that this review and ensuing report is based on the costs and information provided to PB Associates by SPI PowerNet. This report relies on the said information and PB Associates has not undertaken any form of audit to confirm the data collection processes or verify the authenticity of the data.

3. THE SPI POWERNET SUBMISSION

3.1 STRUCTURE

The submission reviewed included three main documents: the Revenue Cap Application for the period 1 January 2003 to 31 March 2008, the Appendices and a separate non-bound set of financial and capital expenditure attachments. The Application includes section 4 covering all expenditure, with sub-section 4.5 on Capital Expenditure.

3.2 CAPITAL EXPENDITURE INFORMATION

Section 4.5 provides high-level information that can be used as a guide to the level of, and reasons for, capital expenditure in primary, secondary and non-system areas over the period concerned. The attachments provide overall historical Capital Expenditure information dating back to 1995. Further specific information was provided in presentations and in response to questions from PB Associates.

3.3 ASSET MANAGEMENT INFORMATION

Section 4.2 of the submission outlines the main reasons for increases in Opex and Capex and identifies some of the issues that will have to be addressed in the asset management process, including the asset management plan development process, but does not describe the process in detail.

Section 4.2.6 indicates that SPI PowerNet recently commissioned Indec Consulting to review asset management processes and that now SPI PowerNet is instigating Indec recommendations.

4. ASSET MANAGEMENT SYSTEM EFFECTIVENESS

4.1 DOCUMENTATION

SPI PowerNet has indicated that instead of the traditional type of Asset Management Plan adopted by many power service providers in the past, it now plans and implements asset management in accordance with a set of regularly updated documents ranging from a high level Asset Management Strategy down to detailed replacement and refurbishment plans. Key documents used in their asset management process are:

Table 4-1

Document	Comments
Asset Management Strategy	A 56 page descriptive document identifying issues, responsibilities, processes and targets, without going into detail. The document has evolved from earlier similar documents and is comprehensive in its coverage of major issues.
Asset Condition Reports	Summary reports covering main primary and secondary asset categories and required actions, (eg transformer replacement, communications), derived from detailed reports for individual items. The summary reports include only those items that have reached a stage where action will be needed in the foreseeable future.
Integrated Asset Management Review, final report, February 2002 issue.	A 47 page confidential report, plus appendices, prepared by Indec Consulting. This report outlines areas for emphasis and improvement in SPI PowerNet's Asset Management procedures.

4.2 ASSET MANAGEMENT PRACTICE

4.2.1 Documentation and Processes

The Asset Management Strategy document has been refined over a number of years and is comprehensive, although at a high level. It incorporates some of the recommendations from INDEC's review of SPI PowerNet's asset management practices undertaken in 2001. SPI PowerNet has also acted on, or are planning to implement further recommendations from the consultant's report. Included in the strategy are performance targets for primary items, identification of overall asset management responsibilities and , processes, and explanations of the reasoning behind replacement and refurbishment decisions.

The decision when to replace or refurbish items of plant, major parts of primary systems systems, e.g. terminal stations or major parts of a terminal station, is made after a process of evaluating inputs from many sources, including:

- incident reports
- field reports and field staff discussions
- work orders for unscheduled work
- information from the 'Maximo' asset management information system

Once it is clear that asset replacement or refurbishment is necessary, an identification of alternatives and an economic evaluation are normally undertaken. It is understood that in cases of major capital expenditure projects, such as terminal station refurbishments, independent consultants are usually engaged to assess prospective projects after the initial decision to proceed has been taken by SPI PowerNet.

4.3 COMMENTS

The Asset Management Strategy's general thrust is towards asset replacement and refurbishment expenditure that is desirable for technical reasons mainly related to age and physical condition. Other factors, such as environmental requirements are addressed, but SPI have indicated that a separate Environmental Management Strategy document addresses environmental issues in more detail.

The Asset Management Plan development process is outlined in the document, but no details of the individual elements of the process are provided. Additional information supplied by SPI PowerNet outlines the many steps in the process and a $50,000 financial threshold for involvement of the Business Review Committee.

Responses to questions and additional information supplied have provided more detail, particularly about terminal station refurbishments.

It appears that for the 2003/4 projects (refer to section 5 of this report for more detail), the majority of the works are occurring at an appropriate time. It would not be possible, without detailed analysis of maintenance records and reliability data, to determine whether some projects could be deferred until a later date, as generally, the main items of expenditure at a particular site are at, near to or past the ends of their economic lives.

SPI PowerNet has described examples of 220kV air blast circuit breakers that are now difficult to maintain due to a lack of spares and the general aging of most components. Given the key transmission switching functions that most of these circuit breakers perform, and a recently increased VOLL, it is considered that these circuit breaker replacements are justifiable due to the cost of outages. (An increase in the VOLL occurred on 1 April 2002, raising the value from $5,000 per MWh to $10,000).

5. CAPITAL EXPENDITURE

5.1 CATEGORIES

SPI PowerNet has classified its Capex under system and non-system headings. System expenditure is categorised into primary and secondary, covering hardware and systems directly related to power transmission. Non-system Capex includes such items as information technology, vehicles and maintenance equipment.

5.1.1 Primary Systems

The components of the primary systems proposed for capex are the lines, substations/terminal stations and reactive plant and some of the individual items of plant within these headings. Approximately 45% of overall capex proposed over the next regulatory period is designated as primary systems capex and occurs towards the end of the regulatory period. This percentage appears to be realistic when considering the age profiles of individual high value primary asset items (see Figures 5-1, 5-2). It is recognised that on major sites, such as terminal stations, there are several different categories of equipment, each having a slightly different useful life, integrated to form a functional site. SPI PowerNet's planning has had to take account of the spread of lifetimes and the wide range of plant items, then define an appropriate time to implement the plans. It should also be noted, that due to the spread of primary equipment purchases between the 1950's and the early 1970's, the high level of primary system expenditure will need continue over more than one regulatory period and cannot be seen as a 'one off' exercise.

5.1.2 Secondary Systems, Communications and Infrastructure

The main secondary systems included in the capex proposal are protection systems, control and monitoring, and metering, batteries and secondary protection. Secondary systems, communications and associated infrastructure comprise a relatively high 22% and 25% of overall capex respectively.

5.1.3 Economic Lives and Age Profiles

The 1994 SKM Valuation Report (Para 5.2) defined the following economic lives for primary plant items, with an added comment that lives for secondary equipment are assumed to be the same, but the report did indicate that secondary asset lives may be less in many cases. It has been assumed that SPI PowerNet's reference to economic life in the second paragraph of Section 7.8 of the Application is meant to refer to useful life or technical life rather than economic life.

PB Associates notes that SPI PowerNet has highlighted that modern secondary systems will not attain full economic lifespan and that substantially lower life spans should be factored into asset management. It is expected that life spans of 30 years or less will be applicable for many of the items installed since the 1980's when new technologies were emerging. However, some of the older technologies, inherited by SPI PowerNet, for example, electromechanical protection relays, would have had life spans considerably longer than 30 years.

Table 5-1

Asset	Economic Life, Years
Transmission lines	70
Switchgear	45
Transformers, reactors, neutral earthing resistors	45
Capacitors	40
Static VAR compensators	40
Underground cable	70

The age profiles shown below have been extracted from information supplied by SPI PowerNet and illustrate the present age and population of the main primary items, circuit breakers and transformers. (To facilitate comparison with the capital expenditure tables and profiles in the Submission, the profiles have been shown in reverse order to that normally used for age profiles.)

It can be seen from the profiles, that the majority of one of the largest primary expenditure groups, 220kV circuit breakers, were installed between 1953 and 1970. Similarly, the majority of 220kV transformers were installed between 1957 and 1973.

Using the SKM Report economic lives as a reference point, and with the understanding that equipment is not likely to fail as soon as it reaches the end of its official economic life, it could be expected that replacement of switchgear would have started some time after 1998. SPI has indicated that the actual replacement timing will depend on several criteria, including general condition, maintenance history, availability of spares and the condition of the other items at the same locations, although PBA did not see these details.

Although the basic functional integrity of transformers does not depend on moving parts (apart from tap changers), their useful lives can be very dependent upon loading history and quality of manufacture. Therefore, a wide variation in transformer lives can be expected, rarely less than the 45 years nominated in the SKM Report, but often considerably longer. We would expect transformers to have useful lives of more than 45 years unless periodic testing and inspection had shown major degradation or defects. Specific condition information would need to be assessed to compare the regulatory economic lives with those of SPI PowerNet's transformers.

Figure 5-1

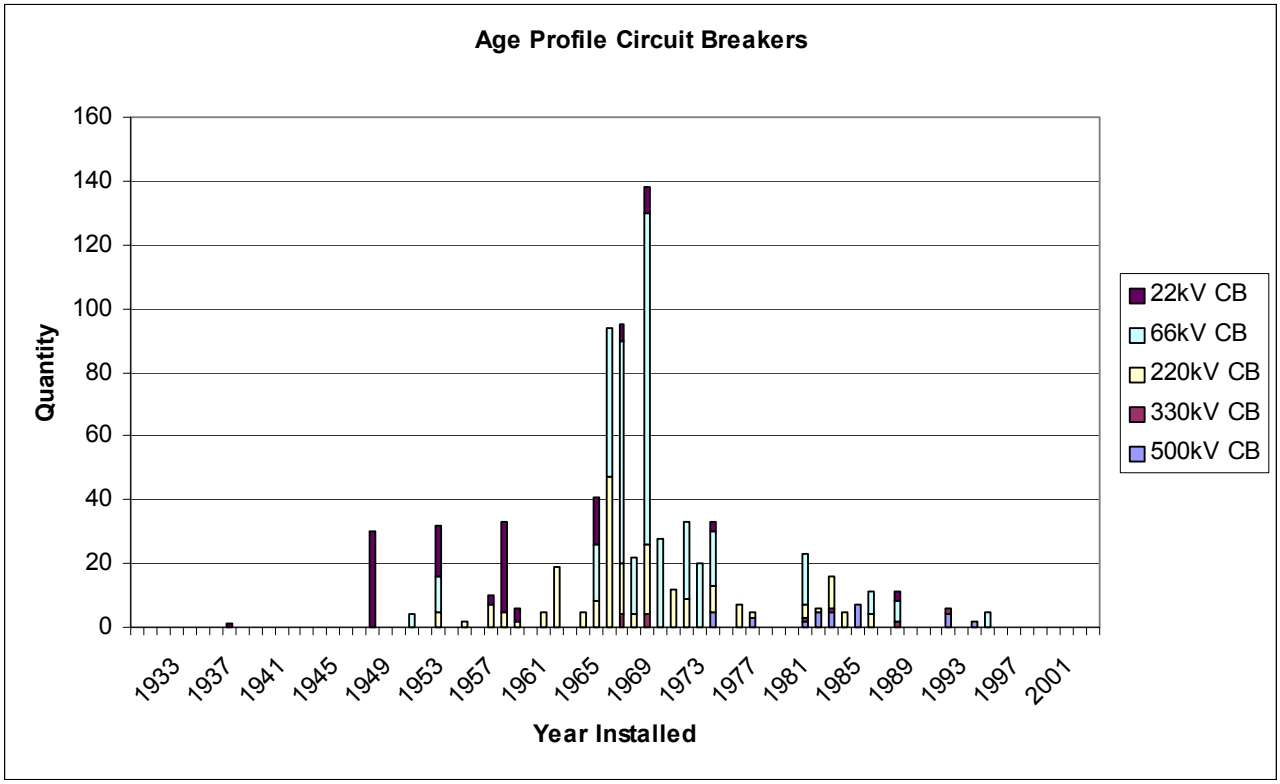
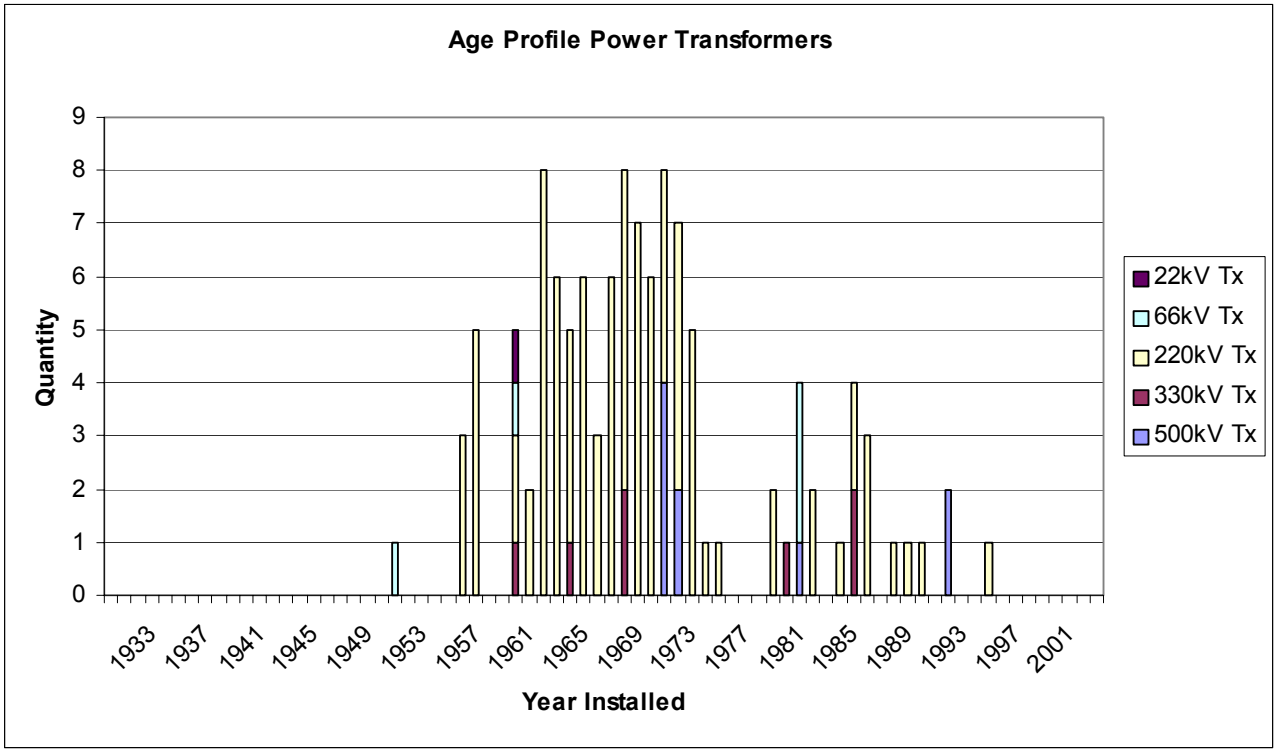

Age Profile Circuit Breakers
Quantity
160
140
120
100
80
60
40
20
0
1933
1937
1941
1945
1949
1953
1957
1961
1965
1969
1973
1977
1981
1985
1989
1993
1997
2001
Year Installed
22kV CB
66kV CB
220kV CB
330kV CB
500kV CB

Figure 5-2



5.2 MAJOR EXPENDITURE ITEMS PROPOSED

5.2.1 Analysis of 2004 Expenditure

As part of the overall review of the SPI PowerNet capital expenditure forecasts, PB Associates requested more specific detail for one year of the capital forecast. The year 2003/4 was randomly selected and has a forecast budget of $66.1 million as detailed in Table 5-2.

TABLE 5-2

CAPITAL EXPENDITURE FORECAST 2003/4	**$'000's**
Primary Projects	$36,837
Secondary Projects	$14,394
Communications	$7,541
Business Support	$1,700
IT	$5,600
TOTAL	**$66,072**

SPI PowerNet provided a spreadsheet containing a list of specific projects for 2003/4 divided into Primary, Secondary and Communications projects. The total of expenditure in these three main categories is $58.8 million, which represents 89% of the expenditure forecast. Detail for Business Support and Information Technology expenditure was not

investigated due to limited time available for review and as it is not considered material for the purposes of this review.

Identifiable items from the Primary projects list were examined and where possible the installation date and therefore age of the asset to be replaced was determined from the asset register in the SKM 1994 Valuation. The asset ages were compared to the asset lives used for valuation purposes to identify whether these assets were relatively close to the end of their asset life or were perhaps being replaced for other reasons.

Based on the detail provided in the Primary projects list, together with a set of project descriptions for each Terminal Station, the assets associated with approximately 50% (based on $ value) of the primary projects were assessed. The majority of the replacements appear to be related to the age of the equipment and were at, or over the economic asset life assigned for valuation purposes. The exceptions seem to be with some circuit breakers performing capacitor switching duty where they are being replaced before the end of their economic lives. Capacitor switching is an arduous application for circuit breakers, usually imposing more frequent switching and electrically stressful duty compared with normal terminal station circuit breakers. Early replacement of these circuit breakers could therefore be expected.

Details of the projects examined are as follows. Note that for the purposes of this analysis, an age basis has been used, although SPI PowerNet have indicated that condition is one of the main drivers for replacement decisions.

5.2.2 BETS Cap Bank CB Replacements

The 66kV circuit breakers at Bendigo Terminal Station (BETS) were installed in 1969 according to the asset register, making them approximately 34 years old in 2003. The economic asset life assigned for circuit breakers is 45 years, which indicates these 2 circuit breakers are being replaced early. However, the circuit breakers are being used for capacitor switching.

5.2.3 EPSY Station Refurbishment

This planned project involves the complete refurbishment of the Eildon Power Station Switchyard. The identifiable assets in the asset register at EPSY were installed in 1956, making of them approximately 50 years old in 2003/4. This replacement of assets appears reasonable in terms of asset age and the total expenditure for 2003/4 appears realistic.

5.2.4 KGTS 220kV Switchyard

This project involves replacement of 220kV and 66kV circuit breakers that were installed at KGTS in 1957 and 1964, respectively. These replacements appear reasonable on an asset age basis and correspond with the information provided on the project description sheets. The forecast expenditure for 2003/04 appears realistic.

5.2.5 MBTS 220kV Switchyard

Expenditure is forecast for Mount Beauty Terminal Station in 2003/04 and the original assets were installed between 1950 and 1964, making the oldest assets 53 years old in 2003. The project sheet for MBTS describes the project for rebuilding the 66kV yard and has expenditure for this rebuild and replacement of 4 66kV circuit breakers spread over 2002/3 and 2003/4. This expenditure appears reasonable on the basis of the asset age.

5.2.6 SHTS Cap Bank CB Replacements

The asset register shows circuit breakers installed at Shepparton Terminal Station in 1963 and 1966, indicating they will be approximately 40 years old in 2003 and replacement would therefore be reasonable on an age basis. The project title indicates the Circuit Breakers for the Capacitor Banks are to be replaced and this corresponds to the Project Descriptions sheets which detail replacement of these circuit breakers in 2003/4 followed by more significant expenditure for replacement of 7 x 220kV and 9 x 66kV circuit breakers during 2005/6/7.

5.2.7 SVTS Cap Bank CB Replacements

The 66kV circuit breakers at Springvale Terminal Station (SVTS) were installed in 1968 according to the asset register, making them approximately 35 years old in 2003. The valuation asset life assigned for circuit breakers is 45 years, which indicates these 2 circuit breakers are being replaced earlier than would normally be expected. The cost of replacement shown in the Primary Projects list for 2003/4 appears reasonable. The project sheet for SVTS indicates the early replacement is due to the number of operations and capacitor switching duty for these circuit breakers.

5.2.8 BTS Station Refurbishment

This planned project involves the complete refurbishment of the Brunswick Terminal Station. The identifiable assets in the asset register at BTS were installed between 1947 and 1959, making all of them older than 50 years. This replacement of assets appears reasonable in terms of asset age and expenditure in 2003/4. The project sheet for SVTS indicates the early replacement is due to the number of operations and switching duty for these circuit breakers.

5.2.9 SUMMARY

Most of the identifiable replacements shown in the detailed project list for 2003/4 are considered reasonable using the asset age as a reference. It could be expected that the condition of these breakers would now be a main driver for replacement. The two exceptions to this are replacement of capacitor bank circuit breakers for Bendigo and Springvale Terminal Stations. The age of the circuit breakers to be replaced appears to be approximately 35 years in comparison with the 45 year economic life used for valuation purposes. Both the project description sheets for these projects explain the replacement is due to the number of operations and switching duty required from these capacitor bank circuit breakers. PB Associates notes that not all circuit breakers at each terminal station are being replaced and concludes that these few relatively early replacements appear reasonable considering the function and arduous capacitor switching duty of these specific circuit breakers within the terminal station.

5.3 EXPENDITURE IN OTHER YEARS

The relative proportions of capital expenditure from 2003 to 2008 remain approximately the same from year to year, with the exception of switchbays, which absorb $28.5M and $32.5M respectively in 2007 and 2008. This compares with an annual average of approximately $8M for switchbays in the previous 4 years. The projects consuming most of this expenditure are:

Table 5-3

LOCATION	**MAIN ACTIVITIES** (earliest installation dates)
BATS	Replace 9 x 220kV and 8 x 66kV CB's (1950's)
BETS	Replace 8 x 220kV and 7 x 66kV CB's (1950's)
DDTS	Replace 5 x 220kV CB's (1950's)
HOTS	Replace 6 x 220kV and 5 x 66kV CB's (1950's)
KTS	Replace 17 x 220kV CB's (1960's)
MBTS	Replace 8 x 220kV CB's (1950's)
RCTS	Replace 6 x 220kV and 6 x 66kV CB's (1950's)
RTS	Replace 13 x 66kV CB's (1960's)
SHTS	Replace 7 x 220kV and 9 x 66kV CB's (1950's)
TGTS	Replace 5 x 220kV and 11 x 66kV CB's (1950's)
TSTS	Replace 3 x 66kV CB's (1960's)

Some additional expenditure, particularly preparatory civil works related to the above projects is due to occur in 2006 and earlier. The 45 year economic life for switchgear appears to have been exceed prior to replacement in the above projects. Information provided by SPI PowerNet indicates that the projects concentrate on the replacement of older technology, such as air-blast circuit and bulk oil circuit breakers. Newer circuit breakers within some of these switchbays are being retained.

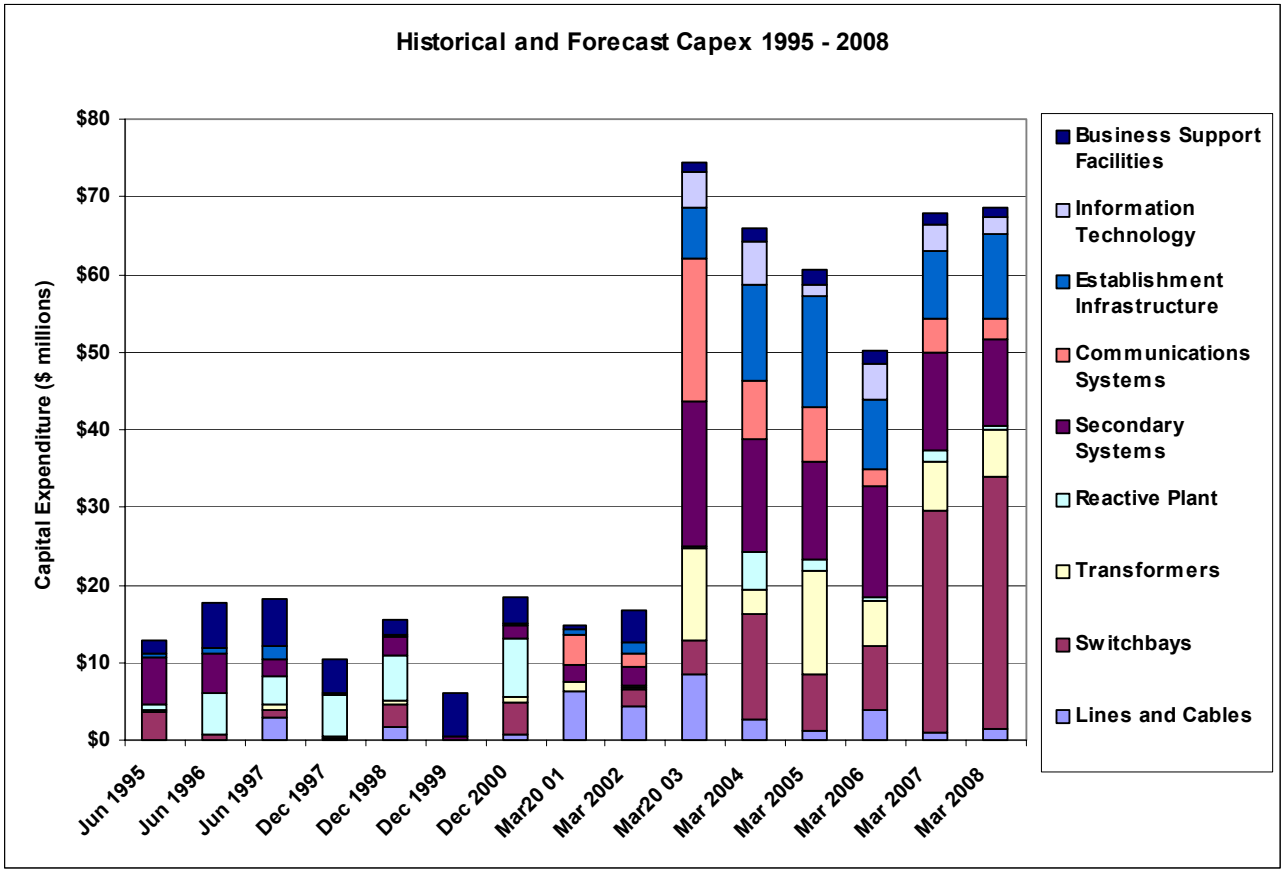
PB Associates therefore considers that the expenditure in the above projects is justified and is appropriately timed.

5.4 PAST EXPENDITURE

5.4.1 Overview of Historical and Future Capital Expenditure

Tables 4.3 and 4.4 of the Submission show a large step increase in the level of capex from 2003 onwards, relative to 2002 capex. To check for consistency with previous years, Table 5-4, below, was derived from the Application and additional information supplied by SPI PowerNet. The reasons for the step increase in capex from 2002/2003 onward are discussed in some detail in Section 6.3 of this report.

Table 5-4


Historical and Forecast Capex 1995 - 2008
Capital Expenditure ($ millions)
$80
$70
$60
$50
$40
$30
$20
$10
$0
Jun 1995
Jun 1996
Jun 1997
Dec 1997
Dec 1998
Dec 1999
Dec 2000
Mar20 01
Mar 2002
Mar20 03
Mar 2004
Mar 2005
Mar 2006
Mar 2007
Mar 2008
Business Support Facilities
Information Technology
Establishment Infrastructure
Communications Systems
Secondary Systems
Reactive Plant
Transformers
Switchbays
Lines and Cables

6. CAPITAL EXPENDITURE ISSUES

6.1 ADEQUACY OF EXPENDITURE

6.1.1 Existing Systems

In the Application, SPI PowerNet has addressed all the major capital expenditure areas under its direct control. The asset economic (regulatory) lives defined in the 1994 SKM Report were generally realistic by industry standards and are still applicable to most of the SPI PowerNet systems. As identified earlier in section 5, secondary systems such as controls and protection will have shorter useful lives than the assumed economic lives.

Since 1994, very little augmentation has taken place, even though the overall system load has increased at around 3 per cent per annum. Although in many areas, the SPI PowerNet network was conservatively loaded in 1994, since that date, the cumulative effect of increased loads and aging of assets has meant that relatively old equipment is operating closer to its nominal ratings, subject to increased thermal stresses and in the case of switchgear, controls and protection, subject to the effects of general wear and tear. It is difficult to quantify the overall effect on network reliability and availability, but given the above scenario, the risk of outages will increase if steps are not taken to ensure to replace and/or refurbish

SPI PowerNet's plans for refurbishment and replacement focus on replacement and updating of secondary systems which are, in most cases, near the end of their useful lives, and the replacement of primary equipment such as switchgear and transformers which are at or near the end of their economic lives and showing a degradation in condition. In the case of transformers, technology has not changed significantly over the past 50 years, but in the case of switchgear, technology has developed towards lower maintenance and higher reliability. Control, protection and communication technologies have undergone major changes over the same period and have tended to merge into integrated systems rather than discrete technologies. Also, within the last 2 years the flexibility to interface equipment from multiple vendors has improved significantly.

As VENCorp and connection customers (DNSP's and generators) are responsible for system planning and augmentation, SPI PowerNet is not in a position to easily increase primary system ratings to maintain conservative loadings in the face of load increases and need to be more vigilant in the operation and monitoring of their overall network. It is therefore considered that SPI PowerNet is justified in taking a conservative approach with replacements and refurbishments.

We consider that SPI PowerNet's capital expenditure plans have taken account of these changes in a conservative and reasonable manner.

6.1.2 New Infrastructure

Works planned by SPI PowerNet outside the definition of augmentations, include bunding protection against oil spillage and the purchase of new spare transformers.

Discussion with SPI PowerNet has indicated that since mid 2001, there has been increased institutional and public awareness of the possibility of oil spills from transformers. It considers that the methodology for bunding and oil retention used in the past by the SEC, although conservative, needs to be updated to meet gradual improvements in environmental standards. It is thus embarking on a programme of upgrading of terminal station environmental protection.

6.1.3 Summary

In view of the significant amount of primary equipment either at or near to the end of its economic life, and the changing technologies impacting on secondary systems, we consider that projects proposed in SPI PowerNet's capex plans are reasonable and necessary.

6.2 MAINTAINABILITY

6.2.1 Spare Parts and Support

In many cases, it is possible for the useful lives of primary equipment such as switchgear and transformers to extend past the end of their economic lives. To be able to do this, the equipment has to have been used within its ratings, well maintained and have its condition monitored at appropriate intervals. Easy sourcing of spare parts and manufacturer's support is also necessary. Much of the 66kV and 220kV switchgear used by SPI PowerNet is past the end of its economic life and although some spares are available, these are limited and manufacturers' support is no longer available.

Secondary equipment including communications and protection are in a similar situation and have also been affected by major technology changes.

6.2.2 Summary

We conclude that SPI PowerNet's capital expenditure proposals realistically take account of the economic and useful lives of primary and secondary equipment and that in many cases, if replacements are not made, some items will be out of service for increasingly longer periods, impacting on overall transmission system integrity.

6.3 EXPENDITURE SCHEDULING

6.3.1 Timing

Table 4.3 in the Submission shows a step increase in capex from $17.6m in the 2002 FY (1 April 2001 to 31 March 2002) to $74.6m in the 2003 FY. The forecast and the historical coverage of less than 2 years in the table do not give a clear indication of how the forecast expenditure relates to past expenditure. The Historical and Forecast Capex Table in section 5, derived from additional information supplied by SPI PowerNet shows a large change in average capex between the present regulatory period and the next 5 year regulatory period. This initially appears to show that capital expenditure in the period to 2003 and possibly the preceding few years is relatively low. Further discussion with SPI PowerNet, review of further information supplied and reference to the Circuit Breaker and Transformer Age profiles in section 5 (Figures 5-1, 5-2) indicated that costs relate to project commissioning dates and do not always reflect earlier expenditure commitments (in preceding years) associated with the same projects. SPI PowerNet also highlighted the following points:

- Environmental remediation requirements, including oil containment and noise abatement have come into focus over the past year.

- Technological developments within the last 18 months, particularly in control, monitoring and protection (station digital platform and OPGW equipment) have reached a stage where it is now possible to achieve significant gains in

effectiveness by installing and integrating a range of compatible systems. SPI PowerNet's acquisition of the VNSC in 1998 and the need to provide functionality with upgraded VNSC technology is also driving secondary systems capital expenditure in the next few years.

- The first significant quantities of 220kV air-blast and older technology circuit breakers were installed around 1957 and would have reached the end their economic life in 2002. Although their useful lives may extend past this point, new spares are no longer available from manufacturers. Due to the large number of these items in service and the complexity of replacing equipment while terminal stations remain in service, an ongoing programme over several years, covering more than one regulatory period is likely to be necessary. We consider that SPI PowerNet have taken a prudent and necessary step in initiating a replacement programme around 2002/2003.

- The joint distribution planning review, issued jointly by the Victorian Electricity Distribution Businesses in October 2001, has increased pressure on SPI PowerNet to coordinate terminal station and connection asset upgrades.

6.3.2 Summary

PB Associates has concluded that although it initially appears that SPI PowerNet has deferred capital expenditure from the current regulatory period to the next, a major increase in capital expenditure has occurred in the 2002/2003 FY, prior to the next regulatory period. There are several coincident factors that have led to the need to start a major and sustained capital expenditure programme from 2002 onwards and decisions to undertake projects would have had to meet the condition and other criteria outlined in SPI PowerNet's Asset Maintenance Strategy plus supporting documents.

A detailed study of fault records, maintenance data and overall reliability and equipment availability would be required to determine whether an earlier start to major capital expenditure projects would have been justified. Under the current regulatory regime, there is little incentive for a TNSP to advance major capital expenditure unless the expenditure has been part of earlier proposals and there could be some prospect of efficiency gains.

6.4 EFFECTIVENESS

6.4.1 Validity of Costs Used

For major works entailing replacement of large capital equipment items, such as groups of switchgear at terminal stations, SPI PowerNet has engaged independent consultants to undertake studies to investigate alternatives, best options, technical feasibility and costs. Discussions with SPI PowerNet have indicated that options selected for the projects progressing to detailed planning and design could still be subject to significant cost changes due to external factors such as planning requirements. An example would be for a local council insist on high cost indoor switchgear, e.g. GIS, in lieu of outdoor switchgear. Indoor switchgear would be quieter in operation and could be housed in a building designed to blend in with surrounding areas. Section 1.3 of the Application (Caveats....) and the proposed pass though criteria in Section 10.2 and Appendix G of the Application, could impact on how SPI PowerNet expects to deal with these additional costs, should they occur. It is recommended that the Commission establishes what criteria and thresholds SPI PowerNet would use to trigger a revised or supplementary application.

6.4.2 Overall Effectiveness of Expenditure

There appears to be ample justification for a large and ongoing capital expenditure programme throughout the 2003 to 2008 regulatory period. At the time of planning and budget preparation for large and technically complex replacement and refurbishment programmes, it is difficult to find ways to make major savings. There is no indication in the Application that SPI PowerNet's forecasts of expenditure on capital items are unreasonable. However, savings in expenditure could be possible in a number of situations and ways, including tight market conditions at the time competitive tendering, a strengthening in the Australian dollar international exchange rates, lower international commodity prices or improved procurement arrangements based on large purchases with staged deliveries and payments. It should be noted that some of these factors are outside SPI PowerNet's control and adverse trends could increase costs.

It has been assumed that direct project management staffing costs have been capitalised into projects. The introduction of new technologies and greater monitoring of operational and plant condition parameters is likely to have an impact on other expenditure areas, such as the costs for specialist staffing to collate and analyse data. Resulting greater awareness of equipment condition may have an effect on maintenance expenditure, timing of replacements or refurbishment.

It is concluded that there it is no indication that SPI PowerNet are proposing to spend ineffectively or unnecessarily. It is not possible at this stage, to quantify the extent to which efficiency gains will be possible during to regulatory period under consideration.

7. GLOSSARY

ACCC	Australian Competition and Consumer Commission
Application	SPI PowerNet's Revenue Cap Application
Capex	Capital Expenditure
DNSP	Distribution Network Service Provider
ESC	Emergency Services Commission
ITOMS	International Transmission Operating and Maintenance Study
O&M	Operations and Maintenance
GIS	Gas Insulated Switchgear
GWh	Giga Watt hours (1,000,000 kWh)
kWh	kilowatt hour
MWh	Mega watt hour (1,000 kWh)
MW	Mega watt
NEC	National Electricity Code
NEMMCO	National Electricity Market Management Company
OPEX	Operating expenditure
TNSP	Transmission Network Service Provider
VENCorp	Victorian Energy Networks Corporation
VNSC	Victorian Network Switching Centre
VOLL	Value of Lost Load