# SPI PowerNet's Revenue Cap Application

For the period 1 January 2003 to 31 March 2008

SPI POWERNET
A subsidiary of Singapore Power International

ABN 78 079 798 173

# EXECUTIVE SUMMARY

## Importance of Victoria's transmission assets

SPI PowerNet is the owner of the Victorian electricity transmission network, a key strategic asset servicing Australia's second largest economy and the National Electricity Market (NEM).

The Company is responsible for the operation of approximately 6,500 kilometres of high-voltage lines and 44 associated switching and transformation facilities that transport the State's electricity from point of generation to distribution supply points over a total area of 228,000 square kilometres.

The network serves in excess of 1.8 million households, 280,000 businesses and an economy in which growth in energy demand is currently running at around 3 per cent per annum.

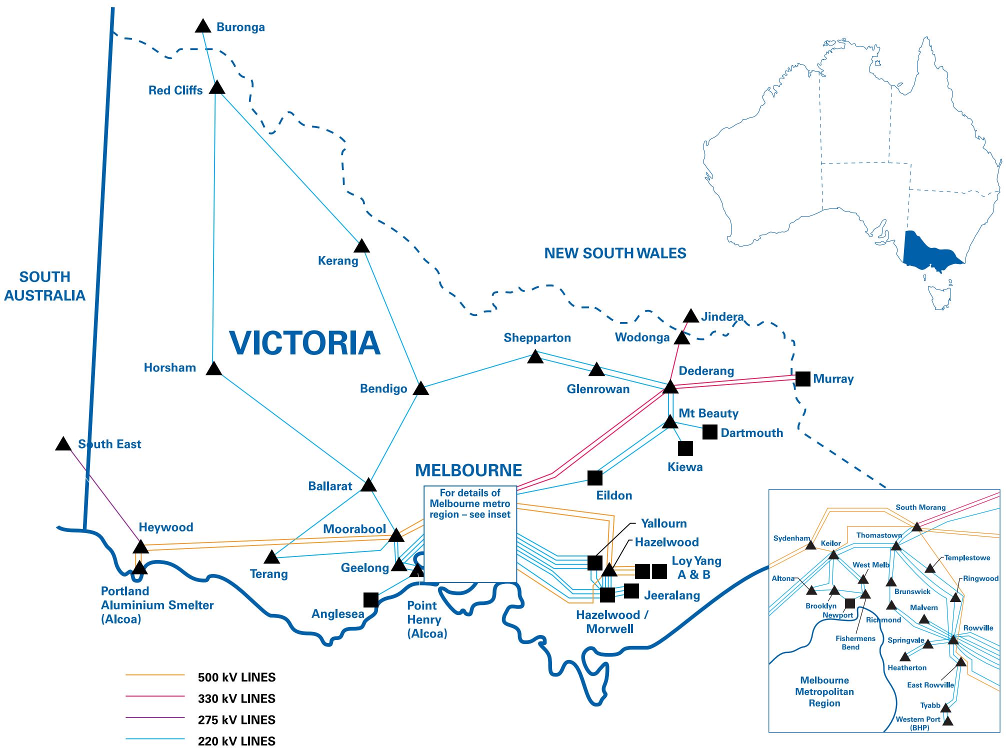
In total, the transmission network is responsible for transferring 53 million megawatt hours of energy annually.

Victoria's transmission network is also an integral part of the NEM. Its interconnections link the power systems of neighbouring New South Wales and South Australia, providing the bulk of NEM trade between Australia's states.

As demand for electricity grows, these links will be subject to continual expansion and upgrading, reinforcing the critical role of Victoria's transmission network in the future operations of the NEM.

The expanse of the network is shown in the following illustration:

**Figure 1:** Victorian transmission network




*Source: SPI PowerNet*

## Industry disaggregation and transitional regulation

A stand-alone company to operate and maintain Victoria's transmission network was formed as part of the disaggregation of the State's electricity industry in 1994.

The process of disaggregation, creating discrete generation, transmission and distribution/retail sectors, was aimed at ensuring greater accountability, transparency, and commercial disciplines within the industry.

As part of the industry restructuring, the Victorian Government established a five-year *Victorian Electricity Supply Industry Tariff Order* (Tariff Order) which set down the maximum revenue that could be earned from the transmission network.

The part of the Tariff Order applying to SPI PowerNet was extended in 1997 to the end of 2002.

## The ACCC review

This ACCC review is the first time that Victoria's transmission system has been subject to an independent regulatory review.

With the Tariff Order expiring at the end of this year, service benchmarks and revenue for Victoria's transmission network will be determined by the ACCC, for the period 1 January 2003 to 31 March 2008.



This Application, which covers only non-contestable transmission services, sets out a range of proposals which will deliver significant value to the Company's customers over the period, while maintaining the commercial balance necessary to support the on-going viability of the business.

## Price trends

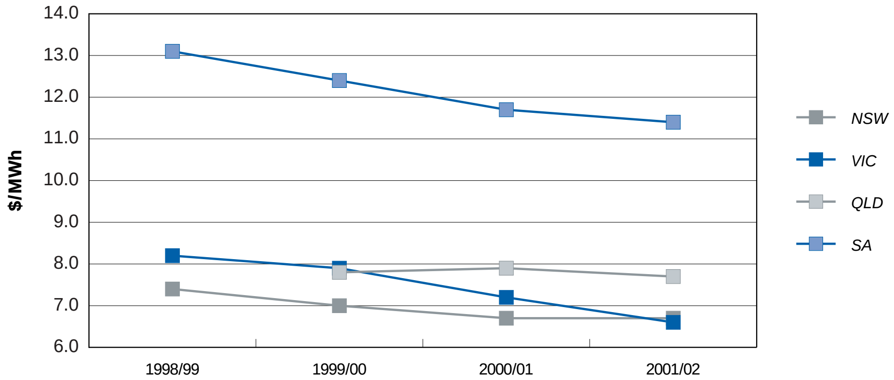
SPI PowerNet's unit cost for providing transmission services is currently the lowest in Australia and, in real terms, has been trending down for some years.

The low cost of transmission in Victoria, compared with other States, has occurred since disaggregation of the network from the State's other electricity assets, and its subsequent privatisation in 1997, and is illustrated on the following page.

The revenue cap proposed in this Application will continue the downward trend in real transmission prices.

This will result in the unit cost of transmission in Victoria remaining significantly below that incurred by electricity customers in most other States.

**Figure 2:** Transmission costs, real 2000/01 $/MWh energy delivered



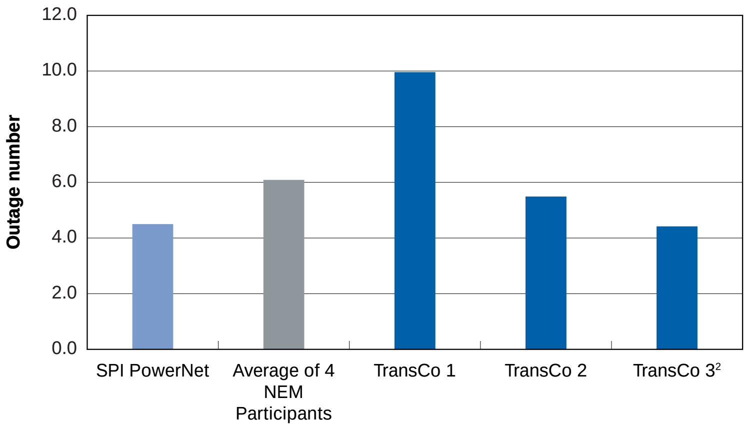

*Source: ACCC and State regulatory determinations, NEMMCO* Statement of Opportunities *and SPI PowerNet*

## Service levels and asset profile

At the same time as delivering low-cost transmission services, the performance of SPI PowerNet's network leads other Australian transmission networks on a range of measures as illustrated by the following figures:



**Figure 3:** Average number of outages per 100 circuit km 1994/95 to 1998/99[1]

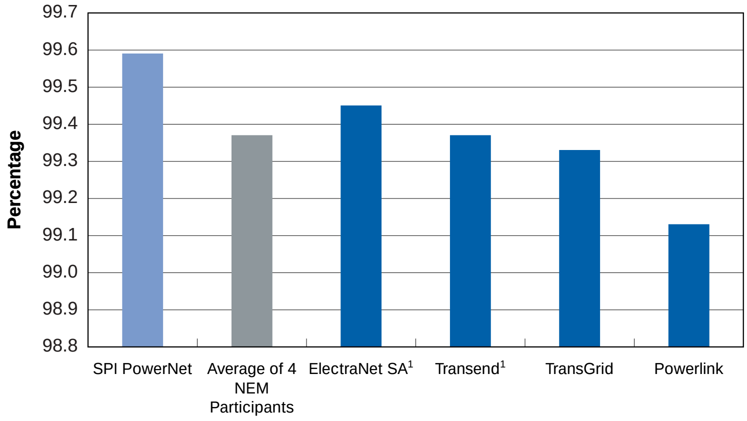



*1 The terms of the survey prevent disclosure of other participants' names.*

*2 TransCo 3 figures are for 1996/97 to 1998/99*

*Source: ICTP Study*

**Figure 4:** Average circuit availability 1994/95 to 1999/00




*1 ElectraNet SA and Transend figures are for 1996/97 to 1999/00*

*Source: ESAA*

To ensure continuing these levels of service and reliability, the Company has developed an asset management strategy that draws upon its wide experience in consistently delivering high standards of service through the rigorous application of best practice asset management.

The single most significant challenge in maintaining performance levels, and in turn, the largest factor driving the nature and cost of the asset management plan, is the ageing profile of Victoria's transmission network.

On average, the network is now past the middle of its effective life and, more significantly, many elements of the network are now falling due for replacement or refurbishment. As well, maintenance costs are rising as the Company works to ensure ageing assets continue to operate at optimal levels.

Adding to the challenge of an ageing network in maintaining performance levels, demand has been growing steadily and has effectively absorbed all excess capacity in the network.

Maximum load on the transmission network has been growing at a compound rate of around 3 per cent a year between 1994 and 2000 and is forecast to grow at the same rate for the next decade.

This has a number of implications, not least of which is the increasing complexity associated with managing network maintenance. A fully utilised system has necessitated changed approaches to work practices and priorities, with the imperative to schedule work out of normal business hours during peak demand periods, increasing maintenance costs.

Within the context of the network's ageing asset profile and utilisation rates, the asset management plan proposed by the Company focuses on a program of managing its assets to maintain high levels of performance while achieving the lowest life cycle cost to transmission users.

The plan includes required allowances for major asset replacement, increased maintenance and refurbishment and condition monitoring and assessment.

## Service standards proposals

In addition to maintaining current levels of service, SPI PowerNet proposes incentive arrangements to encourage innovation that leads to greater availability of critical plant and equipment when it is most needed – at times of peak demand. It also proposes target levels of performance and principles for a future efficiency glide path that together provide balanced incentives for pursuing both efficiency and performance excellence.

In combination, these encompass a greater scope of performance and service accountability than the ACCC has required in either of its determinations for TransGrid in 2000 and Powerlink in 2001. The proposals provide a good example of performance measures matched to responsibilities and incentives that produce many of the desirable outcomes that the ACCC is seeking. These include:

- being linked closely to actions which are controllable by the TNSP;
- rewarding improved performance while penalising poor performance;
- reflecting end-user outcomes;
- broadly reflecting market outcomes; and
- flexibility.

## Overview of revenue path

The revenue requirement is the amount required for SPI PowerNet to operate its transmission business and provide the revenue-capped transmission services.

The revenue requirement outlined by the Company is competitive, fair and reasonable for transmission users and the wider community, and provides a long-term investment incentive for the owner. It has been carefully determined to deliver continued high levels of asset performance and reliability while retaining Victoria's cost advantages in the provision of network transmission services.

The annual revenue requirement has been constructed using the post-tax nominal building block approach proposed by the ACCC in its draft *Statement of Regulatory Principles* (Draft SoRP), and now adopted in the most recent regulatory determinations.

It is calculated as the sum of the cost components that contribute to the cost of service. These are:

- the **required return on capital** (which is the product of the required rate of return and the value of assets used in the delivery of transmission services);
- the **return of capital** (which is the annual depreciation charge on the assets used in the delivery of transmission services);
- **operating and maintenance expenditure** associated with the delivery of the transmission services;
- **efficiency glide path** (an incentive payment that rewards above forecast efficiency savings in the previous regulatory period); and
- the **net tax allowance**.

The forecast for each of these components is presented below (Table 1) together with the CPI–X[1] smoothed revenue requirement. The smoothing mechanism acts to provide a hedge against inflation in the last four years of the regulatory period, 2004/05 to 2007/08.

**Table 1:** Revenue requirement, 2003 to 2007/08 (nominal $m)

| | Financial years ending 31 March | | | | | |
|---|---|---|---|---|---|---|
| | 2003[1] $m | 2004 $m | 2005 $m | 2006 $m | 2007 $m | 2008 $m |
| Operating and maintenance | 19.5 | 70.1 | 73.2 | 75.1 | 78.2 | 81.2 |
| Depreciation | 18.4 | 79.7 | 83.6 | 86.3 | 89.4 | 92.8 |
| Nominal return on capital | 49.8 | 203.2 | 208.5 | 212.9 | 217.8 | 223.8 |
| Less RAB indexation | -16.3 | -67.4 | -69.1 | -70.4 | -72.3 | -74.3 |
| Glide path | 2.5 | 9.4 | 7.7 | 5.8 | 3.8 | 1.7 |
| Net tax allowance | 1.1 | 4.8 | 5.0 | 4.9 | 4.8 | 4.7 |
| **Raw revenue requirement** | **75.0** | **299.8** | **308.8** | **314.7** | **321.6** | **329.8** |
| **Smoothed revenue requirement** | **75.0** | **299.8** | **307.2** | **314.8** | **322.6** | **330.6** |

*1 This is data for a three-month period, 1 January 2003 to 31 March 2003*

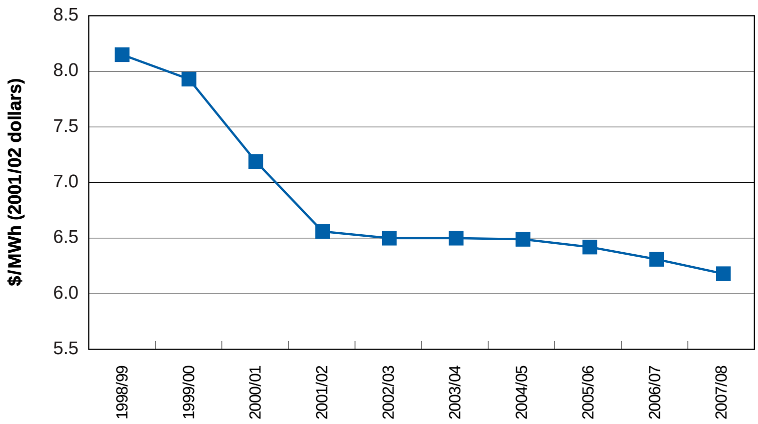
*Source: SPI PowerNet forecasts*



It should be noted that throughout this Application, totals appearing in table columns may not add due to rounding.

On a $/MWh basis (see Figure 5), SPI PowerNet's proposed revenue cap will secure the significant real price reductions SPI PowerNet has delivered since privatisation, and will continue the trend for real price decrease over the period. A year-on-year real price reduction of 1 per cent will be delivered over the next regulatory period.

**Figure 5:** Real price of transmission per MWh energy delivered (2001/02 $)




*Source: NEMMCO* Statement of Opportunities *and SPI PowerNet*

[1] *The X–factor is 0.0061 (+0.61 per cent)*

# Key inputs to the revenue requirement

## Overview of expenditure and performance

SPI PowerNet differs from other Australian transmission networks through the unique structural arrangements established for Victoria's transmission sector, in particular the separation of transmission ownership from augmentation planning.

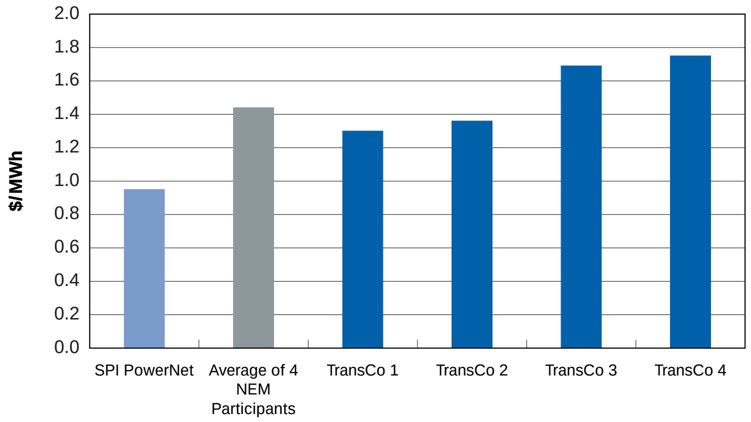
The network's capacity and "load at risk" are within the control of the planning bodies – VENCorp and the connected parties – not SPI PowerNet.

Accordingly, SPI PowerNet's expenditure claim includes no forecast operating and maintenance or capital expenditure for growth.

The Company's expenditure proposals are underpinned by systems and processes which build a "bottom-up" plan of maintenance and asset replacement and refurbishment work that is required over the next regulatory period to deliver optimal network performance and reliability.

Benchmarked against its peers, SPI PowerNet's actual operating and maintenance expenditure shows Victoria has one of the most cost-effective transmission systems in Australia – as evidenced in Figure 6 below.

**Figure 6:** Average controllable operational expenditure per MWh 1996/97 to 1999/00[1]

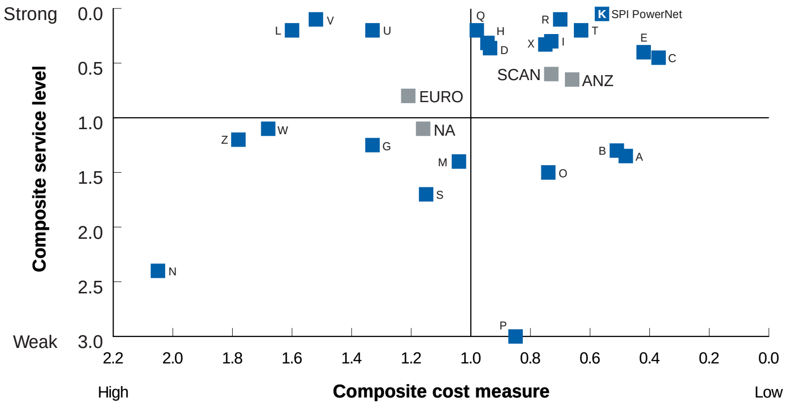



*1 The terms of the survey prevent disclosure of other participants' names*

*Source: ESAA*

Benchmarked against international transmission businesses, SPI PowerNet is an outstanding performer with respect to both cost and service levels (see Figures 7 and 8).

**Figure 7:** Transmission line maintenance[1] composite benchmark: Best performers have improved their processes, and practices to achieve leading performance. Focus has been placed on collecting adequate condition information and minimizing intrusive and low value activities. Companies K[2], E, and C have exhibited sustained best performer results in this area.



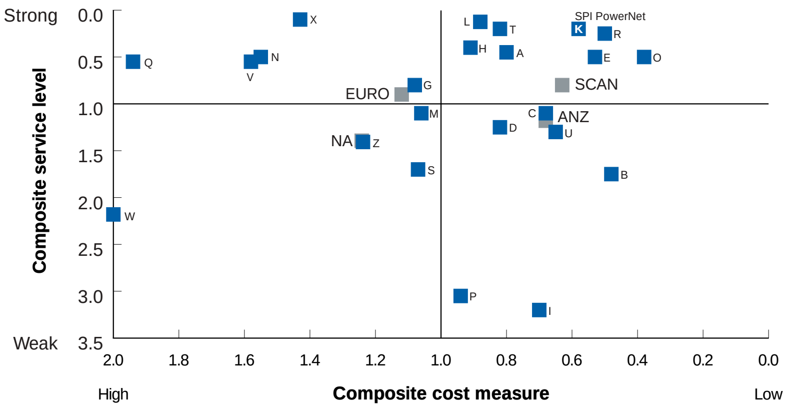

1 Includes overhead line patrol and inspection 100–199 kV (8.2%), overhead line maintenance 100–199 kV (23.7%) and 200+ kV (21.2%), right-of-way maintenance (38%) and pro-rated support services costs

2 SPI PowerNet is company K

Source: International Transmission Operations & Maintenance Study 2001 (rules require results to be masked)



**Figure 8:** Composite performance benchmark – Substation operations and maintenance[1]: Companies R, K[2], E and O have exhibited sustained leading performance in ITOMS




1 Includes breaker maintenance (6.8%), transformer maintenance (9.3%), relay, SCADA and communications system maintenance (23%), compensation equipment maintenance (12%), disconnector and earth switch maintenance (6.5%), instrument, transformer and other circuit end equipment maintenance (5.6%), substation site and auxiliary plant equipment maintenance (17%), substation field operations (12.6%) and pro-rated support service costs.

2 SPI PowerNet is company K

Source: International Transmission Operations & Maintenance Study 2001 (rules require results to be masked)

The age of network assets and increased network utilisation will demand significant attention and intervention over the regulatory period, and are major drivers of cost in the Company's asset management plans.

- **Age of assets** – the Victorian integrated power system was substantially established in the three decades from 1955–1985. As a consequence, many of its strategic assets are reaching end-of-life, and are in need of increased inspection and husbanding to ensure continued high performance. A number of system elements are now at the end of their useful lives and are due for replacement.
- **Network utilisation** – previous surplus capacity in the Victorian network has now been absorbed, to the extent that many elements are loaded above the level of single element redundancy during peak periods. SPI PowerNet's asset management plans must necessarily take into account implications of equipment failure in an operating environment characterised by increased reliance on full network availability and increased load duty.

The Company's proposed expenditure over the period is set out in Table 2. (Note: $10 million per annum of opex is attributable to changes to the scope of revenue-capped services on 1 January 2003, such as the inclusion of VNSC.)

**Table 2:** Proposed expenditure pattern (average 2001/02 $m)

| | Financial years ending 31 March | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2002 $m | 2003 $m | 2003[1] $m | 2004 $m | 2005 $m | 2006 $m | 2007 $m | 2008 $m |
| Total operating and maintenance expenditure | 47.5 | 55.7 | 19.1 | 66.3 | 67.1 | 66.8 | 67.4 | 67.9 |
| Total capital expenditure | 17.6 | 74.6 | 16.4 | 66.1 | 60.6 | 49.9 | 67.8 | 68.7 |

*1 This is data for a three-month period, 1 January 2003 to 31 March 2003*

*Source: SPI PowerNet forecasts*

## Overview of the asset base

Based on guidance from the ACCC, SPI PowerNet has constructed the regulatory asset base (RAB) for the purposes of calculating the return on capital and depreciation elements of the revenue cap. The 1994 valuation that underlies the Victorian Tariff Order was rolled forward by adjusting for capital expenditure, depreciation, retirements and inflation over the period to 2003. On a basis consistent with the original valuation approach, a value was placed on assets omitted from the 1994 valuation and, where necessitated by changes in circumstance, values were revisited (i.e. to reflect increased utilisation of the transmission system). In addition, assets relating to services that will only become revenue-capped from the start of the new regulatory period are included in the RAB from 1 January 2003.

## Overview of depreciation

The depreciation charges reflect the remaining life of individual assets. The level of detail in SPI PowerNet's asset register permits the depreciation schedule to be tailored to the varied characteristics of assets in the pool. The depreciation schedule is based on the asset lives that underlie the 1994 asset valuation and are a close approximation of the expected technical (economic) life of each asset.

SPI PowerNet's Application is based on straight-line depreciation over the life of each asset.

## Overview of rate of return (WACC)

Capital financing accounts for over half the annual cost of providing SPI PowerNet's transmission services. SPI PowerNet has engaged an independent expert – Professor R.R. Officer of the Melbourne Business School – to estimate a benchmark Weighted Average Cost of Capital (WACC) for SPI PowerNet's revenue-capped services.

On the basis of this analysis, SPI PowerNet proposes a vanilla WACC for 2003 to 2007/08 of 9.50 per cent (nominal). The components of this point estimate are set out in Table 3.

**Table 3:** Proposed WACC parameters and variables

| Parameter/variable/outcome | Proposed value |
|---|---|
| **Parameters** | |
| Gearing (D/V) | 60 per cent |
| Asset beta | 0.585 |
| Equity beta | 1.0 |
| Debt beta | 0.31 |
| Debt margin | 185 basis points |
| Market risk premium | 6.0 per cent |
| **Variables** | |
| Risk free rate – nominal 10-year government bond | 5.99 per cent |
| Real risk free rate – indexed 10-year government bond | 2.80 per cent |
| **Outcomes** | |
| Expected inflation | 3.10 per cent |
| Nominal cost of debt | 7.84 per cent |
| Post-tax nominal cost equity | 11.99 per cent |
| **Vanilla WACC (as at time of application)** | **9.50 per cent** |

## Overview of efficiency glide path

As a reward for efficiency achieved over the previous regulatory period, SPI PowerNet has proposed a five-year glide path based on cumulative savings in capital expenditure and operating and maintenance expenditure. Based on the expectation that the regulatory regime would provide material efficiency incentives, the Company has also proposed principles to guide the development of an efficiency glide path for the 2008 reset.

## Conclusion

This Application sets out a competitive, fair and reasonable proposal for both transmission users and the wider community, while providing a long-term investment incentive for the network's owner.

The revenue cap proposed by SPI PowerNet will secure Victoria's low-cost transmission network for electricity customers and continue the trend of declining real prices.

While the operating environment is becoming more challenging due to the ageing asset profile and increased utilisation of the network, transmission users can be assured the Application has been carefully framed to ensure transmission services remain cost-efficient while building upon SPI PowerNet's strong record of high performance and on-going efficiency gains.

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# contents

# 1. INTRODUCTION AND PURPOSE

## 1.1 Application for revenue cap determination

For the purposes of clause 6.2.4(b) of the *National Electricity Code* (NEC), SPI PowerNet (ABN 78 079 798 173) requests the ACCC to determine a revenue cap in accordance with this Application in respect of the non-contestable electricity transmission services provided by the Company in the state of Victoria. The period of the determination requested is five and one quarter years – from 1 January 2003 to 31 March 2008 – which will allow the regulatory year to align with SPI PowerNet's financial year (April to March). A revenue cap determination is necessary because the Victorian revenue capping arrangements that began in 1994, now administered by the ACCC, will cease effect after 31 December 2002 (by virtue of clauses 6.2.1(a) and 9.8.3(b) of the NEC and clause 3.6.2 of the *Victorian Electricity Supply Industry Tariff Order* (the Tariff Order)).

This Application seeks the ACCC's endorsement of five key proposals:

- a definition of the revenue-capped services;
- target performance levels for the provision of those services;
- a CPI–X revenue cap to apply for the period 1 January 2003 to 31 March 2008;
- principles for an incentive mechanism to encourage efficiency gains in excess of those forecast at the time the cap is set; and
- implementation arrangements, which include pass-through rules and a roll-forward mechanism to guide the setting of future revenue caps.



## 1.2 Approach to preparing the revenue cap application

This Application was prepared with regard to the objectives, principles, form and mechanism for transmission revenue regulation as set out in the NEC and on the basis of specific guidance from the ACCC as to how it interprets the NEC in relation to sunk asset valuation. Regard has also been given to prior ACCC revenue cap and NEC determinations, the ACCC's *Draft Statement of Principles for Transmission Revenue Regulation* (Draft SoRP), and relevant decisions by other utility regulators.

SPI PowerNet has endeavoured to meet the needs of transmission users and the wider community by effectively undertaking to:

- provide safe and reliable transmission services; and
- charge a price for those services that is competitive, fair and reasonable.

Following recent trends, the revenue cap proposed is calculated using a post-tax nominal building block approach. As proposed, the revenue cap would maintain SPI PowerNet's financial viability and allow the Company to fund the asset management program that is critical to the performance of the transmission system.

The mathematical detail of how the post-tax nominal building block approach is implemented in this Application is set out in the Technical Annex to this Application and its components are discussed at length later in the Application. For the avoidance of doubt, it should be noted in particular that:

- the revenue cap proposed together with all financial forecasts are expressed on an ex-GST basis;
- operating and maintenance and capital expenditure requirements are generally forecast at their expected values, not at the median or typical year values;
- the costs of bearing diversifiable risks, such as third-party liability and plant failure, are allowed for in the operating expenditure allowance through premia for insurance or self-insurance, rather than through an adjustment to the WACC;
- asset stranding risk is not allowed for, either as a self-insurance cost or via accelerated depreciation, on the assumption that the ACCC will allow SPI PowerNet to make adjustments to its depreciation allowance at the 2008 reset in the event that a total or partial asset stranding occurs over the course of the 2003 to 2007/08 regulatory period – this assumption is based on the position that the ACCC took in the recent Powerlink revenue cap decision;
- regulatory depreciation is calculated on an inflation adjusted, straight line basis over the remaining life of each asset (not simply a broad asset category) – the competition depreciation approach proposed by the ACCC in its Draft SoRP is not considered necessary given that SPI PowerNet's asset base is of diverse vintage; and
- the tax allowance is not normalised – SPI PowerNet believes that, while it would boost near-term revenue, tax normalisation yields little benefit to transmission customers, and is overly complicated and difficult to administer over time.



## 1.3 Caveats on the revenue cap application

SPI PowerNet has developed this Application based on guidance from the ACCC, precedent and well founded interpretations of the NEC. Applied in the context of the building block methodology, the result is one that maintains SPI PowerNet's financial viability. As deviations from these various elements could result in an unworkable outcome, leaving SPI PowerNet unable to fund its expenditure programs, the Company places the following general and specific caveats on this Application.

SPI PowerNet reserves a right to submit a revised application or supplementary application in support of its on-going financial viability in the event that the ACCC:

- signals an intention to determine a revenue cap or associated implementation arrangements so inconsistent with those proposed in this Application as to put in question SPI PowerNet's on-going financial viability;
- signals a change in the manner of determining the opening asset value which conflicts with guidance previously provided;
- intends to expose SPI PowerNet to windfall losses due to asset stranding in the 2003 to 2007/08 regulatory period; or
- intends to expose SPI PowerNet to windfall losses due to asset revaluation at the 2008 reset.

## 1.4 Organisation of the revenue cap application

Given SPI PowerNet's adoption of a post-tax nominal building block approach, this Application is organised to propose:

- a definition of revenue-capped services (Chapter 3);
- the expenditure requirements (capital, operating and maintenance) to provide those services at proposed target performance levels (Chapter 4);
- performance standards for service delivery (Chapter 5);
- an efficiency glide path in respect of above forecast efficiency gains achieved over the current regulatory period (1998 to 2002) and principles for an efficiency glide path in respect of above forecast efficiency gains achieved over the regulatory period 2003 to 2007/08 (Chapter 6);
- a regulatory asset base value and regulatory depreciation allowance for each year of the regulatory period (Chapter 7);
- an allowance for capital financing and taxation (Chapter 8);
- the total revenue requirement in each year of the regulatory period and the resulting X–factor to apply after the first year (Chapter 9); and
- roll-forward and implementation arrangements (Chapter 10).

To set the context for the later chapters, a basic description of SPI PowerNet's business and its electricity transmission network is provided in Chapter 2.



## 1.5 Review of this application by the ACCC

SPI PowerNet understands that the ACCC's review of this Application will involve:

- independent consultant reviews of the Company's proposals in respect of the RAB, operating and maintenance expenditure and capital expenditure (service standards are already under consideration as part of an ACCC review that commenced in late 2001 and covers all NEM transmission businesses) and publication of their reports;
- public consultation (inviting submissions) on this Application and the findings of the independent consultants;
- publication of a Draft Decision by the ACCC;
- a pre-decision conference and further public consultation (inviting submissions) in relation to the Draft Decision; and
- a Final Decision by the ACCC.

SPI PowerNet understands that the ACCC will inform the Company of changes to the above if this is not the case.

In the context of this process, this Application provides a level of detail sufficient to define and establish the basis of the revenue cap determination sought and only the completed information requirements templates (Appendix I) and a section of the Trowbridge Consulting *Valuation of Non-insured Risks* report (Appendix B) are considered confidential. It is anticipated that the independent consultants retained by the ACCC to review the asset management aspects of the Application, in particular, would gather further and more detailed information direct from SPI PowerNet as required. The confidentiality of any further information would have to be determined at the time.

# 2. SPI POWERNET BUSINESS CHARACTERISTICS

The purpose of this Chapter is to provide a brief description of SPI PowerNet's business and its role in the Victorian transmission sector. This will enable clear understanding of the context in which this Application is made. The Chapter outlines respectively:

- the structure of the industry (Section 2.1);
- SPI PowerNet's functional structure (Section 2.2); and
- the physical characteristics and usage of the transmission system (Section 2.3).

## 2.1 Structural arrangements for transmission in Victoria

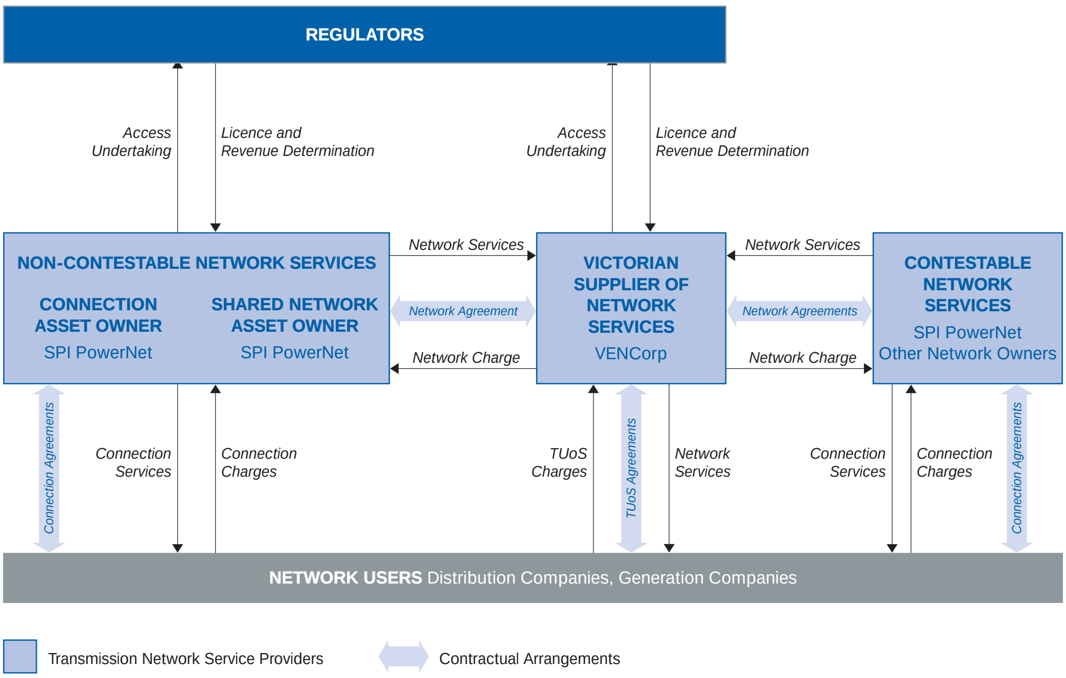
When the Victorian Government disaggregated the Victorian energy industry in 1994, it decided to split the responsibility for transmission between:

- the Regulator;
- the network planner, VENCorp (then VPX);
- other transmission customers (distribution companies, generation companies and directly-connected industrial customers); and
- the asset owner, SPI PowerNet (then PowerNet Victoria).

The relationships between these parties are shown in Figure 2.1.



**Figure 2.1:** Regulatory and commercial relationships




*Source: SPI PowerNet*

VENCorp is a government-owned organisation responsible for:

- procuring shared network services from SPI PowerNet and other providers;
- providing transmission use of system services to transmission customers (including transmission pricing); and
- planning and requisition of augmentation to the shared transmission network.

Augmentation of the shared transmission network is by default contestable and VENCorp manages the procurement of these services.

Connection customers are responsible for planning and directing the augmentation of the transmission connections they use. As with the shared network, new connection services are potentially contestable.

For its part, SPI PowerNet is responsible for owning, maintaining and operating its transmission network to provide services as defined in its Network Agreements with VENCorp and Connection Agreements with other transmission customers, and pursuant to the Victorian System Code. The Company also acts as "augmenter of last resort" for VENCorp and for connection customers pursuant to its *Victorian Transmission Licence* (issued by the Office of the Regulator-General, Victoria).

In addition to non-contestable transmission services, SPI PowerNet provides contestable transmission services to its customers. The significant services in this category are those services awarded to the Company by VENCorp through its tendering process for network augmentations. Contestable transmission services account for less than 2 per cent of the value of the Company's total asset base.

## 2.2 SPI PowerNet functional structure and accountabilities

SPI PowerNet operates under a business structure that is consistent with best practice approaches for driving efficiency and accountability in operations. Key features of the structure include:

- **commercial relationships** – managed by the Transmission Services Department, this function is responsible for management of relationships with the Company's transmission customers, including negotiation of new services. This provides a concentrated customer focus within the organisation, separate from the network management functions;
- **network asset management** – divided into strategic asset management and asset servicing functions. The network management model that SPI PowerNet applies separates strategic asset management from the asset servicing (construction and maintenance) functions. The strategic asset management department is responsible for the development of asset management strategies and plans. This work is performed by staff highly skilled in the technology of extra high voltage electricity transmission plant. The asset management plans are handed over to the asset servicing department for implementation; and
- **resource pools** – sourced both internally and externally based on the most efficient use of the Company's highly skilled technical workforce. For example, the network maintenance activity in one of the Company's geographic network regions is outsourced. This enables the Company to compare relative performance in field activities. Similarly, the Company relies on outsourced project design services beyond the capability of a base internal resource. SPI PowerNet is currently negotiating agreements with a number of strategic partners who provide competitively-priced field services at short notice to support the Company's program requirements. Other external resources are competitively sourced as required.

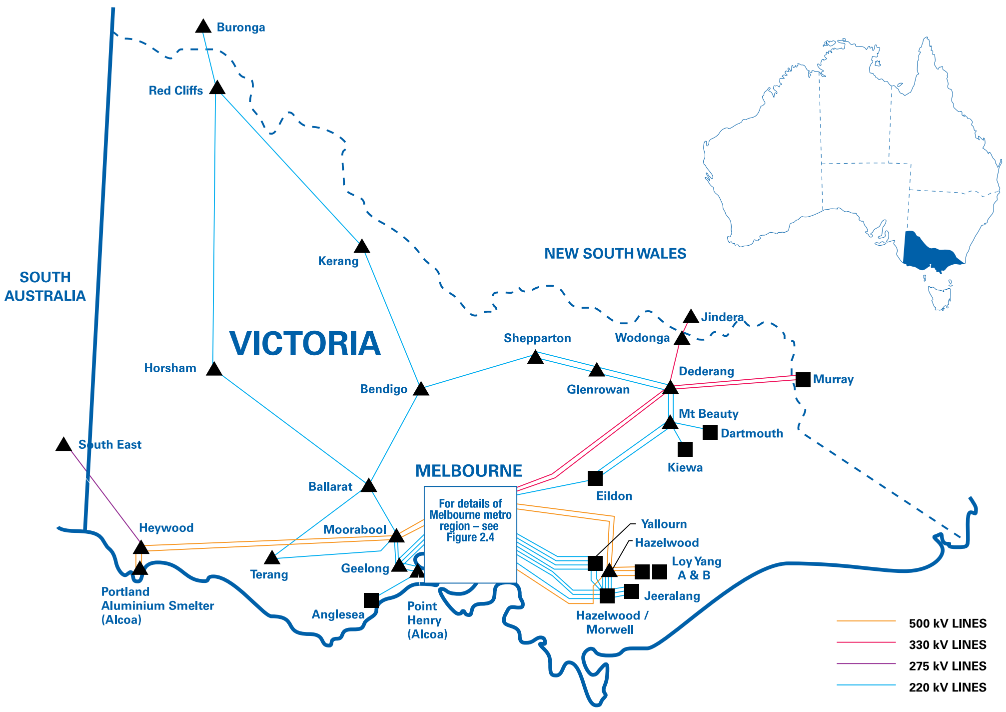
## 2.3 Transmission system overview

The SPI PowerNet transmission system serves all of Victoria covering an area of approximately 227,600 square kilometres and a population base of approximately 4.5 million. The network is built around a 500 kV backbone running from the major generating source in the Latrobe Valley, through Melbourne, and across the southern part of the state to Heywood, near the South Australian border. This backbone is designed to support the major load centres (Melbourne and the Portland aluminium smelter) and is surrounded by:

- a 220 kV ring around the Melbourne metropolitan area supplying 220 kV/66 kV terminal stations;
- an inner and outer ring of 220 kV/66 kV terminal stations in country Victoria supplying the regional centres (the "State Grid"); and
- three interconnections with NSW and one with South Australia.

The network is summarised in Figures 2.2, 2.3 and 2.4.

**Figure 2.2:** SPI PowerNet's transmission system



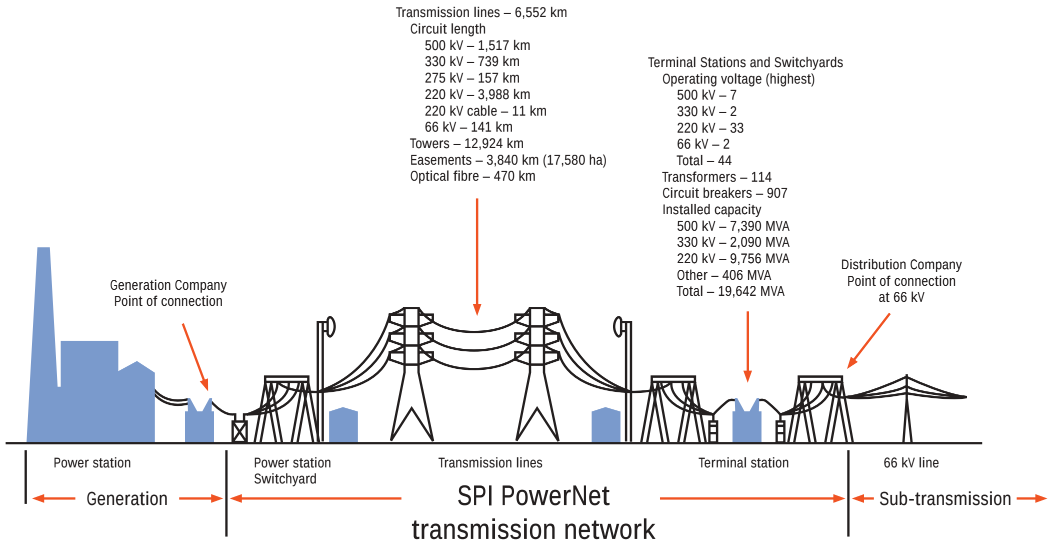

*Source: SPI PowerNet*

Physically, the transmission system is made up of the following major plant types and systems.

- **Towers and lines –** the most visually imposing elements of the transmission system, they physically link the generators to the supply points at terminal stations. The number and thickness of the wires determines their maximum capacity and their height above the ground is an indicator of the voltage at which they are operated.

- **Transformers –** are very large items of plant that change the voltage at which electricity is transported. At SPI PowerNet's terminal stations they allow the high transmission voltages (500,000 to 220,000 volts) to be converted to the lower levels (66,000 to 22,000 volts) at which the regional distribution companies take supply.
- **Switchbays –** contain switchgear such as circuit breakers and disconnectors, which allow items of plant to be switched on and off in the system and enable changes to be made to the configuration of the transmission system. The circuit breakers are controlled remotely from SPI PowerNet's Victorian Network Switching Centre (VNSC) in Richmond.
- **Reactive plant –** such as capacitor banks and static var compensators (SVCs), are necessary to enable the system operators to maintain system stability and control voltages.
- **Secondary systems –** provide protection (tripping), monitoring and control functions for the transmission system elements described above. Their importance to system security requires the protection systems to be duplicated.
- **Communications network –** provides the information links between VNSC and the system elements at remote terminal stations. This network transmits all data for remote control and monitoring of the system and for protection systems. To provide redundancy for the protection systems with which it is integrated, dual systems are installed.
- **Redundancy –** is a measure of the network's ability to continue to transport electricity without constraint when network elements are removed from service (such as in the event of a major transformer failure). Where the loss of a single network element could result in constrained electricity transfer (with potential loss of supply) then the redundancy level is zero (load is secure only for system normal operation, referred to as "N"). Where a backup network element is installed to ensure avoidance of such a constraint, the redundancy level is one (load is secure even following failure of one major item of equipment, referred to as "N–1").

**Figure 2.3:** SPI PowerNet's asset profile (March 2002)




*Source: SPI PowerNet*

## 2.3.1 Melbourne metropolitan area

The Melbourne metropolitan area is serviced by 500 kV and 220 kV networks which receive power from the major generators in the Latrobe Valley (Yallourn, Hazelwood, Loy Yang A, Loy Yang B and Jeeralang), the Victorian hydro-electric power stations, the gas-fired Newport power station and the Snowy/NSW generators.

The Latrobe Valley to Melbourne transmission link comprises four 500 kV lines (one operating at 220 kV) and six 220 kV lines. The fourth 500 kV line was established between the Latrobe Valley and Melbourne in the late 1980s to increase transmission capacity to accommodate the construction of additional Latrobe Valley generation. This line has since been operated at 220 kV to optimise the use of the existing assets and defer the need for additional 500 kV/220 kV transformation; however, conversion to 500 kV operation is now imminent (refer to Section 2.3.4 on system capacity). The system is generally operated in what is termed "radial mode", with

- the 220 kV network transferring power from the majority of the Yallourn generation units into the eastern metropolitan area at Rowville Terminal Station; and
- the 500 kV network supplying power from Loy Yang A and B, Hazelwood and one Yallourn unit via step-down transformation to 220 kV at Keilor, South Morang and Moorabool Terminal Stations.

The 500 kV/220 kV transformation added at Rowville Terminal Station in 1999 has provided support for the 220 kV network in meeting the growing demand in the eastern metropolitan area. This transformation service is not provided by SPI PowerNet but by another network service provider.

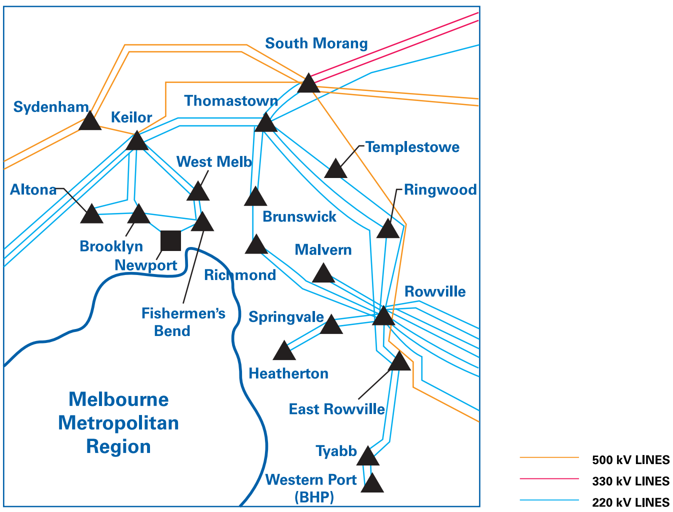


Supply from NSW and the Snowy Mountains generators is via Dederang Terminal Station in Victoria's north-east. Two 330 kV lines from Dederang Terminal Station connect to South Morang Terminal Station on Melbourne's northern perimeter.

A 220 kV system connects the Southern Hydro supply from the Kiewa, Eildon and Dartmouth schemes to Thomastown Terminal Station.

The Melbourne metropolitan area transmission network is illustrated below.

**Figure 2.4:** Melbourne metropolitan network




*Source: SPI PowerNet*

Springvale, Heatherton, East Rowville, Tyabb and Malvern Terminal Stations in the Melbourne metropolitan area all derive their supply from single tower double circuit 220 kV transmission lines, (i.e. the two circuits are sourced from the same station and are both carried on the same tower). This double circuit arrangement has been widely used throughout the metropolitan area to distribute energy to the load centres because of its reduced easement requirements. Transmission links installed during the 1980s between Newport and Fishermen's Bend Terminal Stations and between Brunswick and Richmond Terminal Stations increased the number of routes for supplying the inner metropolitan area and the Central Business District of Melbourne.

## 2.3.2 Regional network

The majority of regional Victoria is directly supplied by the 220 kV network, which includes terminal stations at Terang, Ballarat, Bendigo, Shepparton, Glenrowan, Kerang, Horsham and Red Cliffs. Supply is derived from the main 500 kV backbone via transformation at Moorabool, Keilor and South Morang Terminal Stations.

A 500 kV connection supplies the largest regional load – the Portland aluminium smelter in the State's far west – and provides for the interconnection with South Australia.

## 2.3.3 Interconnections

The primary interconnection with NSW and the Snowy Mountains generators is provided by two 330 kV lines from the Murray switching station (in the Snowy scheme) connecting at SPI PowerNet's Dederang Terminal Station in Victoria, and one 330 kV line from Jindera in southern NSW connecting at Dederang via Wodonga Terminal Station. The 330 kV system extends to Melbourne terminating at South Morang Terminal Station. In addition, a 220 kV line extends from Red Cliffs Terminal Station in Victoria to Buronga in NSW.



The South Australian interconnection originates at Heywood Terminal Station where the 500 kV transmission is transformed at Heywood into two 275 kV circuits.

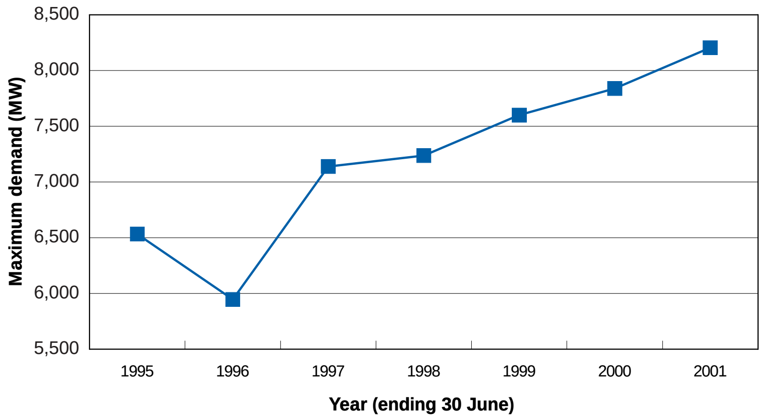
Additional network interconnections (connecting into the SPI PowerNet network) are in various phases of development. These include:

- the "Murraylink" direct current interconnection of Victoria and South Australia between Red Cliffs and Berri. This interconnector is under construction;
- the "Basslink" direct current interconnection of Victoria and Tasmania via undersea cable. This proposal is currently being assessed under jurisdictional planning approvals processes;
- an approved plan to upgrade the transfer capability on the existing interconnectors between NSW and Victoria via Dederang, known as "SNOVIC"; and
- a proposed hybrid interconnector upgrade of the existing interconnector from Victoria to South Australia between Heywood and Tailem Bend, known as "SouthernLink".

## 2.3.4 System capacity

The maximum demand (half hour average) on the SPI PowerNet transmission system is 8,205 MW recorded in the summer of 2001. Historical demand is provided in Figure 2.5 below. The Victorian peak loading conditions occur during high temperature summer days and the transmission system capability is limited by reactive support following critical contingencies. To provide this summer capability the network incorporates approximately 3,728 MVAr of static capacitors and +660/–429 MVAr of dynamic reactive capacity.

**Figure 2.5:** Growth in peak demand

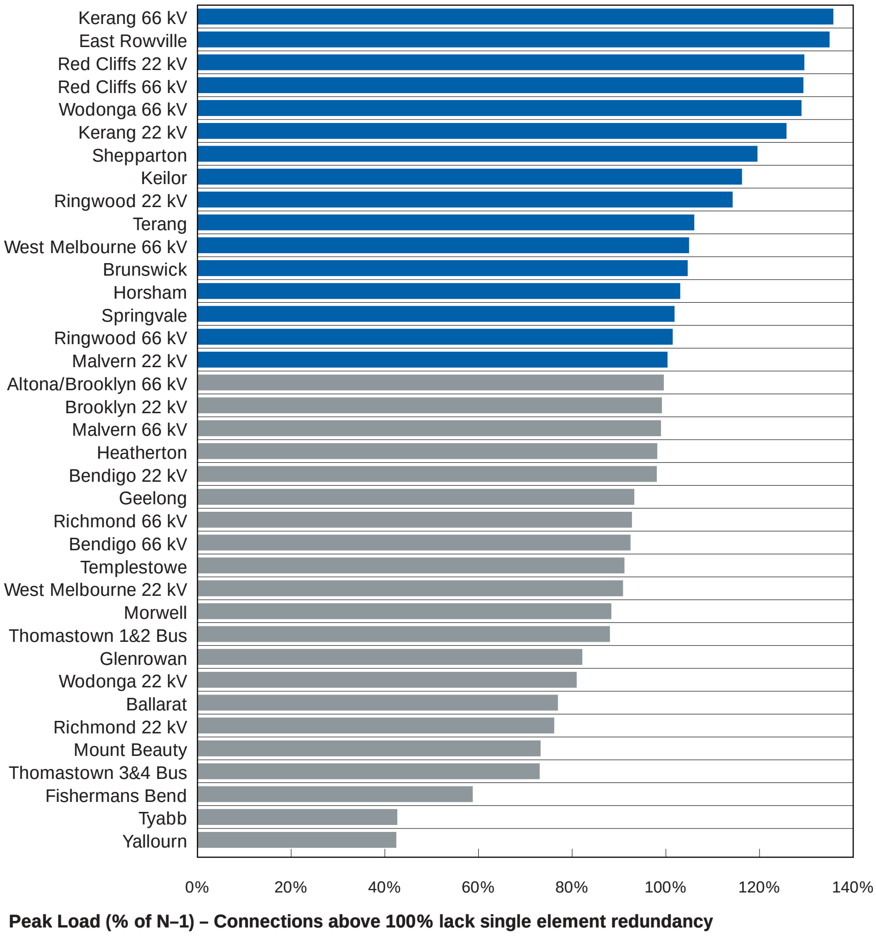



*Source: SPI PowerNet*

The ability of the system to meet higher peak demands is dependent on the establishment of additional capacitive support and may also be limited by the mix of generation sources supplying the market at peak demand time. There is little capacity available to transfer increased generation from the Latrobe Valley (where the base load brown coal plants are located) to Melbourne (where the majority of the demand is located) on the existing network without converting the fourth 500 kV circuit currently operating at 220 kV to 500 kV operation.

At terminal stations which serve as bulk supply points to the distribution companies, capacity is defined by the amount of transformation established in accordance with the requirements of the distribution companies that have planning responsibility for that station. There are a large number of the stations exceeding the level of single element redundancy (redundancy level reduced to “N”) during times of peak demand. In practical terms this means customer load is at risk from the failure of one piece of equipment. The redundancy status of each SPI PowerNet terminal station is illustrated in the following figure.

**Figure 2.6:** Stations operating with no redundancy during 2000/01 peak loads




*Source: SPI PowerNet*

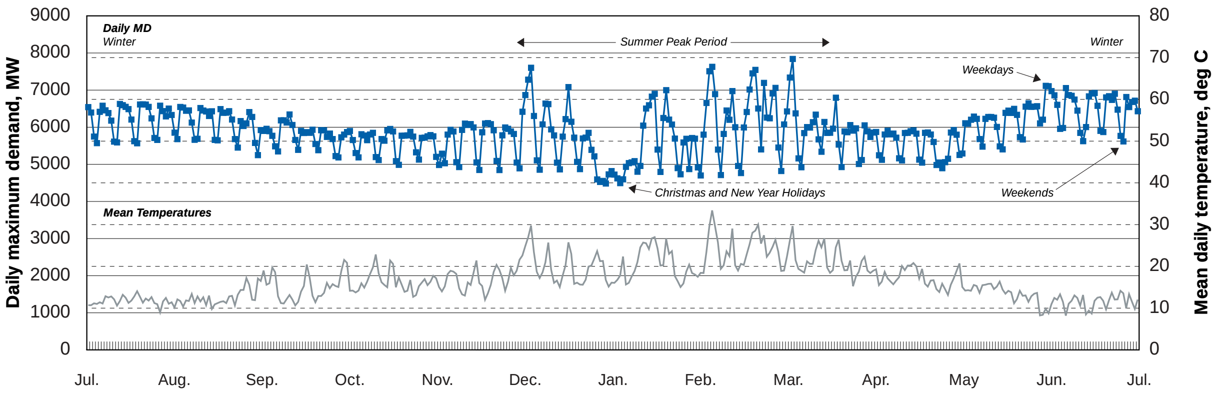
## 2.3.5 Network load profile

Victoria has a maximum electricity demand that occurs during summer, the peak period lasting four months from mid-November. This summer peak demand pattern results from the increasing use of air-conditioning during the hotter months and the availability of natural gas as an alternative heating source during winter.

The utilisation of SPI PowerNet's network corresponds to the electricity usage pattern of consumers. At a mean daily ambient temperature of 30°C, a 1°C temperature rise is accompanied by a load increase of about 150 MW (source: *VENCorp Annual Planning Review 2001*). This incremental response grows higher as ambient temperature increases. In winter, decreasing ambient temperature is also accompanied by a load increase; however, the effect is not so pronounced.

To illustrate these effects, the loading pattern in the year July 1999–June 2000 is shown in Figure 2.7.

**Figure 2.7:** Daily system maximum demand




*Source: SPI PowerNet*

Although the profile changes from year to year, the year shown is a good indicator of the system demands which SPI PowerNet must be structured to deal with.

The diagram illustrates how the loading of the network varies in response to random daily temperature change. Extreme load points are experienced throughout the summer period, but also stretch into late spring (November) and early autumn (March). The load also rises again throughout winter, to about 90 per cent of the summer peak level.

It is important to have the highest availability of network plant during periods of high utilisation. With high growth in system demand over the last decade causing the period of high utilisation to broaden (into November and March as shown above), the periods available to SPI PowerNet to take plant out of service for either network maintenance or construction of new and replacement plant have become increasingly restricted.

# 3. REVENUE-CAPPED SERVICES

To set the basis for the other elements of this Application, the revenue-capped services must be defined. While such definitions will always be required, they may not be static over time and, indeed, are not expected to be. This is largely because they are the product of dynamic factors including customer expectations, regulatory arrangements, technology and costs. This is especially the case in Victoria where SPI PowerNet is transferring between two distinct and sometimes contradictory regulatory frameworks.

Victoria has had service definitions and standards for transmission in place since the disaggregation of the electricity industry in 1994. These were developed before the NEC established national definitions. Therefore, as SPI PowerNet enters the NEC regime proper in 2003 small but significant changes to the scope of revenue-capped services occur.

The following sections outline respectively:

- the changes between regimes (Section 3.1);
- a summary of the regulatory environment and contractual arrangements in the Victorian regime (Section 3.2); and
- a summary of proposed transitional arrangements and future contracting in the NEC regime under ACCC regulation (Section 3.3).

## 3.1 Scope changes between the Victorian and NEC regimes



Revenue-capped transmission services under Victorian Tariff Order arrangements cover network and connection services "at the levels required as of 3 October 1994" plus a limited number of augmentation projects over the period 1994/95 to 1999/00 that were identified in 1994 as required. These services are referred to as "prescribed services" (revenue-capped). Services outside the revenue cap are referred to as "excluded services".

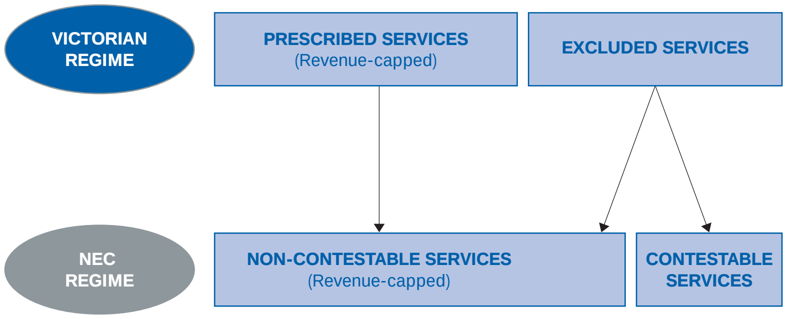
However, under the NEC regime, transmission services will fall into "non-contestable" (revenue-capped) and "contestable" categories (see Clause 6.2.4(f) of the NEC). In contrast to the Victorian regime, these definitions are not date based.

Therefore, the non-contestable concept is a broader definition of revenue-capped services than the prescribed services definition in Victorian arrangements. This means that:

- some currently excluded services will become part of the revenue cap for the period 2003 to 2007/08; and
- from 2003, new transmission services agreed with customers will use the NEC definition. Therefore, they will be separated into non-contestable services (to be included in the revenue cap from 2008) and contestable services (to remain outside the revenue cap).

The following diagram illustrates the change in scope between the two regimes that occurs on 1 January 2003. It is important to note that upon switching regimes, capped (regulated) revenue would rise, all else being equal, due to the scope change, while overall revenue would remain unchanged (non-revenue-capped revenue would fall).

**Figure 3.1:** Change in scope between Victorian and NEC regimes



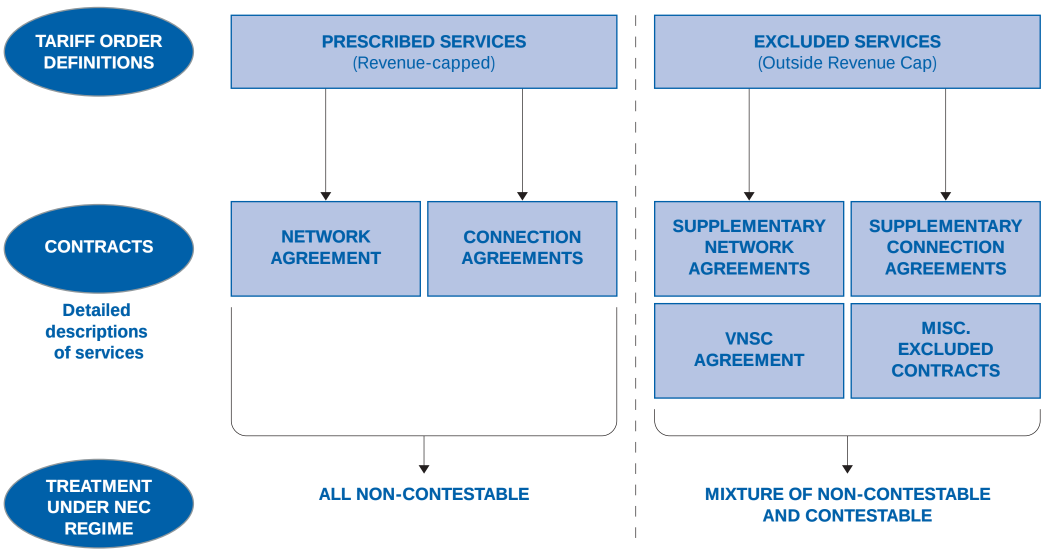

*Source: SPI PowerNet*

Detailed descriptions of the Victorian regime and proposed transition to and operation under the NEC regime are provided in the following sections.

## 3.2 Transmission services under the Victorian regime

The services provided by SPI PowerNet are broadly defined under the Victorian Electricity Supply Industry Tariff Order (Tariff Order). Underlying the Tariff Order, all prescribed and excluded transmission services are contracted with SPI PowerNet's customers. The apparently imprecise definition of the prescribed services in terms of "at the levels required as of 3 October 1994" is supported in the contracts through detailed clauses and schedules describing the agreed technical parameters for the services being provided. The figure below illustrates the types of agreements and how they relate to the services and definitions under the two regimes.

**Figure 3.2:** *Tariff Order* and contract definitions in the Victorian regime




*Source: SPI PowerNet*

### 3.2.1 Prescribed services contracts

The detailed scope of the prescribed transmission services provided by SPI PowerNet is defined through long-term agreements executed in 1994 with VENCorp (then VPX) and connected customers. There is a Network Agreement with VENCorp and separate Connection Agreements with each distribution company, generation company and the SECV Shell (relating to the smelters at Portland and Point Henry). SPI PowerNet also provides technical services (as defined in the Tariff Order) to VENCorp pursuant to the Network Agreement, up to a pre-determined value.

### 3.2.2 Excluded services contracts

A range of transmission services is provided under separate supplementary Network and Connection Agreements. These represent augmentations to the initial set of services and were customer-initiated.

Separate to the supplementary agreements, SPI PowerNet has an agreement with VENCorp in relation to provision of the services of the Victorian Network Switching Centre (VNSC). VENCorp (then VPX) sold VNSC to SPI PowerNet (then GPU PowerNet) in 1998 and entered into a contract to buy the services back, outside the current revenue cap.

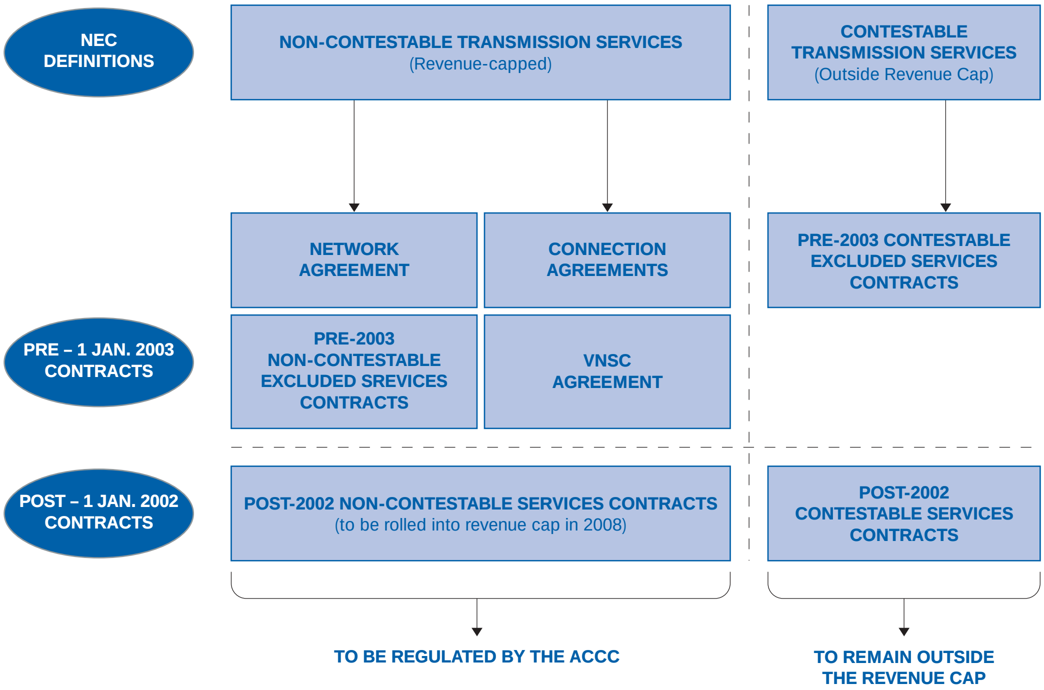
## 3.3 Transmission services under NEC regime

From 1 January 2003, the definition of transmission services to be regulated under a revenue cap depends on the NEC concept of 'contestability'. Under the NEC, a transmission service is contestable if it "is permitted by the laws of the relevant participating jurisdiction to be provided by more than one Network Service Provider as a contestable service or on a competitive basis". To arrive at a practical definition of the revenue-capped services, it is necessary to have regard to non-contestable transmission services only.

Figure 3.3 shows the contractual arrangements under the NEC regime. The detailed description of these arrangements is outlined in the subsequent sections. It includes SPI PowerNet's proposals for:

- the scope changes when shifting between regimes – i.e. existing transmission services to be included in or excluded from the revenue cap to be determined by the ACCC under the NEC regime; and
- arrangements for new transmission service contracts – i.e. contracting procedures applicable once ACCC oversight under the NEC regime commences in 2003.

**Figure 3.3:** Contract definitions in the NEC regime




*Source: SPI PowerNet*



### 3.3.1 Non-contestable transmission services (revenue-capped)

The revenue-capped services at the commencement of the new regime will include all prescribed services defined in the Network and Connection Agreements and certain specified excluded services contracts.

On-going excluded transmission contracts that provide services beyond 2002 fall into three broad groups:

- services procured by VENCorp through an open tender process;
- services procured from SPI PowerNet with take-or-pay provisions specifying the charges to be paid for the duration of the service period, independent of future revenue caps; and
- services procured from SPI PowerNet that specify charges to be paid up to 31 December 2002, with the services thereafter to be treated as revenue-capped, i.e. the charges are to be determined according to the ACCC's determination of the revenue cap for regulated services.

SPI PowerNet proposes that the first two groups be regarded as contestable and hence remain outside the revenue cap after 2002. The third group, in accordance with the agreement of the parties, should be treated as non-contestable and included in the revenue cap after 2002. These Agreements are listed in the following section.

## 3.3.2 Pre-2003 excluded services contracts to be included in revenue cap

The non-contestable augmentations to be included are specifically listed below in Table 3.1. These were placed in service during the 1994 to 2002 period and are subject to long-term contracts.

**Table 3.1:** Pre-2003 customer augmentations to be included in revenue cap

| ID number | Project description | Service date | Term (years) |
|---|---|---|---|
| P160 | Thomastown Terminal Station 5th transformer | 12 Feb. 1999 | 30 |
| P212 | Battery duplication | 6 May 2001 | 15 |
| P236/7 | Rowville Terminal Station transformer interface | 17 Nov. 1999 | 30 |
| P350 | East Rowville Terminal Station connection upgrade | 19 Oct. 2000 | 15 |
| P314 | Keilor Terminal Station 4th transformer | 1 Feb. 2001 | 30 |
| P417 | 2000/2001 shunt capacitors | 31 Dec. 2000 | 20 |
| P426 | Springvale Terminal Station bus protection modifications | 1 Jan. 2000 | 20 |
| P466 | West Melbourne Terminal Station 4th transformer | 18 Dec. 2001 | 30 |
| P496 | Shepparton Terminal Station 3rd transformer | 30 Apr. 2001 | 30 |
| P498 | Richmond Terminal Station 22 kV auto-close | 31 Dec. 2000 | 15 |
| P501 | Keilor Terminal Station – sub BY connection point | 23 Feb. 2002 | 15 |
| Z101 | Thomastown Terminal Station – sub BD 66 kV feeder | 31 Oct. 2002 | 15 |
| Z103 | Valley Power connection at Loy Yang Power Station | 7 Jan. 2002 | 30 |
| Z129 | Altona Terminal Station – Laverton feeder exits | 31 Mar. 2002[1] | 15 |

*1 The service date represents the date scheduled for commencement of service*

*Source: SPI PowerNet*

## 3.3.3 Contestable transmission services (to remain outside the cap)

SPI PowerNet proposes that all other on-going excluded services contracts (i.e. not those listed in Table 3.1), constituting just 2 per cent of transmission services revenue, remain outside the revenue cap.

In order to finalise this Application and to provide certainty for customers, SPI PowerNet has selected a pragmatic date for ceasing the roll-in of additional non-contestable transmission services. Any additional non-contestable services subject to contracts with a projected service date prior to 1 January 2003 that were not executed by 31 August 2001, are not proposed to be included in SPI PowerNet's revenue-capped services until the 2008 reset.

## 3.3.4 Future contracting with customers in the NEC regime

In relation to any future non-contestable augmentations, an arrangement is proposed in Chapter 10 for how these should be treated until they are "rolled-in" to the asset base at the start of the next regulatory period in 2008.

It is important to note that each new service would be the subject of a separate agreement between SPI PowerNet and the customer, with the requirements and specifications of those services to be determined by the customer.

# 4. EXPENDITURE

This Application proposes operating and maintenance expenditure (opex) and capital expenditure requirements (capex) for the existing network. It includes maintenance, refurbishment and replacement of plant, and the non-system expenditures needed to run a regulated business. SPI PowerNet has not included any allowance for network growth opex and capex because it does not plan augmentations to its network. This is dissimilar to other States' Transmission Network Service Providers (TNSPs) which have the planning function for their networks.

This Chapter provides a high level explanation of the expenditure proposals. SPI PowerNet understands that the ACCC will commission independent consultants to review the expenditure proposal at a detailed level (with the benefit of discussions with SPI PowerNet staff and access to supporting data) and that the resulting reports will be made public for comment by interested parties. The Chapter is organised to:

- provide some background to expenditure on the network since disaggregation and privatisation (Section 4.1);
- describe the drivers of future expenditure in the next regulatory period and beyond (Section 4.2);
- describe the systems that SPI PowerNet uses to forecast its expenditure needs and allocate costs (Section 4.3);
- detail SPI PowerNet's opex and capex requirements respectively, over the regulatory period 2003 to 2007/08 (Sections 4.4 and 4.5); and
- provide a benchmark analysis of price, cost and performance to illustrate that SPI PowerNet leads Australia in providing best practice transmission services (Section 4.6).

In determining the required opex and capex, the Company has assumed that it will be compensated on a cost pass-through basis for changes such as to codes, legislation, or standards that result in unforeseen additional capex and opex. A complete and precise articulation of the pass-through arrangements proposed is set out in Chapter 10 and Appendix G.

## 4.1 Background to expenditure

Since disaggregation of the industry, cost reduction has been a key driver for SPI PowerNet and its predecessors. As in other parts of the industry, the focus has been on cost reduction (over 35 per cent reduction in opex costs between 1995 and 2000) and the absorption of the excess network capacity that was the legacy of the former SECV.

At June 1994, personnel numbers stood at 491, while today SPI PowerNet employs approximately half that number. Hard decisions were made to restructure field maintenance areas and outsource non-core roles such as plumbers and groundsmen. Similar emphasis was placed on reduction of non-labour expenses, with significant cost reductions having been made in many areas, such as IT, communications costs and accommodation.

SPI PowerNet now employs a highly skilled core workforce, and contracts in non-core activities and "mans up" for periods when high demand is made on resources.

However, it must be noted that these cost reductions were achieved at a time when the system was functioning under less stressful conditions. For example, in 1994:

- the average age of SPI PowerNet's terminal stations was 21 years. This was less than half the expected technical life of most primary transmission plant and no major replacement programs were due (the average age has increased to 29 years and major replacements are being undertaken);
- there was sufficient redundancy in the system to allow significant optimisation of assets (that redundancy was all but absorbed by 2001);

- the 1993/94 summer peak load was only 6,158 MW (8,205 MW in 2000/01); and
- fewer than three terminal stations were operating with a redundancy level lower than "N–1" (i.e. in peak demand periods customers serviced by those stations could lose supply from a single connection plant failure). (In 2000/01, 16 terminal stations were operating with a redundancy level lower than N–1.)

Without exception, these system conditions have adversely changed over the last eight years. The following Section details how these and other regulatory and environmental changes drive increasing expenditure, now, over the next regulatory period and over the next 20 years as major replacement programs are undertaken and remaining plant continues to age.

## 4.2 Key drivers of increased opex and capex

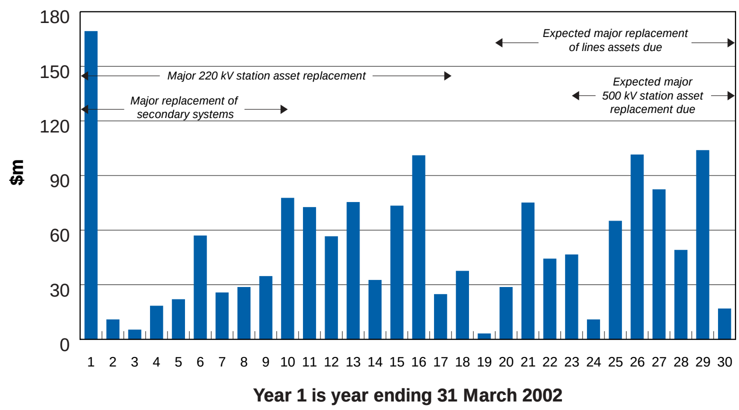
The following emerging issues will drive future increases in expenditure on SPI PowerNet's network.

### 4.2.1 Ageing network assets

The single most important driver of increased opex and capex over the 2003 to 2007/08 period is the ageing of the Victorian transmission network. With the asset fleet past mid-life on average, the business is focussed on managing the assets to maintain their current high levels of performance and also achieve the lowest life cycle cost. This is an asset management challenge that will intensify over the next two decades as major classes of assets progressively reach the end of their technical lives and are unable to fulfil their function. The ageing fleet will require increased maintenance, and a boost to the program of condition assessment and monitoring, the breadth of which has not hitherto been necessary. Corrosion of towers is also becoming a problem for the first time. With respect to its oldest assets, for example, Brunswick, Eildon and Malvern Terminal Stations, SPI PowerNet is, for the first time, embarking on a program of major asset replacement.

Figure 4.1 illustrates how the cyclical nature of the forecasts produced from the long-term replacement capex model is driven by the timing of major asset replacement in distinct parts of the system. This is in turn driven by the historical development of the system and the expected technical lives of the plant. For example, the older 220 kV station assets will have to be replaced before the 500 kV assets, and stations (45-year expected life) will need to be refurbished before lines (70-year expected life).

**Figure 4.1:** Major replacement programs driving capital expenditure forecasts




*Source: SPI PowerNet*

### 4.2.2 Environmental remediation

With urbanisation reaching a number of outer-lying terminal stations, environmental concerns such as noise and visual pollution around terminal stations have become an issue. In addition, the need for remediation work such as oil containment and control has become urgent in order to meet more stringent environmental guidelines. Significant capex is planned over the next five to ten years to solve these problems.

### 4.2.3 Technological change

Advances in technology are resulting in significant changes in the nature and functionality of new transmission equipment. While the new technology often brings with it significant benefits in improving functionality and reducing maintenance costs, it can also leave older items of equipment unsupported and hence obsolete before they have reached the end of their technical lives. When replacing major groups of primary plant, analysis often demonstrates that it is more efficient to replace the supporting secondary equipment at the same time. Such near-term capital investment means a reduction in total life cycle cost.

### 4.2.4 Ageing workforce

Another important cost driver is the increasing age of SPI PowerNet's workforce. The average age of the skilled workforce is 48 years and the Company expects to lose 14 per cent of its workforce to retirement in the next five years and 30 per cent over the next ten years. This potential decrease in the pool of skilled labour in the high voltage electrical area is a significant risk to the business.

In response to this risk, SPI PowerNet has embarked on the progressive renewal of its workforce in order to maintain an appropriate long-term level of engineering and technical skills. The Company has a pro-active process in place for recruitment of up to four graduate electrical engineers and up to six electrical trades apprentices in each year from 2001 to 2005 inclusive. With allowances for retirements and normal staff turnover, this recruitment program should support a target level of technical staff for the longer term.

Additional costs from this policy arise from the lack of productivity in the early years devoted to skilling trainees and to long understudy periods needed to replace key staff. Without a substantial hand-over period, there can be significant losses of experience and corporate knowledge that would result in higher long-term costs to the consumer.

It has been and will continue to be necessary to resort to overseas countries to fill vacancies in some specialist areas in anticipation of retirements. SPI PowerNet knows from experience that the cost of recruiting such new employees is often at a premium to hiring local labour, however, the skills required are not available locally.

### 4.2.5 Increasing network utilisation

Maximum load on the transmission network has been growing at a compound rate of around 3 per cent per year over the period 1994 to 2000 and is forecast to grow at the same rate for the next decade[2]. While this increased utilisation is in general highly desirable because it lowers the unit cost of transporting power, it also places additional pressure on asset performance and availability.

[2] *VENCorp* Annual Planning Review *(2001)*

For example, redundancy in the system, planned by VENCorp and the distribution companies, has declined and many network and connection elements are now operating with a redundancy level lower than "N–1" during periods of peak demand. In practical terms this means:

- in the absence of contingency plans, customer load is at risk for long durations from the failure of one piece of equipment;
- that transmission connection assets are being run harder than has been the case historically, increasing the importance of good asset management; and
- the lack of plant redundancy under high system demand conditions imposes limits on when SPI PowerNet can access its equipment for maintenance, repair, modification or replacement.

The three cost consequences of these considerations are:

(1) shorter time windows for scheduled outages, which necessitates out-of-hours work and can give rise to last minute rescheduling[3], both of which cause higher costs;

(2) risk management considerations necessitate a higher level of strategic spares, including high-cost items such as spare transformers. This allows rapid replacement of failed equipment at a station; and

(3) a major condition assessment program is required to ensure the risk of failure is minimised for large (ageing) items of plant such as transformers, especially during the peak summer demand period. This allows replacement of identified suspect equipment during low demand periods before a failure results in potential load shedding.



### 4.2.6 Asset management process enhancements

SPI PowerNet recently commissioned Indec Consulting to review the adequacy of its asset management processes. While concluding that SPI PowerNet's current asset management policies and practices are "generally consistent with good industry practice ... evidenced by robust business management, planning and operating strategies ..."[4], Indec Consulting has identified deficiencies in the processes for which the Company is instigating the following programs:

- more robust feedback processes between field maintenance personnel and asset management personnel;
- improved post project reviews of major projects to ascertain whether the benefits posited in the business case for the project were delivered;
- more rigour in developing and following appropriate procedures to manage and mitigate risk in asset management;
- implementation of a strategic network planning function to ensure that asset management decisions are optimal given the very long-term impact of those decisions due to the nature of the infrastructure. This will ensure that the plans of VENCorp and connected parties impact positively on the optimisation of asset management decisions by SPI PowerNet; and
- enhancement of SPI PowerNet's management of facilities (i.e. buildings and other establishment infrastructure).

[3] *Although SPI PowerNet does plan network outages, NEMMCO has to approve the outages as they are taken and system security considerations often lead to outages having to be rescheduled*

[4] *Indec Consulting* Integrated Asset Management Review, *August 2001*

## 4.3 Process of forecasting expenditure

To provide the revenue-capped services during the period 2003 to 2007/08 at the proposed target performance levels and in accordance with all relevant contractual and regulatory requirements, SPI PowerNet has undertaken a detailed assessment of the Company's expenditure needs. The Company has used a "bottom-up" analysis to develop forecasts for all major expenditure items including capital replacement, refurbishment and opex, and believes that its expenditure proposal is efficient in terms of both the cost and the quality of the transmission service that it delivers.

### 4.3.1 Systems for forecasting expenditure

In common with most well-established infrastructure businesses, SPI PowerNet has in place systems for forecasting short, medium and long-term expenditure requirements in the categories of capex and opex. Essentially, these systems combine three processes to forecast expenditure on revenue-capped services:

- identification and costing of system requirements;
- identification and costing of non-system requirements; and
- allocation and attribution of expenditure between revenue-capped and non-revenue-capped services.



### 4.3.2 Identifying and costing system requirements

To identify and cost future system maintenance, replacement and refurbishment requirements, SPI PowerNet uses an asset management process that combines:

- a technical assessment of plant life;
- condition information; and
- system-generated forecasts based on maintenance records and manufacturers' or other maintenance specifications.

The process is illustrated in Figure 4.2. The outputs of the asset management process are:

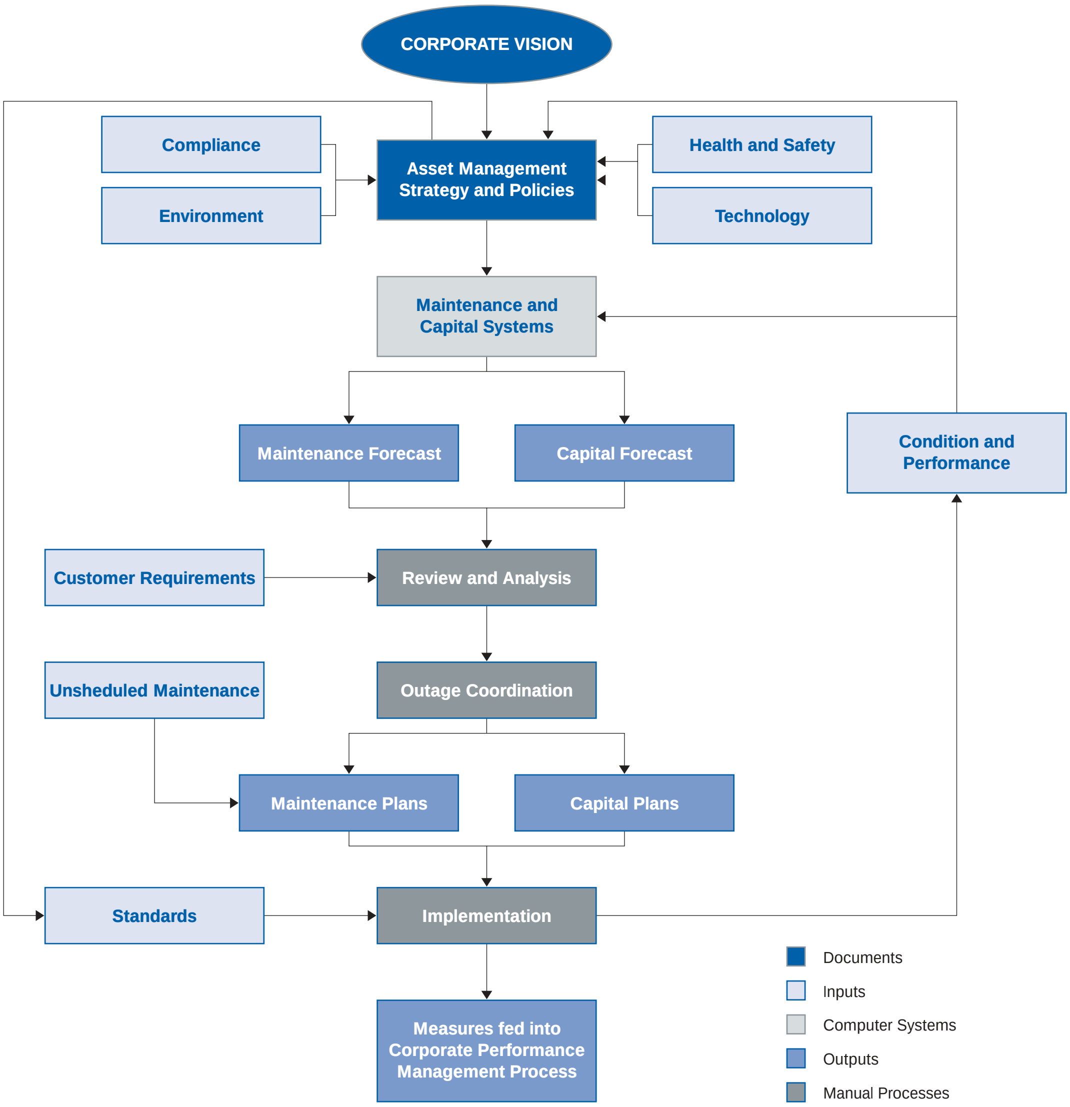
- **maintenance plans** – a detailed annual maintenance plan is issued four months in advance of the year in which it is to be executed. Five-year maintenance forecasts are produced annually and the forecast period can be extended to seven years for purposes such as a revenue cap determination; and
- **capital plans** – five-year replacement and refurbishment plans are produced annually, beneath which sits a 30-year replacement capex model. As above, these can be extended to seven years for purposes of revenue cap determinations. Opex related to replaced or refurbished assets is also reviewed to ensure that appropriate adjustments (normally reductions) are made to the forecast.

In addition, there are separate operating expenditures directly related to the network which are budgeted outside these systems. The activities involved (network switching primarily) are by nature relatively static in terms of their scale and scope, and hence the associated future operating expenditure is predictable based on current patterns of expenditure.

The forecasting process allows volatility in the level of asset replacement work to be smoothed to enable the efficient implementation of the replacement works and to minimise volatility in revenue requirements. This reduces the risk of a significant decline in network performance that can occur when large numbers of assets reach the end of their effective lives at the same time. However, two important points must be recognised:

- replacement capex will be cyclical in nature, with that cycle determined by the historical development of the network; and
- accuracy of the exact timing of expenditure will decrease with the length of the forecast.

**Figure 4.2:** SPI PowerNet *asset management plan* development process




## 4.3.3 Identifying and costing non-system requirements

Non-system expenditure requirements relate to the corporate functions of the business, such as finance and human resources functions, and are developed through a standard budgeting process.

## 4.3.4 Cost allocation and attribution

SPI PowerNet maintains a linked asset register/asset management system that tags assets according to whether they provide revenue-capped or non-revenue-capped services. The direct maintenance expenditure (labour hours and materials) on each asset is tracked and the asset tagging means that the split of this expenditure between revenue-capped and non-revenue-capped services can be accurately determined. Opeating expenditure for VNSC – a non-contestable service – is attributed to the provision of revenue-capped services. With respect to overheads, a hybrid activity-based marginal costing approach is used to allocate costs. This is a pragmatic approach appropriate to the 3 per cent of SPI PowerNet's business from non-revenue-capped services.

For forecasting opex on revenue-capped services over the 2003 to 2007/08 period, a full cost allocation exercise has not been undertaken in each year. Instead, a cost allocation factor has been derived from the 2000/01 cost allocation and used to split SPI PowerNet's total forecast opex between revenue-capped and non-revenue-capped components. Like the choice of the costing methodology, choosing a constant factor to apply over the forecast regulatory period is pragmatic, although it may slightly underestimate the opex for revenue-capped services (because the direct opex cost for revenue-capped services is rising in real terms while growth in opex for non-revenue capped services is negligible).



# 4.4 Operating and maintenance expenditure

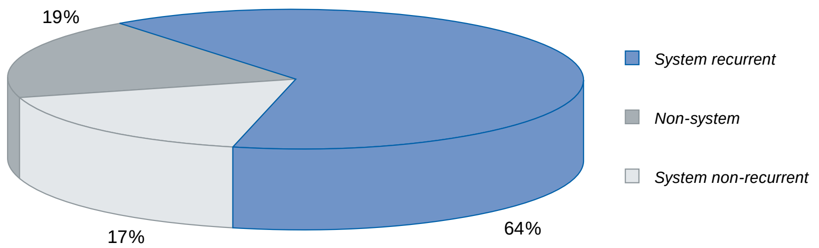
SPI PowerNet's current levels of opex deliver a cost-effective service while maintaining high levels of reliability.

This Section identifies the operational and maintenance expenditures for the period from 2003 to 2007/08 that are required to maintain this performance. SPI PowerNet categorises opex into three types outlined below:

- system recurrent expenditure – on activities of a regular and on-going nature such as routine plant maintenance;
- system non-recurrent expenditure – on one-off programs put in place to respond to specific problems such as corrosion; and
- non-system expenditure – mainly on corporate support functions.

System expenditure accounts for around 80 per cent of the Company's opex. This breakdown is provided in Figure 4.3.

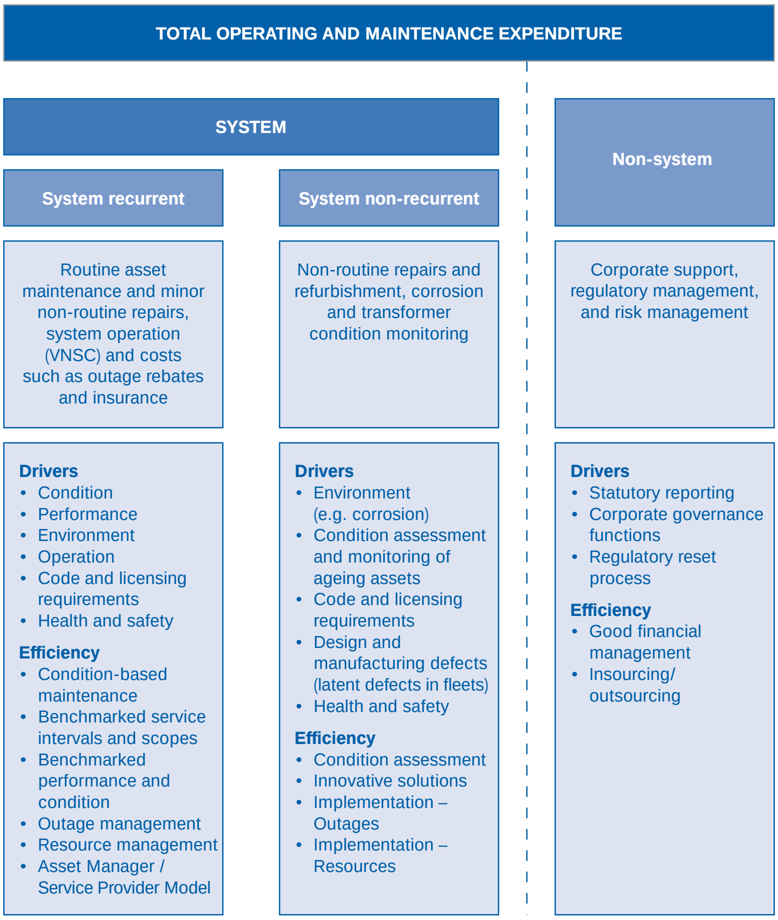
**Figure 4.3:** Operating expenditure by expenditure type 2003–2007/08




*Source: SPI PowerNet*

Each type of expenditure has individual cost drivers, and individual drivers of efficiency, illustrated in Figure 4.4.

**Figure 4.4:** Break-up of operating and maintenance expenditure




SPI PowerNet's total forecast opex for the review period is set out in Table 4.1.

It should be noted that the apparent increase in expenditure under the new revenue cap period relates in large part to reallocation of cost due to the changes in scope of the services referred to in Chapter 3. Also non-comparable (on a like-for-like basis) are the revised availability rebates and the allowance for non-insured risks. Therefore, to enable comparison, these expenditures have been removed and total expenditure on a like-for-like basis to the current revenue-capped services is shown at the bottom of Table 4.1.

**Table 4.1:** Operating and maintenance expenditure – 2001/02 to 2007/08 (average 2001/02 $m)

| | Financial years ending 31 March | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2001/02 $m | 2002/03 $m | Q1 2003[2] $m | 2003/04 $m | 2004/05 $m | 2005/06 $m | 2006/07 $m | 2007/08 $m |
| **System recurrent** | | | | | | | | |
| Maintenance | 18.7 | 19.0 | 5.4 | 20.7 | 21.6 | 21.4 | 21.7 | 21.9 |
| System operation[1] | 0.0 | 0.7 | 0.7 | 3.3 | 3.4 | 3.4 | 3.5 | 3.5 |
| Health, safety and environment | 0.5 | 0.8 | 0.3 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| Rebates | 1.2 | 2.4 | 1.5 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Taxes/leases | 2.8 | 4.0 | 0.9 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 |
| Insurance | 1.6 | 2.1 | 0.6 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 |
| Support | 3.0 | 4.1 | 1.8 | 4.6 | 4.6 | 4.5 | 4.6 | 4.6 |
| Sub-total | 27.8 | 33.1 | 11.2 | 42.3 | 43.2 | 43.1 | 43.4 | 43.8 |
| **System non-recurrent** | | | | | | | | |
| Corrosion/condition monitoring, etc | 6.0 | 6.9 | 3.8 | 8.3 | 8.4 | 8.1 | 8.2 | 8.2 |
| Support | 2.0 | 2.9 | 0.8 | 3.1 | 3.1 | 3.2 | 3.2 | 3.2 |
| Sub-total | 8.0 | 9.8 | 4.5 | 11.5 | 11.5 | 11.3 | 11.4 | 11.4 |
| **Non-system** | | | | | | | | |
| Finance | 4.1 | 4.6 | 1.1 | 3.6 | 3.6 | 3.6 | 3.6 | 3.7 |
| HR | 1.0 | 1.4 | 0.4 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 |
| IT | 2.0 | 2.5 | 0.6 | 2.6 | 2.6 | 2.7 | 2.7 | 2.7 |
| Other corporate | 4.6 | 4.0 | 0.9 | 3.8 | 3.8 | 3.8 | 3.9 | 3.9 |
| Non-insured risks | 0.0 | 0.2 | 0.2 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| Sub-total | 11.7 | 12.8 | 3.3 | 12.5 | 12.4 | 12.5 | 12.6 | 12.7 |
| **Total** | **47.5** | **55.7** | **19.1** | **66.3** | **67.1** | **66.8** | **67.4** | **67.9** |
| Adjustments to normalise for scope change | 1.2 | 3.3 | 2.4 | 10.2 | 10.2 | 10.3 | 10.3 | 10.4 |
| **Total on same service scope basis** | **46.3** | **52.4** | **16.6** | **56.1** | **56.9** | **56.5** | **57.1** | **57.6** |

*1 VNSC not included in revenue-capped services until 1 January 2003*

*2 This is data for a three-month period, 1 January 2003 to 31 March 2003*

*Source: SPI PowerNet forecasts*

## 4.4.1 System – recurrent expenditure

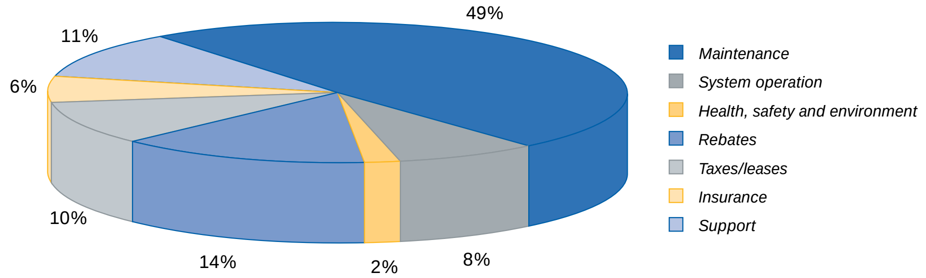
The recurrent expenditure category includes the costs of activities of a regular and on-going nature.

The major cost in this category is routine system maintenance. In addition the costs of the following activities are included:

- system operations (VNSC);
- health and safety and environmental management;
- taxes/leases;
- insurance;
- asset management support; and
- rebates.

The percentage break-down of each activity is illustrated in Figure 4.5.

**Figure 4.5:** Break-down of recurrent system costs 2003–2007/08




*Source: SPI PowerNet*

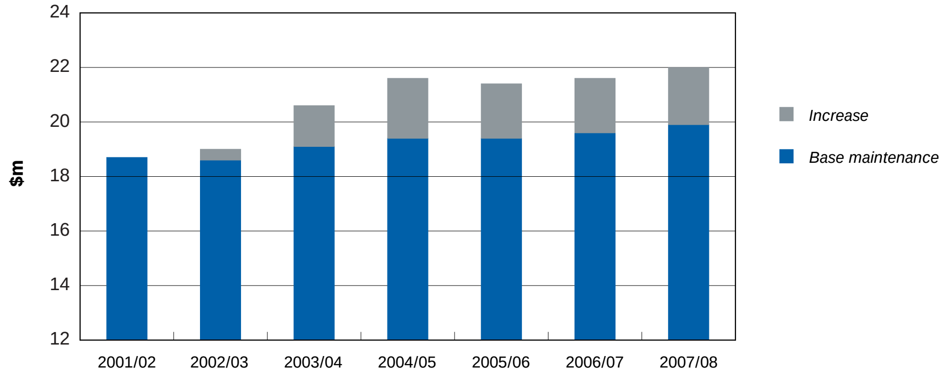
### Drivers of increases to system-recurrent expenditure

The following key drivers (which were discussed earlier in Section 4.2) will increase costs over the period 2003 to 2007/08:

- implementation of improved asset management processes such as the condition monitoring and assessment program, risk management and the formation of the new strategic network planning function which commenced in 2001;
- increased resources for environmental and health and safety management;
- SPI PowerNet's recruitment program to replenish its ageing workforce; and
- increased overtime due to tightening constraints on windows of opportunity for accessing plant.

Expenditure on base maintenance requirements is fairly static over the review period, and the cost increase due to the drivers listed above is illustrated in Figure 4.6.

**Figure 4.6:** Increase in maintenance expenditure 2001/02 to 2007/08 (average 2001/02 $m)




*Source: SPI PowerNet*

## 4.4.2 System – Non-recurrent expenditure

Included in this category are costs for "one-off" activities, though often applying across a "fleet" of similar assets. The costs of these activities will vary significantly from period-to-period. Within the period 2003 to 2007/08, the costs required have been smoothed across the five years.



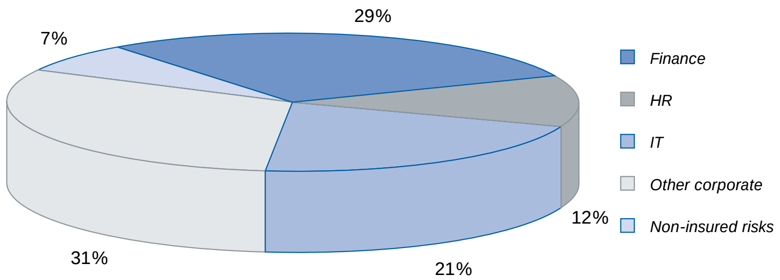
### Drivers of system-non-recurrent expenditure

The following activities will drive non-recurrent costs between 2003 and 2007/08:

- Corrosion abatement – the majority of SPI PowerNet's assets are situated outdoors, and therefore are exposed to the elements. Until recently, corrosion has not been a major maintenance expenditure. However, with the transmission assets now passing the half-way point of their technical lives, corrosion on the ageing tower network is becoming a significant maintenance expense. A comprehensive program of remedial works is currently underway and will extend into and beyond the 2003 to 2007/08 regulatory period. The program involves several elements:
  - tower painting, particularly towers exposed to corrosive environments such as those situated near the coastline; and
  - preventive measures (such as ground-level painting and sacrificial anodes) to protect tower footings with steel footings buried directly into the earth – these would otherwise eventually succumb to corrosion.
- Repair of equipment fleets – some equipment fleets require significant repairs. For example, repair work on early model outdoor gas-insulated and air-insulated $SF_6$ switchgear is increasing, mainly due to design and manufacturing deficiencies in these early models. Repair programs for other 220 kV and 500 kV $SF_6$ circuit breakers were initiated in 2000 and will continue throughout the period.
- Upkeep of terminal station buildings and grounds – many of these facilities are well past their mid-life and now require significant repair work to sustain them through to the end of their economic life.
- Condition assessments – additional assessments, including diagnostic testing have been instigated and will need to continue into the forecast period in order to manage the risks associated with the ageing asset base and enable confident deferment of asset replacement. For example, the condition assessment program for main power transformers, involving annual inspection and testing, is aimed at establishing a trend over time of internal condition, providing valuable information for the analysis of deterioration rates, identification of incipient defects and life assessment studies.

## 4.4.3 Non-system costs

**Figure 4.7:** Break-down of non-system costs 2003–2007/08




*Source: SPI PowerNet*

### Corporate support

Most non-system costs comprise the support functions required to operate any business, in addition to costs that are specific to the regulated business. These include:

- finance;
- human resources;
- information technology;
- a provision for uninsured risks (see Table 4.2 below); and
- other corporate functions such as secretariat, regulation and managing customer relationships.

Commercial relationships are managed by the Transmission Services department. This customer interface is necessary to manage SPI PowerNet's contractual obligations and new connection applications. With the recent increase in applications for gas-fired peaker generation and proposals for interconnectors, resources in the Transmission Services area have been tested. Dealing with uncertain issues such as the regulatory framework for hybrid interconnectors also demands resources which have not been required previously.

Despite these new demands, SPI PowerNet will contain support costs over the 2003 to 2007/08 period so that there are no real increases.

### Uninsured risks

There are a number of risks borne by SPI PowerNet in the conduct of its regulated business which are not compensated through WACC or otherwise, and which cannot be insured cost-effectively. The Company bears and must manage these risks, and must therefore be compensated for them.

SPI PowerNet recently commissioned an actuarial assessment of the cost of bearing such risks. They are not numerous, and the following Table 4.2 summarises each risk and its determined value, the amount of which is sought in this Application as being the most appropriate compensation. A copy of one part of the report by Trowbridge Consulting, which fully details the analysis and justification, is included as Appendix B to this Application. Another part of the report contains sensitive information, and has been provided separately to the ACCC on a confidential basis.

**Table 4.2:** Uninsured risks

| Risk | Value of risk $/per annum |
|---|---|
| **Property risks** | |
| Extortion and bomb threat (not terrorism)<br>– Cost of insurance policy against ransom and related costs | 5,000 |
| **Current insurance – deductibles** | |
| Bushfire<br>– Deductible against claims if SPI PowerNet starts the bushfire | 40,000 |
| Other property damage<br>– Building type repairs due to fire or storm type damage | 42,000 |
| Liability insurance (excluding bushfires)<br>– Claims by third parties where SPI PowerNet caused damage or loss e.g. metering errors, human error incidents – either a deductible or a claim below the deductible | 248,000 |
| Small claims<br>– The cost of replacing uninsured items, i.e. stolen lap-tops, mobile phones<br>– Cost of minor property damage, e.g. broken windows | 30,000 |
| **Credit risk** | |
| Insurers' credit risk<br>– Risk of insurer going bankrupt and having to reinsure, plus risk of existing claims not being met | 3,000 |
| Counter party credit risk<br>– Risk of non-payment due to insolvency of VESI customers | 60,000 |
| **Contractual disputes** | |
| Easements<br>– Disputes with landowners | 175,000 |
| Risk of legal costs exceeding expected costs<br>– Metering error claims<br>– Legal actions by market participants<br>– Contract dispute concerning revenue-capped services | <br>10,000<br>15,000<br>15,000 |
| **Public liability** | |
| Costs of handling public liability claims | 100,000 |
| **Other risks** | |
| Key person risk<br>– Cost in excess of standard replacement cost for having to hire a replacement for a key person<br>– Business disruption cost caused by a key person leaving | 75,000 |
| Employment practices insurance | 15,000 |
| **Total** | **833,000** |

*Source: Trowbridge Consulting 'Valuation of Non-insured Risks' December 2001*

## 4.5 Capital expenditure

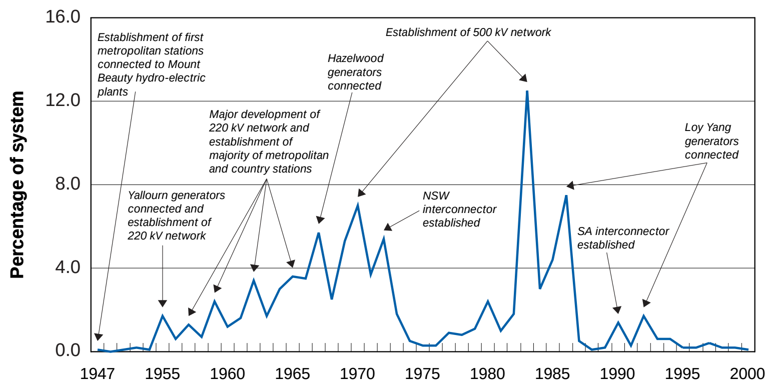
As discussed in Section 4.2, the single most important driver of capex over the 2003 to 2007/08 period is the ageing Victorian transmission network. With the asset fleet past mid-life on average and a number of network elements reaching the end of their expected technical lives, the business is focussed on managing the assets to maintain their current high levels of performance and also on achieving the lowest life cycle cost to transmission users.

Significant technological change in protection and control equipment is another major driver for replacement of station assets. Manufacturers no longer support older equipment and spare parts are often unavailable. Considerations such as these mean that piecemeal equipment replacement is no longer viable.

For these reasons, SPI PowerNet is at the beginning of a major asset replacement program. For example, the network has reached the stage where significant sections of terminal stations must be replaced. This refurbishment program commenced in 2001 and is expected to continue until 2017.

Figure 4.8 illustrates historical network development capex from the time the Victorian transmission system was established to 2000. Significant elements of the transmission system (including most metropolitan stations) were installed from the late-1940s to the mid-1960s and that the majority of station assets can be expected to reach the end of their technical lives over the next 15 years. Similarly, the last significant development phase that occurred in the 1980s with an augmentation to the 500 kV backbone system to service the generators in Latrobe Valley should produce a surge in replacement capex around 2030.

**Figure 4.8:** Installed date of existing assets as a percentage of total system




*Source: SPI PowerNet*

## 4.5.1 Capex plans

SPI PowerNet's capex program is produced in the form of fully supported detailed five and seven-year plans generated by the asset management plan development process outlined in Section 4.3.2. That overall process generates the detailed capex works plans described in Section 4.5.2 for each major asset category. The works plans are fully coordinated with the maintenance plans outlined in Section 4.4 to minimise disruption to the system and overall cost.

The purpose of this Section is to describe how these plans are generated in terms of data inputs and drivers. The focus is on the replacement and refurbishment of system assets as that accounts for over 80 per cent of the expenditure.

The total planned capex during the period 2003 to 2007/08 is summarised in the Table 4.3 below:

**Table 4.3:** Capital expenditure – Total by broad category, 2001/02 to 2007/08 (average 2001/02 $m)[1]

| | Financial years ending 31 March | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2002 $m | 2003 $m | 2003[3] $m | 2004 $m | 2005 $m | 2006 $m | 2007 $m | 2008 $m |
| System asset replacement | 8.0 | 13.1 | 3.3 | 31.4 | 36.5 | 27.9 | 47.1 | 55.7 |
| System additions[2] and refurbishments | 5.7 | 55.7 | 11.7 | 27.3 | 20.7 | 15.8 | 15.8 | 9.7 |
| Information technology | 1.0 | 4.6 | 1.2 | 5.6 | 1.6 | 4.7 | 3.4 | 2.2 |
| Business support facilities, equipment, vehicles and special tools and equipment | 2.9 | 1.3 | 0.3 | 1.7 | 1.9 | 1.5 | 1.6 | 1.2 |
| **Total** | **17.6** | **74.6** | **16.4** | **66.1** | **60.6** | **49.9** | **67.8** | **68.7** |

*1 Capex associated with VNSC is included, however it does not enter the RAB for return purposes until 1 January 2003*

*2 Additions are not augmentations, but small upgrades necessitated by changes such as regulatory changes*

*3 This is data for a three-month period, 1 January 2003 to 31 March 2003*

*Source: SPI PowerNet forecasts*

## System asset replacement

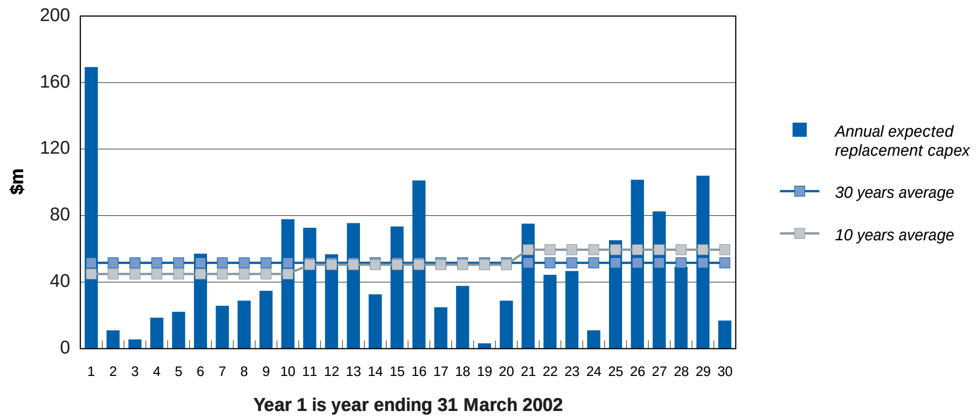
The replacement component of these plans has, as its starting point, SPI PowerNet's capital replacement model forecast. This identifies assets that are at the end of their expected technical lives, and potentially require replacement. The forecast capex numbers it produces assumes equipment is replaced immediately upon reaching the end of its regulatory life, and is replaced at "greenfields" cost.

Therefore, the results of the model need to be combined with equipment condition analysis, defect and incident reports, and performance information. This determines how the assets are likely to perform over the period of the plan, and form the basis of the Company's decisions regarding replacement or refurbishment during the period.

The replacement capex needs, so determined, are then verified against the model forecast to establish if the planned level of expenditure is reasonable. Significant variations are identified and investigated.

The 30-year replacement capex forecast from the model is shown in Figure 4.9.

**Figure 4.9:** Installed date of existing assets as a percentage of total system (communications excluded)




*Source: SPI PowerNet*

The average model forecast expenditure over the 30-year period is $51.6 million per annum and the average over the 2001/02 to 2010/11 period is $44.9 million per annum.

By comparison, planned system asset replacement excluding communications, averages $38.4 million per annum (in 2001 dollars) over the period 2003 to 2007/08 and includes the additional costs associated with the replacement of in-service equipment. This indicates that the planned replacements are not excessive given the expected technical lives of the plant and that the Company's asset management strategies and processes can be expected to deliver more cost-effective solutions.

## System additions and refurbishments

In addition to replacement works, capex on the refurbishment of plant (often in response to condition and performance data) and additions to plant due to changing compliance, environment, health and safety requirements must also be incorporated into the plans as part of SPI PowerNet's asset management plan development process (refer to Figure 4.2). Examples of expenditure in these categories include strategic spares such as spare transformers to meet service standard compliance and bunding modifications to transformer bays to comply with more stringent environmental guidelines on oil containment.

As would be expected, some plant needs to be replaced or refurbished before the end of its regulatory life, while other plant delivers a longer effective life.

## Non-system

Capex plans are also produced for non-system assets:

- information technology facilities and systems (the installation of hardware and software systems required to support the maintenance, operation, monitoring and asset management of the transmission assets); and
- business support facilities – systems, plant and equipment (corporate facilities including buildings, information technology systems, special tools and equipment, motor vehicles, mobile plant and other equipment required to support the efficient operation and maintenance of the revenue-capped business).



# 4.5.2 Capex plans by asset category

Planned system capex by asset type is shown in Table 4.4 below and a percentage breakdown of expenditure over the period 2003 to 2007/08 is provided in Figure 4.10.

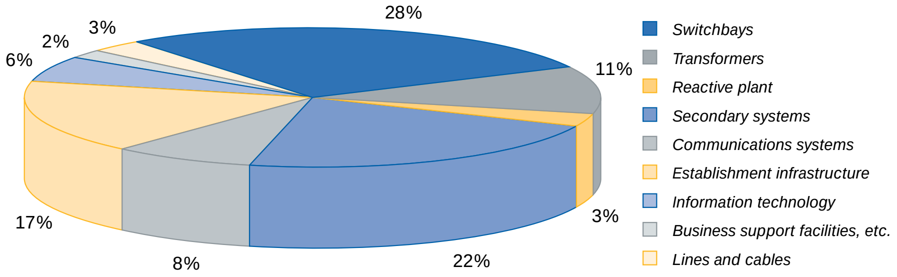
**Table 4.4:** Capital expenditure by asset category 2001/02 to 2007/08 (average 2001/02 $m)

| | Financial years ending 31 March | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2002 $m | 2003 $m | 2003[1] $m | 2004 $m | 2005 $m | 2006 $m | 2007 $m | 2008 $m |
| Lines and cables | 4.3 | 8.6 | 0.5 | 2.7 | 1.3 | 4.0 | 1.0 | 1.4 |
| Switchbays | 2.3 | 4.3 | 0.9 | 13.6 | 7.1 | 8.1 | 28.5 | 32.5 |
| Transformers | 0.3 | 11.9 | 2.3 | 3.0 | 13.3 | 5.9 | 6.3 | 6.1 |
| Reactive plant | 0.2 | 0.1 | 0.0 | 5.0 | 1.6 | 0.5 | 1.6 | 0.5 |
| Secondary systems | 3.3 | 18.8 | 6.9 | 14.4 | 12.7 | 14.2 | 12.5 | 11.1 |
| Communications systems | 1.6 | 18.4 | 2.7 | 7.5 | 6.9 | 2.2 | 4.4 | 2.8 |
| Establishment infrastructure | 1.6 | 6.5 | 1.6 | 12.5 | 14.2 | 9.0 | 8.7 | 10.9 |
| Information technology | 1.0 | 4.6 | 1.2 | 5.6 | 1.6 | 4.7 | 3.4 | 2.2 |
| Business support facilities, etc | 2.9 | 1.3 | 0.3 | 1.7 | 1.9 | 1.5 | 1.6 | 1.2 |
| **Total** | **17.6** | **74.6** | **16.4** | **66.1** | **60.6** | **49.9** | **67.8** | **68.7** |

*1 This is data for a three-month period, 1 January 2003 to 31 March 2003*

*Source: SPI PowerNet forecasts*

**Figure 4.10:** Capital expenditure break-down, 2003/04 to 2007/08




*Source: SPI PowerNet forecasts*

A high level summary of the capital work requirements for each of the categories shown above over the period 2003 to 2007/08 is detailed below. (All quantities are shown in 2001/02 dollars.)

## Switchbays

The average age of the switchbays is 29–30 years and some of the oldest switchgear in the network is past its expected life. During the period 2003 to 2007/08, works totalling in excess of $90 million will provide replacement assets at 18 stations with close to half of this work associated with the replacement of 220 kV air blast circuit breakers.

SPI PowerNet has the largest remaining fleet of high voltage air blast circuit breakers in Australia. This technology is becoming obsolete, as the manufacturers no longer support it and many spares are becoming unavailable. The circuit breakers have high maintenance requirements and their complexity results in lower reliability than that offered by modern equipment. A replacement program is in place to remove these from the system by 2011.

Many old bulk oil and minimum oil circuit breakers also require replacement due to the deterioration of bushings, mechanisms and other components, a lack of spare components and reliability and performance issues.

## Secondary systems

Significant expenditure is forecast for the replacement of secondary assets due to the considerable technology changes that have occurred, the need for increasing maintenance intervention and the increasing cost of supporting many of the old assets. Expenditure in these areas is essential in order to ensure reliable protection of the primary assets and the network and will provide increased monitoring of the assets. The forecast work over the 2003 to 2007/08 period includes:

- replacement and upgrading of primary plant protection systems at a cost of around $26.0 million;
- replacement and upgrading of primary plant control and monitoring at a cost of $18.0 million; and
- replacement of metering, batteries and protection and control equipment at a cost in excess of $17.0 million.

In addition, the Victorian Network Switching Centre (VNSC) facilities will be upgraded at a cost of approximately $9.0 million, as much of its equipment will become unsupported by manufacturers. This equipment, which is critical to the control of the network, includes the system control and data acquisition system and the energy management system.

## Establishment infrastructure

Establishment infrastructure includes the buildings, civil works and other infrastructure at SPI PowerNet sites. The work required in this category is mainly associated with major station refurbishments at Ballarat, Bendigo, Brunswick, Dederang, Horsham, Keilor, Kerang, Malvern, Mount Beauty, Richmond, Shepparton, Terang and Thomastown Terminal Stations and will total approximately $27 million over the period. In addition, the plan provides for a security upgrade at terminal stations including improved fire detection and suppression systems. This will add approximately $12 million over the period.

## Transformers

Transformer replacement requirements are determined by condition assessment and as part of station refurbishments. Other works include transformer refurbishments and the installation of monitoring equipment. The total forecast expenditure over 2003 to 2007/08 is $37 million.

## Lines and cables

The life expectancy assigned to transmission lines is 70 years and the average life of SPI PowerNet's lines is 29 years. No significant lines replacement expenditure is forecast over the period. Replacement of some defective line insulators, dampers and corroded earth wires is planned. These works will cost approximately $11 million over 2003 to 2007/08.

## Communications systems

The burden on the communications system is increasing with new requirements to carry equipment condition and status information, and to support modern protection and control systems. Moreover, with the considerable technological advances in this area, much of the older equipment is no longer supported and spares are either difficult to obtain or unavailable, and optical fibre technology is being increasingly used to enable the transmission of large volumes of data and to provide a more cost-effective solution than like-for-like replacement. The forecast work in 2003 to 2007/08 includes the replacement of obsolete and unsupported equipment such as old valve-based equipment and the installation of optical fibre at a cost over the period of approximately $26 million.

## Reactive plant

Refurbishment works are required for the three hydrogen-cooled synchronous condensers and some minor static var compensator refurbishment to ensure reliable operation. The total expenditure over 2003 to 2007/08 is $9 million.

## Information technology facilities and systems (non-system)

Major expenditures of over $19 million on information technology are forecast for the period 2003 to 2007/08, including:

- asset management and information system upgrades;
- electronic data conversion;
- implementation of a geographical information system; and
- server and PC replacements.

## Business support facilities, systems, plant and equipment (non-system)

The major expenditure in this category relates to the provision of special tools and equipment, vehicles and mobile plant and equipment for the field maintenance personnel. The total expenditure over 2003 to 2007/08 is $8 million.

## 4.6 Demonstrated cost-effectiveness

This Section provides evidence to illustrate that SPI PowerNet delivers a low-priced, high-quality transmission service through:

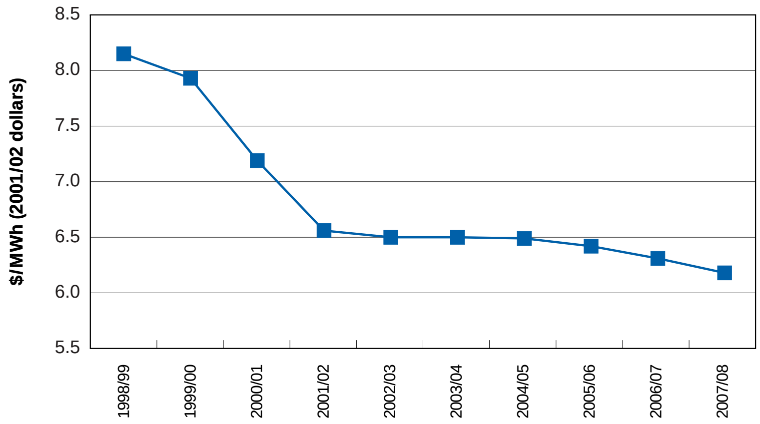
- strong cost control; and
- high levels of network performance.

The evidence is assembled from internal sources and external industry surveys. It confirms that SPI PowerNet's operational effectiveness places the Company at the forefront of the transmission sector in Australia.

### 4.6.1 Transmission price benchmarks

The price of transmission in Victoria, as a component of the customer's consolidated electricity bill, is currently the lowest in Australia, and on the basis of this Application will continue to be one of the lowest, if not *the* lowest. The price of transmission in Victoria is markedly lower than Queensland and South Australia in particular. The Victorian electricity customer is unquestionably reaping the rewards of the State's long-standing commitment to a well-designed and well-maintained transmission network.

**Figure 4.11:** Real price of transmission per MWh energy delivered (2001/02 $)



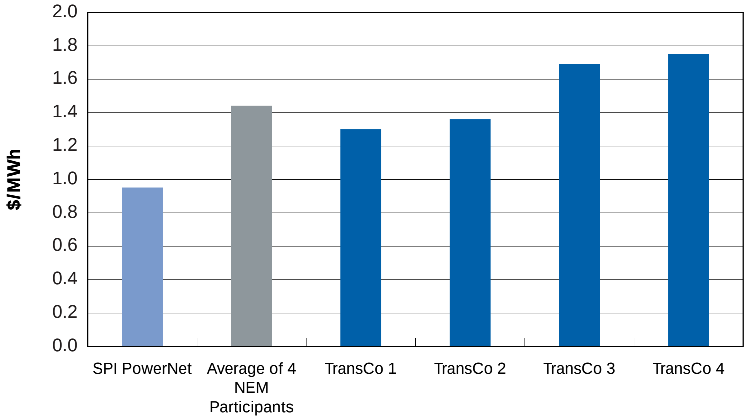

*Source: NEMMCO* Statement of Opportunities *and SPI PowerNet*

## 4.6.2 Opex cost benchmarks

Low prices are to a large degree possible due to SPI PowerNet's low cost relative to other electricity companies.

Benchmarking of controllable opex costs relative to energy delivered by the transmission system confirms the efficiency of SPI PowerNet's opex. Electricity Supply Association of Australia (ESAA) data show that SPI PowerNet's average controllable opex cost rate of $0.91/MWh is 30 per cent less than the measure of the nearest peer entity, and more than 40 per cent less than the average of the peer group (see Figure 4.12).

**Figure 4.12:** Average controllable operational expenditure per MWh 1996/97 to 1999/00[1]



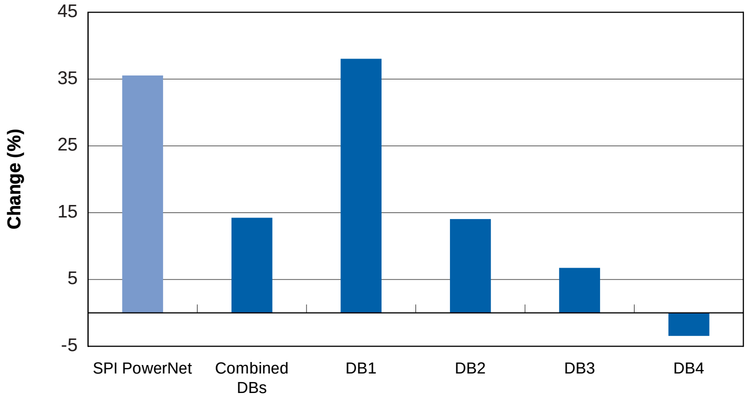

*1 The terms of the provision of data prevent disclosure of other participants' names*

*Source: ESAA*

This achievement, while retaining the highest level of network performance, has been driven by significant cost cutting over the period 1995–2000 (over 35 per cent), which has been among the best of all the Victorian privatised network businesses. The relative improvements in operational cost-efficiency made by Victorian electricity network businesses are shown in Figure 4.13.

However, it also illustrates that cost reduction and control have been pushed to the limit within SPI PowerNet's business. Further efficiencies are unlikely to be available; indeed, the increasing age and utilisation of the network requires additional maintenance expenditure.

**Figure 4.13:** Percentage reduction in operating and maintenance costs 1995–2000 (July 1999 $)[1]




*1 The terms of the provision of data prevent disclosure of other participants' names*

*Source: ORG 2001* Electricity Distribution Price Review *and SPI PowerNet*

### 4.6.3 Opex cost benchmarks – stand-alone cost model

As a further check of the efficiency of SPI PowerNet's opex performance, the Company commissioned an independent assessment of its opex costs taking account of the type of network and business environment in which it operates (see Appendix A, Executive Summary, Indec Consulting *Stand-alone Cost Model Final Report* August 2001).

The analysis is based on benchmarks and includes a historical cost (in part) and functional activity review over a 12-month period. The performed functions identified are required to meet SPI PowerNet's external key performance indicators, and take into account non-controllable factors driven by business conditions.

The stand-alone cost model performs the efficiency analysis by:

- benchmarking those costs which are most likely to be under managerial control relative to overheads endorsed by recent regulatory decisions in various jurisdictions;
- applying general industry best practice benchmarks where applicable;
- reviewing SPI PowerNet's asset management processes; and
- comparing the stand-alone cost model with other networks on a unit cost and cost ratio relationship.

The comprehensive nature of the review makes allowance for the cost implication of VENCorp and connected parties planning augmentation.

A copy of the whole report by Indec Consulting has been provided to the ACCC on a confidential basis. In summary the findings are:

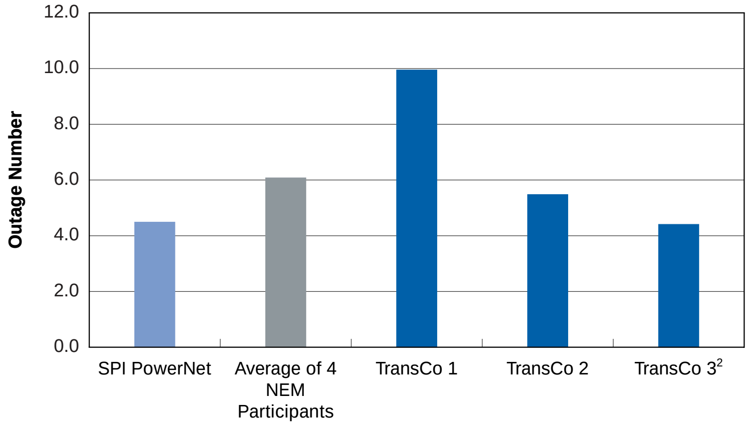
- SPI PowerNet provides Victoria with Australia's highest level of reliability while maintaining a low level of opex costs;
- on the basis of km x kV x MW as the measure of the expanse and scale of physical assets, SPI PowerNet is well below the industry average level of opex;
- SPI PowerNet has the most efficient level of opex in the transmission industry relative to throughput, capacity, and level of reliability; and
- on a total cost basis (i.e. opex plus capex), SPI PowerNet is well below the industry average on a total cost basis.

### 4.6.4 Network performance benchmarks

While SPI PowerNet's business operations are extremely cost-efficient, the Company recognises that overall effectiveness of business operations must also be gauged by observing performance against service delivery measures.

Benchmarking studies confirm that SPI PowerNet's network service performance has not been diminished by its low cost of operations. The performance of the Company's transmission network, measured by reference to circuit availability, is the highest in Australia, as shown in the following figures.

**Figure 4.14:** Average number of outages per 100 circuit km 1994/95 to 1998/99[1]

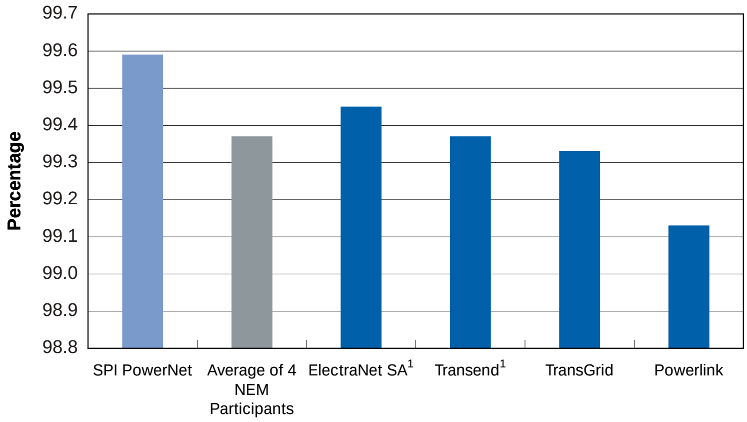



*1 The terms of the provision of data prevent disclosure of other participants' names*

*2 TransCo 3 figures are for 1996/97 to 1998/99*

*Source: Data from International Comparison of Transmission Performance Studies*

**Figure 4.15:** Average circuit availability 1994/95 to 1999/00




*1 ElectraNet SA and Transend figures are for 1996/97 to 1999/00*

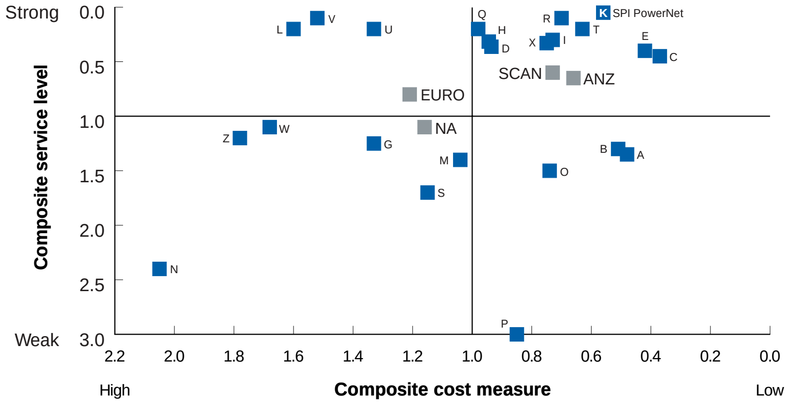
*Source: ESAA*

## 4.6.5 International cost / performance benchmarks

SPI PowerNet has for a number of years participated in the *International Operations & Maintenance Study* (ITOMS) conducted by a consortium of international transmission companies as a means of comparing performance and practices within the transmission industry worldwide. The most recent ITOMS study is dated 2001, which includes SPI PowerNet data for its 2000/01 financial year.

The following masked results and quotes from the study demonstrate that the Company has cemented its place as a leading transmission business in an international context.

**Figure 4.16:** Transmission line maintenance[1] composite benchmark: Best performers have improved their processes, and practices to achieve leading performance. Focus has been placed on collecting adequate condition information and minimizing intrusive and low value activities. Companies K[2], E, and C have exhibited sustained best performer results in this area.



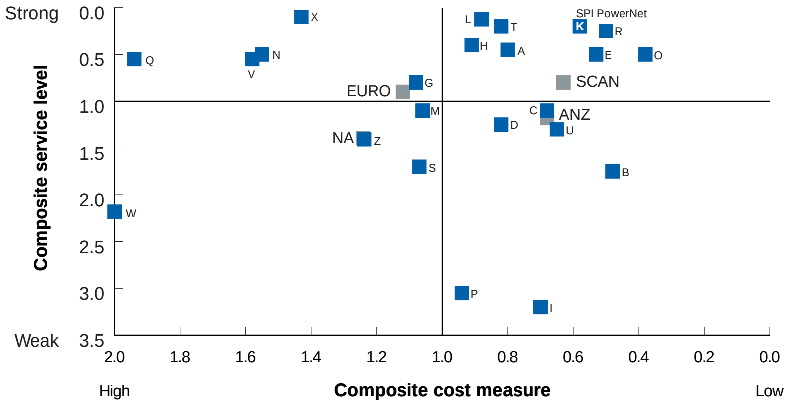

*1 Includes overhead line patrol and inspection 100–199 kV (8.2%), overhead line maintenance 100–199 kV (23.7%) and 200+ kV (21.2%), right-of-way maintenance (38%) and pro-rated support services costs*

*2 SPI PowerNet is company K*

*Source: International Transmission Operations & Maintenance Study 2001 (rules require results to be masked)*



**Figure 4.17:** Composite performance benchmark – Substation operations and maintenance[1]: Companies R, K[2], E and O have exhibited sustained leading performance in ITOMS




*1 Includes breaker maintenance (6.8%), transformer maintenance (9.3%), relay, SCADA and communications system maintenance (23%), compensation equipment maintenance (12%), disconnector and earth switch maintenance (6.5%), instrument, transformer and other circuit end equipment maintenance (5.6%), substation site and auxiliary plant equipment maintenance (17%), substation field operations (12.6%) and pro-rated support service costs.*

*2 SPI PowerNet is company K*

*Source: International Transmission Operations & Maintenance Study 2001 (rules require results to be masked)*

# 5. PERFORMANCE STANDARDS

SPI PowerNet's performance standards proposal is presented in this Chapter. As the ACCC is currently conducting a review of TNSP service standards as part of the process of finalising its Draft SoRP, the proposal in many respects represents the status quo. SPI PowerNet is participating in the review and if finalisation of the service standard section of the Draft SoRP imposes any additional risks or obligations on the Company, any resultant additional cost or revenue requirement would be dealt with either before the conclusion of the current revenue setting process through a supplementary submission or as proposed in Section 10.2 of this Application, via arrangements for the pass-through of the effect of identified events.

The following Sections outline:

- the performance accountability framework established through regulation, under which SPI PowerNet operates in the Victorian jurisdiction (Section 5.1);
- direct performance accountability via SPI PowerNet's service agreements (Section 5.2); and
- translation of SPI PowerNet's performance reporting obligations into the ACCC regulatory regime (Section 5.3).

## 5.1 Performance reporting in the Victorian jurisdiction



Performance measures have been a feature of Victorian regulatory arrangements since 1994. The separation of functions within the Victorian transmission sector has a direct bearing on the reporting arrangements, as described in Section 2.1. Specifically, SPI PowerNet's functions exclude the responsibility for planning of the network to meet customer demand requirements and service reliability criteria, which is allocated between VENCorp and connected customers.

Accordingly the measures against which SPI PowerNet reports align with the function of making available the network elements and systems under its management. In the Victorian jurisdiction, measures relating to supply reliability, which feature network planning functions, are not included in SPI PowerNet's reporting requirements.

Under SPI PowerNet's *Transmission Licence*, and as prescribed by the *Victorian System Code* (System Code), the Company is required to report annually to its customers – VENCorp and connected customers – on specified performance measures. A benchmark performance level is identified for each measure. The measures are incorporated in Attachment 11 to the System Code, and are summarised in Table 5.1. Each measure monitors an aspect of equipment availability, consistent with SPI PowerNet's primary function.

**Table 5.1:** Summary of Victorian performance measures

| No. | Benchmark name |
|---|---|
| 1 | Sustained forced outage rate for transmission lines |
| 2 | Mean duration of forced outages for transmission lines |
| 3 | Successful auto-reclose of transient faults on transmission lines |
| 4 | Sustained forced outage rate for transformers |
| 5 | Mean duration of forced outages for transformers |
| 6 | Availability of equipment forming part of the transmission network |
| 7 | Percentage of incorrect protection system responses |

*Source: Victorian System Code*

## 5.2 Direct performance obligations via service agreements

### 5.2.1 Benchmark performance levels

The Network Agreement with VENCorp does not specifically incorporate the network performance reporting arrangements, relying instead on the System Code obligations. However, the future of the System Code is unclear as a result of the transfer of transmission regulation to the NEC regime. Therefore, the benchmark performance levels and reporting obligations will be replicated in the Network Agreement between SPI PowerNet and VENCorp. This performance information is particularly important to VENCorp in its planning role.

### 5.2.2 Availability incentive arrangements

In addition to the performance reporting obligations described in the preceding section, SPI PowerNet has been bound since 1994 to network availability incentive schemes through its service contracts. These schemes present the Company with exposure to substantial financial penalty if its performance does not achieve the target levels. The schemes are described in this Section.

Two incentive schemes apply, consisting of the following sets of arrangements:

- under its Network Agreement with VENCorp, SPI PowerNet pays rebates in the event of non-availability of elements on the main transmission network; and
- under its Connection Agreements with a number of the connected generation companies, SPI PowerNet pays rebates when a generator's connection to the network is constrained.

The potential financial exposure of the schemes provides a powerful incentive to maximise availability, particularly when the network is most in demand by network users.

#### Network Availability Incentive Scheme

The Network Agreement with VENCorp provides for rebates to be paid to VENCorp when network elements are not available for service. In preparation for SPI PowerNet's revenue determination, the incentive scheme has been reviewed jointly with VENCorp and revised to better meet the objectives for the scheme, which are to:

- encourage SPI PowerNet to seek plant outages that correspond with times when the expected cost to wholesale electricity market participants of an outage is minimal;
- encourage asset management practices which assist in ensuring that the actual cost borne by market participants due to unavailability of transmission assets is minimised; and
- encourage asset management practices which assist in ensuring that over the long run, targets for performance are achieved.

The Network Availability Incentive Scheme puts an explicit value on individual asset availability. The rate to be applied for an individual transmission system element is intended to reflect the criticality of its outage, and the time period in which the outage occurs. The original scheme did not differentiate the rate according to when the outage occurred.

In order to define the rates for the revised scheme, VENCorp has undertaken detailed network analysis to determine the "cost" of an outage of each network element in three time periods. As an outage is only taken when there is remaining redundancy to perform the transmission service (i.e. when no interruption to supply will result), these rates are evaluated by considering the market costs (of losses, constraints and unsupplied energy) that would result in the event that a second unplanned outage occurred during the time period the first piece of plant remained out of service. Therefore, the cost exposure is determined by the probability and cost of the second outage occurring. As such it represents the long-term expected cost for each outage, and applies to planned outages and to plant failures.

The $6.0 million annual cost of outages is the estimated cost of rebates that SPI PowerNet will pay to VENCorp in a year under the revised scheme. This is based on VENCorp's analysis of historical planned and unplanned outages combined with SPI PowerNet's forecast requirements for future planned outages. If there is no change from past practice, the entire $6.0 million will be returned as rebates to VENCorp and on to end customers and, therefore, is included in SPI PowerNet's forecast operating cost.

SPI PowerNet's financial exposure is in relation to the variance from predicted availability that may occur. To ensure that the scheme satisfies "incentive" objectives and can be reasonably costed, the terms agreed between VENCorp and SPI PowerNet incorporate liability limitations and rebate payment capping. SPI PowerNet's total liability under the revised scheme is capped at $12.0 million per annum.



### Generator constrained network connection rebates

The constrained network connection rebates scheme is a feature of the Connection Agreements with the majority of Victorian generators. Rebates are paid to the generation companies on a "per hour" basis when connection to the network is constrained. Like the availability incentive scheme with VENCorp, rebate payments are capped.

As generation connection asset outages taken in conjunction with generator shutdown do not constitute constrained connection, it is possible (and normal practice) for planned work to be co-ordinated with generation companies. Therefore, the cost of the scheme is mostly related to unplanned outage occurrences.

## 5.3 Performance reporting for revenue regulation purposes

The preceding sections of this Chapter describe SPI PowerNet's accountability to its customers for the services it provides. They also identify that the reporting measures are consistent with the allocation of transmission functions in Victoria and remain the most appropriate form of measurement that can be applied to SPI PowerNet.

This Section proposes a framework for measuring and reporting performance for the purpose of revenue regulation by the ACCC.

### 5.3.1 Monitoring in conjunction with jurisdictional obligations

SPI PowerNet acknowledges that monitoring of SPI PowerNet's performance against standards is integral to the ACCC's revenue regulation process, and believes that the relevant measures for this purpose must be consistent with those that form the basis of SPI PowerNet's services obligation to its customers. This approach should avoid the overlay of conflicting accountabilities and unclear signals.

Accordingly SPI PowerNet proposes to report to the ACCC in the same way as it reports to its customers.

Under this reporting arrangement SPI PowerNet will provide information to the ACCC under the following process:

- report of actual performance against the benchmark performance levels; and
- clarification information in respect of any issues raised by customers and regulators.

SPI PowerNet believes its current performance measures and incentive schemes, as proposed by the Company and its customers, provide a good example of performance measures matched to responsibilities and incentives that produce many of the desirable outcomes that the ACCC is seeking. These include:

- being linked closely to actions which are controllable by the TNSP;
- rewarding improved performance while penalising poor performance;
- reflecting end-user outcomes;
- broadly reflecting market outcomes; and
- flexibility.

It must be noted that, consistent with the objective of regulatory service standards, the performance standards proposed by SPI PowerNet in this Chapter are contingent on the ACCC approving the capital and operating and maintenance expenditure outlined in Chapter 4 of this Application. As stated in the introduction to this Application, SPI PowerNet's proposals must be assessed as one package.



### 5.3.2 Outcomes of the ACCC review of TNSP service standards

As an outcome of the present ACCC *Review of TNSP Service Standards*, SPI PowerNet anticipates that the ACCC may, in addition to the above plant availability reporting, also want to monitor additional transmission service indicators and overall transmission network performance for Victoria (i.e. incorporating the effects of VENCorp's planning decisions).

SPI PowerNet submitted a detailed *Performance Standards Discussion Paper* to the ACCC in January 2002 as part of the review process outlining its views on TNSP service standards and the effects of the unique split of responsibilities in Victoria. The Company does not intend revisiting these views in detail for the purpose of this Application.

Nonetheless, SPI PowerNet restates its belief that any new service standards arising from the review should meet the following principles:

- standards should be set only for performance which the Company can control (such as availability driven by its maintenance strategy, the quality of its maintenance work, planning/scheduling of outages, spares holdings, etc.), or which it is best placed to manage;
- standards are contingent on the capital and operational expenditure approved by the regulator being sufficient to meet them;
- standards must not compromise or conflict with Jurisdictional planning criteria or national NEC and NEMMCO requirements; and
- a "one size fits all approach" should not be imposed on a TNSP where it is impractical due to differences in responsibility, operating environment or planning philosophy in the Jurisdiction.

# 6. EFFICIENCY INCENTIVES

SPI PowerNet operates its electricity transmission business so as to seek out and achieve cost-efficiencies while maintaining performance levels. A key driver of this performance has been the understanding that the revenue capping arrangements would:

- provide for some form of explicit incentive payment in relation to the efficiency gains made over the period 1998 to 2002; and
- define a specific mechanism for efficiency carry-over to apply at the 2008 reset that will motivate cost-efficiency over the 2003 to 2007/08 period.

Ideally, the efficiency incentive mechanism applying for 1998 to 2002 would have been established at the beginning of the regulatory period. Nevertheless, confirmation of the arrangements applying to this revenue determination will be important not only for confirming the principles that were discussed in relation to SPI PowerNet in 1997, as part of privatisation, but also for confirming the ACCC's commitment to providing a tangible incentive for efficiency moving forward.

If anything the need for credible regulatory commitment on this issue is now greater than over the initial regulatory period since the scope for further efficiencies is reducing as the significant early gains from privatisation have already been achieved.

## 6.1 Key principles

In proposing specific mechanisms for efficiency carry-over, SPI PowerNet believes that a key principle should be the equal treatment of cost-reducing efficiency gains, irrespective of whether they arise from capital, operating or maintenance expenditure. Any arrangement that attempts to distinguish between different forms of cost is likely to encourage skewed and inefficient expenditure decisions.

SPI PowerNet is no different from any other business in that there is often a degree of latitude available in the choice between operating and capital solutions to an asset management requirement. Distinguishing artificially between one form of expenditure and another introduces bias to what otherwise should be an over-riding principle of effectiveness in making resource allocation decisions.

## 6.2 Link between incentives for cost-efficiency and quality of service

In addition to the key principles discussed above, SPI PowerNet is aware that in the broader regulatory context, the incentives for cost-efficiency should not conflict with the achievement of agreed quality of service outcomes. In particular, there should not exist a net financial incentive to reduce expenditure at the expense of performance.

Elsewhere in this Application, SPI PowerNet has described the Network Availability Incentive Scheme that the Company has agreed with VENCorp and has discussed the regime of performance measures and targets under which the Company operates (noting that ACCC is currently developing an NEM-wide approach to service standards). In combination with the specific incentives for cost-efficiency proposed in the following Section, SPI PowerNet would face a balanced set of incentives – to maintain and (in relation to network availability during peak periods) improve the quality of service, while pursuing cost-efficiency. If approved by the ACCC, this balance would mean that the regulatory system would not encourage cost cutting at the expense of quality of service.

## 6.3 Mechanism for efficiency carry-over into the 2003 revenue cap

In respect of the carry-over of efficiencies achieved over the period to 2002, SPI PowerNet proposes a mechanism that works as follows.

- The value of the efficiency is determined as the difference between the cumulative expenditures over the period 1998 to 2002 (in 2002 dollars) allowed for in the Tariff Order benchmarks and the cumulative expenditures actually made or forecast to the end of 2002 (in 2003 $). Multiplying by the regulated WACC annualises the savings on the capital expenditure component. Dividing through by 5 annualises the savings on the operating and maintenance expenditure.
- This value is then "glide-pathed" for five years from 2003 so that in each successive year, commencing in 2003, SPI PowerNet retains the following proportion in real terms – 1, 0.8, 0.6, 0.4, 0.2. To account for the fact that the regulatory period is five-and-one-quarter years rather than five, the glide path is pro-rated between the six sub-periods to achieve an equivalent financial outcome.
- The glide path is a combined figure for capital and operating and maintenance efficiency.

This proposal is considered appropriate in the circumstances because it is comparatively simple. It could be argued that this mechanism would create an incentive for delaying efficiencies that may arise late in the regulatory period were it to be used to encourage efficiency in the 2003 to 2007/08 period. However, in respect of rewarding past performance over the Tariff Order period, there is now little that SPI PowerNet could do to affect its spending patterns. Nonetheless, the issue is one that SPI PowerNet anticipates the ACCC will consider in finalising its Draft SoRP.

## 6.4 Proposed efficiency carry-over based on 1998 to 2002 performance

Applying the proposed efficiency carry-over mechanism produces a relatively small glide path that is added to revenue over the 2003 to 2007/08 period.

The build up of the carry-over is presented in Table 6.1.

**Table 6.1:** Calculation of the efficiency carry-over

Panel A

| Cumulative expenditure over the period 1998 to 2002 on: | Actual 2002 $m | Benchmark 2002 $m | Annualised difference 2002 $m |
|---|---|---|---|
| Capital | 130.7 | 190.1 | 5.6 |
| Operating and maintenance | 212.7 | 232.3 | 3.9 |
| **Total** | | | **9.6** |

Panel B

| | Financial years ending 31 March (nominal $) | | | | | |
|---|---|---|---|---|---|---|
| | 2003[1] $m | 2004 $m | 2005 $m | 2006 $m | 2007 $m | 2008 $m |
| Glide path | 2.5 | 9.4 | 7.7 | 5.8 | 3.8 | 1.7 |

*1 This is data for a three-month period, 1 January 2003 to 31 March 2003*

*Source: SPI PowerNet forecasts*

## 6.5 Principles for efficiency carry-over into the 2008 revenue cap

As mentioned above, SPI PowerNet recognises that the efficiency carry-over mechanism proposed for the 2003 regulatory period has some drawbacks when applied on a prospective basis. At this time, however, SPI PowerNet is not proposing a particular mechanism for efficiency carry-over into the 2008 regulatory period. SPI PowerNet understands that the ACCC intends addressing this issue as part of its process for finalising the Draft SoRP during 2002. As input into this process, SPI PowerNet has set out above the key principles that it believes an efficiency carry-over mechanism should satisfy together with a discussion of the link between incentives for cost-efficiency and quality of service.

# 7. REGULATORY ASSET BASE VALUATION

Based on guidance from the ACCC, SPI PowerNet has constructed the regulatory asset base (RAB) for the purposes of calculating the return on capital and depreciation elements of the revenue cap. The 1994 valuation that underlies the Victorian Tariff Order was rolled forward by adjusting for capital expenditure, depreciation, retirements and inflation over the period to 2003. On a basis consistent with the original valuation approach, a value was placed on assets omitted from the 1994 valuation and, where necessitated by changes in circumstance, values were revisited (i.e. to reflect increased utilisation of the transmission system). In addition, assets relating to services that will only become revenue-capped from the start of the new regulatory period are included in the RAB from 1 January 2003.

Accordingly, SPI PowerNet's RAB is consistent in scope with the RAB for other TNSPs in the NEM.

A high level summary of the components of the RAB, together with forecasts of the roll-forward of the RAB and regulatory depreciation for the 2003 to 2007/08 regulatory period is set out below together with relevant background on the 1994 valuation. It is supported by Appendices C, D and E, which provide more detailed descriptions of the relevant valuations and procedures.

## 7.1 Background

In 1994, as a prelude to privatisation, the Victorian Government disaggregated the SECV into generation, transmission and distribution/retail. To separate the transmission and distribution assets, Sinclair Knight Merz (SKM) was commissioned to identify and value (at Optimised Depreciated Replacement Cost – ODRC) the transmission, sub-transmission and distribution networks. Data were provided by the entities formed from the break up of the SECV: National Electricity, Electricity Services Victoria and the Municipal Electricity Undertakings. The final version of SKM's report was completed in September 1994 with a valuation date of 1 July 1994.

Subsequently, when PowerNet Victoria (a successor to National Electricity) was due to be privatised in 1997, the Victorian Government revisited the transmission revenue controls and extended the application of the relevant parts of the Victorian Tariff Order to 31 December 2002. In so doing, the 1994 SKM valuation formed the foundation of the RAB; however, the valuation of assets classified as non-system were drawn from a different source. This resulted in a "modified" RAB value at 1 July 1994 that was different to that originally determined by SKM.

As it stands, the modified 1994 valuation has a number of deficiencies. In particular, several classes of assets were omitted in 1994 without which the service could not be delivered, now or then. These include easements, communication assets, sub-transmission assets used exclusively for providing transmission services (e.g. system black start), land for future system expansion and system spares.

In addition, given that there is now virtually no spare capacity in the transmission network, the network optimisation performed in 1994 is incompatible with the current context. This possibility was foreseen by the ACCC in 1997 when, in the process of authorising the NEC, it expressed some reservations in relation to the 1994 valuation and determined that it would not be bound by it in setting future revenue caps.

> *'Similarly locking in the asset values until 2007 would be a concern, because irrespective of their veracity when determined in 1994, it is unlikely that the use of the network will remain such that the valuation would still be correct, in either 8 years (2002) or 13 years (2007). ... Consequently, the Commission maintains its view expressed in the draft decision that it would not accept a derogation which prevents the Commission from taking the option of revaluing the assets at the time the Commission takes over as regulator.' (p.73, ACCC* NEM Access Code Decision*, September 1998)*

## 7.2 Overview of RAB construction

Against this background, SPI PowerNet has constructed a RAB value at 1 January 2003 by:

- rolling forward the modified 1994 valuation to 1 January 2001 (Section 7.3);
- determining a value for omitted assets, consistent with the modified valuation (Section 7.4);
- including the omitted assets in the roll-forward at 1 January 2001 to form a value for "sunk assets" for the purposes of clause 6.2.3(d)(4)(iii) of the NEC[5] (Section 7.5); and
- rolling the sunk assets valuation forward to 1 January 2003 to form the opening value of the RAB, which includes re-optimising the network and rolling in assets related to non-contestable excluded services (Section 7.6).

From this opening value, the RAB applying over the 2003 to 2007/08 regulatory period is determined by rolling forward on the basis of the forecast asset additions and retirements as set out in Chapter 4. Depreciation for the roll-forward and the annual revenue allowance is determined on a straight-line basis with respect to standard technical lives. The forecast roll-forward and forecast depreciation are discussed in Sections 7.7 and 7.8 respectively.

## 7.3 Roll-forward of 1994 valuation for the RAB as at 1 January 2001



To roll forward the 1994 modified valuation, SPI PowerNet has used actual asset additions, retirements and inflation (average of eight cities' all groups CPI) up to 1 January 2001. Depreciation was calculated consistent with the asset lives and in-service dates underlying the 1994 modified valuation.

The written-down value of the rolled-forward base at 1 January 2001 is $1,406.9 million. This excludes any allowance for omitted assets. The roll-forward is summarised in Table 7.1

**Table 7.1:** Asset base roll-forward from 1 July 1994 to 1 January 2001

| Period starting | 1 Jul. 1994 $m | 1 Jul. 1995 $m | 1 Jul. 1996 $m | 1 Jul. 1997[1] $m | 1 Jan. 1998 $m | 1 Jan. 1999 $m | 1 Jan. 2000 $m |
|---|---|---|---|---|---|---|---|
| Opening asset base | 1,390.6 | 1,421.1 | 1,436.6 | 1,411.6 | 1,395.0 | 1,382.1 | 1,360.1 |
| New assets (capex) | 12.8 | 17.7 | 18.2 | 10.5 | 15.5 | 6.1 | 18.5 |
| Indexation | 63.1 | 44.6 | 4.9 | -2.4 | 22.3 | 25.1 | 80.0 |
| Depreciation[2] | 45.4 | 46.8 | 48.1 | 24.8 | 50.7 | 53.2 | 51.6 |
| Closing asset base | 1,421.1 | 1,436.6 | 1,411.6 | 1,395.0 | 1,382.1 | 1,360.1 | 1,406.9 |
| **Opening asset base 1 Jan. 2001:** | | | | | | | **1,406.9** |

*1 This is data for a six month period, 1 July 1997 to 31 December 1997*

*2 This includes retirements*

*Source: SPI PowerNet*

[5] *As modified by the Victorian derogation to Chapter 6, clause 9.8.3(a)(1).*

## 7.4 Value of omitted assets

Various classes of assets were omitted in the original valuation (easements, future terminal station sites, system spares, communications assets and 66 kV transmission assets). These omitted assets are crucial to delivering the transmission service and are included and valued in the Regulatory Asset Bases of the Queensland and NSW TNSPs. Taken together, the value of the omitted assets is $307.2 million at 1 January 2001 (see Table 7.2). The basis of the valuation of each omitted asset class is discussed in the following sub-sections.

**Table 7.2:** Value of omitted assets ($m)

| Omitted asset class | Value at 1 January 2001 $m |
|---|---|
| Easements | 231.8 |
| Future terminal station sites | 25.2 |
| System spares | 10.1 |
| Communication assets | 28.8 |
| 66 kV transmission lines | 11.2 |
| **Total** | **307.2** |

*Source: SPI PowerNet*

### 7.4.1 Easements

A registered electricity easement is a right to construct, operate and maintain a power line and does not involve ownership of the land under the line. It is usually granted in perpetuity. In view of this, an easement holder does not have to provide for replacement of the “asset” in the future, nor provide for depreciation.

The easement portfolio on which the Victorian transmission network stands was purchased by GPU from the Victorian Government in 1997 and subsequently by SPI in 2000 and is essential for the supply of revenue-capped services. SPI PowerNet controls registered easements over private land, which were originally purchased under Victorian laws of compulsory acquisition. In addition, there are usage agreements with the Department of Natural Resources and Environment and other government or semi-government authorities. These perform the same function as registered easements but cover Crown land and land owned by government authorities and local councils.

In December 1997, A.T. Cocks (now operating as urbis) conducted a replacement cost valuation of SPI PowerNet’s transmission easements. This report is attached in Appendix E. The valuation applied only to the easement network over privately-held land and does not include agreements covering Crown land or land owned by government or semi-government authorities. This valuation has been the only attempt to assign a complete value to the Company’s easement portfolio. The break down of this valuation is provided in Table 7.3.

**Table 7.3:** Replacement cost of acquiring easements, 1997

| Cost Components | Value at December 1997 $m |
|---|---|
| Value of land under easements | 366.5 |
| Value of injurious affect | 109.3 |
| Sub-total value of land acquired (LAC Act) | 475.8 |
| Solatium | 34.7 |
| Landowners' costs | 22.6 |
| Sub-total landowners' costs | 57.3 |
| Authority's fees and direct costs | 46.5 |
| Authority's management costs | 35.2 |
| Sub-total SPI PowerNet's costs | 81.7 |
| **Total Cost of acquiring easements** | **614.8** |

*Source: A.T. Cocks Easement Valuation Report*



In an exercise to verify the 1997 value, urbis has since indicated the value would likely approach $1.0 billion in 2001 as SPI PowerNet has many easements over valuable inner city and urban land. This value is very similar to replacement cost valuations of easements in other jurisdictions.

However, for setting the initial value for easements in the regulatory asset base, the ACCC's preferred approach outlined in the Draft SoRP is for the value to be based on the actual cost to the network of obtaining the easement rights (historical cost of acquisition escalated by CPI).

It is understood that the ACCC prefers this approach to the normal (replacement cost) methodology because there is a likelihood that the value of easements will escalate continuously over time, at rates in excess of the rate of increase in the CPI. The reason for this is the strong link with real estate values. This is in contrast to the expected fall in value of transmission assets over time as technology change reduces real unit replacement costs.

In recognition of the ACCC's preferred approach, SPI PowerNet has constructed a proxy historical cost value for its easements. SPI PowerNet has extensive records (over 97 per cent complete) on the actual cost of land compensation paid to owners for easements over their land; however, there are no records of the associated transaction costs at the time, although it is known that such costs were significant. The non-existence of this information prevents construction of a consistent and complete historical cost of SPI PowerNet's easements.

To synthesise a CPI-adjusted historical cost for easements, SPI PowerNet combined the CPI-indexed land compensation value with the 1997 transaction costs of easement acquisition taken from the 1997 A.T. Cocks report indexed to 1 January 2001. The CPI-indexed value of land compensation for easement acquisition is $79.7 million at 1 January 2001. The transaction costs so derived have been added to this to complete the valuation.

The 1 January 2001 value of $231.8 million is included in the RAB (see Table 7.4). This is consistent with the easement values included in the RABs of TransGrid ($345 million in 2001 dollars) and Powerlink ($123 million in 2001 dollars).

**Table 7.4:** Imputed historic cost of acquiring easements

| Cost components | Value at 1 January 2001 $m |
|---|---|
| Historical cost of compensation for land under easements | 79.7 |
| Indexed transaction costs from 1997 report | 152.1 |
| **Total cost of easements** | **231.8** |

*Source: SPI PowerNet, based on A.T. Cocks* Easement Valuation Report

## 7.4.2 Land for future terminal stations

As a legacy of privatisation, SPI PowerNet owns a number of parcels of land that were originally purchased by the SECV as sites for future terminal stations and are strategically located along transmission easement paths – these sites were omitted from the 1994 modified valuation.

VENCorp has since indicated that it requires SPI PowerNet to hold specified future terminal station sites for system development even if this is expected to occur well beyond the 10-year planning horizon. In view of this, it is appropriate that the land be rolled into the RAB from 1 January 2001.

SPI PowerNet commissioned urbis to value the land as at 1 January 2001. The properties have been valued on the basis of “market value for the existing use”. This is a well-established methodology used by valuers throughout Australia and is incorporated as “value in use” into the NSW Treasury’s *Policy Guidelines for Valuation of Electricity Network Assets* for land valuation.

The value of the omitted land is set out in Table 7.5.

**Table 7.5:** Value of future terminal station sites

| Cost Components | Value at 1 January 2001 $m |
|---|---|
| Future terminal station sites | 25.2 |

*Source: urbis Land Valuation Report*

## 7.4.3 Other omitted asset classes

There is little to indicate how the 1994 modified valuation came to omit the essential asset classes of system spares, communications assets or 66 kV transmission lines. These assets are critical for providing the revenue-capped transmission services and it is therefore appropriate that they be included in the RAB. System spares have been included at their (historical cost) book value at 1 January 2001, while the values for communications assets and 66 kV transmission lines are based on 2001 depreciated replacement costs. The choice of replacement cost is pragmatic and reasonable in the context of equipment whose price is trending down in real terms.

The 1 January 2001 values for system spares, communications assets and 66 kV transmission lines are set out in Table 7.6

**Table 7.6:** Value of other omitted asset classes

| Omitted asset class | Value at 1 January 2001 $m |
|---|---|
| System spares | 10.1 |
| Communication assets | 28.8 |
| 66 kV transmission lines | 11.2 |

*Source: SPI PowerNet*

## 7.5 Value of sunk assets at 1 January 2001

The value of sunk assets for the purposes of the NEC is set out in Table 7.7. It represents the 1 January 2001 rolled-forward value from Section 7.3, to which the value of omitted assets has been added.

**Table 7.7:** Regulatory asset base on 1 January 2001

| Asset class | Value at 1 January 2001 $m |
|---|---|
| *System assets* | |
| Secondary | 60.2 |
| Switchgear | 205.6 |
| Transformers | 126.3 |
| Reactive | 78.8 |
| Towers and conductors | 839.5 |
| Establishment | 32.7 |
| Communications | 28.8 |
| *Non-system assets* | *29.9* |
| *Land* | *80.4* |
| *Easements* | *231.8* |
| **Regulatory Asset Base** | **1,714.1** |
| 1994 RAB rolled forward | 1,406.9 |
| Omitted assets | 307.2 |

*Source: SPI PowerNet*

## 7.6 Roll-forward to 1 January 2003

To determine the opening value of the RAB at 1 January 2003, the 1 January 2001 value from Table 7.7 is rolled forward for 2 years to include actual and forecast capital expenditure, retirements, inflation and depreciation over the period. In addition, adjustments have been made at 1 January 2003 to allow for re-optimisation and the roll-in of some services previously outside the revenue cap. A brief description of the basis on which capital expenditure was included, together with the opening value adjustments, is provided in the following sub-sections.

The results of the roll-forward and adjustments are provided in Table 7.8 and the composition of the opening value of the RAB at 1 January 2003 ($2,089.7 million) is shown in Table 7.9.

**Table 7.8:** Asset base roll forward from 1 January 2001 to 1 January 2003

| Period starting | 1 Jan. 2001[1] $m | 1 Apr. 2001 $m | 1 Apr. 2002[2] $m | 1 Jan. 2003 $m |
|---|---|---|---|---|
| **Opening asset base** | **1,714.1** | **1,733.8** | **1,734.5** | **2,089.7** |
| New assets (capex) | 14.8 | 16.6 | 55.5 | |
| Indexation | 18.4 | 42.3 | 32.4 | |
| Depreciation[3] | 13.5 | 58.2 | 48.0 | |
| **Closing asset base** | **1,733.8** | **1,734.5** | **1,774.4** | |
| Roll-ins for new revenue period | | | | |
| VNSC | | | 7.4 | |
| Other excluded assets | | | 36.1 | |
| Re-optimisation | | | 271.8 | |

*1 This is data for a three-month period, 1 January 2001 to 31 March 2001*

*2 This is data for a nine-month period, 1 April 2002 to 31 December 2002*

*3 This includes retirements*

*Source: SPI PowerNet*

**Table 7.9:** Regulatory asset base on 1 January 2003

| Asset class | 1 Jan. 2003 $m |
|---|---|
| *System assets* | |
| Secondary | 71.3 |
| Switchgear | 212.7 |
| Transformers | 134.7 |
| Reactive | 79.3 |
| Towers and conductors | 1,140.1 |
| Establishment | 37.7 |
| Communications | 45.3 |
| VNSC | 7.4 |
| *Non-system assets* | *32.2* |
| *Land* | *84.8* |
| *Easements* | *244.3* |
| **Regulatory Asset Base** | **2,089.7** |

*Source: SPI PowerNet*

## 7.6.1 Roll-in of 2001 and 2002 replacement capex

The values of assets brought into or expected to be in service after 1 January 2001, but before the determination date of 1 January 2003, are listed in Table 7.8, above. They comprise both:

- actual capital expenditure from 1 January 2001 to 31 March 2002; and
- forecast capital expenditure from 1 April 2002 to 31 December 2002.

## 7.6.2 Optimisation of system assets

The ACCC's Draft SoRP proposes that the RAB should include only those network assets which form the notional "optimised" network required to provide the regulated services. This approach has been applied in all recent transmission revenue cap determinations in Australia. SPI PowerNet's present revenue cap via the Victorian Tariff Order is also based on an optimised network.

The effect of optimisation is to remove or reduce the value of some assets not required to provide revenue-capped services. In the building block formulation this influences the revenue amount derived from the "return on capital" invested and "depreciation" elements.

The previous optimisation was performed in 1994, considering the transmission service levels required at the time. This optimisation left the network the most stringently optimised transmission system in Australia. For the regulatory period commencing in 2003, this optimisation will be incorrect given changing network usage patterns and higher than anticipated load growth that has occurred in the intervening period. This is not surprising because of the relatively low level of transmission augmentation commissioned by VENCorp since 1994 compared to other jurisdictions.

SPI PowerNet commissioned SKM to perform an independent study to review optimisation of the network. The methodology of this study is consistent with that applied in all previous transmission network optimisations performed for revenue capping purposes.

However, unlike previous studies, the current exercise is a re-optimisation and this raises an important issue in relation to what constitutes a fair value to place on assets that the owner has been denied a return on, wholly or partly, since the original optimisation in 1994. That this issue would arise was foreseen by ACCC in its Draft SoRP. Proposed statement S4.5, provides that:

> *"Assets which are optimised out of the regulatory asset base will be carried forward at the rate of return. If they are optimised back into the regulatory asset base, their value will be the lesser of the carry forward value or depreciated replacement cost.*
>
> *Where assets are reinstated into the asset base the Commission will take into account past levels of recovery (that is, the written down value when removed from the regulatory asset base)." (p.54)*

SPI PowerNet endorses the ACCC's intention to allow a transmission owner to recoup the rate of return and depreciation allowance that it had been denied in respect of the portion of the network that was optimised out, provided that so doing would not:

- cause the present value of future network charges to exceed the replacement cost of the relevant assets (which should theoretically trigger network bypass); or
- otherwise cause customers to cease their use of the transmission system.

If these conditions are met then allowing assets to be optimised back into the RAB at their written-down value in 1994, carried forward at the cost of capital (but without depreciating the asset) represents fair value for electricity customers.

Although proposed statement S4.5 is at variance with SPI PowerNet's proposal, the Company notes that many submissions to the consultation on the Draft SoRP commented that the statement, as drafted, seems at odds with itself, such that the reference to depreciated replacement cost should probably be just to replacement cost. Since then, the ACCC has not issued any further guidance on the issue nor responded directly to the submissions made.

In the context of determining the opening value of the RAB on 1 January 2003, SPI PowerNet has implemented the Fair Value re-optimisation by:

- commissioning SKM to undertake an optimisation study using the standard methodology (as mentioned above);
- carrying forward at the cost of capital the written-down value of assets partly or wholly optimised out in 1994;
- comparing on an optimisation-by-optimisation basis the replacement cost of the re-optimised assets to the present value of the network charges that would result from using the carried forward value (this includes allowance for replacing the assets at some point in the future); and
- designating the lesser of these to be the fair value of the re-optimised asset.

While network utilisation justifies a substantially lower level of optimisation than was the case in 1994, SKM's network study indicates that some optimisation remains appropriate.

The optimisation outcomes, which are reflected in the RAB, are shown in Table 7.10 below. The study is attached in Appendix D.

**Table 7.10:** Optimisation Outcomes of Network Study

| | 1994 Optimisation | 2001 Optimisation |
|---|---|---|
| **Rowville Terminal Station (TS) – South Morang TS single circuit 500 kV line (operating at 220 kV)** | Medium rated single circuit 220 kV line | Medium rated single circuit 220 kV line |
| **Hazelwood TS – Rowville TS single circuit 500 kV line (operating at 220 kV)** | Removed with extra transformation at South Morang TS | No optimisation |
| **Moorabool TS – Heywood TS – Portland Aluminium Smelter double circuit 500 kV lines** | Double circuit 330 kV lines with extra reactive support | No optimisation |
| **Yallourn Power Station – Rowville TS double circuit 220 kV lines (lines 5,6,7,8)** | High rated double circuit line | High rated double circuit line with extra reactive support |
| **Keilor TS – Thomastown TS double circuit 220 kV lines** | High rated single circuit line | High rated single circuit line |
| **Keilor TS – Geelong TS single circuit and double circuit 220 kV lines** | High rated single circuit | Medium rated double circuit line |
| **Hazelwood Power Station – Rowville TS double circuit 220 kV lines (lines 2,3)** | High rated single circuit | High rated single circuit |
| **Dederang TS – Glenrowan TS – Shepparton TS double/single circuit 220 kV lines (lines 1,2,3)** | High rated double circuit | No optimisation |
| **Yallourn Power Station – Hazelwood Power Station double circuit 220 kV line** | No optimisation | High rated single circuit |
| **East Rowville TS – Tyabb TS 220 kV double circuit line** | No optimisation | Medium rated double circuit line |
| **Synchronous condensers** | Capacitor banks | SVCs |
| **Optimised switching configurations associated with above line optimisations** | | |

*Source: SKM optimisation study*

## 7.6.3 Roll-in of non-contestable services outside the Tariff Order cap

Some assets associated with providing non-contestable services that were outside the revenue cap under the Victorian Tariff Order are to be incorporated into the RAB for the new regulatory period commencing on 1 January 2003. The major additions will be the Victorian Network Switching Centre (VNSC) and various connection works (see Chapter 3, Table 3.1). The values of those assets brought into the RAB are listed in Table 7.8.

## 7.7 Roll-forward to 2007

The movements in the RAB over the 2003 to 2007/08 regulatory period are set out in Table 7.11. These incorporate the capital expenditure plan from Chapter 4 and the expected depreciation and asset retirements (write-offs) over the period from Table 7.13, presented later in this chapter.

**Table 7.11:** Asset base roll forward from 1 January 2003 to 31 March 2008

| Period starting | 1 Jan. 2003[1] $m | 1 Apr. 2003 $m | 1 Apr. 2004 $m | 1 Apr. 2005 $m | 1 Apr. 2006 $m | 1 Apr. 2007 $m |
|---|---|---|---|---|---|---|
| Opening asset base | 2,089.7 | 2,104.5 | 2,162.1 | 2,213.6 | 2,253.8 | 2,315.4 |
| New assets (capex) | 16.8 | 69.9 | 66.1 | 56.2 | 78.6 | 82.1 |
| Indexation | 16.3 | 67.4 | 69.1 | 70.4 | 72.3 | 74.3 |
| Depreciation[2] | 18.4 | 79.7 | 83.6 | 86.3 | 89.4 | 92.8 |
| Closing asset base | 2,104.5 | 2,162.1 | 2,213.6 | 2,253.8 | 2,315.4 | 2,379.1 |
| **RAB for return purposes** | **2,098.2** | **2,139.5** | **2,195.1** | **2,241.7** | **2,293.1** | **2,363.5** |

*1 This is data for a three-month period, 1 January 2003 to 31 March 2003*

*2 This includes retirements*

*Source: SPI PowerNet*



## 7.8 Depreciation

Each asset in the RAB has been depreciated on a straight-line basis over the life assigned to it in 1994. SPI PowerNet has followed standard practice by assigning a regulatory life to assets that equate to their expected economic or technical life. In general, the regulatory, economic and technical lives of an asset coincide.

However, secondary equipment was assigned the same life as the associated primary equipment (generally 40–45 years). Although this is substantially higher than its economic life, consistency has been maintained with the 1994 modified valuation and economic replacement of secondary assets will be associated with a retirement (write off), through depreciation, of the residual value of the replaced assets.

Capital expenditure in the secondary category after 1 January 2003 is assigned the appropriate economic life from its in-service date.

Standard lives for the various asset classes are supplied in Table 7.12.

**Table 7.12:** Standard lives for assets

| Asset class | | Standard life (years) |
|---|---|---|
| Secondary sunk assets | | 45 |
| Secondary future capital expenditure | | 15–20 |
| Switchgear | | 45 |
| Transformers | | 45 |
| Reactive | | 40 |
| Lines | | 70 |
| Establishment | | 45 |
| Communications | – Towers | 70 |
| | – Establishment and buildings | 45 |
| | – Equipment and cables | 10–45 |
| Non-system assets | | Accounting life |
| Land | | Infinite |
| Easements | | Infinite |

*Source: SPI PowerNet*

SPI PowerNet has chosen to depreciate assets on a straight-line basis because of the simplicity and effectiveness of the method. Depreciation and asset retirements from 1 January 2003 to 31 March 2008 are shown in Table 7.13.

**Table 7.13:** Depreciation from 1 January 2003 to 31 March 2008

| Period starting | 1 Jan. 2003[1] $m | 1 Apr. 2003 $m | 1 Apr. 2004 $m | 1 Apr. 2005 $m | 1 Apr. 2006 $m | 1 Apr. 2007 $m |
|---|---|---|---|---|---|---|
| Retirements | 1.6 | 4.3 | 4.4 | 2.9 | 3.3 | 4.2 |
| Depreciation | 16.8 | 75.5 | 79.2 | 83.5 | 86.0 | 88.6 |
| **Depreciation and retirements** | **18.4** | **79.7** | **83.6** | **86.3** | **89.4** | **92.8** |

*1 This data is for a three-month period, from 1 January 2003 to 31 March 2003*

*Source: SPI PowerNet*

# 8. CAPITAL FINANCING AND TAXATION

## 8.1 Introduction

For some years now, there has been considerable debate about the theoretical and empirical aspects of the cost of capital appropriate for use in revenue and price regulation. This debate underlines that there is potentially a wide range of outcomes that could be justified. In this environment regulators, on behalf of the community, need to consider what is the greater cost – setting rates of return aggressively low and possibly putting at risk network investment or taking a more conservative approach and potentially paying slightly more than required to elicit "efficient" levels of investment.

SPI PowerNet believes that the community values the reliability of the electricity transmission system at more than the cost of being sure that this reliability will be forthcoming through appropriate investment. This view is consistent with the findings and analysis of the Productivity Commission in its *Review of the National Access Regime*:

> *"In essence, third party access over the longer term is only possible if there is investment to make these services available on a continuing basis. Such investment may be threatened if inappropriate provision of access, or regulated terms and conditions of access, lead to insufficient returns for facility owners. While the denial or monopoly pricing of access also impose costs on the community ... they do not threaten the continued availability of the essential services concerned. Thus over the longer term, the costs of inappropriate intervention in this area are likely to be greater than the costs of not intervening when action is warranted. The substantial information and other difficulties that confront regulators in establishing access terms and conditions, make this asymmetry in the benefits and costs of access regulation even more important in a policy context."* [6]

Against this background, this Chapter is organised to:

- describe the methodology used to determine the cost of capital and a net tax allowance (Section 8.2);
- put forward an estimate of the cost of capital for a benchmark transmission company in the same regulatory and operating context as SPI PowerNet (Section 8.3); and
- in concert with this estimate, propose a net tax allowance that is consistent with the WACC methodology being used (Section 8.4).

The substance of this Chapter is drawn from an expert report by Professor R.R. Officer, supported by market evidence provided by UBS Warburg and Westpac. Included at Appendix F, these reports provide a detailed and comprehensive set of evidence, analysis and justification for the proposed WACC and the basis of the net tax allowance.

[6] *Productivity Commission 2001 Review of the National Access Regime Position Paper, pp. XVIII to XVIX.*

## 8.2 Methodology for determining the cost of capital and the net tax allowance

As discussed in Chapter 1, in accord with recent regulatory decisions across a range of industries and jurisdictions, SPI PowerNet has used the post-tax nominal approach to develop the revenue cap proposed in this Application. This involves estimating the cost of capital as a simple weighted average of the post-tax nominal return on equity and the pre-tax nominal return on debt where the weights are the respective shares of equity and debt in the value of the regulated business. Referred to as a "Vanilla" cost of capital, mathematically it is represented as:

$$WACC = R_e \frac{E}{V} + R_d \frac{D}{V} \qquad \text{Equation 8.1}$$

where:

- $R_e$ is the nominal return on equity;
- $\frac{E}{V}$ is the equity share in total value;
- $R_d$ is the nominal return on debt; and
- $\frac{D}{V}$ is the debt share in total value (equal to $1-\frac{E}{V}$).

What is notable about this definition of the WACC is that there is no allowance for company tax or for the offset of company tax against personal income tax through dividend imputation. Instead, a net tax allowance is provided for as a separate cash flow for inclusion in the revenue cap. The net tax allowance is calculated as:

$$(1-\gamma)\,T_t = (1-\gamma)\max\left\{0, \frac{\left[DR_t - DT_t + \left(\frac{E}{V}R_e\right)RAB_t + GP_t + CFTL_t\right]t}{1-t(1-\gamma)}\right\} \qquad \text{Equation 8.2}$$

The Technical Annex provides a derivation of this Equation together with the definition of each variable.

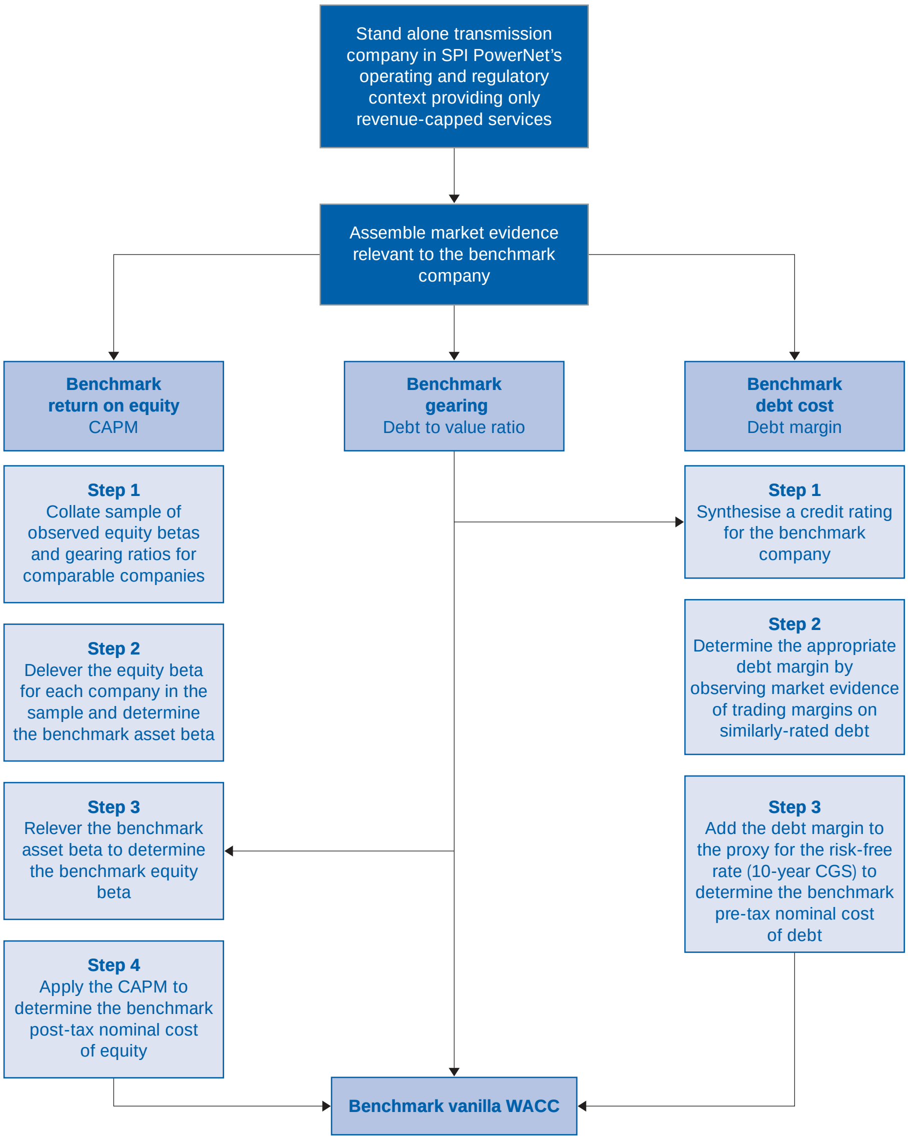
## 8.3 Estimate of the Vanilla WACC in the current context

For the purpose of setting a revenue cap for SPI PowerNet's revenue-capped services, a Vanilla WACC needs to be estimated that represents an efficient benchmark for a transmission company in the same operating and regulatory context providing only the revenue-capped services on a stand-alone basis. Based on the formulation of the Vanilla WACC in Equation 8.1 deriving a suitable benchmark requires consistent estimation of:

- the nominal return on equity;
- the nominal return on debt; and
- the gearing ratio (debt to value).

Following the approaches that have been progressively refined in recent regulatory decisions, SPI PowerNet has sought to use the Capital Asset Pricing Model (CAPM) as the primary tool for estimating the nominal return on equity. The nominal return on debt is estimated by synthesising a credit rating for the benchmark transmission company and then marking to market against observed debt costs for similarly-rated entities. Gearing is based on the average gearing observed in the market for companies similar to the benchmark entity. A simplified depiction of the process for estimating the Vanilla WACC is presented in Figure 8.1.

**Figure 8.1:** Simplified WACC estimation process






In the estimation process, there are a number of key aspects that should be noted, as they are relatively influential to the benchmark proposed.

- Primary weight has been given to Australian capital markets evidence because of the theoretical and empirical difficulties inherent in translating overseas evidence in a reliable manner.
- The duration of the risk-free rate used in the CAPM and for the purposes of determining the debt cost benchmark is the ten-year Commonwealth Government Security (CGS). This is consistent with both the way that the market risk premium (MRP) in the CAPM is measured in Australia and with the investment horizon of such a capital-intensive business with very long-lived assets. The fact that the regulatory period is typically only five years is irrelevant and there is no sound justification for the use of a five-year rate.

- The Vanilla WACC proposed is made up from parameters and variables, as listed in Table 8.1. Parameters are those inputs to the Vanilla WACC that are relatively constant over time and are not expected to change between the date of this Application and the end of the regulatory period. By contrast, variables are those inputs that by their nature change on a more than hourly basis. SPI PowerNet proposes that the parameters in the Vanilla WACC be adopted at the values indicated; however, for variables, it is proposed that a more up-to-date market sample be taken prior to the ACCC making its Final Decision on the revenue caps. Variables are currently set at their values at the time of lodging this Application.

Based on the current values for each variable, SPI PowerNet proposes a Vanilla WACC (post-tax nominal WACC) of 9.50 per cent.

**Table 8.1:** Proposed WACC parameters and variables

| Parameter/variable/outcome | Proposed value |
|---|---|
| **Parameters** | |
| Gearing (D/V) | 60 per cent |
| Asset beta[1] | 0.585 |
| Equity beta | 1.0 |
| Debt beta | 0.31 |
| Debt margin | 185 basis points |
| Market risk premium | 6.0 per cent |
| **Variables** | |
| Risk free rate – nominal 10-year government bond | 5.99 per cent |
| Real risk free rate – indexed 10-year government bond | 2.80 per cent |
| **Outcomes** | |
| Expected inflation[2] | 3.10 per cent |
| Nominal cost of debt | 7.84 per cent |
| Post-tax nominal cost equity | 11.99 per cent |
| **Vanilla WACC (as at time of application)** | **9.50 per cent** |

1 *Asset beta is an average of the equity and debt betas weighted in proportion to gearing*

2 *Calculated via the Fisher Equation from the risk free rate and the real risk free rate*

*Source: R.R. Officer (2001),* A Benchmark Weighted Average Cost of Capital for an Australian Electricity Transmission Business, and SPI PowerNet analysis of bank economic forecasts

Based on current forecasts and the RAB values proposed in Chapter 7, the nominal return on capital proposed is as set out in Table 8.2.

**Table 8.2:** Proposed return on capital, 2003 to 2007/08 (nominal $m)

| | Financial years ending 31 March | | | | | |
|---|---|---|---|---|---|---|
| | 2003[1] $m | 2004 $m | 2005 $m | 2006 $m | 2007 $m | 2008 $m |
| Return on capital | 49.8 | 203.2 | 208.5 | 212.9 | 217.8 | 223.8 |

*1 This is data for a three-month period, 1 January 2003 to 31 March 2003*

*Source: SPI PowerNet*

## 8.4 Net tax allowance

As part of the post-tax nominal approach, a separate (cash flow) allowance has to be made in the revenue cap for corporate income tax, net of the value ascribed to dividend imputation credits. This allowance is derived with reference to Australian tax rules, the most significant of which relates to the tax deduction that would be allowable for depreciation. For this calculation, SPI PowerNet has used its actual tax depreciation position in relation to assets providing revenue-capped services.

The formula for deriving the net tax allowance was presented earlier in this Chapter (Equation 8.2) and is reproduced below for reference (note that all variables are as defined in the Technical Annex).

$$(1-\gamma)\,T_t = (1-\gamma)\max\left\{0,\ \frac{\left[DR_t - DT_t + \left(\frac{E}{V}R_e\right)RAB_t + GP_t + CFTL_t\right]t}{1-t(1-\gamma)}\right\}$$

Equation 8.2

In relation to the treatment of dividend imputation, SPI PowerNet proposes to maintain consistency with recent regulatory precedents and current evidence (this is supported by Professor R.R. Officer's expert report – see Appendix E). The $\gamma$–factor is therefore set at 50 per cent for the calculation of the tax allowance.

Based on current forecasts of bond rates and inflation, SPI PowerNet's proposed net tax allowance for the regulatory period is as set out in Table 8.3. This will need to be updated prior to the Final Decision by the ACCC.

**Table 8.3:** Proposed net tax allowance, 2003 to 2007/08 (nominal $m)

| | Financial years ending 31 March | | | | | |
|---|---|---|---|---|---|---|
| | 2003[1] $m | 2004 $m | 2005 $m | 2006 $m | 2007 $m | 2008 $m |
| Net tax allowance | 1.1 | 4.8 | 5.0 | 4.9 | 4.8 | 4.7 |

*1 This is data for a three-month period, 1 January 2003 to 31 March 2003*

*Source: SPI PowerNet*

# 9. TOTAL REVENUE REQUIREMENT

## 9.1 Introduction

Having worked through the various building blocks, the revenue cap is determined in the two steps discussed in the Technical Annex. That is, first "raw" revenue requirements for each of the six revenue periods between 2003 and 2007/08 are calculated (the first of these periods is only three months). Second, a CPI–X revenue cap is derived. SPI PowerNet believes that the revenue cap proposed would deliver a competitive, fair and reasonable outcome. The trend of declining real prices is illustrated below together with key financial indicators that demonstrate overall consistency with the benchmark credit rating underlying the cost of capital put forward in Chapter 8.

## 9.2 Raw revenue requirement

The raw revenue requirement for each year of the period is calculated as the sum of operating and maintenance expenditure, regulatory depreciation, return on capital, efficiency carry-over and net tax allowance. The outcomes are presented in Table 9.1.

**Table 9.1:** Raw revenue requirement, 2003 to 2007/08 (nominal $m)

| | Financial years ending 31 March | | | | | |
|---|---|---|---|---|---|---|
| | 2003[1] $m | 2004 $m | 2005 $m | 2006 $m | 2007 $m | 2008 $m |
| Operating and maintenance | 19.5 | 70.1 | 73.2 | 75.1 | 78.2 | 81.2 |
| Depreciation | 18.4 | 79.7 | 83.6 | 86.3 | 89.4 | 92.8 |
| Nominal return on capital | 49.8 | 203.2 | 208.5 | 212.9 | 217.8 | 223.8 |
| Less RAB indexation | -16.3 | -67.4 | -69.1 | -70.4 | -72.3 | -74.3 |
| Glide path | 2.5 | 9.4 | 7.7 | 5.8 | 3.8 | 1.7 |
| Net tax allowance | 1.1 | 4.8 | 5.0 | 4.9 | 4.8 | 4.7 |
| **Raw revenue requirement** | **75.0** | **299.8** | **308.8** | **314.7** | **321.6** | **329.8** |

*1 This is data for a three-month period, 1 January 2003 to 31 March 2003*

*Source: SPI PowerNet forecasts*

## 9.3 Smoothed revenue requirement

While the raw revenue requirement is already comparatively smooth, it still needs to be converted to a CPI–X format in order for the revenue cap to be implemented. Applying the formula set out in the Technical Annex (refer to Equation 16) the revenue cap proposed is:

- for the three-month period 1 January 2003 to 31 March 2003, $75.0 million (nominal);
- for the financial year ending 31 March 2004, $299.8 million (nominal); and
- for the financial years ending 31 March 2005 to 2008, escalating according to the formula

$$R_t^c = R_{t-1}^c (1 + CPI_t)(1 - 0.0061)$$ Equation 9.1

where $R_t^c$ is the revenue cap in year t, $R^c_{t-1}$ is the revenue cap in the previous year and CPI for year t is:

(a) the *Consumer Price Index: All Groups Index Number Average of Eight Capital Cities* published by the Australian Bureau of Statistics for the December Quarter immediately preceding the start of the year t

*divided by*

(b) the *Consumer Price Index: All Groups Index Number Average of Eight Capital Cities* published by the Australian Bureau of Statistics for the December Quarter immediately preceding the December Quarter referred to in paragraph (a)

*minus one.*

As would be expected the smoothed revenue requirement is not significantly different from the raw revenue requirement (see Table 9.2). This is essentially because there is no growth factored into the revenue cap.

**Table 9.2:** Smoothed revenue requirement, 2003 to 2007/08 (nominal $m)

| | Financial years ending 31 March | | | | | |
|---|---|---|---|---|---|---|
| | 2003[1] $m | 2004 $m | 2005 $m | 2006 $m | 2007 $m | 2008 $m |
| Raw revenue requirement | 75.0 | 299.8 | 308.8 | 314.7 | 321.6 | 329.8 |
| Smoothed revenue requirement | 75.0 | 299.8 | 307.2 | 314.8 | 322.6 | 330.6 |
| **Difference** | **0.0** | **0.0** | **-1.6** | **0.1** | **1.0** | **0.8** |

*1 This is data for a three-month period, 1 January 2003 to 31 March 2003*

*Source: SPI PowerNet forecasts*

## 9.4 Benchmark financial indicators and consistency with assumed credit rating

As a check on whether the building block methodology produces outcomes that are consistent with the input assumptions, SPI PowerNet has checked that the revenue cap would permit a credit rating the same as that assumed in the WACC calculation (BBB+) to be attained by a business that conforms to the regulatory benchmark in terms of business scope and financing. Although rating agencies including Standard and Poors and Moody's use both quantitative and qualitative factors to determine ratings, in the current context, the consistency issue is solely related to quantitative factors. Assuming an average profile on qualitative factors, the credit rating that could be achieved by the benchmark business is determined with respect to the two most significant financial indicators used by rating agencies:

- the EBDIT to interest cover ratio; and
- the gearing ratio (debt to total assets).

The time profile of these two ratios for the revenue cap proposed is shown in Table 9.3 below. Based on advice from Westpac's credit research group (see Appendix F), an electricity transmission business exhibiting a 60 per cent gearing and with an EBDIT to interest cover ratio around 2.0 times would, most likely, be rated BBB+. In view of this, the revenue cap would support an investment grade credit rating and is consistent with the input assumptions in the WACC calculation (BBB+).

**Table 9.3:** Key financial indicators, 2003 to 2007/08 (nominal $m)



| | Financial years ending 31 March | | | | | |
|---|---|---|---|---|---|---|
| | 2003[1] $m | 2004 $m | 2005 $m | 2006 $m | 2007 $m | 2008 $m |
| Gearing ratio (per cent) | 60 | 60 | 60 | 60 | 60 | 60 |
| EBDIT to interest cover ratio (x)[2] | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |

*1 This is data for a three-month period, 1 January 2003 to 31 March 2003*

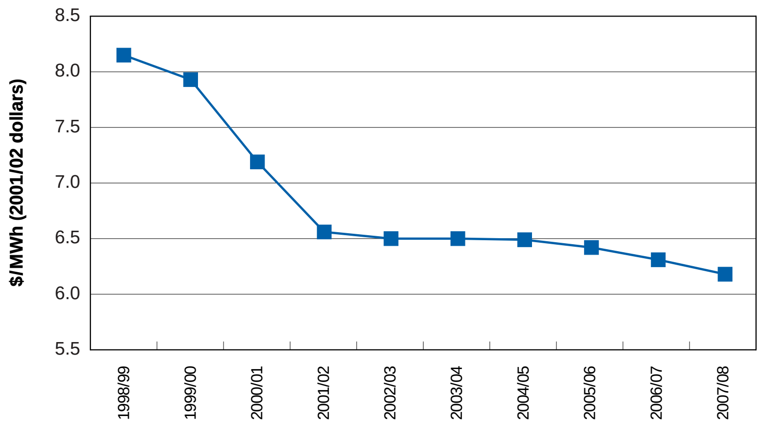
*2 Excludes the efficiency glide path*

*Source: SPI PowerNet forecasts*

## 9.5 Assessment of proposed revenue cap

On a $/MWh basis (see Figure 5), SPI PowerNet's proposed revenue cap will secure the significant real price reductions SPI PowerNet has delivered since privatisation, and will continue the trend for real price decrease over the period. A year-on-year real price reduction of 1 per cent will be delivered over the next regulatory period.

**Figure 9.1:** Real price of transmission per MWh energy delivered (2001/02 $)




*Source: NEMMCO* Statement of Opportunities *and SPI PowerNet*

# 10. IMPLEMENTATION OF THE REVENUE CAP

Successful implementation of the revenue cap requires an accompanying set of arrangements that provide a solid basis for the subsequent reset, avoid disputes and allow efficiency incentives to achieve their objectives. In the following sections, SPI PowerNet has set out its proposals for implementation arrangements covering:

- roll-forward of the regulatory asset base (RAB) for the reset in 2008;
- pass-through of the financial effect of events outside the Company's control or influence;
- treatment of non-contestable augmentations occurring over the period 2003 to 2007/08; and
- consistent regulatory accounting.

It should be noted that these are an integral part of this Application, with many inputs to the revenue cap calculation being dependent on the proposed implementation arrangements.

## 10.1 Roll-forward of the RAB for the reset in 2008

A clear understanding of how the RAB will be treated at the 2008 revenue reset is very important to the integrity of the regulatory system. To address this, SPI PowerNet proposes a simple roll-forward arrangement.

- The RAB value at 1 January 2003 should be rolled forward to 1 April 2008 by adding actual capital expenditure plus indexation less retirements and regulatory depreciation (based on actual capital expenditure) year by year.
- Revaluation and/or re-optimisation on 1 April 2008 should be allowed; however, in the event that the (rolled-forward) RAB exceeds the revalued/re-optimised value, this gap should be closed over the regulatory period via an accelerated depreciation allowance. This is consistent with the way that SPI PowerNet has constructed the revenue cap for 2003 to 2007/08 in that no self insurance costs for stranding risk or accelerated depreciation have been included.

## 10.2 Pass-throughs for identified events

While SPI PowerNet has made every effort to accurately forecast the components of the revenue required to provide its revenue-capped services, there are a number of factors that are outside the Company's control or direct influence but which affect the revenue requirement to a significant degree. For such factors, SPI PowerNet proposes a pass-through arrangement that would be triggered by identified events.

The pass-through arrangements proposed are set out in legal form at Appendix G. The key aspect of the arrangements is the identification of events that could trigger a pass-through application. There are four categories:

- **service standards event** – changes to the scope, standard or risk of the revenue-capped services that SPI PowerNet is required to provide as a result of: changes to the *National Electricity Code* (NEC); decisions by NECA, NEMMCO or the ACCC; or changes to legislation or regulation that SPI PowerNet is required to comply with;
- **change in taxes event** – changes in the way or rate at which a relevant tax is calculated or the imposition of a new tax;
- **terrorism event** – an act of terrorism, which includes threats associated with terrorism; and
- **insurance event** – changes in the availability and extent of cover and cost of insurance relative to that forecast as part of the revenue cap.

Regarding insurance events, SPI PowerNet is particularly concerned about the possibility of the insurance markets failing to provide cover for low probability but high consequence events that the Company does not have the financial capacity to self-insure. For such events, if insurance cover becomes unavailable (at all or only at an uneconomic price) then SPI PowerNet believes that there is a strong case for an arrangement whereby the loss arising from an event (when and if it occurs) is passed on to transmission customers. This pass-through could occur over time or once off depending on the circumstances.

More generally, if the cost of insurance or the extent of cover available change materially from that forecast as part of the revenue cap, then SPI PowerNet believes that the best way of treating this is via a pass-through arrangement. The pass-through could consist of a mixture of an increased premium cost, allowance for self-insurance (where SPI PowerNet has the financial capacity to self-insure) and loss recovery. In the event that premiums are no longer being paid because insurance is no longer available and SPI PowerNet cannot self-insure, the revenue cap would be reduced proportionately as transmission customers would bear the actual cost of losses as and when they occur.

It should be noted that the cost of insurance premiums together with an allowance for non-insured risks have been included in the expenditure forecasts in Chapter 4. These would form the baseline for comparison in the event that an insurance event occurs. That is, if there were a change to the cost, extent of cover and/or availability of cover for those risks currently insured, the pass-through would (essentially) be net of the allowances already made in the revenue cap.



## 10.3 Treatment of non-contestable augmentations during the period from 2003 to 2007/08

Chapter 3 explains that augmentations to regulated services occurring during the 2003 to 2007/08 regulatory period are excluded from the revenue cap. This approach has been adopted because SPI PowerNet does not have the role of planning augmentations and cannot with any certainty predict augmentations determined by other parties – that is, VENCorp with respect to augmentation of the shared network in Victoria and connected customers with respect to the connection assets.

In addition, in Victoria, transmission augmentation is contestable, and large transmission projects are by default developed via a contestable process. Examples to date include the Rowville Terminal Station 500 kV/220 kV transformer services (won by TXU) and the Dederang–South Morang 330 kV line series compensation services (won by SPI PowerNet).

In practice, however, a market for supply of augmented services will not always exist, such as, for example, where the project value does not satisfy a threshold, or where network interfacing complexity would require duplication to an inefficient degree. Where new services are provided on a contestable basis, connection to the SPI PowerNet network will likely always require an element of non-contestable augmentation by SPI PowerNet at the interface.

For those augmentations designated via Network or Connection Agreements to be non-contestable, a process is needed for delivering augmentations that recognises their regulatory status. This will provide all parties, including SPI PowerNet's customers and the ACCC, with the same certainty as applies to the services subject to the revenue cap.

SPI PowerNet's proposal for treatment of in-period augmentations is set out in detail at Appendix H and the key elements are as described below:

- Where a service is non-contestable, having regard to the NEC definition, SPI PowerNet and its customer will write this into the Network Agreement or Connection Agreement.
- Contestable services provided by SPI PowerNet shall not form part of the revenue-capped services, at any time.
- For the duration of the prevailing (2003 to 2007/08) regulatory period, non-contestable services shall be the subject of a supplemental Network or Connection Agreement. The derivation of charges for the service shall be on the basis of:
    - the building block revenue model as described in this Application;
    - operating and maintenance charges based on incremental cost;
    - efficient establishment cost for the new services (as agreed in the Network or Connection agreement); and
    - the Vanilla WACC applied using the parameters as proposed in this application, but with updated variables.
- Charges for the 2008/09 to 2012/13 regulatory period in respect of non-contestable augmentations undertaken over the 2003 to 2007/08 period shall be determined via allocation of the next revenue cap in accordance with the charging allocation principles of the NEC. That is, the associated assets will be included in the RAB from 1 April 2008 and the costs of service provision will be captured within the overall revenue cap.

# TECHNICAL ANNEX:

## IMPLEMENTATION OF POST-TAX NOMINAL APPROACH

As the regulatory period is five and one quarter years, the revenue cap is calculated to apply for six periods – the first period being of three months' duration, from 1 January 2003 to 31 March 2003; and the subsequent periods being of 12 months' duration, commencing on 1 April and finishing on 31 March. The calculation is made in two steps.

### Step 1: Calculation of revenue requirements for periods 1 to 6

In each period of the revenue control period, the revenue requirement is calculated as:

$$R_t = O_t + DR_t + RAB_t WACC + GP_t + T_t(1-\gamma) \qquad \text{Equation 1}$$

where:

- $R_t$ is revenue in period t;
- $O_t$ is operating and maintenance expenditure in period t;
- $DR_t$ is regulatory depreciation in period t (net of CPI indexation of the RAB);
- $RAB_t$ is the value of the regulatory asset base in period t;
- WACC is the (nominal) vanilla WACC, assumed constant over the period;
- $GP_t$ is the efficiency carry-over (glide path) in period t;
- $T_t$ is the tax incurred in respect of period t revenue; and
- $\gamma$ is the dividend imputation adjustment factor.

The vanilla WACC is in turn defined as:

$$WACC = R_e\frac{E}{V} + R_d\frac{D}{V} \qquad \text{Equation 2}$$

where:

- $R_e$ is the post-tax nominal return on equity;
- $\frac{E}{V}$ is the proportion of the RAB funded by equity;
- $R_d$ is the pre-tax nominal cost of debt; and
- $\frac{D}{V}$ is the proportion of the RAB funded by debt.

In respect of period 1, which is a three-month period, it should be noted that the inputs to Equation 1 are determined using appropriate quarterly definitions – in particular, the RAB, regulatory depreciation and WACC are determined on a geometric basis (allowing for the quarterly compounding of inflation and rates of return). For example, the relationship between the quarterly WACC ($WACC^q$) and the annual WACC ($WACC^a$) is:

$$WACC^q = (1 + WACC^a)^{\frac{1}{4}} - 1 \qquad \text{Equation 3}$$

In view of this definition, the quarterly $R_e$ and $R_d$ are defined as:

$$R_d^q = (1 + R_d^a)^{\frac{1}{4}} - 1 \qquad \text{Equation 4}$$

$$R_e^q = \left(WACC^q - R_d^q\frac{D}{V}\right)\frac{V}{E} \qquad \text{Equation 5}$$

In Equation 1, all the variables on the right side are independent of $R_t$ except for one, $T_t$. Tax in period t is calculated as:

$$T_t = \max\left\{0, \left[R_t - \left(O_t + DT_t + RAB_t\frac{D}{V}R_d\right) + CFTL_t\right]t\right\} \qquad \text{Equation 6}$$

where:

- $DT_t$ is tax depreciation in period t;
- t is the statutory tax rate; and
- $CFTL_t$ is the value of carried forward tax losses in year t, determined as follows

$$CFTL_t = \min\left\{0, \left[R_{t-1} - \left(O_{t-1} + DT_{t-1} + RAB_{t-1}\frac{D}{V}R_d + CFTL_{t-1}\right)\right]\right\}$$ Equation 7

and

$$CFTL_0 = 0$$ Equation 8

The consequence of Equation 6 is that without further analysis $R_t$ can only be determined via numerical methods (e.g. goal seeking on $R_t$ in Equation 6 to find those levels of revenue and tax that jointly satisfy Equations 1 and 6). However, in mathematical terms, Equations 1 and 6 represent a system of simultaneous equations with two variables, $R_t$ and $T_t$ and it is relatively simple to solve the system for expressions of $R_t$ and $T_t$ that are independent of each other.

Start by substituting Equation 1 for $R_t$ in Equation 6.

$$T_t = \max\left\{0, \left[\begin{array}{l} O_t + DR_t + RAB_t WACC + GP_t + T_t(1-\gamma) - \\ \left(O_t + DT_t + RAB_t \frac{D}{V}R_d\right) + CFTL_t \end{array}\right] t\right\}$$ Equation 9

There are two cases for the solution to Equation 9.

**Case 1: tax paying position, $T_t$>0**

In this case, Equation 9 reduces to:

$$T_t = \left[O_t + DR_t + RAB_t WACC + GP_t + T_t(1-\gamma) - \left(O_t + DT_t + RAB_t \frac{D}{V}R_d\right) + CFTL_t\right]t$$ Equation 10

Rearranging and collecting terms,

$$\Rightarrow [1 - t(1-\gamma)]T_t = \left[GP_t + DR_t - DT_t + \left(WACC - \frac{D}{V}R_d\right)RAB_t + CFTL_t\right]t$$ Equation 11

and then solving for $T_t$ leads to the following expression,

$$\Rightarrow T_t = \frac{\left[GP_t + DR_t - DT_t + \left(\frac{E}{V}R_e\right)RAB_t + CFTL_t\right]t}{1 - t(1-\gamma)}$$ Equation 12

**Case 2: non-tax paying position, $T_t$=0**

When no tax is being paid in a year, Equation 9 is much simplified to:

$$T_t = 0$$ Equation 13

Looking across these two cases, the solution to Equation 9 can be summarised as:

$$\Rightarrow T_t = \max\left\{0, \frac{\left[GP_t + DR_t - DT_t + \left(\frac{E}{V}R_e\right)RAB_t + GP_t + CFTL_t\right]t}{1 - t(1-\gamma)}\right\}$$ Equation 14

(Note that this solution cannot be determined directly from Equation 9.)

This solution for tax in period t can then be substituted into Equation 1 to determine the solution for $R_t$.

$$R_t = O_t + DR_t + RAB_t WACC$$

$$+(1-\gamma)\max\left\{0, \frac{\left[GP_t + DR_t - DT_t + \left(\frac{E}{V}R_e\right)RAB_t + CFTL_t\right]t}{1-t(1-\gamma)}\right\} + GP_t \qquad \text{Equation 15}$$

Step 2: Derivation of CPI–X revenue cap

As SPI PowerNet is seeking a five and one quarter year revenue determination, the implementation of the CPI–X revenue cap is somewhat unusual in that the first 15 months are fixed in nominal terms rather than the first twelve. This is actually implemented as two periods: the three-month period 1 January 2003 to 31 March 2003; and the 12-month period 1 April 2003 to 31 March 2004. In each of these periods the revenue cap is set to equal the revenue requirement derived from Equation 15. The remaining four years are then set using a familiar CPI–X mechanism, with the base being the (nominal) revenue cap for the financial year ending 31 March 2004. The X–factor is calculated so that the present value of revenue from Step 1 for the four years subject to CPI–X escalation is the same as the present value of the revenue cap for those same four years. That is, solve for the X–factor that satisfies:

$$\sum_{i=1}^{4} \frac{R_{2004+i}}{(1 + WACC)^i} = \sum_{i=1}^{4} \frac{R^c_{2004+i}}{(1 + WACC)^i} \qquad \text{Equation 16}$$

where $RC_t$ is the revenue cap for the financial year ending 31 March in the year t and is determined as:

$$R^c_t = R_{2004}(1 + CPI)^{t-2004}(1 + X)^{t-2004} \qquad \text{Equation 17}$$

For the purposes of implementing Equation 17, CPI for year t is:

(a) the *Consumer Price Index: All Groups Index Number Average of Eight Capital Cities* published by the Australian Bureau of Statistics for the December Quarter immediately preceding the start of the year t

divided by

(b) the *Consumer Price Index: All Groups Index Number Average of Eight Capital Cities* published by the Australian Bureau of Statistics for the December Quarter immediately preceding the December Quarter referred to in paragraph (a)

minus one.

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