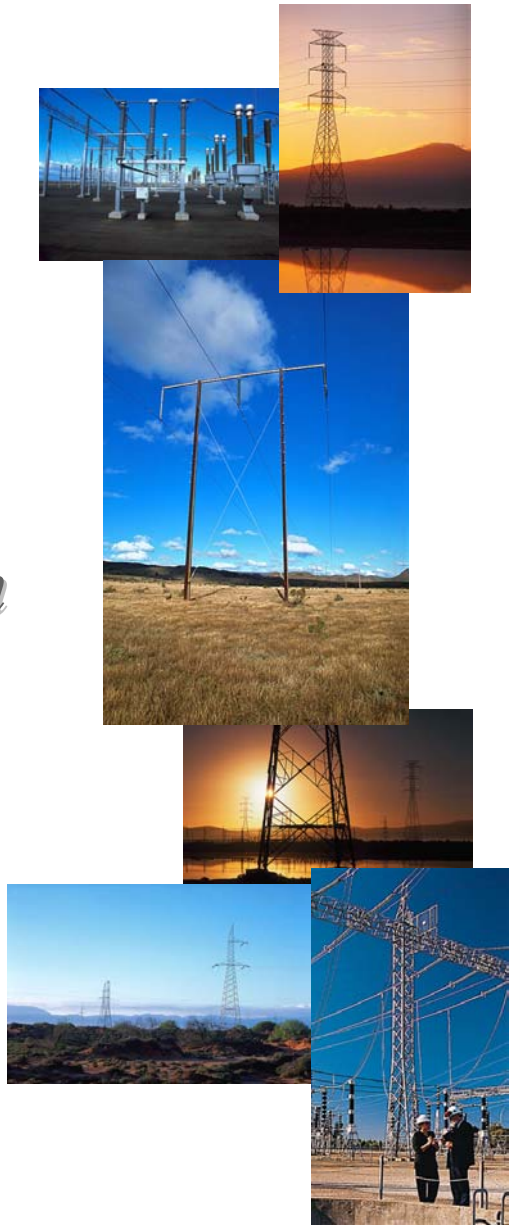
ElectraNet SA



Transmission Network Revenue Cap Application 2003 – 2007/08

16 April 2002

ElectraNet SA
electricity transmission network

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GLOSSARY

ACCC	Australian Competition and Consumer Commission
Capex	Capital Expenditure
CAPM	Capital Asset Pricing Model
COAG	Council of Australian Governments
CPI	Consumer Price Index
Draft Regulatory Principles	Draft Statement of Principles for the Regulation of Transmission Revenues, 27 May 1999
DRC	Depreciated Replacement Cost
DRP	Debt Risk Premium or Debt Margin
EPO	South Australian Electricity Pricing Order
ERSU	South Australian Electricity Reform and Sales Unit
ICRC	Independent Competition and Regulatory Commission (Australian Capital Territory)
IDC	Interest During Construction
IPART	Independent Pricing and Regulatory Tribunal (New South Wales)
ITOMS	International Transmission Operations and Maintenance Benchmarking Study
MAR	Maximum Allowable Revenue
MEAV	Modern Equivalent Asset Valuation
MRP	Market Risk Premium
MNSP	Market Network Service Provider
NEC	National Electricity Code
NECG	Network Economics Consulting Group
NEM	National Electricity Market
NEMMCO	National Market Management Company
NERA	National Economics Research Associates
NPV	Nett Present Value
ODRC	Optimised Depreciated Replacement Cost
Opex	Operating and Maintenance Expenditure
ORG	Office of the Regulator-General (Victoria)
PTRM	ACCC Post-Tax Revenue Model
QCA	Queensland Competition Authority

RAB	Regulatory Asset Base
SAIIR	South Australian Independent Industry Regulator
SKM	Sinclair Knight Merz
TNSP	Transmission Network Service Provider
WACC	Weighted Average Cost of Capital

1. EXECUTIVE SUMMARY

1.1 Introduction

ElectraNet SA operates and maintains South Australia's high-voltage electricity transmission network.

The network connects the State's electricity generators and interconnector with South Australia's 1.5 million end-users of electricity, including households, industry and business, via 5,500 kilometres of transmission lines covering a total area of 200,000 square kilometres.

As such, the network is an integral part of South Australia's economic infrastructure, and its operation and performance over the regulatory period will play a significant role in the future development of the State.

From 1 January 2003, the Australian Competition and Consumer Commission (ACCC) will commence regulation of the non-contestable elements of ElectraNet SA's electricity transmission network in accordance with the National Electricity Code (NEC).

As a result, determination of ElectraNet SA's entire regulated income will rest with the ACCC.

This application sets out ElectraNet SA's total regulated revenue requirement for the five and a half year regulatory period from 1 January 2003 to 30 June 2008 to operate, maintain and upgrade the network to meet forecast growth in customer demand and the performance standards applicable to the transmission network.

1.2 Role of Transmission

ElectraNet SA is the only regulated transmission network service provider operating in South Australia.

The primary function of ElectraNet SA's transmission business is to build, operate and maintain the "electricity transmission highways" that transport electricity from generators and interconnectors to distribution networks and large direct connect customers.

As the backbone of the State's overall electricity system, the transmission network is fundamental to maximising the net economic benefits of the national electricity market to South Australian industry and consumers, and ensuring a secure and reliable supply of electricity.

Therefore, it is critical that the ACCC revenue determination provide ElectraNet SA with sufficient funds to expand, refurbish, maintain and operate the transmission network efficiently and effectively to meet these objectives.

As the submission outlines, the network requires significant investment over the next five-and-a-half years to ensure that development of both the network and the State's electricity system can meet the challenges and opportunities faced by South Australia over the regulatory period and beyond.

The challenges and opportunities over this period include:

- Expanding and upgrading the network to meet higher forecast growth in electricity demand (actual customer demand levels are already 200 to 300 MW higher than was allowed for in the 1999 South Australian Electricity Pricing Order (EPO) and this inevitably requires additional capital investment).
- Developing the network to facilitate new sources of generation, including from renewable energy sources;
- Improving and expanding existing and planned interconnectors;
- Maintaining the network's high performance and reliability levels;
- Replacing and refurbishing network assets that have reached the end of their economic and technical life;
- Minimising transmission costs for end-users despite a number of network characteristics that limit operational efficiencies; and
- Prudently increasing network capacity to remove network constraints and thereby increase competition in the South Australian electricity market for the benefit of end-users of electricity.

1.3 Regulatory Environment and Risk

As the ACCC will determine the regulated network's entire operating and capital expenditure allowance, the revenue review has significant implications for the overall performance of South Australia's electricity system and the social and economic well being of South Australia.

The ACCC *Draft Regulatory Principles* sets out the approach that the ACCC proposed in May 1999, subject to a public review process, to determine a network's maximum allowable revenue in accordance with an accrual building block and forecast costs of service methodology.

At the time of submitting this Application, the *Draft Regulatory Principles* document remains unfinished. The lack of finalisation of this document has created a significant level of uncertainty as to how ElectraNet SA's application will be assessed by the ACCC. This uncertainty and the consequential risks have been highlighted by the ACCC as it has recently commenced reviews on Service Standards, Prescribed Services and ODRC Guidelines, all of which are fundamental to ElectraNet SA's regulated business in which it has an investment of over $1,000 million. Investor risk is therefore exacerbated by the lack of conclusion to the *Draft Regulatory Principles*.

1.4 Application Summary

In preparing this application, ElectraNet SA has undertaken a comprehensive review of its asset management plan and developed detailed plans for network augmentation, asset maintenance, monitoring and refurbishment to ensure that the needs of South Australian electricity users and generators can be met.

While ElectraNet SA's total revenue requirement in this application is built up from a number of building block elements, it is critical to note that the overall submission is framed by a $409 million (in nominal price terms) capital upgrading, refurbishment and expansion program to augment the network and to replace and refurbish ageing network assets.

Capital investment in the network has been minimal in the period prior to privatisation, which means that network capacity is insufficient to meet the projected increases in customer electricity demand, or the demands of new interconnector capacity and renewable energy developments without significant capital investment during the regulatory period.

Some 24 per cent of assets are already more than 40 years old and will reach the end of their technical and economic lives during the regulatory period.

Without a significant program of asset replacement and refurbishment during the regulatory period, equipment failure and supply interruptions will inevitably increase, which in turn will impact on the overall reliability of South Australia's electricity system.

In short, the outcome of this review is critical to the future operation of the network and will underpin the capacity of the State's total electricity system to support the economic development and investment growth predicted for the State.

The costs of the required transmission investment program are justified by the benefits to electricity users, in terms of continued reliability of electricity supply and lower overall electricity costs due to increased competition in the wholesale electricity market.

ElectraNet SA is confident that its proposed investment program – which involves more than 100 separate upgrading and refurbishment projects in both regional and metropolitan areas of the network – will deliver clear customer benefits, both in the short and long term.

Transmission charges presently account for less than 10 per cent of total electricity costs for end-users. Independent studies have shown that the benefits of a strong and reliable transmission grid far outweigh its small relative costs. The investment program proposed by ElectraNet SA would only increase transmission costs to the average South Australian end-user by an estimated 40 cents a week. The benefits of the investment program far outweigh this small increase in transmission costs.

The following provides a summary of the key issues and cost drivers associated with each building block element detailed in the application.

1.4.1 Cost of Capital

The assessment of an adequate rate of return is of critical importance to ElectraNet SA. Regulated rates of return in recent ACCC revenue decisions have been inadequate to provide the necessary incentives for private investment in the transmission network although the economic benefits to consumers and the market of additional prudent investment in the transmission network will far outweigh the relatively small increase in transmission costs involved.

An inadequate rate of return will result in the necessity for ElectraNet SA to critically review its proposed investment program and could result in increased constraints on the grid with corresponding price spikes in the wholesale price of electricity in South Australia.

ElectraNet SA requires a minimum nominal post-tax cost of equity of 13.66% to justify private investment in the transmission network. This rate has been determined using the Capital Asset Pricing Model (CAPM) and parameter values recommended by the Network Economics Consulting Group (NECG). This cost of equity equates to a post-tax nominal WACC of 8.66% and a nominal vanilla WACC (used to calculate the return on capital) of 10.03%. The rate of return is based on the following:

- A nominal risk free rate of 5.90%, based on the 40-day average yield on 10-year Commonwealth Government bonds, as of 4 March 2002;
- A debt margin of 1.72% above the nominal risk free interest rate leading to a nominal pre-tax cost of debt of 7.62%;
- A market risk premium of 6.5%;
- An asset beta of 0.45 and an equity beta of 1.12;
- An increment to the cost of equity capital for asymmetric risk of 0.5%; and
- An imputation factor (gamma) of 0.5.

1.4.2 Opening Asset Base

ElectraNet SA's assets have been valued at $994.4 million as of 1 January 2003 by rolling forward the 1 July 1999 asset base established by the South Australian Government after correcting material errors in that valuation.

The jurisdictional asset valuation contained material errors as it omitted easement and financing costs for most of ElectraNet SA's assets. The opening asset value includes adjustments for these omissions consistent with the treatment in other regulatory decisions made by the ACCC.

Failure to make the necessary adjustments would leave the network significantly undervalued and would not provide ElectraNet SA with "*a sustainable commercial revenue stream*"[1]. Unless these errors are corrected, ElectraNet SA's rate of return would be well below the level required to be fair and reasonable[2].

Any decision by the ACCC that fails to properly address this fundamental issue will cause ElectraNet SA to reassess its position and would likely impact on future investment decisions.

1 National Electricity Code, Clause 6.2.2(b).
2 National Electricity Code, Clause 6.2.4(c).

1.4.3 Capital Expenditure

ElectraNet SA has a projected capital expenditure program of $409 million (in nominal price terms) to meet South Australia's needs over the regulatory period by:

- Meeting independent forecasts of growth in customer demand while adhering to the service standards required by the National Electricity Code and the South Australian Transmission Code (current and forecast customer demand levels are 200 – 300 MW higher than was allowed for in the EPO, and require additional investment);

- Facilitating new interconnector developments that will provide significant benefits to South Australian industry and electricity consumers, including the SNI interconnector and an upgrade to the existing SA-Victorian interconnector (these developments will reduce interconnector constraints and improve the ability to contract for electricity from interstate, thereby increasing competition in the energy market that will put downward pressure on electricity prices in South Australia);

- Augmenting the shared transmission network to accommodate new power station developments in South Australia, including various wind farm developments that are expected to take place in response to the Federal Government's renewable energy policy; and

- Replacing aged and technologically obsolescent assets to ensure the ongoing reliability of the transmission network.

ElectraNet SA has applied a probabilistic methodology to forecasting capital expenditure due to the uncertainties involved in forecasting future developments.

1.4.4 Depreciation

Consistent with the approach previously adopted by the ACCC, ElectraNet SA has made an allowance for "economic depreciation" which offsets straight-line depreciation by the annual inflation effect on the regulated asset base.

On the basis of this approach ElectraNet SA has calculated an allowance for economic depreciation that trends from $13.8 million in 2003/04 to $17.6 million in 2007/08 in nominal price terms.

1.4.5 Operating Expenditure

It is essential that an adequate allowance be made for the ongoing operation, maintenance and refurbishment of the transmission network in order to maintain a secure and reliable transmission network that will meet the needs of South Australian industry and electricity consumers.

In forecasting the required operating and maintenance expenditure for the regulatory period, ElectraNet SA has developed a comprehensive asset management plan with long-term objectives. The plan takes into account

information obtained through leading (early warning) asset indicators, risk assessment and industry benchmarking.

While independent benchmarking demonstrates that ElectraNet SA's operating and maintenance expenditure is low by world standards, it would not be prudent to continue at these low levels during the forthcoming regulatory period. The historic levels of asset maintenance and refurbishment are not sustainable if the long-term reliability of the transmission network is to be safeguarded. It is essential that operating and maintenance expenditures be increased above current levels during the regulatory period to avoid adverse reliability impacts on South Australian industry and electricity consumers.

ElectraNet SA faces increased operating costs in the following areas:

- Increased expenditure on asset refurbishment and network monitoring due to its ageing network and to maintain network reliability, consistent with best practice asset management and expenditure levels of other Australian TNSPs (a looming issue facing South Australia is the large proportion of assets that must be replaced in the next regulatory period and beyond. Some 24% of ElectraNet SA's network assets are already more than 40 years old and will be at the end of their technical and economic life during the regulatory period);

- Higher insurance costs including self-insurance provision to manage uncompensated risks that threaten the ongoing viability of the transmission business in South Australia; and

- Additional obligations under the National Electricity Code to coordinate planning and operation of the transmission network with the National Electricity Market.

1.4.6 Estimated Taxes Payable

Based on the ACCC's benchmark gearing level of 60% and the network's tax depreciation profile, ElectraNet SA's estimated taxes payable trend from $13.3 million in 2003/04 to $17.8 million in 2007/08 in nominal price terms.

The estimated taxes payable are offset in the total revenue requirement by the value of franking credits. A value of 0.5 has been adopted consistent with recent ACCC regulatory decisions.

1.5 Total Revenue Requirement

Using the ACCC's building block approach and the ACCC's approach to modelling capital additions to the regulated asset base, ElectraNet SA has determined that the following revenues are necessary to undertake the major investment program that is required to upgrade and expand the network during the regulatory period, and to fund the ongoing operation of the network. Financial indicators analysis confirms that at least this level of revenue is necessary to provide funding for the required investments without jeopardising the ongoing financial viability of the business and thereby adversely affecting transmission network services in South Australia.

Table 1.1: Summary of ElectraNet SA's MAR, 2003 to 2007/08 ($nominal)

	Jan-Jun 2003 ($m)	2003/04 ($m)	2004/05 ($m)	2005/06 ($m)	2006/07 ($m)	2007/08 ($m)
Return on capital	48.4	99.8	107.4	114.2	121.5	129.0
Return of capital	4.2	13.8	14.7	15.9	16.9	17.6
Operating expenses	36.8	74.2	76.3	78.4	81.5	82.1
Taxes payable	5.5	13.3	14.7	15.8	16.7	17.8
Less franking credits	(2.7)	(6.7)	(7.4)	(7.9)	(8.4)	(8.9)
Unadjusted revenue allowance	92.1	194.5	205.8	216.4	228.3	237.6
Smoothed MAR	**92.1**	**194.5**	**205.0**	**216.0**	**227.6**	**239.9**

Six-month transitional period

The ACCC's approach to introducing capital additions to the regulated asset base is inappropriate given the large capital investment program that must be funded during the regulatory period (refer to Section 9.6). During the review process that follows the submission of this Application, ElectraNet SA intends to propose an alternative approach to the ACCC that is more precise and is revenue neutral in NPV terms.

As the following events are outside of ElectraNet SA's control, it is proposed that pass through adjustments to the MAR be allowed for material costs in relation to the following events, if these costs arise during the regulatory period. No allowance for these events has been made in the total revenue requirement:

- Additional contracted network support services (subject to the outcome of discussions with the ACCC);
- Material increases in ElectraNet SA's operating costs or risk exposures resulting from future NEM or other legislative or regulatory changes;
- A change in the way or rate at which any rates and taxes are imposed on ElectraNet SA;
- Catastrophic events such as bushfires, major earthquakes or terrorist attacks where the cost of these events exceeds either ElectraNet SA's insurance cover and deductible limits or, where insurance is unavailable, the self-insurance provision made in the revenue cap; and
- Changes to service obligations imposed upon ElectraNet SA through changes to the South Australian Transmission Code or the NEC.

A definition of materiality and rules for implementing a pass through amount will be discussed with the ACCC during the review process.

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2. REVENUE CAP APPLICATION

2.1 Introduction

From 1 January 2003, the Australian Competition and Consumer Commission (ACCC) will commence economic regulation of the non-contestable elements of ElectraNet SA's electricity transmission network in accordance with the processes set out in Chapter 6 of the National Electricity Code (NEC).

ElectraNet SA is required to submit a revenue cap application to the ACCC setting out its revenue requirement for the regulatory period based on the elements of the building block approach adopted by the ACCC.

In accordance with this requirement, ElectraNet SA hereby submits its formal revenue cap application.

2.2 Code Requirements

Clause 6.2.2 of the NEC specifies the following objectives of the transmission revenue regulatory regime to be administered by the ACCC.

> *"The transmission revenue regulatory regime to be administered by the ACCC pursuant to this Code must seek to achieve the following outcomes:*
>
> *(a) an efficient and cost-effective regulatory environment;*
>
> *(b) an incentive-based regulatory regime which:*
>
> *(i) provides an equitable allocation between Transmission Network Users and Transmission Network Owners and/or Transmission Network Service Providers (as appropriate) of efficiency gains reasonably expected by the ACCC to be achievable by the Transmission Network Owners and/or Transmission Network Service Providers (as appropriate); and*
>
> *(ii) provides for, on a prospective basis, a sustainable commercial revenue stream which includes a fair and reasonable rate of return to Transmission Network Owners and/or Transmission Network Service Providers (as appropriate) on efficient investment, given efficient operating and maintenance practices of the Transmission Network Owners and/or Transmission Network Service Providers (as appropriate);*
>
> *(c) prevention of monopoly rent extraction by Transmission Network Owners and/or Transmission Network Service Providers (as appropriate);*
>
> *(d) an environment which fosters an efficient level of investment within the transmission sector, and upstream and downstream of the transmission sector;*
>
> *(e) an environment which fosters efficient operating and maintenance practices within the transmission sector;*

(f) an environment which fosters efficient use of existing infrastructure;

(g) reasonable recognition of pre-existing policies of governments regarding transmission asset values, revenue paths and prices;

(h) promotion of competition in upstream and downstream markets and promotion of competition in the provision of network services where economically feasible;

(i) reasonable regulatory accountability through transparency and public disclosure of regulatory processes and the basis of regulatory decisions;

(j) reasonable certainty and consistency over time of the outcomes of regulatory processes, recognising the adaptive capacities of Code Participants in the provision and use of transmission network assets;

(k) reasonable and well defined regulatory discretion which permits an acceptable balancing of the interests of Transmission Network Owners and/or Transmission Network Service Providers (as appropriate), Transmission Network Users and the public interest as required of the ACCC under the provisions of Part IIIA of the Trade Practices Act."

The review of this revenue cap application must seek to achieve these objectives.

2.3 Regulatory Principles

The ACCC published its Draft Statement of Principles for the Regulation of Transmission Revenues on 27 May 1999 (*Draft Regulatory Principles*). This document requires ElectraNet SA to make its formal revenue cap application at least eight months prior to the expiry of the current regulatory period, or in other words by 30 April 2002.

The *Draft Regulatory Principles* document sets out the approach that the ACCC proposed to use, subject to a public review process, to determine a TNSP's maximum allowable revenue in accordance with an accrual building block and forecast costs of service methodology.

The ACCC has demonstrated its application or adoption of some of these principles in its regulatory decisions for other TNSP's including TransGrid, Snowy Mountains and Powerlink. The ACCC has provided further guidance in relation to its regulatory approach by:

- Writing to TNSP's on 27 April 2001 identifying a number of changes to the Draft Regulatory Principles that will be taken into account when considering future revenue cap decisions;
- Publishing on 9 May 2001 a draft *Statement of Regulatory Principles for the Regulation of Transmission Revenues – Information Requirements Guidelines* that, amongst other things, sets out the information that should accompany the TNSP's revenue cap application; and
- Releasing on 25 October 2001 its post-tax revenue model (PTRM), which the ACCC applies in its regulation of Australian utilities.

However, the *Draft Regulatory Principles* document remains unfinished and considerable uncertainty still exists regarding the practical implementation of many of these principles. This factor is significant in adding to the regulatory risk ElectraNet SA faces.

These risks are highlighted by the ACCC recently commencing reviews on Service Standards, Prescribed Services and ODRC Guidelines. While ElectraNet SA welcomes these reviews, this revenue cap application will be submitted before any of these reviews is completed. There are also a number of other significant reviews of the National Electricity Market and NEC underway that could increase ElectraNet SA's risk profile and costs during the forthcoming regulatory period. ElectraNet SA may make a submission to the ACCC on these matters later in this revenue review process when the direction of the reviews may be better known.

These additional regulatory risks must be taken into account in the asymmetric risk factor when determining ElectraNet SA's required cost of capital for this revenue cap determination.

2.4 Regulatory Control Period

ElectraNet SA is making this revenue cap application for a five and a half year regulatory period from 1 January 2003 to 30 June 2008.

The *Draft Regulatory Principles* requires the regulatory period to be a minimum of five years. However, the application is based on a five and a half year period in order to align the regulatory period with the Australian financial year, with the first six months from 1 January to 30 June 2003 being treated as a transition period.

Alignment with the financial year will simplify, and provide consistency with, the reporting and forecasting processes outlined in the ACCC's draft *Statement of Regulatory Principles for the Regulation of Transmission Revenues – Information Requirements Guidelines,* and will thereby avoid duplication and help to minimise regulatory reporting costs.

2.5 Regulatory Compact

The *Draft Regulatory Principles* states that:

> *"Effective incentive-based regulation will include an explicit level of service, for which the TNSP has been provided by the regulator with sufficient income to maintain the assets necessary to provide that level of service".*

ElectraNet SA's revenue cap application is based on the service levels set out in Chapter 11 of this application. Growth in customer electricity demand that exceeds these levels has not been taken into account in determining the total revenue requirement and is, therefore, excluded from the regulatory compact.

Should customers require higher levels of service than those agreed in the regulatory compact then ElectraNet SA would require additional revenue compensation for providing these higher levels of service.

2.6 Structure of this Document

The remainder of this application broadly follows the structure inherent in the ACCC's building block approach to transmission revenue determinations.

- Chapter 3 provides a description of ElectraNet SA's business characteristics and an introduction to some of the key cost drivers underlying its total revenue requirement;
- Chapter 4 sets out ElectraNet SA's required weighted average cost of capital (WACC);
- Chapter 5 sets out ElectraNet SA's opening asset base as at 1 January 2003;
- Chapter 6 determines the projected future capital expenditure requirements of the transmission network;
- Chapter 7 describes ElectraNet SA's approach to depreciation of the regulatory asset base;
- Chapter 8 determines ElectraNet SA's projected future requirements for operating and maintenance expenditure;
- Chapter 9 sets out ElectraNet SA's total revenue requirement and includes a summary on each building block component;
- Chapter 10 sets out relevant financial indicator analysis for the regulatory period; and
- Chapter 11 sets out the service standards proposed by ElectraNet SA that are appropriate and consistent with the required revenue cap.

3. BUSINESS CHARACTERISTICS AND ISSUES

3.1 Synopsis

ElectraNet SA is the only regulated transmission network service provider operating in South Australia and operates and maintains South Australia's entire regulated high voltage transmission network.

This chapter describes ElectraNet SA's regulated transmission business and highlights the key cost drivers and challenges facing the business. A number of key points are summarised below:

- The primary function of ElectraNet SA's transmission business is to build, operate and maintain the "electricity highways" that transport electricity from generators and interconnectors to the distribution networks and directly connected customers.

- Unlike other TNSPs, ElectraNet SA has to comply with the requirements of the South Australian Transmission Code in addition to the National Electricity Code (NEC), with the State Code being more prescriptive on the need to augment the transmission network and maintain a high standard of reliability.

- The economics of the transmission network are driven primarily by the required transport capacity and the distances involved. The required transport capacity is a function of customer electricity demand and the service standard requirements of the NEC and the South Australian Transmission Code.

- There has been minimal investment in the transmission network in the period prior to privatisation, which means that network capacity is insufficient to meet the projected increases in customer electricity demand, or the demands of new interconnector capacity and renewable energy developments without significant capital investment during the regulatory period. Many parts of the transmission network are already close to being fully utilised and major investment is now necessary to develop the required network capacity.

- The South Australian transmission network is small in an industry dominated by economies of scale and operates in an unfavourable operating environment characterised by long distances, low load factor and low energy density (which all impact on asset productivity). South Australia's "electricity highways" are longer and more lightly loaded than in other states due to a larger geographical spread and smaller customer base. When these unique features of the operating environment in South Australia are taken into account, total transmission service costs compare favourably with those in other states.

- In addition, independent benchmarking shows that operating and maintenance costs (unit rates) are efficient and compare very favourably with other network service providers in Australia and overseas.

- A looming issue facing South Australia is the large proportion of assets that must be replaced or refurbished during the regulatory period. Some 24% of network assets are already more than 40 years old. ElectraNet SA has performed a risk assessment on key network assets and developed an asset management plan including sufficient asset refurbishment and asset

replacement during the regulatory period to ensure the ongoing reliability of the transmission network as required by South Australian electricity users and the National and State Electricity Codes.

- South Australia is on the verge of developing a major wind generation industry in response to the Federal Government's Renewable Energy Policy, which will be of National and State importance. Because of the remote nature of the prevailing wind resources, significant developments are required to the shared transmission network to support this new industry. ElectraNet SA has allowed for these developments in its forecast capital investment program (connection assets are not included), but requires a revenue cap that will provide a fair and reasonable return on these investments if these renewable energy initiatives are to proceed.

3.2 Ownership Structure

ElectraNet SA is a privately owned company that on 31 October 2000 acquired the South Australian transmission network through a long-term Government lease. The new owners and operators of ElectraNet Pty Ltd (trading as ElectraNet SA) are a consortium group of companies comprising:

- Harold Street Holdings Pty Ltd (an investment company of Powerlink Queensland);
- YTL Power Investments Ltd (an investment company of YTL Power International Berhad);
- ABB Net SA Pty Ltd (an investment company of ABB Group Holdings Pty Ltd);
- Macquarie Specialised Asset Management Limited (on behalf of UniSuper); and
- National Australia Trustees Limited (on behalf of EquipSuper).

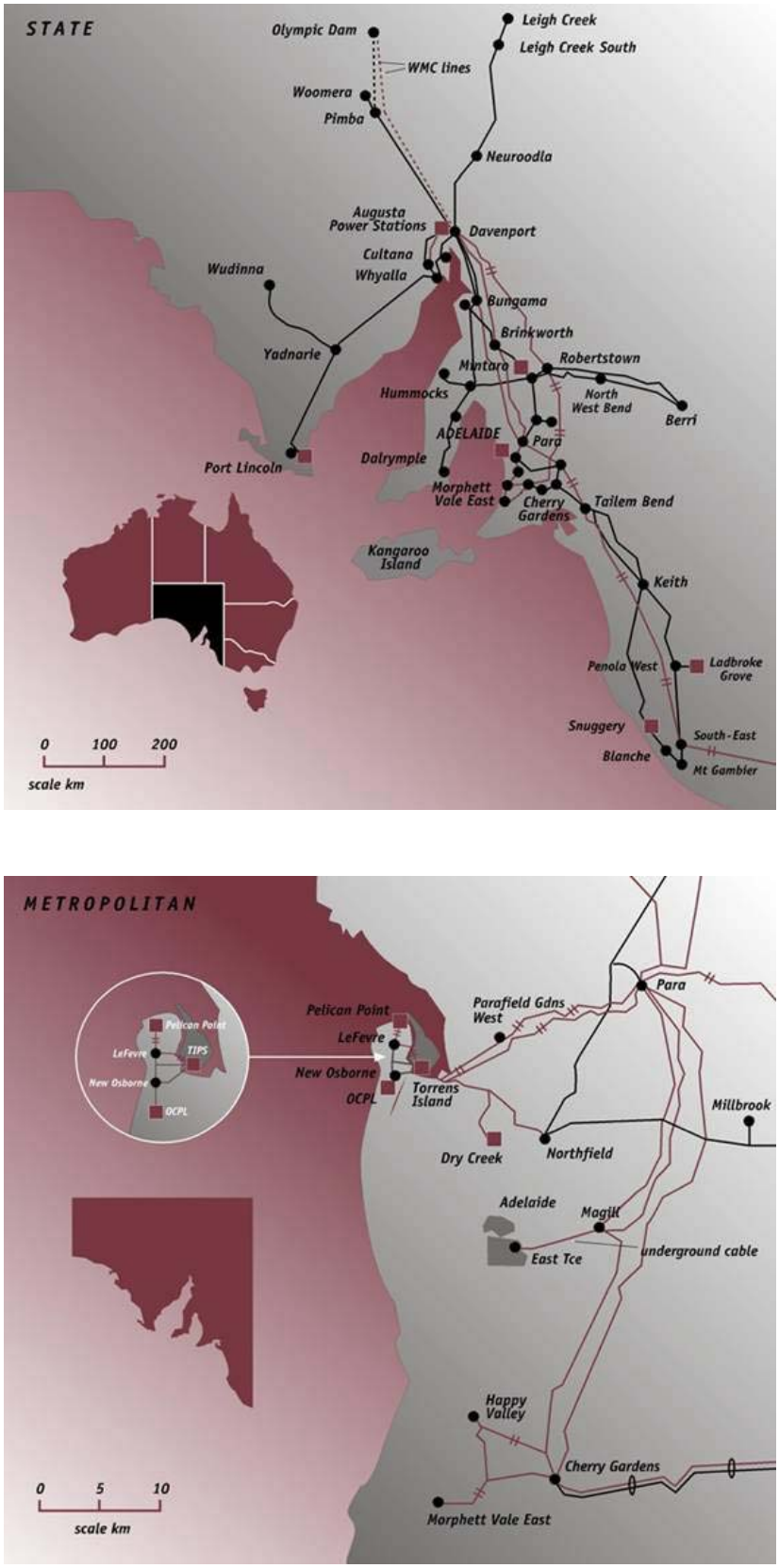
3.3 Description of Transmission Network

3.3.1 Overview

The South Australian transmission network forms a spine connecting the major load centre of metropolitan Adelaide with the two largest sources of generation in South Australia at Port Augusta and Torrens Island and generators in the eastern states via the SA-Victorian interconnector. Transmission from the main network to country areas of South Australia is characterised by long, generally radial 132 kV lines – a characteristic that differentiates the South Australian transmission network from those interstate. The transmission network is illustrated in Figure 3.1.

The main transmission network extends for more than 1,000 km from the Victorian border near Mount Gambier in the State's south east to Port Lincoln on the Eyre Peninsula. In addition there are significant radial extensions of over 200 km each from the main network to Leigh Creek in the State's north, the York Peninsula and the Riverland.

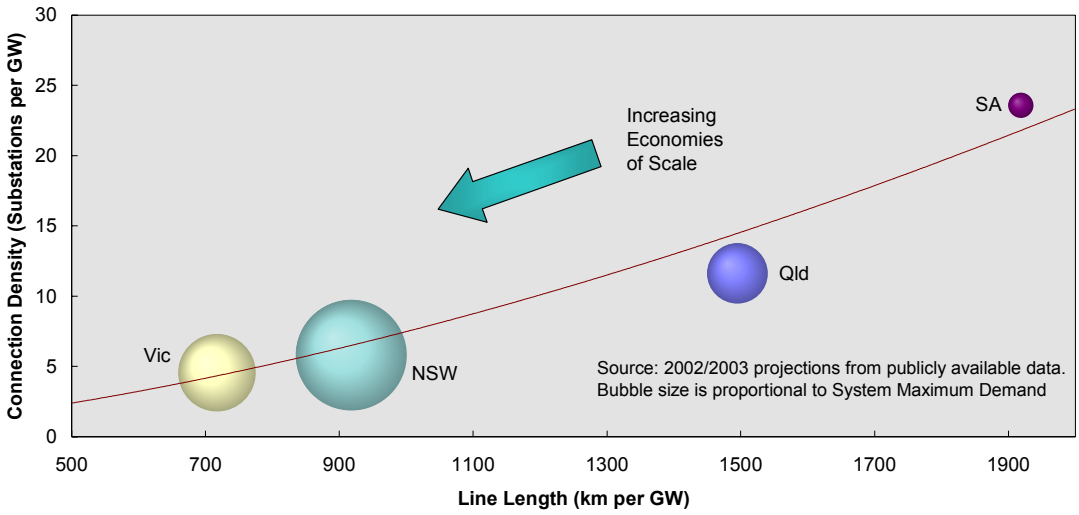
Figure 3.1: ElectraNet SA Transmission Network as of 30 June 2001



Because of its geographical size and relatively smaller and decentralised population, South Australia's transmission network is spread more widely than other states. The decentralised nature of the system limits the potential for economies of scale, while increasing the cost of maintaining and upgrading the network to meet electricity demand across the state and, in particular, remote regional areas.

Figure 3.2 compares the South Australian transmission network with those of other states on the basis of two economy of scale measures, transmission line length and connection point density. The figure shows that in South Australia relatively longer lines and higher numbers of smaller connection points are required to provide the same level of service to customers, leading to significant diseconomies of scale.

Figure 3.2: Economies of Scale Comparisons



3.3.2 Transmission Lines

The ElectraNet SA transmission network consists of 5,576 circuit kilometres of transmission lines that operate at nominal voltages of 275 kV, 132 kV and 66 kV[3].

The lengths of lines for each voltage are given in Table 3.1.

Table 3.1: Circuit Kilometers of Line

Voltage	Overhead Lines (Circuit km)	Underground Cables (Circuit km)
275 kV	2,563	7.6
132 kV	2,989	-
66 kV	14	2.5
Total	**5,566**	**10.1**

[3] As of 30 June 2001.

3.3.3 Substations

ElectraNet SA operates and maintains 68 substations, which include 6,102 MVA of installed transformer capacity[4]. ElectraNet SA's substation assets are summarised by voltage level in Table 3.2.

Table 3.2: Summary of Substation Assets

Voltage	Number of Substations	Circuit Breakers[5]	Transformers	
			Number	MVA
275 kV	20	142	34	4,833
132 kV	46	169	84	1,269
66 kV	2	71	0	0
Total	**68**	**382**	**118**	**6,102**

3.3.4 Operations Control Centre

ElectraNet SA operates and maintains a single Operations Control Centre with transmission network control and data acquisition facilities to monitor system conditions at substations and control equipment in the network.

The Centre provides continuous real time operational control of the South Australian transmission system.

Like other TNSPs, an unmanned Back-up Control Centre is maintained to provide the necessary security and reliability of this important function.

3.4 Customers

ElectraNet SA's customers, comprising the South Australian distributor ETSA Utilities and a number of generators and loads directly connected to the transmission network, are summarised in Table 3.3.

Table 3.3: Summary of ElectraNet SA's Customers

Customer Type	No. of Customers	No. of Connection Points
Distributors	1	82
Generators	6	32
Direct Connect Loads	7	19
Total	**14**	**133**

ElectraNet SA has legally binding and enforceable connection agreements with its customers that, amongst other things, require ElectraNet SA to abide by and comply

[4] As of 30 June 2001.
[5] Circuit breakers may not be located in substations of the same voltage.

with both the National Electricity Code and the more prescriptive South Australian Transmission Code. The connection agreements set out the specific terms and conditions that have been agreed for the provision of connection and transmission network services.

The service quantities required by the customer at each connection point are specified in the connection agreement in the form of an Agreed Maximum Demand (kW or MW).

The customer Agreed Maximum Demand and agreed level of service reliability at each connection point determine the required capacity of the ElectraNet SA transmission network. This is a requirement of the SA Transmission Code and creates additional obligations on ElectraNet SA to augment and maintain its regulated transmission network in order to reliably meet customer needs.

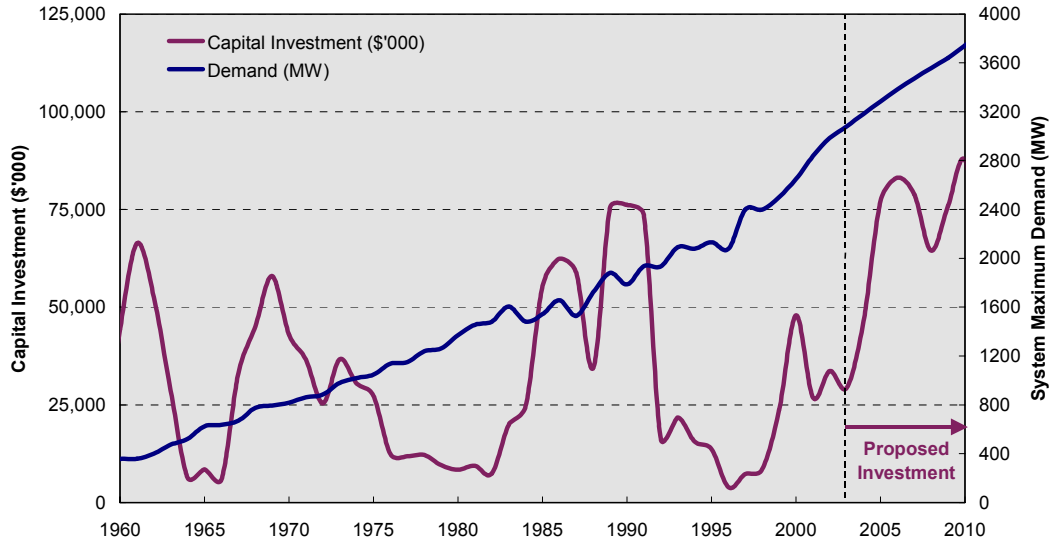
3.5 Customer Maximum Demand – Principal Cost Driver

As noted earlier in this chapter, the primary function of ElectraNet SA's transmission business is to build, operate and maintain the "electricity highways" that transport electricity from generators and interconnectors to the distribution networks and directly connected customers.

The principal driver for investment in the transmission network is growth in electricity demand, which has been rising steadily. The customer demand levels on which this application is based are 200 – 300 MW higher than was allowed for in the 1999 South Australian Electricity Pricing Order (EPO). The allowable capital investment program explicitly excluded augmentations of the interconnectors and the CBD and regional networks, which are now urgently required.

Figure 3.3 shows that there has been minimal investment in the transmission network during the years prior to privatisation and that investment has not kept pace with growth in electricity demand. Consequently, any spare capacity to meet growth in maximum demand is now close to being fully utilised in many parts of the network and major investment is now required to develop the capacity to meet demand forecasts.

Figure 3.3: Capital Investment and Growth in Electricity Demand



Investment in transmission networks tends to be lumpy because efficient network investment is generally sized to accommodate forecast growth in electricity demand for up to 10 years in advance. This helps to explain the observed cyclic nature of network development. All the evidence confirms that South Australia's next cycle of network investment must now be committed.

3.6 Prescriptive Service Standards

The Transmission Code imposes prescriptive and legally binding service obligations on ElectraNet SA in addition to those imposed by the National Electricity Code – a factor that differentiates ElectraNet SA from TNSPs interstate.

ElectraNet SA is required to plan and develop its transmission system to meet the standards of reliability set out for each exit point or group of exit points in Section 2.2.2 of the Transmission Code.

Each exit point or group of exit points is allocated to one of five categories with each category having a specific reliability standard. The reliability standards are specified in terms of limiting the amount of Agreed Maximum Demand for which ElectraNet SA may contract with customers at the exit point or group of exit points under normal operating conditions, and the amount of line and/or transformer capacity which ElectraNet SA must provide against contingencies. These service standards also drive the spares that ElectraNet SA is required to keep and specify minimum times for restoring transmission outages.

The capacity of exit points, and when necessary, the transmission network must be augmented as load growth takes place or when customers request increases in Agreed Maximum Demands that would result in the mandated reliability standards no longer being met.

In the case of contingency capacity, ElectraNet SA is required to consider providing the necessary capacity by alternative means such as contracting for distribution system capability, generating unit capability and load interruptibility. ElectraNet SA actively considers these options and currently has in place network support arrangements with local generators and ETSA Utilities (the local distributor) at a number of locations. Clause 5.6.3 of the NEC requires that network support costs be included in the TNSPs regulated revenue. The costs of these existing network support arrangements were not adequately provided for in the EPO and this must be corrected in the current revenue cap determination.

Customer Agreed Maximum Demands and the Transmission Code exit point reliability standards are the principal drivers for the required capacity of the transmission network and hence ElectraNet SA's capital and operating and maintenance expenditure. ElectraNet SA has a statutory and contractual obligation to make these investments, whereas other TNSPs may have the option of using probabilistic planning to defer investments.

3.7 Maintaining a Reliable Transmission Network

The age profile of ElectraNet SA's transmission network assets is shown in Figure 3.4. The figure shows that at the commencement of the regulatory period 24% of ElectraNet SA's network assets are more than 40 years old and that this

percentage would increase to 30% unless significant investment is made during the regulatory period.

A high proportion of transmission network assets will reach the end of their technical and economic lives during the regulatory period and provision must be made to replace these assets.

The figure also shows that 50% of network assets will be more than 30 years old by the end of the regulatory period. These older assets will require increased expenditure on condition monitoring, remnant life assessment, refurbishment and life extension.

Figure 3.4 (a): Network Assets Age Profile

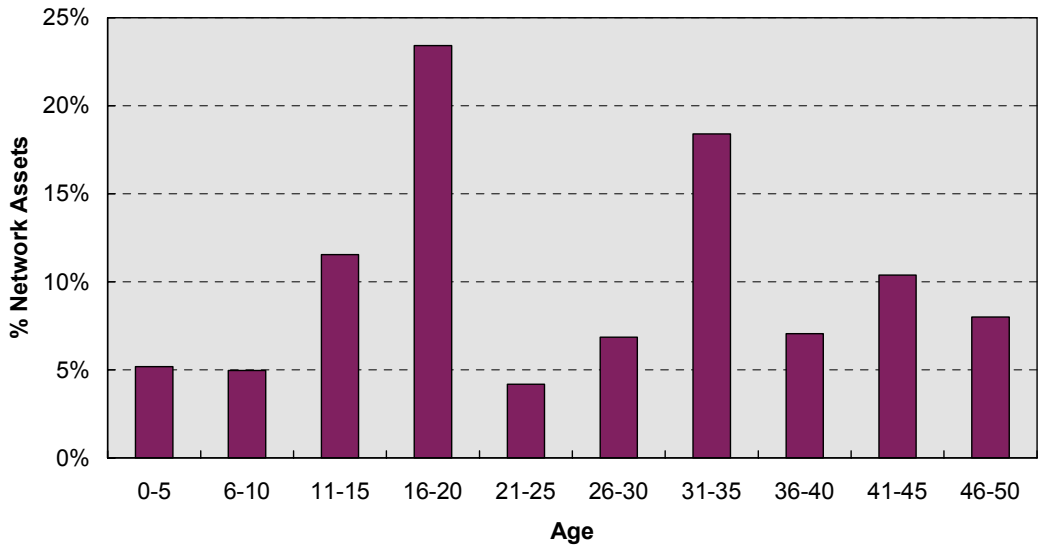
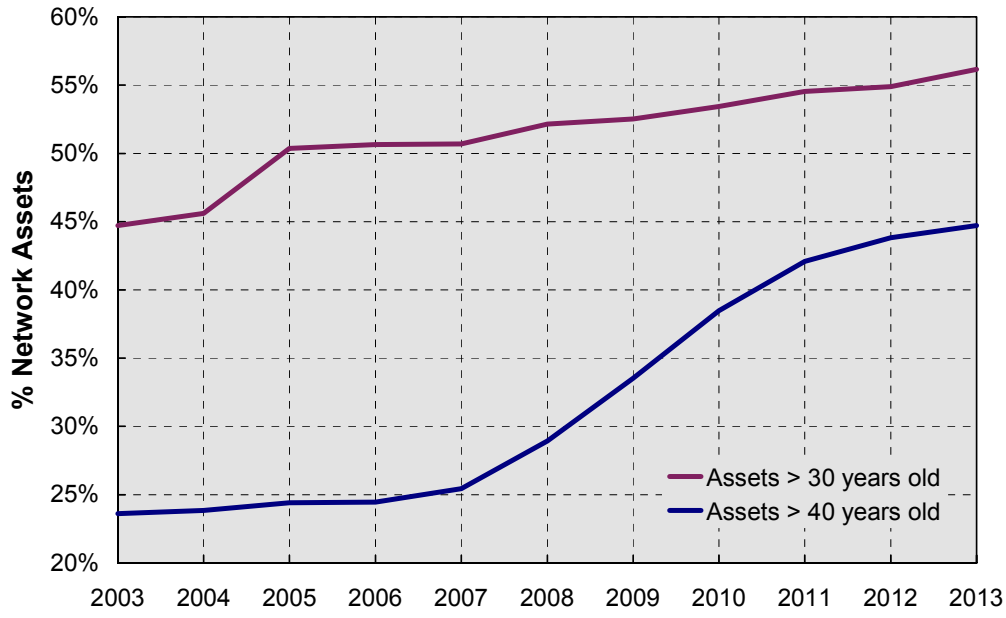


Figure 3.4 (b): Network Assets Age Profile



The number of assets reaching the end of their economic life is a looming issue of crisis proportions and will require substantial investments in the next regulatory period and beyond.

ElectraNet SA has performed a risk assessment on key network assets and developed an asset management plan that increases expenditure on asset refurbishment and asset replacement to more sustainable levels to ensure the long-term reliability of the transmission network as required by the National and State Electricity Codes.

Failure to increase expenditure in these areas during the regulatory period will have a detrimental impact on future transmission network reliability and increase the risk of not being able to meet statutory reliability standards.

The South Australian Independent Industry Regulator (SAIIR) commented publicly in February 2001 on the effect that cost-cutting, "*a decade of neglect*" and significant State Government cash withdrawals have had on South Australia's electricity networks and noted that the level of spending included in the South Australian Electricity Pricing Order was far below what is necessary[6].

3.8 Transmission Cost Comparisons

South Australia's total transmission service costs compare favourably with those in other states when the unique features of the operating environment in South Australia are taken into account.

The importance of identifying the impact of operating environment on costs cannot be stressed too greatly if benchmarks are to provide credible performance comparisons. In a recently released Staff Paper on cost factors in electricity prices, the Productivity Commission observed that:

> *"The usefulness of benchmarking as a guide to relative performance depends critically on an ability to compare like with like, or to make allowance for differences in operating environment that may be outside a utility's control"*[7]

Factors such as network topology, asset age profile, load factor, energy density, economies of scale, state regulatory frameworks and other factors beyond the control of the network owner must be taken into account when comparing overall TNSP performance.

The South Australian transmission network is small in an industry dominated by economies of scale and operates in an unfavourable operating environment characterised by long distances, low load factor and low energy density (which all impact on asset productivity).

It was shown earlier in Figure 3.2 that South Australia requires longer lines and higher numbers of smaller connection points to provide the same level of service to customers, leading to significant diseconomies of scale and consequently higher relative transmission costs when compared to other states.

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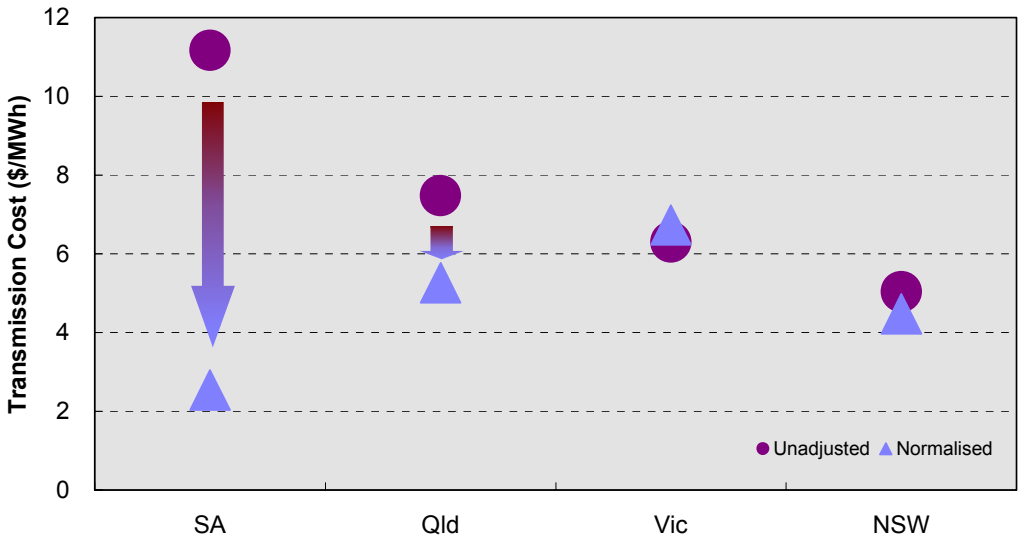
6 Power Industry News, Edition 230, 12 February 2001.

7 Sayers, C. and Shields, D. 2001, *Electricity Prices and Cost Factors,* Productivity Commission Staff Research Paper, AusInfo, Canberra, August.

Figure 3.5 shows that when these two factors are taken into account by normalising for transmission line length and connection point density, South Australia's total transmission service costs are actually lower than those of other states.

Figure 3.5: Comparison of Total Transmission Service Costs (energy based)



Another significant factor that results in South Australia having higher per unit transmission costs is that interconnector assets represent a larger proportion of the transmission network than in other states of the NEM. The existing SA-Victorian interconnector makes up approximately 20% of ElectraNet SA's asset base and a similar proportion of capital expenditure is proposed during the regulatory period to increase interconnector capacity. The savings to customers from increased competition and lower wholesale electricity prices more than justify this element of South Australia's higher transmission costs.

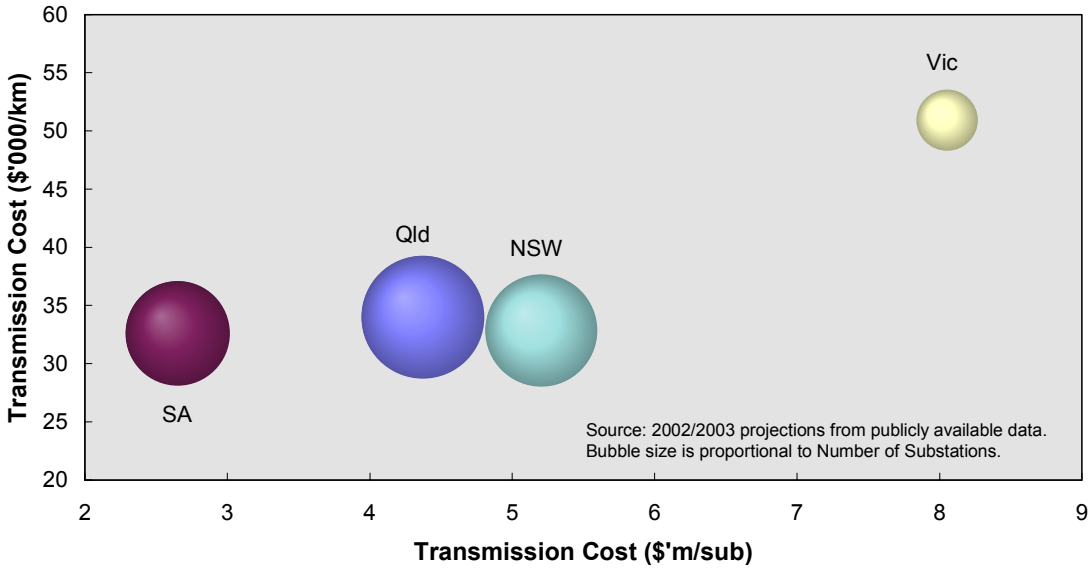
Figure 3.6 compares total transmission service costs on the basis of each km of transmission line and each substation in service. On this basis, transmission charges in South Australia are lower than in other states.

Independent benchmarking of ElectraNet SA's detailed operating and maintenance costs confirms that unit rates are efficient and compare very favourably with other network service providers in Australia and overseas.

A number of significant reforms have been made to the company's operations including the competitive outsourcing of 60% of the company's total operating and maintenance spending, as well as other significant business cost reductions. Service contracts are best practice and include key performance indicators and financial incentives for service providers to improve efficiency.

ElectraNet SA is a top cost efficient performer in international transmission performance benchmarking.

Figure 3.6: Comparison of Total Transmission Service Costs (asset based)



3.9 Non-Regulated Business Activities

Approximately 97% of ElectraNet SA's total revenue is derived from the provision of regulated transmission services.

Even though non-regulated business activities are immaterial in the overall context of the business, these costs have been separately identified and excluded from this Application. There is, therefore, no cross subsidisation between the regulated and non-regulated parts of the business.

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4. COST OF CAPITAL

4.1 Synopsis

This chapter sets out the regulated rate of return that ElectraNet SA requires on efficient capital investment. Clause 6.2.2(b)(2) of the National Electricity Code requires the ACCC to set a fair and reasonable rate of return as one of the objectives of its economic regulation of TNSPs.

The return on capital on prudent investment is a significant component of ElectraNet SA's total revenue requirement and relatively small reductions in the rate of return can have a material and adverse impact on the business and its financial viability.

The assessment of an adequate rate of return is of critical importance to ElectraNet SA. Regulated rates of return in recent ACCC decisions have been inadequate to provide the necessary incentives for private investment in the transmission network. Failure to provide an adequate return, from an investor's viewpoint, will deny customers the economic benefits of additional prudent investment, as discretionary investments are unlikely to be economically justifiable.

An inadequate rate of return will result in the necessity for ElectraNet SA to critically review its proposed investment program and could increase the likelihood of periods of constrained access to the grid and corresponding price spikes in the wholesale price of electricity.

A nominal post-tax cost of equity of 13.66% has been determined for ElectraNet SA using the Capital Asset Pricing Model (CAPM) and parameter values determined by the Network Economics Consulting Group (NECG). This cost of equity equates to a post-tax nominal WACC of 8.66% and a nominal vanilla WACC (used to calculate the return on capital) of 10.03%. The rate of return is based on the following:

- A nominal risk free rate of 5.90%, based on the 40-day average yield on 10 year Commonwealth Government bonds, as of 4 March 2002;
- A debt margin of 1.72% above the nominal risk free interest rate leading to a nominal pre-tax cost of debt of 7.62%;
- A market risk premium of 6.5%;
- An asset beta of 0.45 and an equity beta of 1.12;
- An increment to the cost of equity capital for asymmetric risk of 0.5%; and
- An imputation factor (gamma) of 0.5.

4.2 Incentives for Investment

Much has been said and written in recent times concerning the impact of inadequate rates of return on incentives for efficient investment in regulated infrastructure

facilities. In submissions to the Productivity Commission Review of the National Access Regime the point was made that[8]:

> *"there is an asymmetry in the consequences of over- and under-compensating investors in essential infrastructure facilities. Regulators effectively face a choice between:*
>
> - *Erring on the side of lower access prices, presumably so as to ensure the removal of any potential for monopoly rents and of the consequent allocative inefficiencies, from the system; or*
> - *Allowing higher access prices so as to ensure that sufficient incentives for efficient investment are retained, with the consequent productive and dynamic efficiencies such investment engenders.*
>
> *The dynamic and productive efficiency costs associated with distorted investment incentives and with slower growth in productivity are almost always likely to outweigh any allocative efficiency losses associated with above-cost pricing. The Commission accepted these important points*[9]*."*

ElectraNet SA strongly supports the point of view that the lower pool price and reliability benefits of additional prudent investment in the transmission network will far outweigh the additional transmission costs involved.

ElectraNet SA requires a fair regulated rate of return, which realistically provides sufficient incentives for further investment in the transmission network. Regulated rates of return in recent ACCC decisions have been inadequate to provide the required incentives for private investment in the transmission network.

In a recent speech, ACCC Chairman Professor Allan Fels referred to a study undertaken for the ACCC by National Economics Research Associates (NERA) to compare Australian regulated rates of return in the gas and electricity transmission and distribution industries with those in North America and the United Kingdom, and stated that:

> *"In assessing its findings, NERA concluded that there was little evidence from the decisions surveyed that Australian regulators are offering lower investment incentives than in North America and the UK and there were reasons to suggest that Australian regulatory decisions may be relatively more generous than is implied through a simple comparison of declared rates of return across jurisdictions"*[10]*.*

The NERA report wrongly creates the impression that Australian regulators are being generous, if not overly generous, to investors, when compared with counterparts in the UK and North America. A subsequent review of the NERA analysis by the Network Economics and Consulting Group (NECG) found that the NERA conclusions are flawed because of three key failings in the analysis:

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8 Joint Industry Submission on the Productivity Commission's Review of the National Access Regime prepared by the Network Economics Consulting Group, 5 June 2001

9 Productivity Commission's Position Paper on the Review of the National Access Regime, 29 March 2001

10 "Efficient energy markets: The ACCC, competition and regulatory issues", Speech to Inaugural Conference of Energy User's Association of Australia by Professor Allan Fels, Chairman of the ACCC on 19 November 2001.

- *"Selectivity and bias in the sample of UK regulatory decisions that are examined, which serves to misrepresent UK experience as being consistent with a set of relatively harsh cost of capital determinations;*

- *Omission of any analysis in differences in country-specific risks, which we believe can fully account for the apparent differentials in allowed rates of return across the three jurisdictions (UK, USA and Australia); and*

- *Omission of any detailed discussion of differences in the three regulatory regimes, the impact of those differences being to expose utilities in Australia to greater risk than their counterparts in the UK and US.*[11]*"*

In order to maximise the benefits to market participants and consumers, it is essential that ElectraNet SA receive a regulated rate of return, which realistically provides sufficient incentives for prudent investment in the transmission network.

Clearly the provision of an inadequate rate of return will result in the necessity for ElectraNet SA to critically review its proposed investment program and could result in an increased likelihood of periods of constrained access to the grid and corresponding price spikes in wholesale price of electricity.

4.3 Approach to WACC

Consistent with its *Draft Regulatory Principles*, the ACCC has in recent revenue decisions adopted a post-tax nominal framework for determining the weighted average cost of capital.

The resulting cash flow modelling approach removes the parameters relating to business income tax from the WACC formula and explicitly models the impact of tax and franking credits in the cash flows. The remaining WACC formula, known as the vanilla WACC, simply becomes the weighted average of the gross post-tax returns on debt and equity.

ElectraNet SA shares the misgivings expressed by others concerning the ACCC's post-tax approach and maintains that a pre-tax method as adopted under the existing South Australian regulatory regime is more consistent with achieving the objectives of incentive regulation.

Incentive regulation has two primary objectives:

- To encourage the business to seek to maximise its financial return by best practice management of its regulated business; and

- To encourage the regulated business to make further productivity gains that can ultimately benefit customers in subsequent revenue resets.

The post-tax approach does not support the achievement of the latter objective because:

[11] "International comparisons of rates of return, Comment on NERA report", paper prepared by Network Economics Consulting Group (NECG), 18 July 2001.

- It controls revenue by regulating post-tax profit thereby minimising incentives for the business to achieve further productivity gains and to minimise tax liabilities; and

- It involves a higher degree of regulatory intrusion and scrutiny over business costs (inputs) rather than focussing on outcomes such as prices, performance standards and customer satisfaction. This reduces the flexibility available to the business to conduct its operations as well as increasing "regulatory" costs.

Despite ElectraNet SA's strong preference for a pre-tax approach, we recognise that the ACCC is unlikely to change its position on this issue, as demonstrated by previous revenue determinations. Therefore, this Application sets out ElectraNet SA's total revenue requirement on the basis of using the ACCC's post-tax nominal approach.

In this approach, the return on capital is derived from the nominal vanilla WACC, which is defined as:

$$WACC = r_e (E/V) + r_d (D/V)$$

where:

r_e = cost of equity capital;

r_d = cost of debt capital;

E/V = equity proportion; and

D/V = debt funding proportion.

NECG has prepared a submission for the ACCC on the appropriate WACC that ElectraNet SA should be allowed to earn on its regulated transmission assets. The results of the NECG analysis are summarised in the remainder of this chapter. However, more detailed analysis and supporting arguments are contained in the NECG submission, which forms part of and should be read with this Application[12].

4.4 Cost of Equity Capital

The cost of equity for ElectraNet SA has been estimated using the Capital Asset Pricing Model (CAPM) formula:

$$r_e = r_f + \beta_e (r_m - r_f)$$

where:

r_f = the nominal risk free rate of return;

$(r_m - r_f)$ = the market risk premium (MRP) which is the return of the market as a whole less the risk free rate; and

[12] "Analysis of weighted average cost of capital for ElectraNet SA", Submission to the ACCC by Network Economics Consulting Group, 11 April 2002.

β_e = the equity beta which represents the systematic risk of ElectraNet SA's equity.

4.4.1 Risk Free Rate of Return

The risk free rate of return is generally derived from government bond rates. The major regulatory issue with the risk free rate is the appropriate bond maturity that should be used. The bond maturity in the CAPM should reflect the decision that an efficient firm would reach in choosing its capital structure.

Consistent with this consideration and the long lives of transmission assets, the appropriate bond maturity for the business is the 10-year Commonwealth Government bond, which is the most liquid long dated bond available.

The ACCC has in recent decisions adopted the 5-year bond as a proxy for the risk free rate. The ACCC has provided a number of arguments in support of its position. In its Powerlink decision the ACCC notes that setting the bond maturity equal to the regulatory period minimises expectation errors and is appropriate for the one period nature of the CAPM. The ACCC has also argued that regular review of investments by investors also warrants the use of a shorter bond rate.

However, the ACCC's position as set out in its Powerlink draft and final decisions is misguided for a number of reasons:

- the expected returns of asset owners will only correspond to 'estimated rates' where it is efficient to alter financing to be consistent with the regulatory decision. Given the transaction costs in re-issuing debt and the long lived nature of infrastructure assets, short term financing is likely to increase overall costs to the company;

- although it is correct that the CAPM is a single-period model, the model provides no guidance on the appropriate length of that period. There is nothing in CAPM that supports using the regulatory period. A longer period is supported by the observation that three-quarters of the Net Present Value (NPV) of a regulated business is in future regulatory periods, namely the terminal valuation in an NPV calculation of regulated revenue streams; and

- the frequency of trading in a stock is irrelevant in relation to efficient financing. The idea that because investors regularly review investment decisions, a short bond rate is appropriate is without foundation. The aim of the regulatory regime should be to send the appropriate signal for new investment in the transmission network (i.e. long-term infrastructure assets), which suggests the use of a long-term bond rate.

About 95% of ElectraNet SA's assets are in transmission lines and substations. These have lives of up to 55 years and average remaining useful lives of well over 20 years. Matching debt maturity with asset maturity suggests use of a long trading bond of similar length.

The NECG submission provides further detailed argument for why a 5-year bond rate is inappropriate. We also point out that the ACCC is out of step

with the approach taken by other regulators on this issue. The ORG, IPART, ICRC and QCA have consistently applied the principles in the National Electricity Code and used the 10-year bond to derive the risk free rate in electricity decisions. UK regulators consistently base the risk free rate on bonds with long maturities. A similar position exists with respect to other regulated industries in Australia where all other regulators have based the risk free rate for regulatory decisions on the 10-year bond.

Prior to its Powerlink decision, the ACCC set the risk free rate for TransGrid based on the 10-year bond. However, in its Powerlink decision, the ACCC changed its stance on this issue, noting that its position set out in its TransGrid decision "*did not reflect the final position of the Commission*"[13].

The inconsistency of the ACCC's stance on the risk free rate, in relation to its own and other regulatory decisions sends confusing signals to infrastructure industries and thereby can only increase regulatory risk. This will have negative implications for investment in all regulated industries, not just those regulated by the ACCC.

To summarise, the use of a bond rate consistent with asset maturities will best reflect efficient financing behaviour for ElectraNet SA. Given this and the precedent set by all regulators other than the ACCC for a 10-year bond rate, the 10-year Commonwealth bond is the appropriate bond rate to use at this time. Consistent with the ACCC's approach on averaging we have adopted a 40-day average of this bond.

ElectraNet SA proposes a nominal risk free rate of 5.90%, given by the 40-day average yield on 10-year Commonwealth Government bonds, as of 4 March 2002.

The use of the capital asset pricing model to determine the cost of equity exposes ElectraNet SA to significant interest rate risk in relation to funding its capital investment program during the regulatory period. This risk management issue is discussed in the following section.

4.4.2 Interest Rate Risk on New Investment

The use of the capital asset pricing model to determine the cost of equity exposes ElectraNet SA to significant interest rate risk in relation to funding of its capital investment program during the regulatory period. ElectraNet SA's investment program of $409 million (in nominal price terms) is a weighted average outcome of a probabilistic assessment of customer needs (refer to Chapter 6). The extent of actual investment is therefore inherently uncertain. The investment program represents a large proportional exposure in relation to the company's total net assets that are expected to grow by over 35% during the regulatory period.

Figures 4.1 and 4.2 demonstrate how the yield on Commonwealth bonds, which is used as a proxy for the risk free rate of return, has varied over time. At the present time, interest rates are at their lowest point in over 20 years. This position is not sustainable and interest rates are expected to rise during the regulatory period.

[13] ACCC Final Decision, "Queensland Transmission Network Revenue Cap 2002-2006/07", 1 November 2001, p16.

The approach adopted by the ACCC which fixes the risk free rate prior to the commencement of the regulatory period based on current market conditions around the decision date exposes ElectraNet SA to a significantly higher cost of debt on its expected capex program than would be allowed in the revenue determination using the ACCC's building block and CAPM based approach. This is a substantial additional and uncompensated risk for ElectraNet SA arising from the methodology proposed in the *Draft Regulatory Principles*.

To illustrate, a 1% increase in the risk free rate would increase the required return on capital investment during the regulatory period by approximately $15 million. Figure 4.2 demonstrates that in recent years rate changes of 1-2% have occurred within a period of no more than a year or two. Figures 4.1 and 4.2 taken together show that movements of up to 5% or more have occurred within 5-year cycles over the last 10 years.

Given the magnitude of ElectraNet SA's proposed capital investment program, it is impractical and inappropriate for ElectraNet SA to be exposed to this level of financial risk without compensation.

ElectraNet SA has made provision in its operating expenditure allowance for the cost of swap options to hedge interest rate risk related to its forecast capital expenditure program.

Figure 4.1: Commonwealth Bond Rates 1983 to 2001

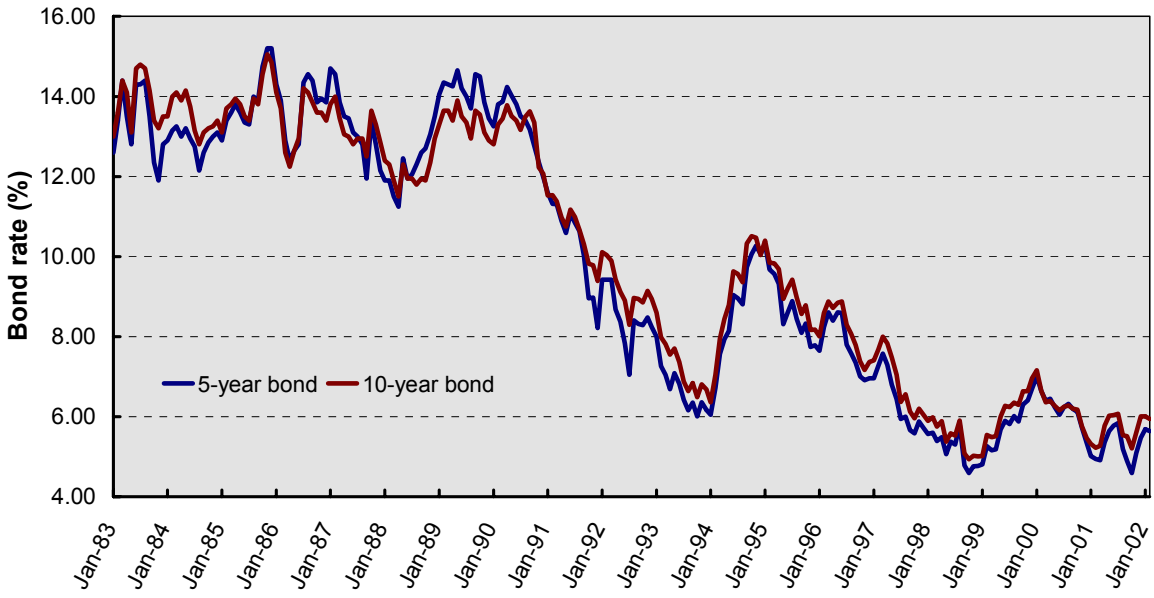
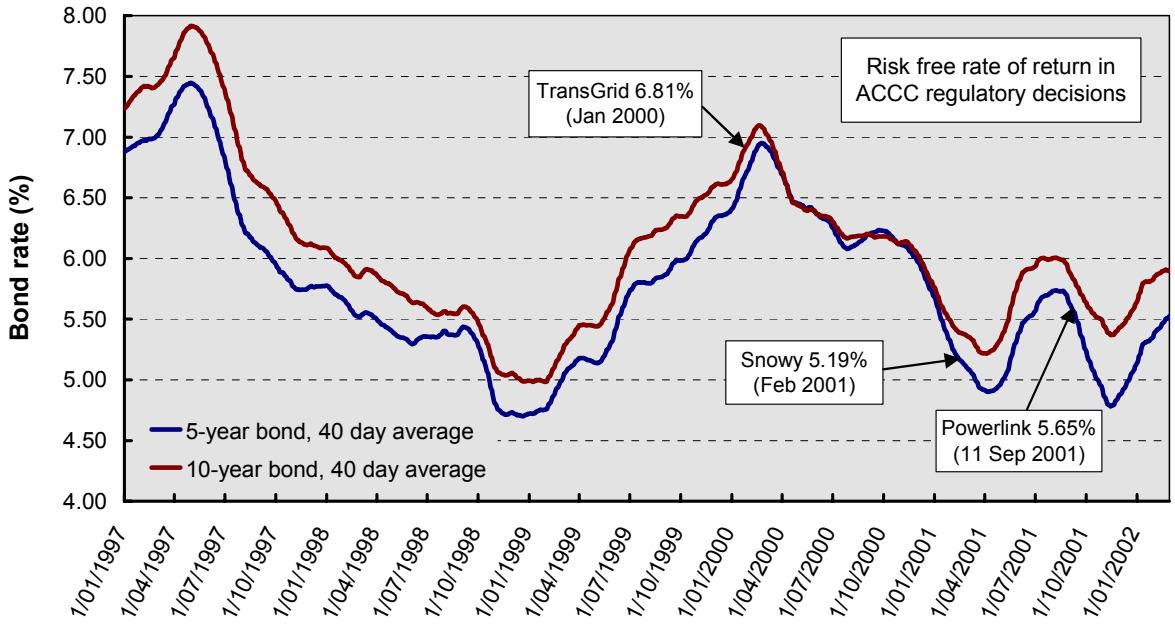


Figure 4.2: Commonwealth Bond Rates 1 Jan 1997 to 28 Feb 2002



4.4.3 Market Risk Premium

The market risk premium (MRP) is the amount that an investor expects to earn from an investment in the market above the return that can be earned on a risk free investment. The MRP is an expectation and therefore is not directly observable. The difficulties in estimating the MRP are well known, and the choice of an appropriate rate is inevitably *ad hoc*. Generally a range of plausible values is identified and the MRP is chosen within the range, most commonly at the midpoint.

Two approaches are considered to determine the appropriate MRP:

- Use of historical data; and a
- Benchmarking approach using international data.

This section then goes on to assess the regulatory position of the ACCC and in particular address the claim by the ACCC that the appropriate MRP for regulatory purposes has been falling in Australia.

Historical estimates of MRP

The use of historical estimates of MRP has been the predominant method of estimating a forward-looking MRP by regulators in Australia. In assessing historical evidence, the generally accepted range among corporate finance professionals in Australia has been 6% to 8%[14]. This range is largely favoured because of empirical evidence of the historical, realised MRP in Australia over time periods ranging as far back as 1882. In

[14] For example, see R. Officer, "Rates of Return to Shares, Bond Yields and Inflation Rates: An Historical Perspective," in Share Markets and Portfolio Theory (2nd ed), 1989 (University of Queensland Press, St Lucia), pp 207-211.

the absence of additional evidence, the mid-point in this range of 7% is often picked as the point estimate. In 1999, Davis presented a range for MRP of between 5% and 8%, and noted that the midpoint of 6.5% "is not unreasonable"[15]. Section 3.2 of Schedule 6.1 of the National Electricity Code also notes that the MRP has averaged 6.6% since 1952.

Table 4.1 outlines historical estimates of the MRP.

The historic data set out in the table is consistent with a range of 6.0 to 8.0%. On the basis of historical data, the Australian MRP should be approximately 7%.

Table 4.1: Historical Estimates of MRP

Source	Market risk premium (%)
Officer (1989) (based on 1882-1987)[16]	7.9
Hathaway (1996) (based on 1882-1991)[17]	7.7
Hathaway (1996) (based on 1947-1991)[18]	6.6
NEC (based on 1952-1999)[19]	6.6
AGSM (based on 1964-1995, including October 1987)[20]	6.2
AGSM (based on 1964-1995, excluding October 1987)[21]	8.1

Benchmarking approach to MRP

An alternative way of setting a forward-looking MRP is through a benchmarking approach. Australia is an open and international economy. Investment funds move freely into and out of the country and the currency. For example, as of September 2000 non-resident investors owned 37.5% of the value of the Australian Stock Exchange[22], the largest single shareholder group by far, and more than 30% of the trading on the Australian share market is due to foreign investors[23].

The Australian debt and equity markets have only been integrated into world markets for around 20 years. In a recent study, Ragunathan found that the Australian stock market was segmented from the world capital markets during the period 1974 to 1983. Over the period 1984 to 1992, Australia was integrated with the world markets. She says:

15 K. Davis, "Comments on the Cost of Capital. A Report prepared for the ACCC," dated April 1999.
16 R. Officer, "Rates of Return to Shares, Bond Yields and Inflation Rates: An Historical Perspective," in Share Markets and Portfolio Theory (2nd ed), 1989 (University of Queensland Press, St Lucia), pp 207-211.
17 N. Hathaway, "Market Risk Premia" unpublished manuscript.
18 Ibid.
19 National Electricity Code, schedule 6.1, section 3.2.
20 IPART, "Regulation of New South Wales Electricity Distribution Networks," section 5.4.2, Table 5.4, December 1999.
21 Ibid.
22 Information provided by Australian Stock Exchange. Figures for 19 September 2001.
23 ASX Fact Book 2001.

Consistent with expectations, our test indicates that the capital market, segmented prior to deregulation, was integrated in the post-deregulation period[24].

The market in Australia prior to deregulation was different to that after deregulation, since market prices (and in turn the MRP) were significantly affected by government intervention, in particular the restrictions on foreign ownership of shares and exchange rate controls. This resulted in prices of shares and government bonds being predominantly determined by domestic (rather than international) factors. Given these circumstances, it is unlikely that the ex-post MRP in this market provides the best estimate of an ex-ante MRP in the current (international) market[25].

In the absence of sufficient relevant historical information from the current market, the MRP has been estimated using a benchmarking approach[26]. With this approach, a benchmark country is chosen based upon its having a reliable estimate of MRP available, and the potential differences between the MRP in that country and in Australia are evaluated. The benchmark MRP is adjusted for the estimated difference between the two countries to arrive at an estimate of the Australian MRP.

Using this approach, Australia's MRP can be thought of as being equal to an international benchmark MRP plus a premium for the incremental risks associated with the Australian equity market. The best benchmark country for this exercise is the United States. Contrary to Australia, the US has been an open economy for virtually all of its existence. The size of the US equities markets dwarfs every other market in the world. For example, the US equities markets comprise almost 50% of the Morgan Stanley Capital International (MSCI) index[27]. The quantum and quality of evidence and analysis of the US equities markets (and its MRP) exceeds that of all other countries in the world combined.

Using a benchmarking approach, Bowman recently estimated the Australian MRP from the US MRP to be 7.8% on the basis of[28]:

- A US MRP in the range of 6.0% to 9.0%; and
- An increment of 0.1% to 2.35% on the US MRP for differences in taxation, market composition, country risk and estimation time horizon between the US and Australia, with 0.3% considered an appropriate adjustment.

[24] V. Ragunathan, "The Effect of Financial Deregulation on Integration: An Australian Perspective," *Journal of Economics and Business*, November 1999, pp 505-514.

[25] Although Australian markets have been open to international investment for nearly two decades, that is too short to provide a reliable *ex ante* estimate of MRP. For example, B. Cornell, J. Hirshleifer and E. James ("Estimating the Cost of Equity Capital," *Contemporary Finance Digest*, 1997, p 16) state, "The unfortunate fact is that stock prices are so variable that the risk premium cannot be estimated precisely even with 20 years of data."

[26] See R. Bowman "Estimating the Market Risk Premium", *JASSA*, Spring 2001 for a more extensive discussion of this approach to estimating the MRP.

[27] Axiss Australia, The Australian Equity Market (at www.axiss.com.au).

[28] R. Bowman, "Estimating the Market Risk Premium", *JASSA*, Spring 2001.

Similarly, Ibbotson Associates suggest that the US market risk premium is 7.76% and that based on Australia's country credit rating, the expected return on the Australian market is 1.53% to 2.26% higher than for the US[29].

The benchmarking approach indicates that a MRP at least at the upper end of the range from 6.0% to 8.0% is appropriate for Australia.

Summary on MRP

Historical data and benchmarking estimates of the Australian MRP indicate that a figure towards the upper end of the historical range of 6.0% to 8.0% is justified.

On balance, taking into account regulatory precedent and the weight of evidence for a higher MRP, a MRP of at least 6.5% is justified. This figure is considered to be conservative.

ElectraNet SA proposes a MRP of 6.5%.

ACCC approach to MRP

A conservative MRP of 6.5% does not accord with the recent decisions and supporting arguments of the ACCC.

In its regulatory decisions the ACCC has generally set a MRP of 6.0%. While this is the same headline rate as used by most other regulators, the effective MRP used is different due to the ACCC's use of the 5-year bond rate for the risk free rate. As historical estimates of the MRP have been based on a 10-year bond rate, conversion to a MRP for the 5-year bond requires adjustment for the difference in yield between the two bond rates.

Since daily trading in these bonds began in October 1983, the difference between the 5-year and 10-year nominal bond has averaged 21 basis points. Using this as an adjustment suggests that to be consistent with other regulators, the ACCC should have increased the MRP for Powerlink from 6.00 to 6.21%. Given the ACCC has not applied this adjustment, it is effectively stating that the appropriate MRP based on the 10 year bond is around 5.79%.

In its Powerlink decision, the ACCC defended this position by stating:

> *Further, the Commission believes that the current market risk premium of 6.0 per cent is on the high side and therefore sufficient to compensate for the difference between the five and ten-year bond yields[30].*

The NECG submission presents detailed arguments in relation to each of the reasons given by the ACCC in support of a MRP below 6.0% and concludes that the evidence provided does not provide support for a declining MRP.

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[29] Ibbotson Associates (2001), "International Cost of Capital Report 2001", www.valuation.ibbotson.com.

[30] ACCC Final Decision, "Queensland Transmission Network Revenue Cap 2002-2006/07", November 2001 pp19-20.

4.4.4 Betas and Risk

The CAPM assumes all non-systematic (specific) risks are diversifiable and hence are not provided an expected return in a competitive market. The systematic risk (β or beta) of a firm is the only risk factor incorporated in the CAPM. Systematic risk is usually estimated by direct measurement or consideration of comparable companies, also known as "method of similars".

For ElectraNet SA, where there is no time-series of market returns available to estimate beta, the method of similars provides the best approach for determining the beta. A set of comparable (listed) firms is identified, and the average asset beta of those firms is used as a proxy for the asset beta of the company in question. This approach has been adopted to determine a feasible range for ElectraNet SA's asset beta from other regulatory decisions and individual (comparator) company data.

The NECG submission includes a breakdown of recent regulatory decisions on asset beta, which shows that these decisions have considered the appropriate range for the asset beta to be 0.40 - 0.45 in electricity distribution, 0.40 - 0.60 in gas distribution and 0.50 - 0.65 in gas transmission. The ACCC has adopted a range of 0.30 - 0.50 in its various electricity transmission decisions.

Table 4.2 estimates the asset betas of comparable (listed) companies using the most recent AGSM estimates of equity betas covering the period up to 31 May 2001[31].

Table 4.2: Estimates of Equity Beta and Asset Beta

Company	Primary business	Equity beta (Blume)	Leverage (%)	Asset beta (Monkhouse)
Australian Gas Light	Gas distribution and retailing	0.700	30%	0.49
Energy Developments Limited	Electricity generation	1.213	25%	0.91
United Energy Limited	Electricity distribution	0.900	53%	0.42

Note: For consistency with the ACCC's regulatory approach to the debt beta, we have assumed a debt beta of zero in determining the respective asset betas. Assuming a debt beta of zero implies that debt is riskless, which will understate the appropriate beta.

[31] Envestra has been omitted from this table, as it is a questionable comparator. Aside from being a natural gas distribution company, over the period when the beta would have been estimated it had loss making operations, a gearing of about 95% and was involved in a merger that approximately doubled its size. The company was only listed on the stock exchange in August 1997, so the data available to reliably calculate an historical beta would be less than is normally considered necessary. As a result, the statistical and explanatory power of the estimation regression will be low.

The most comparable comparators for ElectraNet SA are the distribution businesses AGL and United Energy, with a range of 0.42 to 0.49 for the asset beta.

This range for the asset beta is higher than the ACCC's estimate of 0.40 for Powerlink, which is based on the average equity beta of the Infrastructure and Utilities Group average (0.962 as of March 2001). However, the methodology adopted by the ACCC in producing its estimate of 0.40 is questionable because:

- The Infrastructure and Utilities Group includes some questionable outliers, particular Contact Energy, which has a limited number of observations and which has been subject to merger and merger speculation during the period for which listed data is available. Given its negative beta and size ($1.4 billion or over 9% of the total asset value of companies in the group), removal from the group increases the average equity beta substantially;

- In de-levering the equity beta to produce an asset beta, the ACCC appears to have assumed gearing of 60% and a debt beta of zero. In practice, this is a significant overestimate. IPART estimated the average gearing of companies in the Infrastructure & Utilities group in late 1998 at 37%[32]. The average gearing for companies in this group in 2000/01 was approximately 38% and around 40% in 1999/00[33]. The equity beta of 0.962 used by the ACCC equates to an asset beta of 0.68 using 37% gearing and 0.58 using 40% gearing, zero debt beta and the Monkhouse formula.

Therefore, ElectraNet SA strongly disagrees with the ACCC conclusion in its Powerlink decision and contends that the Infrastructure and Utilities Group data suggests an asset beta of 0.60 would be more appropriate.

The following additional points, which are of relevance to ElectraNet SA's asset beta, are discussed in much more detail in the NECG submission:

Relative risk of electricity transmission and distribution.

The asset betas for the electricity distribution businesses are likely to understate the appropriate asset beta for ElectraNet SA given the greater bypass risk facing electricity transmission companies than distribution networks, in particular from gas pipelines and new gas fired power stations.

Size in relation to other transmission companies.

There is much evidence, particularly through the research of Rolf Banz[34] and Eugene Fama and Kenneth French[35] that the investment returns to

[32] IPART, "The Rate of Return for Electricity Distribution Networks", Discussion Paper DP-26 November 1998, p20.

[33] Based on borrowings reported in financial reports and the market value of equity as of June 2001.

[34] Rolf W. Banz, "The Relationship Between Market Value and Return of Common Stocks," *Journal of Financial Economics*, November 1981

[35] For example, see F. Fama and K. French: "The Cross-Section of Expected stock Returns", *Journal of Finance*, June 1992, pp 427-465; "Common Risk Factors in the Returns on Stocks and Bonds", *Journal of Financial Economics*, February 1993, pp 3-56; and "Multifactor Explanations of Asset Pricing Anomalies", *Journal of Finance*, March 1996, pp 55-84.

small companies are greater than would be expected based upon the measured beta using CAPM. In this research, returns to companies' shares are explained by a common market factor, size and book value to market value of equity ratio; beta is an insufficient, if not ineffective, explanatory factor of security prices.

Jagannathan and Wang provide evidence on the relationship between beta, size and returns [36]. Small firms have higher returns than large firms, even after adjustment for beta. Furthermore, they show that using conventionally estimated betas provides poor explanatory power for expected returns.

There are at least five published studies of the size effect in Australia, all of which document a significant size effect[37]. Halliwell, Heaney and Sawicki find that "… *in all cases the size effect provides considerable explanatory power over realized returns for the period 1980 to 1991*" (p122).

The results of a vast body of research on the usefulness of beta in estimating future returns show that conventional measurements of beta, as are used in essentially all regulatory decisions in Australia, seriously understate the appropriate returns for smaller companies. There are a number of possible explanations for this observation. One interpretation of the results, consistent with Handa, Kothari and Wasley, is that estimated betas of smaller firms are significantly understated. If this is the explanation then the solution would be to add an appropriate increment to beta. Another explanation is that the CAPM is under-specified in that it does not incorporate all of the risk factors that are present with small firms. Yet these risks will be understood and priced out in the market. These would include factors such as bankruptcy risk and illiquidity. If omitted factors are the explanation, then the appropriate solution would be to add an increment to the cost of equity calculated using the CAPM.

Notwithstanding which reason is valid, the evidence is that an adjustment is necessary for small firms. While it may be theoretically preferable to increase the cost of equity, adjusting the estimated beta relative to a significantly larger comparator is an alternative option that is also theoretically valid[38] and is also more consistent with regulatory practice in Australia to date.

ElectraNet SA is small for an electricity transmission company. Table 4.3 below shows that it ranks significantly below the size of the other transmission companies in the National Electricity Market in terms of asset

[36] R. Jagannathan and Z. Wang, "The Conditional CAPM and the Cross-Section of Expected Returns", *Journal of Finance*, March 1996, pp 3-53.

[37] P. Brown, D. Keim, A. Kleidon and T. Marsh, "Stock Return Seasonalities and the Tax-Loss Selling Hypothesis", *Journal of Financial Economics*, 1983, pp 105-127; W. Beedles, P. Dodd and R. Officer, "Regularities in Australian Share Returns", *Australian Journal of Management*, June 1988, pp 1-29; D. Anderson, A. Lynch and N. Mathiou, "Behaviour of CAPM Anomalies in Smaller Firms: Australian Evidence", *Australian Journal of Management*, June 1990, pp 1-38; J. Halliwell, R. Heaney and J. Sawicki, "Size and Book to Market Effects in Australian Share Markets: A Time Series Analysis", *Accounting Research Journal*, 1999, pp 122-137; and C. Gaunt, P. Gray and J. McIvor, "The Impact of Share Price on Seasonality and Size Anomalies in Australian Equity Returns", *Accounting and Finance*, March 2000, pp 33-50.

[38] See for example, Berk J. "An Empirical Re-examination of the Relation Between Firm Size and Return", University of Washington Department of Finance School of Business Administration Working Paper: 93-BJ-001, Revised October 9, 1996

size[39]. It is also small in relation to comparable transmission companies overseas.

Table 4.3: Size of Transmission Companies in NEM Jurisdictions[40]

State	Company	Value ($m)
QLD	Powerlink	2277
VIC	SPI PowerNet	2273
NSW	TransGrid	2012
SA	ElectraNet SA	938

Precedent for reflecting size in the cost of capital can be found in the UK:

- In its decision on the water and sewerage sector in England & Wales, Ofwat[41] allowed all water-only companies a premium on WACC to reflect their limited access to capital markets and higher cost of capital. The three largest water only companies were provided a premium of 0.40% on WACC, with the remainder gaining a premium of 0.75%. Assuming 60% gearing these figures are equivalent to a premium on the cost of equity of 1.0% and 1.875% respectively. The two largest water only companies, South East Water and Three Valleys Water, have equity value of approximately US$250m each, significantly above that of ElectraNet SA (approximately US$150m); and

- Upon appealing Ofwat's decision, the Competition Commission also allowed Mid Kent Water and Sutton and East Surrey Water[42] a small company equity premium of 1% to reflect the lower liquidity of trading in its shares.

In its decision on Perth International Airport the ACCC accepted the validity of the size effect, noting that "*evidence showing the tendency of small firms to realise higher rates of return than that predicted by CAPM has been demonstrated in various studies*"[43].

Summary on asset beta

The figure of 0.40 for the asset beta adopted by the ACCC for Powerlink (and TransGrid as a mid-point) is not appropriate for ElectraNet SA for a number of reasons:

[39] ElectraNet SA's size is also significantly smaller than that of Western Power and PAWA.

[40] Sources: Powerlink – asset base as of 1 July 2001 determined by the ACCC; SPI PowerNet – total company financing as listed on www.spipowernet.com.au; TransGrid – ACCC estimate of 1 July 2001 asset base at time of regulatory decision (January 2000); ElectraNet SA – asset base as of 1 July 2001 in this Application.

[41] Ofwat: Final Determinations: Future water and sewerage charges 2000–05, 1999

[42] Competition Commission (2000): Mid Kent Water plc – A report on the references under sections 12 and 14 of the Water Industry Act 1991; and Competition Commission (2000): Sutton & East Surrey plc - A report on the references under sections 12 and 14 of the Water Industry Act 1991.

[43] ACCC, Perth Airport, Proposal to increase aeronautical charges to recover the costs of necessary new investment, Final Decision April 2000 p34

- Market data on AGL and United Energy, the closest listed comparators suggests a range above 0.40 – even before adjusting for the systematic risk of electricity transmission companies, which is likely to be higher than for distribution companies;

- Data from another comparator group, the ASX Infrastructure and Utilities Group, suggests an asset beta significantly in excess of 0.40. This is not picked up by the ACCC, who have incorrectly transformed the equity beta of the group with its target gearing rather than actual gearing; and

- ElectraNet SA's relative size suggests an increment to its returns compared with Powerlink and TransGrid.

These factors taken together suggest that as a minimum, the asset beta for ElectraNet SA should be higher than that provided for Powerlink and TransGrid and that on the upper side a figure as high as 0.60 may be appropriate.

On balance taking into account regulatory precedent and the weight of evidence for a higher asset beta, an asset beta of at least 0.45 is justified. This figure is considered to be conservative.

ElectraNet SA proposes an asset beta of 0.45.

The asset beta is used in Section 4.8.1 to estimate ElectraNet SA's equity beta. This is done by attributing to the asset beta the additional risk associated with the company's gearing, which first requires an assessment of the cost of debt.

4.5 Cost of Debt

The cost of debt capital is estimated from:

$$r_d = r_f + DRP$$

where:

r_f = the nominal risk free rate of return; and

DRP = the debt risk premium or debt margin.

Factors that must be taken into account are the market rates of interest on debt, the appropriate maturity of debt and the assumed capital structure. In its Powerlink decision, the ACCC stated that:

> *"In considering an appropriate debt margin the Commission adopts industry wide benchmarking. This provides an incentive for minimising inefficient debt financing"*[44].

[44] ACCC Final Decision, "Queensland Transmission Network Revenue Cap 2002-2006/07", November 2001, p18.

This precedent is followed in developing an estimate of the debt premium for ElectraNet SA. For this reason, we consider the cost of debt that the company would face if it had conventional debt instruments and was geared to 60% debt.

The ACCC approved a debt premium of 120 basis points for Powerlink based on 60% gearing. This figure is not appropriate for ElectraNet SA and is very much inconsistent with market data and other regulatory decisions.

4.5.1 Recent regulatory decisions

Both the ORG and QCA have recently set a debt premium significantly in excess of that used by the ACCC:

- QCA, in its decision on Queensland distribution businesses, determined that an efficiently financed distribution business, with 60% gearing would have a credit rating in the range of A- to BBB and a corresponding debt premium range of 125 to 210 basis points, with BBB+ debt commanding a premium of 165 basis points[45]; and

- the ORG, in its Victorian electricity distribution decision, accepted evidence that its use of a debt premium of 120 basis points in its draft decision was on the low side – allowing the distributors a premium of 150 basis points to reflect 'market realities'. The ORG was persuaded by submissions that suggested a margin on 5-year debt of around 140-150 basis points, with the margin on 10-year debt around 170 basis points for a BBB credit rating[46].

4.5.2 Market data on debt premium

An appropriate credit rating for ElectraNet SA at this time is BBB+. As of February 2002, BBB+ debt yielded a premium over 10-year government debt of between 148 and 195 basis points (exclusive of issuance costs)[47], which is consistent with the ORG and QCA decisions.

Furthermore, advice available to ElectraNet SA from investment banks indicates that a five-year issuance of BBB+ debt of the size that would be required by ElectraNet SA could not be placed on the Australian market and would require:

- credit wrapping;

- more discrete parcels of debt over a longer than five year time frame;

- use of global markets; and/or

- a greater spread of maturity with a variety of instruments from commercial papers through to 15-year Government Bonds.

[45] Queensland Competition Authority Final Determination "Regulation of Electricity Distribution", May 2001, p85.

[46] Office of the Regulator General, "Electricity Distribution Price Determination 2001-05", Volume I, September 2000, p130.

[47] Source: Information provided to ElectraNet SA by the Commonwealth Bank of Australia, 14 February 2002.

As such and notwithstanding the views adopted in previous determinations, the ACCC must consider the size and nature of ElectraNet SA in determining its debt premium. Furthermore, the holding of all portfolio debt at only 5-year maturity would most likely force the premium to the upper end of the yield range. Consistency in the assumptions used by the ACCC in this area is fundamental to its on-going credibility with investors.

4.5.3 Summary on Cost of Debt

From the above considerations, the appropriate range for the cost of debt is the risk free rate plus a debt margin of 1.5% to 1.95%, with a midpoint of 1.72%.

ElectraNet SA proposes that 1.72% be added to the risk free rate to estimate the cost of debt.

Based on a risk free rate of 5.90%, the cost of debt as of 4 March 2002 is estimated to be 7.62%.

4.6 Value of Franking Credits

The dividend imputation mechanism used in Australia is intended to ensure that profits are taxed only once, at least for Australian resident taxpayers. Dividends that are paid out of after-corporate-tax profits can be accompanied with a 'franking' credit to the extent of the corporate tax paid. The value of franking credits is represented by the parameter gamma (γ).

The value of franking credits will be determined at the level of the investor and will be influenced by the investor's tax circumstances. As these will differ across investors, the result will be a value of the franking credit between nil and full value (i.e. a gamma value between zero and one). There has been an increasing body of literature focused on estimating the value of gamma. The early literature generally found a value of about 0.5 or slightly below, which is the value the ACCC has adopted in its decisions.

In its regulatory decisions, the ACCC has assumed domestic ownership in setting gamma, refusing to adjust gamma to take account of varying degrees of foreign ownership of Australian utility companies. The ACCC also believes that recent changes to the taxation system mean that the appropriate value of gamma may be closer to one than zero. We discuss these two claims.

4.6.1 Appropriate Ownership Assumption

The market value of distributed franking credits should be established at the market level, not the firm level. So for regulatory purposes, current shareholding should be irrelevant. Therefore, in principle we agree with the ACCC and others that current ownership should not form the basis for setting gamma.

The gamma used in the CAPM is generally derived as an industry average. However, there is debate whether an average value is appropriate for the basis of setting a forward-looking value consistent with the aims of the CAPM. The ACCC believes it may be more appropriate to consider the

marginal investor – which it claims would increase the gamma towards 1.0. For example, the ACCC recently noted:

> *"For regulatory purposes it is debatable whether an average for the value of imputation credits is appropriate. Generally, if an average rate is used in the regulatory rate of return, investors who are able to take advantage of more than the average will receive a rate of return greater than their expected rate of return. As a consequence the company's share price will be bid up until the actual rate of return (based on market value of the assets and not the regulated value) equals the required rate of return of those investors able to take the most advantage of the tax credits. Investors who are at a comparative disadvantage will either sell their shares or accept a lower rate of return. This argument tends to suggest that the appropriate value for utilisation of imputation credits for regulatory purposes should approach 100 per cent"*[48].

In theory, NECG agrees that the use of the marginal investor is appropriate[49]. However, the ACCC's idea that share price will be bid up to match the gamma of the investor who has the highest gamma is unrealistic. In effect, the ACCC is prescribing how security prices will be set and identifying the marginal investor based on one dimension only - utilisation of franking credits. However, taxation, and imputation, is but one of a host of factors that drive investment decisions (diversification, opportunity, growth, synergistic benefits and so on). Accordingly, this argument completely ignores all other factors that determine the marginal investors and hence security prices.

Share prices are set by price setting (marginal) investors, and this set of investors may have little relationship to the shareholder mix of a company at a point in time. However, it is likely that the marginal investor for publicly listed Australian companies is an international investor. Australian equities represent approximately 1% of the global market and foreign shareholders own over 28% of Australian companies[50]. Also as noted previously, non-resident investors own around 37.5% of the value of the Australian Stock Exchange, and more than 30% of the trading on the Australian share market is due to foreign investors.

Indeed, if the ACCC's reasoning was correct, we would be unlikely to see substantial Australian investment abroad since such investments do not gain the benefit of imputation. However, as Australian investment overseas is considerable, the importance of accessing imputation credits is unlikely to be of key importance[51].

Australia is a net importer of capital. It is suggested that the marginal investor in the Australian equity market is not an Australian domestic investor but instead is an international investor who at best will experience

[48] ACCC Draft Decision, "Access Arrangement by East Australian Pipeline Limited for the Moomba to Sydney Pipeline System", 19 December 2000, p77-78

[49] Officer RR (1994) "The Cost of Capital under an Imputation Tax System", Accounting and Finance, 34, 1-18

[50] ABS statistics, 5302.0 "Balance of Payments and International Investment Position", September Quarter 2001

[51] For example, total Australian overseas investment accounts to over $375 billion, approximately one half of the capitalisation of the Australian Stock Exchange.

considerable difficulty accessing imputation credits[52]. In turn, these factors suggest that gamma may be as low as zero. This is consistent with a recent study of Cannavan, Finn and Gray[53], which showed that for companies with substantial foreign ownership, the market value of tax credits is close to zero.

4.6.2 Recent Changes to Taxation Law

Prior to 1 July 2000, any imputation credits that exceeded a taxpayer's basic income tax liability were disregarded and could not be refunded. The Review of Business Taxation recommended that resident individuals, superannuation funds and like entities should be taxed on dividend income at their appropriate tax rates, rather than at the company tax rate. The changes introduced on 1 July 2000 expand the class of tax offsets that are subject to the refundable tax offset rules to include imputation credits.

These changes have the effect of changing the order of allowable deductions for tax purposes to ensure franking credits are deducted last. The ACCC has stated that these changes are likely to move the appropriate value for gamma closer to 1.0. It states:

> *"The change results in franking credits being treated as a refundable rebate, similar to the private heath insurance rebate, to resident individuals rather than merely a deductible rebate as it previously applied. In addition, the order of allowable deductions for tax purposes has been amended so that franking credits are deducted last when calculating taxable income. This approach ensures the optimal utilisation of tax deductions and franking credit rebates. Therefore, in line with these changes, the Commission believes that a more appropriate value for gamma would be closer to 1.0. The Commission envisages undertaking further work before altering its current position"[54].*

We do not know of any investigation of the impact of the 1 July 2000 tax changes. The ACCC's statement that the tax changes provide a basis for estimating gamma as closer to 1.0 is, with respect, rather meaningless without any assessment of the extent of the impact of the change.

Moreover, we believe there is good reason to suggest there would be little change at all, based upon the impact on the marginal investor. The tax law change will only impact gamma to the extent that the impacted investors play a part in the determination of equilibrium security prices, that is, they are marginal investors. It has already been stated that this is not likely to be the case because of the extent of foreign ownership in Australia and the extent of foreign investment by Australian and Australian companies. Tax and imputation considerations are but one factor influencing valuation decisions.

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[52] This holds irrespective of whether or not Australian residents are the first to invest in these companies – such investors are merely inframarginal but do not set equilibrium security prices. See also Officer (1988), "A note on the Cost of Capital and Investment Evaluation for Companies under the Imputation Tax", *Accounting and Finance*, 28, 65-71.

[53] Cannavan D, Finn F. and Gray S. (2000) "The Value of Dividend Imputation Tax Credits", unpublished working paper, Department of Commerce, The University of Queensland.

[54] ACCC Draft Decision, "Queensland Transmission Network Revenue Cap 2002-2006/07", July 2001 p17.

Furthermore, the ACCC is only considering one side of the story. Another factor arising is that the changes in a low inflation environment encourage a lower payout ratio on account of the concessional treatment of capital gains (taxed at half the rate of income from dividends). Accordingly, even leaving aside the marginal shareholder issues, it is not at all clear that the tax changes will move gamma towards one – indeed, in times of low inflation it could well be the case that taxation would tend to lower gamma (because of incentives to lower payout ratios with shareholders securing returns through capital gains which attracts a lower taxation rate).

4.6.3 Appropriate Estimate of Gamma

There is clearly much uncertainty over the estimate of gamma. Nevertheless, a maximum value of 0.5 is well established in Australian regulatory decision making. As noted, there is much evidence, particularly in relation to the marginal investor, to suggest that 0.5 is on the high side and a figure of zero may be a reasonable. The ACCC's claim that the New Tax System increases the gamma towards one is without evidence, given:

- the uncertainty surrounding the full impact of The New Tax System having particular regard to the concessional treatment of capital gains relative to income;
- the very limited demonstrated impact of these arrangements on the marginal investor; and
- other tax changes reducing the value of franking credits to investors.

When all these factors are combined, on balance, an appropriate gamma for ElectraNet SA is 0.5.

The ACCC should not experiment with different interpretations of the appropriate level of the gamma in this or any other actual revenue determination, particularly when these determinations are being undertaken in a piecemeal fashion, and the impact of an inappropriate gamma will carry over for the next 5 years for the business concerned. Rather the ACCC should adopt an approach which sees orderly and well considered debate on this issue by all interested parties, with the ACCC drawing from learned analysis and examination of the issues.

ElectraNet SA proposes a value of gamma of 0.5.

4.7 Gearing

A gearing ratio needs to be established for ElectraNet SA to determine the appropriate weighted average cost of debt and equity in the WACC.

The *Draft Regulatory Principles* states that an appropriate benchmark gearing ratio should be used rather than a firm specific ratio. In its recent Powerlink decision, the ACCC continued its position established in prior decisions and adopted a gearing ratio of 60% debt.

While the gearing of ElectraNet SA is in excess of this figure and 60% gearing need not necessarily reflect efficient financing for ElectraNet SA, the ACCC's approach

has been adopted for estimating an industry gearing. In any case, small differences in gearing will not materially impact on WACC.

ElectraNet SA proposes a gearing ratio of 60% debt consistent with recent regulatory decisions.

4.8 Calculation of Cost of Equity Capital

4.8.1 Equity beta

A difficulty that arises with estimates of systematic risk is to properly reflect the leverage of the firm. As leverage increases, systematic risk increases. Given the debt level, asset and debt betas, the tax rate and gamma, it is possible to calculate the equity beta for ElectraNet SA.

This process is usually referred to as re-levering and can be done a number of different ways. Each approach implies a different set of assumptions. In its *Draft Regulatory Principles*, the ACCC presents two alternatives. One common approach, incorporating the value of franking credits, is to use the relationship:

$$\beta_e = \beta_a (1 + (1-T(1-\gamma)) (D/E)) - \beta_d (D/V)$$

where

β_e = equity beta,

β_a = asset beta,

β_d = debt beta,

E = market value of equity,

D = market value of debt,

V = E + D,

T = tax rate, and

γ = value of imputation credits.

Another approach discussed by the ACCC and then adopted in its Powerlink Decision uses what is referred to as the Monkhouse formula.

$$\beta_e = \beta_a + (\beta_a - \beta_d) * (1 - [r_d / (1 + r_d)] * (1 - \gamma) * T) * (D/ E)$$

where:

r_d = the cost of debt capital.

Consistent with the ACCC's approach, we adopt the Monkhouse formula, assuming a zero debt beta for ElectraNet SA. The asset beta of 0.45 yields a re-levered equity beta of 1.12.

4.8.2 CAPM Calculation

Using the data and estimates which have been developed, the CAPM formula can be used to calculate the cost of equity capital. Using the equity beta of 1.12 this becomes:

$$r_e = r_f + \beta_e (r_m - r_f)$$

$$= 5.90\% + 1.12 * 6.5\% = 13.16\%$$

4.8.3 Additional Risk Factors Adding to the Cost of Equity Capital

In addition to the conventional analysis above, there is also substantial evidence of asymmetric risks faced by transmission network companies. Asymmetric risk is not captured by the CAPM, but has important implications for the cost of equity capital. It is preferable theoretically and practically to treat this risk as an addition to the cost of equity capital estimated using CAPM, although they note the ACCC's preference for these to be included in cash flows.

Regulated firms such as ElectraNet SA face a range of risks that are asymmetric and which therefore are not picked up in the equity beta. For example, some of the key risks include:

- increased competition from gas transmission, increasing the risk of asset stranding;
- asset valuation risk, as a result of the ACCC's recently commenced review of ODRC guidelines which will set the framework for any optimisation of ElectraNet SA's transmission network and asset values in future regulatory reviews;
- uncertainty surrounding other policy and operational reviews including the COAG energy review and the ACCC's review of service standard guidelines;
- the intrinsic characteristics of ElectraNet SA's network, in particular its long and radial nature, resulting in a higher risk of interruptions; and
- regulatory uncertainty as a result of the ACCC not intending to finalise its *Draft Regulatory Principles* until 2003.

The ACCC added an asymmetric risk premium of 1% to the WACC in its TransGrid Final Decision for regulatory uncertainty, but did not allow such a premium for Powerlink claiming that the major elements of the regulatory regime had by then been finalised. This argument is not convincing given that little has changed to reduce regulatory uncertainty since the TransGrid decision.

These risks are significant and have a number of characteristics that differentiate them from other risks faced by the company. First, the risks are unavoidable and asymmetrical. Therefore they are risks that cannot be diversified away by a transmission network company. Secondly, insurance against these risks is not commercially available. Thirdly, these are risks that cannot be diversified away by investors. This is a critical point as the

counter-parties to the risks are not public companies in which investors can invest. The principal counter-parties in each of the cases are consumers. Finally, these risks are not accommodated in conventional pricing models such as are used in the standard WACC approach.

Since the regulated firm has no alternative but to bear the risk of losses, it should be permitted a return that explicitly includes compensation for these risks.

The NECG submission considers in some detail the question of how the risk should be reflected in the regulatory process and concludes that based on the real risk that ElectraNet SA faces from potential re-optimisation of its network (including asset valuation risk) in future regulatory decisions, for an investor to be indifferent between accepting these risks or not requires an increment on the cost of equity capital of at least 0.5%. This is consistent with the research of Conine and Tamarkin[55] that estimated that for a set of 60 US utilities the cost of equity was understated by 1.3% if a reward for asymmetric risk was not included.

ElectraNet SA proposes a conservative asymmetric risk premium of 0.5%.

4.8.4 Conclusion on Cost of Equity Capital

ElectraNet SA's cost of equity capital is calculated as the CAPM estimate adjusted for the asymmetric risk premium:

r_e = 13.16% + 0.5% = 13.66%.

ElectraNet SA proposes a cost of equity capital of 13.66%.

4.9 Expected Inflation Rate

The expected inflation rate is not an explicit parameter in the return on equity calculation, but it is an inherent aspect of the risk free rate and is also implicit in the cost of debt.

The ACCC proposes in its *Regulatory Principles* to derive the expected inflation rate from nominal and indexed bond rates and has adopted this approach in recent regulatory decisions.

ElectraNet SA agrees with this approach and has determined an expected inflation rate of 2.34%, as of 4 March 2002.

ElectraNet SA has assumed an expected inflation rate of 2.34%.

[55] T. Conine and M. Tamarkin, "Implications of Skewness in Returns for Utilities' Cost of Equity Capital", *Financial Management*, Winter 1985, pp 66-71.

4.10 Conclusion on WACC

Table 4.4 summarises the cost of capital parameters values used to determine ElectraNet SA's total revenue requirement.

The WACC formula calculates the nominal vanilla WACC as the weighted average of the post-tax returns on debt and equity.

$$WACC = r_e (E/V) + r_d (E/V)$$

$$= 13.66\% * 0.4 + 7.62\% * 0.6 = 10.03\%$$

This translates via formularised transformation to a post-tax nominal WACC of 8.66% and a pre-tax real WACC of 8.46%.

This cost of capital is consistent with the overall revenue and cash requirements of ElectraNet SA's regulated business that will enable it to borrow and fund new investment during the regulatory period (refer to financial indicators analysis in Chapter 10).

Table 4.4: ElectraNet SA's Proposed WACC Parameters

Parameter	Value
Nominal Risk Free Interest Rate (Rf)	5.90%
Expected Inflation Rate	2.34%
Debt Margin (over Rf)	1.72%
Cost of Debt Rd = Rf + debt margin	7.62%
Market Risk Premium	6.5%
Corporate Tax Rate	30%
Debt Funding Proportion	60%
Equity Proportion	40%
Value of imputation credits	50%
Debt Beta	0
Asset Beta	0.45
Equity Beta	1.12
Asymmetric risk premium	0.5%
Nominal Post Tax Cost of Equity	13.66%
Nominal Vanilla WACC	10.03%
Post Tax Nominal WACC[56]	8.66%
Pre Tax Real WACC[57]	8.46%

[56] Calculated as a formula approximation after allowing for imputation.
[57] Calculated as a formula approximation.

ElectraNet SA has presented strong arguments for the required cost of capital, including for some WACC parameters a more appropriate treatment to that adopted in recent ACCC revenue decisions. These arguments must be considered on their merits and cannot simply be dismissed if regulatory transparency is to be achieved. The ACCC must, where it adopts alternative treatments, present a strong case for these including detailed arguments supported by learned articles and analysis.

ElectraNet SA requires a nominal vanilla WACC of 10.03% for the purpose of determining its total revenue requirement.

5. OPENING ASSET BASE

5.1 Synopsis

The opening asset base for ElectraNet SA's revenue cap application (as of 1 January 2003) has been derived from:

- The regulatory asset base established in the South Australian Government Electricity Pricing Order (EPO) as of 1 July 1999 ("jurisdictional asset base");
- Adjustments to correct material omissions from the jurisdictional asset base;
- Rolling forward the adjusted jurisdictional asset base to 1 July 2001 to include actual capital additions, disposals, depreciation and indexation;
- Readmission of previously optimised assets at 1 July 2001 that are now necessary due to the significant load growth and generation developments that have taken place in recent years; and
- Rolling forward the 1 July 2001 valuation to 1 January 2003 to include expected capital additions, disposals, depreciation and indexation.

ElectraNet SA's opening asset base as of 1 January 2003 is $994.4 million.

5.2 Code Requirements

Clause 6.2 of the NEC outlines the objectives and principles for governing regulation of transmission revenue. The ACCC's application of these principles has been developed in its *Draft Regulatory Principles* and subsequent revenue decisions.

Clause 6.2.3(d)(4) of the NEC states that the ACCC's regulation of transmission network revenues:

> *"… must be consistent with the objectives outlined in Clause 6.2.2 and must have regard to the need to provide a fair and reasonable risk-adjusted rate of return on efficient investment to TNSP's where:*
>
> *(i) assets created at any time under a take or pay contract are valued in a manner consistent with the provisions of that contract;*
>
> *(ii) assets created at any time under a network augmentation determination made by NEMMCO under clause 5.6.5 are valued in a manner which is consistent with that determination;*
>
> *(iii) subject to clauses 6.2.3(d)(4)(i) and (ii), assets (also known as "sunk assets") in existence and generally in service on 1 July 1999 are valued at the value determined by the Jurisdictional Regulator or consistent with the regulatory asset base established in the participating jurisdiction provided that the value of these existing assets must not exceed the deprival value of the assets and the ACCC may require the opening asset values to be independently verified through a process agreed by the National Competition Commission;*

(iv) subject to clauses 6.2.3(d)(4)(i) and (ii), valuation of assets brought into service after 1 July 1999 ("new assets"), any subsequent revaluation of any new assets and any subsequent revaluation of assets existing and generally in service on 1 July 1999 is to be undertaken on a basis to be determined by the ACCC.

(v) benchmark returns to be established by the ACCC are to be consistent with the method of valuation of new assets and revaluation, if any, of existing assets and consistent with achievement of a commercial economic return on efficient investment."

5.2.1 Take or Pay Assets

ElectraNet SA currently has no regulated assets that fall into this category.

5.2.2 Clause 5.6.5 Interconnector Assets

ElectraNet SA currently has no interconnector assets that have been capitalised after 1 July 1999.

5.2.3 Sunk Assets

In determining the opening asset value, the NEC requires the ACCC to "*have regard to the need to*" include sunk assets generally in service on 1 July 1999 at a value consistent with the regulatory asset base established in the participating jurisdiction.

In the case of ElectraNet SA, this regulated asset base was established as part of the South Australian government privatisation process.

5.2.4 New Assets

New assets are generally assets brought into the asset base after 1 July 1999, excluding interconnector assets and those assets that are the subject of a take or pay contract.

Consistent with the *Draft Regulatory Principles*, these assets have been introduced to the regulated asset base on the basis of actual costs incurred up to the point at which the assets become operational. Assets that are not yet operational have been added to the regulated asset base in their forecast year of commissioning and on the basis of estimated costs.

Only prudent asset expenditures have been added and at a value that represents the efficient competitive costs of those assets.

5.3 Jurisdictional Asset Valuation as of 1 July 1999

The jurisdictional asset valuation as of 1 July 1999 was $685.0 million, as was confirmed in a letter from the South Australian Department of Treasury and Finance to the ACCC on 10 August 2001.

The jurisdictional asset base was derived from:

- A detailed valuation that was conducted for ETSA Corporation (the vertically integrated entity that owned and operated the South Australian electricity industry prior to disaggregation and privatisation) in 1995 by Hill Michael and Associates (HMA); and

- A 1998 high-level review of this valuation by Sinclair Knight Merz (SKM) ("SKM 1998 Review") for the South Australian Government.

Both the original HMA valuation and the SKM review were based on the optimised depreciated replacement cost (ODRC) methodology that was subsequently specified in the ACCC's *Draft Regulatory Principles*.

The State Government subsequently adjusted the *SKM 1998 Review* figures for actual capital expenditure, depreciation and CPI revaluation for the financial year ending 30 June 1999. These adjusted figures plus the addition of non-system and other assets at book values make up the jurisdictional asset value of $685.0 million, which is summarised in Table 5.1.

ElectraNet SA accepts this as the recorded basis for determining its opening asset value for the purpose of this revenue cap application, but argues later in this chapter that adjustments must be made to recognise significant asset value that was omitted from the jurisdictional asset valuation.

Table 5.1: Jurisdictional Asset Valuation as of 1 July 1999

Type of Asset	ODRC ($m)
Adjusted SKM valuation	654.3
Land and Buildings	13.4
Easements	3.1
Plant and Tools	3.2
Working Capital Allowance	11.0
Total	**685.0**

In order to roll forward the jurisdictional asset base, it must be broken down into classes of assets with similar standard and remaining lives. The South Australian Department of Treasury and Finance has confirmed that there is no such detailed breakdown available that can be verified for the 1 July 1999 jurisdictional asset base.

It has, therefore, been necessary for ElectraNet SA to establish a starting point for the roll forward of the jurisdictional asset base from its financial asset register as of 1 July 1998, reconciling this with the *SKM 1998 Review* at that date and thereby maintaining consistency with the jurisdictional asset base.

Therefore, the roll forward of the regulatory asset base presented in this application starts at 1 July 1998.

5.4 Case for Amending the Jurisdictional Valuation

The 1 July 1999 jurisdictional asset base omitted significant asset value that was included in the price paid to the South Australian Government in 2000 for the long-term lease of the transmission network. The most significant omissions are those of easements and financing costs (IDC). The South Australian Government in a letter to the ACCC dated 10 August 2001 has confirmed these material omissions. The jurisdictional asset base must be adjusted for these omissions to provide a consistent treatment with other regulatory decisions made by the ACCC.

5.4.1 Interest During Construction

The *Draft Regulatory Principles* provides for the RAB to be increased

> *"by an amount equivalent to the return that would be achieved on funds employed during construction" (IDC).*

The jurisdictional asset base does not make a fair and reasonable allowance for IDC. This is documented in the SKM Asset Valuation report of 1998. The report states that IDC was only included on projects valued at over $50 million and records show that IDC was only included on one transmission line, the double circuit Tailem Bend to South East 275 kV line. Additionally, the SKM report notes:

> *"…in its report HMA (Hill Michael and Associates) pointed out that they considered the exclusion of IDC did not reflect actual replacement costs and that it should be included for all projects. Sinclair Knight Merz endorses this point of view".*

Consequently, an independent consultant PricewaterhouseCoopers has analysed ElectraNet SA construction projects in order to determine the appropriate allowance for IDC.

This analysis concluded that 7.5% must be added to the construction costs of system assets, to ensure that both debt and equity investors in these projects are adequately compensated for their investment, as is required under the objectives in clause 6.2.2, and the principles in clause 6.2.3, of the NEC.

The value of system assets in the jurisdictional asset base (with the exception of the Tailem Bend to South East 275 kV line) must, therefore, be increased by 7.5% to provide a fair and reasonable allowance for IDC.

This means that the jurisdictional asset base was understated by $44.6 million, as of 1 July 1998.

5.4.2 Easements

The South Australian Government acknowledges that only $3.1 million was included in the jurisdictional asset base for easements and that a proper valuation was not undertaken:

> *"as asset valuations consistent with the approach set out in the ACCC's draft Statement of Principles for the Regulation of*

> *Transmission Revenues dated 27 May 1999 had not been undertaken"*[58]*.*

Verifiable records on what is covered by this amount are not in ElectraNet SA's possession. The $3.1 million was attributed to ElectraNet SA as part of the disaggregation of the vertically integrated ETSA Corporation and clearly does not represent the value or actual cost of easements for 4,469 route km of transmission lines.

The recognition that easements have been undervalued for regulatory purposes is further reinforced by the future guidance that the EPO provides the SAIIR for the next regulatory reset, which requires that the SAIIR give consideration to assets that were not included in the EPO

> *"including, without limitation, the easements used by ETSA Utilities to provide prescribed distribution services".*

This reference is to ETSA Utilities because the SAIIR will have ongoing responsibility for the regulation of its revenues, whereas the ACCC has become the regulator for ElectraNet SA. However, given that the distribution and transmission easements were treated in the same way as part of the electricity reform process in South Australia and the disaggregation of ETSA Corporation, the recognition afforded by the future guidance to the SAIIR must equally apply to ElectraNet SA.

The need to adjust the asset valuation to include a fair easement valuation was recognised at the time of finalising the EPO. The ERSU submission to the ACCC of 11 August 1999 states that:

> *"Easements have been included in the initial asset base at book value, since asset valuations consistent with the approach set out in the Draft Statement of Regulatory Principles have not yet been undertaken".*

This was confirmed by ACCC consultants NERA in their report on a review of the EPO, which stated that:

> *"The valuation of easements in the ERSU submission is not consistent with the ACCC's proposed approach, as outlined in the SORP, which suggests that easements should be valued at cost and revised in line with their DORC value… SA's advisers have indicated that the SORP was released too late to incorporate the proposed methodology into ElectraNet's valuation".*

The easement value included in the jurisdictional asset base is, therefore, inadequate and an appropriate adjustment must be made to include a fair and reasonable value for easements in the regulated asset base.

Easement valuations have two separately identifiable cost components. The first is the cost to establish the easement and the second is the compensation paid to the landholder. Irrespective of the adequacy or otherwise of the easement value in the RAB, it is clear that the amount

[58] Letter from the South Australian Department of Treasury and Finance to the ACCC, dated 10 August 2001.

included falls into the second component (although enormously undervalued) and that no allowance was been made for easement establishment costs.

ElectraNet SA has sought to identify a fair and reasonable cost of both easement establishment and compensation. The former has been addressed as part of work done by SKM to determine, an appropriate basis for easement establishment costs exclusive of compensation. SKM found that:

> *"Historically, many asset valuations undertaken for, and by, the electricity industry have been based on the replacement cost of transmission lines, but with no or inadequate allowance for the actual cost involved in the selection and securing of line routes. Such costs typically include route selection, environmental impact assessments, public consultation, easement surveys, and legal and registration costs.*
>
> *Note that these costs do not include the cost of compensation to property owners for the easement itself.*
>
> *The abovementioned costs are real and tangible costs incurred by a utility in the process of securing routes for transmission lines".*

SKM calculated the "replacement cost" of easement establishment (excluding compensation) to be $123.0 million.

Land valuation experts, Maloney Field Services (MFS) conducted assessments of the deprival value of ElectraNet SA's easements in 1997 and 2000. MFS valued easement compensation costs at $109 million in 1997 and $116 million in 2000.

These easement valuations sum to a total easement value of $239 million compared with only $3.1 million that was allowed in the jurisdictional asset base, resulting in this element of ElectraNet SA's asset value being understated by $236 million.

Easement establishment costs of $123 million (excluding compensation) must be added to the current jurisdictional asset base. Easement compensation costs must also be considered and an appropriate allowance made. ElectraNet SA proposes to discuss an appropriate value for easement compensation with the ACCC during the review process that follows the submission of this application.

5.4.3 Summary

The jurisdictional asset base omitted significant asset value, comprising allowable easement and financing costs. ElectraNet SA's proposed opening asset value of $994.4 million includes adjustments for these omissions, as summarised in Table 5.2.

Failure to allow the necessary adjustments would leave the network significantly undervalued and would also be significantly out of step with other regulatory decisions made by the ACCC, including the Queensland and New South Wales revenue decisions.

Table 5.2: Regulated Asset Base Adjustments

Item	Jurisdictional Asset Base ($m)	Opening Asset Base ($m)
Easement establishment	0	123.0
Easement compensation	3.1	3.1
Financing costs (IDC)	3.9	44.6

The opening asset base presented here does not include an appropriate adjustment for easement compensation costs; however, ElectraNet SA proposes to discuss an appropriate allowance for this component with the ACCC during the review process.

5.5 ACCC Discretion to Amend the Jurisdictional Asset Valuation

In determining the opening asset value, the National Electricity Code (NEC) requires the ACCC to have regard to the valuation of assets generally in service on 1 July 1999, which are included in the Regulatory Asset Base (RAB) established by the South Australian jurisdiction.

ElectraNet SA has held discussions with the ACCC on this issue and has shared detailed legal advice that concludes the ACCC has a discretion with respect to clause 6.2.3(d)(4)(iii) to:

> *"Make adjustments to the jurisdictional valuation of a sunk asset or a class of sunk assets to remedy material anomalies in that valuation".*

ElectraNet SA's legal advice supports the view that in these circumstances the objectives in clause 6.2.2 of the NEC and the principle that the ACCC *"must have regard to the need to provide a fair and reasonable risk-adjusted cash flow rate of return"* require the ACCC to exercise its discretion and allow an adjustment to the 1 July 1999 asset base established by the jurisdiction.

Recent legal opinion obtained by the ACCC confirms that it may allow adjustments to ElectraNet SA's regulatory asset base (RAB) established in the jurisdiction in circumstances where:

- Assets were omitted because they were simply overlooked; or
- The jurisdictional asset base excluded certain asset values for a particular reason and circumstances have changed in such a way that would now justify a different treatment of these assets.

The omissions of easement establishment and financing costs fall into the second category above. These asset values were omitted at the request of ETSA Corporation as part of a valuation that was conducted for business purposes and not regulatory price setting purposes.

The jurisdictional asset base must be adjusted for these omissions to provide a consistent treatment with other regulatory decisions made by the ACCC. Failure to allow the appropriate adjustments would result in:

- An opening asset base that is significantly undervalued by 20%;
- ElectraNet SA not being provided with a fair and reasonable rate of return on its investment as required by the NEC; and
- A reduction in revenue that would seriously jeopardise ElectraNet SA's ability to fund required network investments during the regulatory period without adversely affecting its ongoing financial viability.

5.6 Optimisation

Many of the assets that were optimised out of the regulatory asset base at the time of the jurisdictional asset valuation are now necessary due to significant generation developments and load growth during the intervening years.

The *SKM 1998 Review* resulted in an optimisation of $66 million or 6% of replacement value, which translated to $25 million depreciated replacement cost.

ElectraNet SA engaged SKM to conduct an updated optimisation effective as of 1 July 2001. This study found that a number of previously optimised assets should now be readmitted to the regulatory asset base resulting in a reduced level of optimisation as of this date.

This updated level of optimisation, which reflects current usage of the network, has been incorporated into ElectraNet SA's opening asset base. The depreciated value of assets readmitted to the asset base is $13.0 million.

5.7 Asset Base Roll Forward to 1 January 2003

As discussed in Section 5.3, it has been necessary for ElectraNet SA to establish an appropriate starting point for the roll forward of the jurisdictional asset base, which includes a more detailed set of asset classes than was used to establish the jurisdictional asset base. This has been done using ElectraNet SA's financial asset register as of 1 July 1998.

The roll forward of this asset base to 1 January 2003, taking into account allowable capital additions, disposals, depreciation and indexation is shown in Table 5.3.

The roll forward includes the readmission of previously optimised assets back into the regulated asset base, as discussed in Section 5.6, and admission of previously omitted financing and easement costs, as discussed in Section 5.4.

The 1 July 2001 asset base has then been rolled forward to 1 January 2003 taking into account forecast capital additions at cost, disposals, depreciation and indexation.

5.8 Conclusion on Opening Asset Base

In conclusion, ElectraNet SA's opening asset base of $994.4 million as of 1 January 2003 has been derived from:

- The regulatory asset base established in the South Australian Electricity Pricing Order (EPO) as of 1 July 1999;
- Adjustments to correct material omissions from the jurisdictional asset base;
- Rolling forward the adjusted jurisdictional asset base to 1 July 2001 based on actual capex, disposals, depreciation and revaluation;
- Readmission of previously optimised assets at 1 July 2001 that are now necessary due to the significant load growth and generation developments that have taken place in recent years; and
- Rolling forward the 1 July 2001 valuation to 1 January 2003 based on estimated capex, disposals, depreciation and revaluation.

A summary of the asset base roll forward from 1 July 1998 to 1 January 2003 is shown in Table 5.3.

Table 5.3: Asset Base Roll Forward from 1998/99 to 2003 (ODRC)

Asset Category	1998/99 ($'000)	1999/00 ($'000)	2000/01 ($'000)	2001/02 ($'000)	Jul-Dec 2002
Opening Asset Value	678,922	731,572	794,684	937,878	972,284
Capital Expenditure (i)	24,016	64,921	7,798	41,169	26,372
Economic Depreciation (ii)	(15,953)	(1,809)	(557)	(6,762)	(4,259)
Readmitted Assets (iii)	-	-	12,953	-	-
Financing Costs (iv)	44,587				
Easement Establishment (v)	-	-	123,000	-	-
Closing Asset Value	731,572	794,684	937,878	972,284	994,397

Notes:

(i) Nett of disposals.
(ii) Straight-line depreciation less inflation.
(iii) Based on optimisation conducted by SKM effective as of 1 July 2001.
(iv) Inclusion of financing costs (IDC) to the jurisdictional asset base.
(v) Inclusion of easement establishment costs (not including compensation to land owners)

ElectraNet SA proposes, within the limits of the ACCC's discretion, that the opening asset base as of 1 January 2003 is $994.4 million.

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6. CAPITAL EXPENDITURE

6.1 Synopsis

This chapter presents ElectraNet SA's requirement for regulated capital expenditure (capex) during the regulatory period. The numbers presented represent the capex on assets forecast to come into service and to be rolled into the regulated asset base in each year of the regulatory period.

ElectraNet SA has forecast a $409 million capital investment program for the regulatory period (in nominal price terms) to upgrade the regulated transmission network to:

- Keep pace with independent forecasts of growth in customer electricity demand while adhering to the service standards required by the National Electricity Code and the South Australian Transmission Code (current and forecast customer demand levels are 200 – 300 MW higher than was allowed for in the EPO);
- Support new generation development proposals, including wind farms (these developments will facilitate green energy and increased competition in the energy market leading to lower wholesale electricity prices in South Australia);
- Support new interconnector development proposals, including the SNI interconnector and upgrades to the SA-Victorian interconnector (these developments will reduce interconnector constraints and improve the ability to contract for electricity from interstate leading to lower wholesale electricity prices in South Australia); and
- Replace aged and technologically obsolescent assets to ensure the ongoing reliability of the transmission network.

These investments will lower wholesale electricity prices in South Australia, ensure long-term network reliability and provide other flow-on impacts for the South Australian economy. These benefits will far outweigh the relatively small increase in transmission costs involved.

ElectraNet SA has applied a probabilistic methodology to determining the capex requirement due to the uncertainties involved in forecasting future customer electricity demand, and generation and interconnection developments. The South Australian Electricity Supply Industry Planning Council (ESIPC) is in agreement with the methodology adopted and work done by the ESIPC has been taken into account in the analysis and outcomes presented in this chapter.

6.2 Code Requirements

ElectraNet SA is required to plan and develop the transmission network in South Australia to meet specific reliability standards as laid out in the South Australian Transmission Code. In particular clause 2.2.2 begins as follows.

> *"A transmission entity must plan and develop its transmission system such that, in relation to a connection point or group of connection points*

allocated to one of the categories set out below, the following standards for that category are met for that connection point or group of connection points."

In South Australia, each connection exit point or group of exit points is allocated to one of five categories, with each category having a specific reliability standard. The reliability standards are specified in terms of the demand for which ElectraNet SA may contract with customers and the amount of line and/or transformer capacity that ElectraNet SA must provide against contingencies.

In addition to the standards set out in the Transmission Code, ElectraNet SA is also required to plan and develop its transmission network in accordance with the National Electricity Code (NEC). In particular, some of the more important areas that must be addressed include:

- Quality of supply issues (NEC section 4)
- Removing network constraints (NEC section 5.6)
- Considering the cost of electrical losses (NEC section 5.6)
- Designing the transmission system so that the system continues to remain in a secure state in the event a credible contingency occurs when any part of the network is out for maintenance (NEC section 4)

6.3 Planning with Uncertainty

Predicting generation and interconnection dispatch patterns has become increasingly difficult in South Australia since the introduction of the National Electricity Market, the creation of independent corporations and the subsequent privatisation of electricity assets. Market forces often result in generation dispatch patterns that confound attempts at explanation through marginal cost analysis, as was traditionally applied prior to the operation of the NEM.

While predicting existing generation and interconnection dispatch patterns poses significant challenges, the significant number of potential new developments further complicates prediction of future generation and interconnector dispatch patterns. Potential new developments include wind generation, the new Murraylink interconnector to Victoria, the proposed SNI interconnector, and upgrades to the SA/Victorian interconnector all of which add another dimension of complexity to predicting dispatch patterns in South Australia.

Recognising the significant element of uncertainty with regard to future generation and interconnection dispatch patterns, ElectraNet SA has used a probabilistic approach to develop the capex forecast presented in this chapter. To assist in this process, ElectraNet SA engaged an independent expert consultant ROAM Consulting to assess the likely level of variability in future generation and load growth in South Australia.

6.4 The Planning Process

6.4.1 Methodology

In order to determine future transmission network augmentation requirements, ElectraNet SA must assess future network performance against the reliability and security requirements set out in the SA Transmission Code and the NEC. Where the requirements are not met, solutions are considered from a variety of options, including transmission augmentation, distribution augmentation, new generation, demand side management initiatives and procurement of transmission grid support services. Where a transmission augmentation provides the optimal solution (based on a methodology broadly consistent with the ACCC's Regulatory Test), it is then included in the capex forecast.

The planning process begins with a wholesale market modelling exercise where plausible scenarios for future generation and customer demand within South Australia are identified. For each year in the period of analysis (typically 10 years) and for each scenario, the network is assessed against each plausible generation and interconnection dispatch pattern for the following summer's peak demand situation. Solutions to address limitations in the capability of transmission system are then built into the electrical model before moving onto the next summer where the process is repeated. This process continues for each year until the end year of the planning horizon.

Following completion of this process, a holistic assessment of the projects identified is carried out to determine if the one-year incremental augmentation approach has identified sub-optimal solutions where longer-term solutions may be more appropriate. If this is the case, then appropriate changes are made. A provision is also made for replacement capex where the Asset Management Plan has provided justification to replace aged and technically obsolescent plant.

The outcome of this process is a capex augmentation plan corresponding to each of the future generation/ demand scenarios. Figure 6.1 outlines the process and the necessary inputs to determining augmentation capex.

6.4.2 Customer Peak Electricity Demand Forecasts

As required by clause 5.6.1 of the NEC, ElectraNet SA has obtained 10-year peak electricity demand forecasts from the South Australian Distribution Network Service Provider (ETSA Utilities) and all other customers connected directly to the transmission system.

These forecasts are incorporated into electrical models of the ElectraNet SA transmission network taking into account connection point load diversities observed during summer peak conditions in February 2000. An implied aggregate SA electricity demand forecast is derived from these electrical models, which includes machine auxiliaries and transmission losses. This implied aggregate demand forecast (Table 11.1) closely matches the NEMMCO Statement of Opportunities medium growth demand forecast for South Australia for a 10% probability of exceedance, which was published in March 2001.

The South Australian system has more extreme loading during summer than winter. Consequently, network augmentation is generally required to meet customer electricity demand at the time of summer peak conditions.

Figure 6.1: Summary of the Capex Planning Process

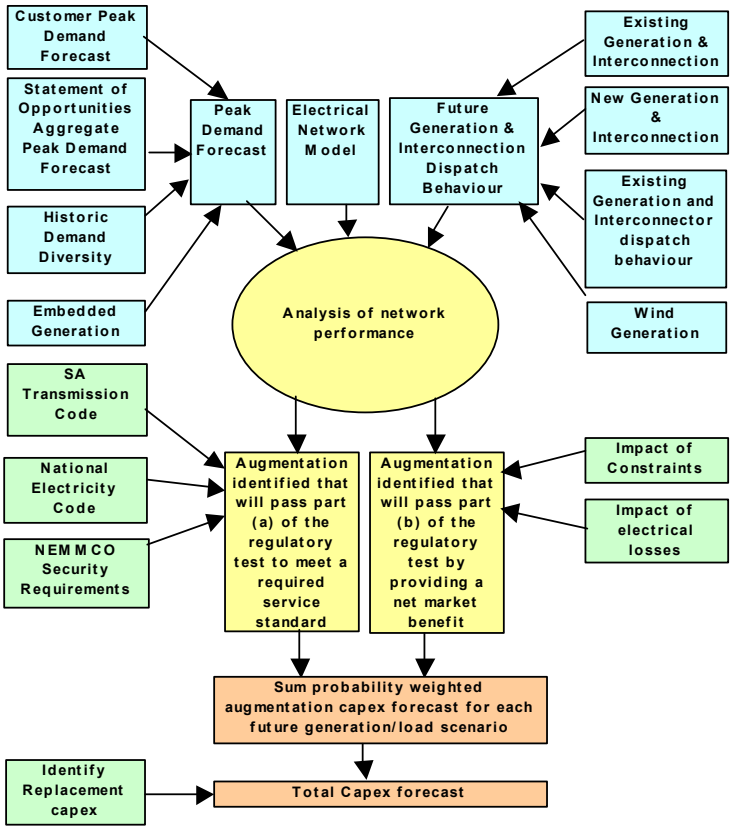
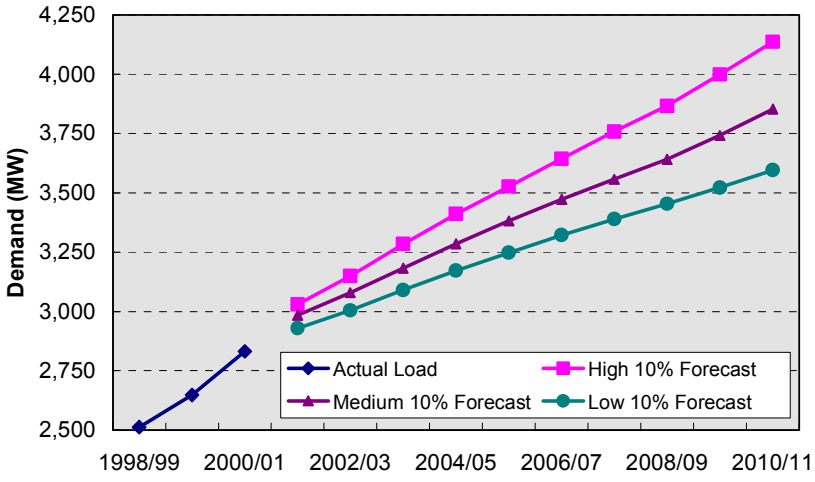


Figure 6.2 plots the NEMMCO peak demand forecast for South Australia for a 10% probability of exceedance. Work carried out by ROAM Consulting suggests that the medium and low growth scenarios are significantly more likely than the high growth scenario. Consequently, these scenarios have been used as the basis for applying the customer forecast demands when developing network augmentation requirements.

Figure 6.2: SA Demand Forecast



6.4.3 Generation forecast

Future generation outcomes in South Australia are subject to significant uncertainty with various outcomes considered possible. Factors driving the outcomes, such as customer demand growth and fuel supplies are beyond ElectraNet SA's control. ElectraNet SA engaged ROAM Consulting to conduct wholesale market modelling to identify plausible generation/ demand/ interconnector scenarios over the next ten years. Each scenario considers demand and interconnector options as well as generation developments.

ROAM Consulting identified a total of 96 plausible generation/ demand/ interconnector scenarios and determined the probability of occurrence for each scenario. Three possible levels of wind generation developments were combined with these scenarios (none, medium and high levels), increasing the total number of plausible generation/load/interconnector scenarios to 288.

Those scenarios expected to have similar transmission development outcomes were merged to reduce the number of scenarios to 24.

The 24 scenarios represent all possible combinations of the four major themes in Table 6.1.

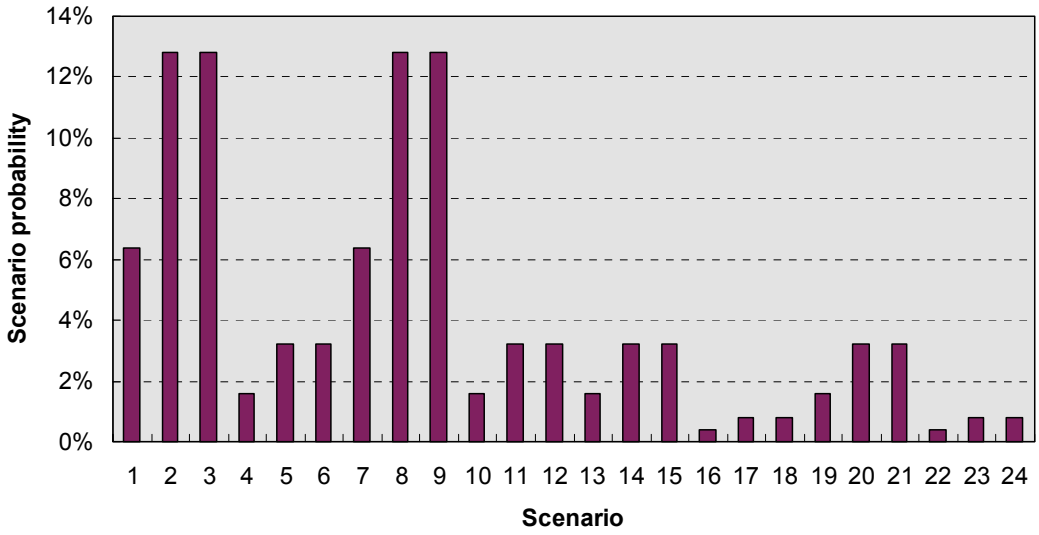
Table 6.1: Probabilistic Scenario Themes

Possible Outcome	Notes
Additional Generation in the South of South Australia	
Low levels of additional generation	Only committed generation added (no wind generation)
Medium levels of additional generation	340 MW of additional generation (including wind)
High levels of additional generation	700 MW of additional generation (including wind)
Additional Generation in the North and West of South Australia	
Low levels of additional generation	Only committed generation added (no wind generation)
High levels of additional generation	490 MW of additional generation (including wind)
Electricity Demand Growth	
Low demand growth	As in NEMMCO's 2001 Statement of Opportunities
Medium demand growth	As in NEMMCO's 2001 Statement of Opportunities
SAMAG Magnesium Smelter	
Proceeds	230MW generation and between 20MW and 170 MW load
Does not proceed	

The 24 scenarios result from the 24 combinations of outcomes from the above themes (i.e. 3 x 2 x 2 x 2).

Figure 6.3 shows the probabilities of the 24 scenarios based on work carried out by ROAM Consulting. While the top six out of 24 scenarios account for about 65% of the probability weighted outcomes, the other eighteen scenarios still each have a 1-3% probability of occurrence.

Figure 6.3: Scenario Probabilities



6.4.4 Transmission Plans

Within each of the above 24 scenarios for future electricity demand growth and new generation, a range of plausible generation and interconnection dispatch scenarios were developed. Each of these dispatch scenarios were then assessed using standard transmission planning techniques to determine a set of augmentations (a transmission plan) to ensure compliance with the NEC, the SA Transmission Code and other requirements. The 24 input scenarios thus resulted in 24 transmission plans.

6.4.5 Estimates of Project Costs

ElectraNet SA has scoped and costed each of the potential capex projects identified. Costing has been carried out at 2001/02 price levels. In order to validate reference costs, ElectraNet SA engaged both Meritec and GHD Black & Veatch to independently cost a cross section of about 20% of the projects. As a result, ElectraNet SA's cost estimates are consistent with those supplied by Meritec and GHD Black & Veatch.

6.4.6 Financing Costs

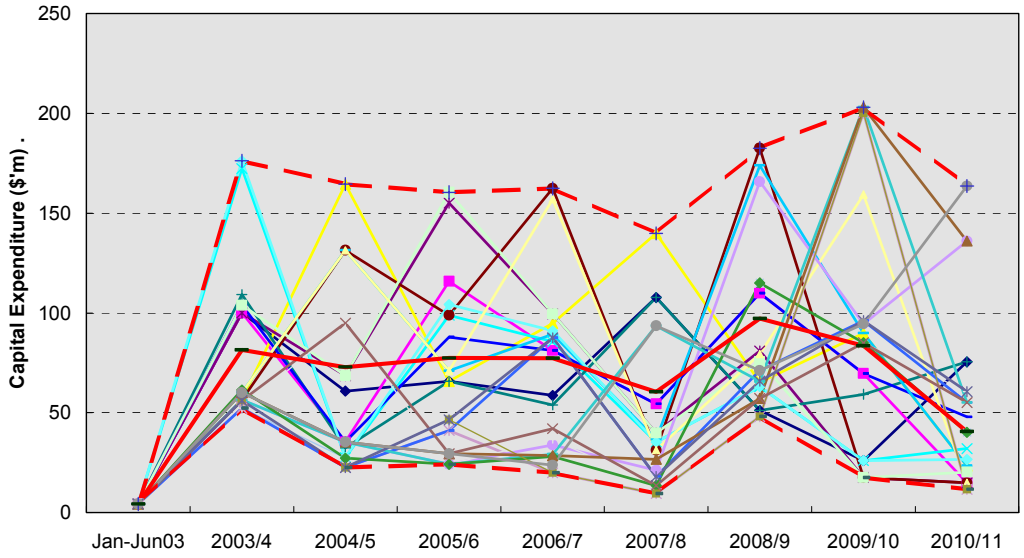
ElectraNet SA engaged PricewaterhouseCoopers to conduct an analysis of historical construction projects to determine an appropriate allowance for Interest During Construction (IDC).

The analysis concluded that 7.5% must be added to the construction costs of system assets, to ensure that both debt and equity investors in these projects are adequately compensated for their investment, as is required under the objectives in clause 6.2.2, and the principles in clause 6.2.3, of the NEC.

6.5 Capital Expenditure Requirement

Figure 6.4 shows the capital expenditure outcomes for each of the 24 scenarios investigated. The dotted red lines show the envelope of these outcomes while the solid red line shows the weighted average.

Figure 6.4: Regulated Capital Expenditure Profile ($2001/02)



The interpretation of this form of capex forecast is that while any one of the individual scenarios may occur in reality, a composite scenario represented by the probability-weighted average provides the expected capital expenditure over the period. Such a composite scenario does not have a list of projects with specific forecast commercial in service dates. Even when projects are common to many scenarios, different commercial in service dates will generally apply to different scenarios. The outcome of the capex forecasting process is, therefore, a capital expenditure allowance for each year of the regulatory period. The probability weighted average regulated capex for each year is shown in Table 6.2.

The information presented in Figure 6.4 can be represented as a cumulative capex requirement as shown in Figure 6.5. Whilst considerable variation still exists, this approach removes the effect of project timing differences from the scenarios presented. It allows the spread of likely capex outcomes to be more easily visualised over the regulatory period, and beyond. Over the five and half year regulatory period, the level of capex is estimated to be between $150 million and $526 million, with an expected total of $374 million and a standard deviation of approximately $127 million (in $2001/02 and excluding allowable financing costs (IDC)). After CPI escalation and including IDC, the expected capital expenditure is a total of $409 million over the regulatory period.

Figure 6.5: Cumulative Regulated Capital Expenditure Profile ($2001/02)

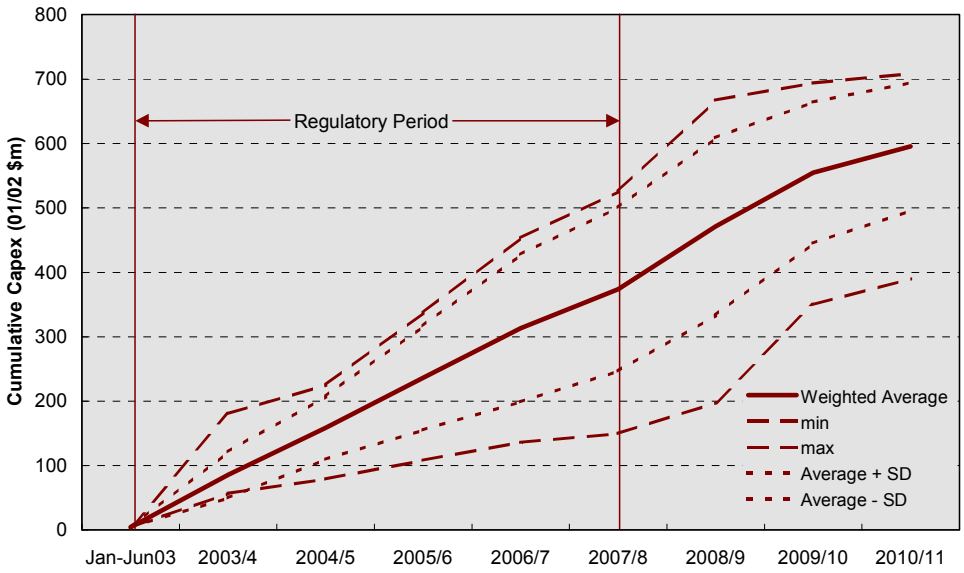


Table 6.2: Scenario Weighted Average Capital Expenditure Requirement ($2001/02)[59]

	Jan-Jun[60] 2003 ($m)	2003/04 ($m)	2004/05 ($m)	2005/06 ($m)	2006/07 ($m)	2007/08 ($m)
Lines	0.1	29.0	18.1	39.7	17.2	30.5
Substations	3.3	50.5	53.5	37.2	58.4	28.3
Other	0.9	2.0	1.3	0.4	1.6	1.7
Total Capex ($2001/02)	**4.3**	**81.5**	**72.9**	**77.4**	**77.3**	**60.5**
Total Capex ($nominal)	**4.4**	**85.3**	**78.1**	**84.9**	**86.8**	**69.5**

Six-month transitional period

6.6 Conclusion on Capital Expenditure

Consistent with the probabilistic methodology applied and the requirements of the *Draft Regulatory Principles*, the forecast regulated capital expenditure to be rolled into the regulated asset base during the regulatory period is $409 million (in nominal price terms) as given in Table 6.2. This estimate is derived from the weighted average of 24 possible development scenarios, which were investigated and include financing costs (interest during construction).

[59] Includes allowable financing costs (IDC).
[60] Capital expenditure during this transitional period is low because most projects are commissioned prior to December in order to meet summer peak demands.

7. DEPRECIATION

7.1 Synopsis

This chapter sets out ElectraNet SA's assessment of the allowable depreciation on regulated assets during the regulatory period.

The depreciation allowance determined is based on a roll forward of the opening asset base and ElectraNet SA's probabilistic forecast of asset additions and disposals. The "economic depreciation" method is utilised consistent with the approach taken by the ACCC in its previous regulatory decisions. Assets identified for replacement are fully depreciated on a straight-line basis over the regulatory period.

7.2 Depreciation Methodology and Issues

In the context of the regulatory framework adopted by the ACCC, depreciation is represented by a change in the value of the regulated asset base for each year of the regulatory period.

The assessment of depreciation depends on:

- The base level of depreciation for an asset, which is calculated from its standard service life; and
- Accelerated depreciation due to a reduction in its service life or a forecast reduction in the value of its service potential over the regulatory period.

7.2.1 Summary of Issues

Transmission assets, by their very nature, are long lived. These lives generally extend from 15 years to over 50 years with the majority being at the upper end of this range. While the initial life of an asset is determined from industry norms, the remaining economic life can change during a particular asset's life due to a combination of factors. Some of these factors are generic to all long-lived infrastructure assets, while others are a product of the regulatory framework. Key factors that affect economic life in the Australian regulatory framework are:

- Physical deterioration of service potential over time through wear and tear;
- Assets no longer required in a particular location with relocation or reuse of the assets impractical or uneconomic;
- Technological obsolescence; and
- Optimisation (service potential no longer required or for a shorter period) due to perceived overcapacity whether due to a change in demand patterns or planning and system design criteria.

In addition, there are factors that may alter the assessment of the value of the service potential that remains at the end of the relevant regulatory period, including:

- Optimisation risk (partial reduction in service potential)
- The Modern Equivalent Asset Valuation (MEAV) approach that exposes TNSPs to revaluation risk as market costs and technologies change over time. This approach could force TNSPs in certain circumstances to reinvest in new technologies at a higher rate than may be commercially prudent, leading to higher transmission costs than would otherwise be necessary.

7.2.2 Accelerated Depreciation

In accordance with the *Draft Regulatory Principles*, ElectraNet SA is expected to forecast any reduction in service potential and alter its depreciation profile accordingly. The ACCC contends that this arrangement simulates the behaviour of a competitive market and that if a TNSP fails to forecast this adequately it should forego investment compensation and returns, even on what was assessed as being prudent investment at the time.

ElectraNet SA is concerned that this approach requires it to take financial responsibility for matters beyond its control, for example, how its customers (in the case of asset stranding) and equipment manufacturers (in the case of technological obsolescence) would manage their businesses over the regulatory period.

This exposure to a reduction in service potential is inconsistent with the low WACC and the regulatory framework ElectraNet SA operates in. While businesses in competitive markets are exposed to similar risk, such businesses are able to promptly react to market information and adjust prices accordingly.

7.2.3 Stranding Risks

ElectraNet SA is mindful of the risks it faces with the very long-lived assets that it holds. ElectraNet SA is particularly concerned that its transmission line and substation assets could be subject to some form of stranding risk (either because of regulatory intervention, network or generation investment or competitive by-pass) in the future, which would diminish remaining lives to less than their current remaining life.

In its Powerlink Draft Decision[61], the ACCC effectively underwrote Powerlink's exposure to asset stranding risk by stating that in the event of such asset stranding occurring, an adjustment would be made in the following regulatory period to account for the reduced service potential. In the Final Decision[62], Powerlink was expected to identify assets that may be exposed to stranding during the regulatory period with the revenue cap in

[61] ACCC Draft Decision, "Queensland Transmission Network Revenue Cap 2002-2006/07", July 2001.

[62] ACCC Final Decision, "Queensland Transmission Network Revenue Cap 2002-2006/07", 1 November 2001, p16.

the following regulatory period to be adjusted to incorporate an allowance for the reduced service potential of these assets in the event such stranding actually occurs.

ElectraNet SA faces the same level of asset stranding risk as Powerlink due to proposed gas pipelines and MNSPs running in parallel to its transmission network. Therefore, ElectraNet SA requests an equivalent treatment from the ACCC and will be submitting a list of assets subject to potential stranding to the ACCC during the review process.

7.2.4 Technological Obsolescence and MEAV Risk

In accordance with the *Draft Regulatory Principles*, ElectraNet SA faces an on-going exposure to changes in the value of its regulated asset base at subsequent revenue resets as a result of the application of MEAV principles that can decrease replacement asset values. For example, the replacement costs of all long-lived assets are subject to technology change and/or sourcing price changes, which can redefine the modern equivalent asset and its commensurate value and service potential. While engineering consultants may take different views on when a change in technology becomes widespread enough for it to affect the definition of the modern equivalent asset (MEA), the full impact of such a change will affect ElectraNet SA when its assets are revalued at subsequent revenue determinations.

ElectraNet SA contends that it is impossible to predict with reasonable certainty what engineering consultants may recommend as a modern equivalent asset at the next valuation of its asset base. However, a preliminary analysis of technological change and sourcing arrangements indicates that the possible impact on future asset valuation could be as high as 10% (i.e. $90 million).

Because of the uncertain nature of this assessment and the corresponding imposts on TUOS prices, ElectraNet SA has not made a claim for accelerated depreciation to recover this amount in this Application.

ElectraNet SA proposes that this recovery be dealt with at the commencement of the subsequent regulatory period in the same way as depreciation due to asset stranding risks

7.2.5 Methodologies

Various methodologies are available to allocate the service consumption or return of capital. Accounting standards allow two methods of depreciation, either straight line or diminishing balance. These recovery approaches reflect views that consumption will be either relatively constant over time or alternatively will be higher in the earlier years and diminish over time. Considerable interest has also been engendered in annuity, inverse annuity and other back and front loaded methods of recovery.

The ACCC has adopted an “economic depreciation” methodology that is effectively straight-line depreciation adjusted for inflation. This approach, which is similar to annuity depreciation, increases ElectraNet SA’s exposure to the risks previously identified as the depreciation allowance is

effectively back loaded via the inflation adjustment. This reinforces the justification of the ACCC's approach to treat unpredictable depreciation risks that actually occur during the regulatory period at the commencement of the subsequent regulatory period.

7.3 Depreciation Approach

ElectraNet SA has utilised the "economic depreciation" method in this Application consistent with the approach taken by the ACCC in its previous regulatory decisions.

Depreciation is not applied to land or other infinite life assets or before assets are in commercial service.

Assets identified for replacement or to be written off during the regulatory period are fully depreciated on a straight-line basis over the regulatory period.

7.4 Depreciation Forecast

ElectraNet SA has estimated its depreciation for the regulatory period based on the roll forward of the opening asset base and its probabilistic forecast of asset additions and disposals.

The required regulatory accounting depreciation allowance determined using the straight-line method is shown in Table 7.1.

Table 7.1: Regulatory Accounting Depreciation ($nominal)

Jan-Jun 2003 ($m)	2003/04 ($m)	2004/05 ($m)	2005/06 ($m)	2006/07 ($m)	2007/08 ($m)
14.8	34.6	36.4	38.2	39.8	41.2

Six-month transitional period

The required economic depreciation allowance, which is required based on the regulatory accounting depreciation adjusted for inflation of the asset base, is shown in Table 7.2.

Table 7.2: Economic Depreciation ($nominal)(CPI = 2.34%)

Jan-Jun 2003 ($m)	2003/04 ($m)	2004/05 ($m)	2005/06 ($m)	2006/07 ($m)	2007/08 ($m)
4.2	13.8	14.7	15.9	16.9	17.6

Six-month transitional period

7.5 Conclusion on Depreciation

ElectraNet SA has modelled and forecast its depreciation allowance at an asset class level using straight-line depreciation with all assets within a class assigned weighted average standard and remaining lives. This approach is consistent with the manner in which the ACCC models depreciation over the regulatory period.

In cases where assets are displaced as a result of the capital expenditure program, those assets are written-off over the regulatory period on a straight-line depreciation basis.

The present requirement that TNSPs forecast the reduction in service potential of assets is impractical given the impossibility of being able to predict factors that are outside of the knowledge and control of ElectraNet SA. Due to the uncertainty involved and arbitrariness of any estimation method, ElectraNet SA proposes that an allowance be included in the revenue decision for the next regulatory period to account for any ensuing reduction in asset value resulting from asset stranding or MEAV optimisations.

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8. OPERATING AND MAINTENANCE EXPENDITURE

8.1 Synopsis

This chapter develops ElectraNet SA's operating and maintenance expenditure (opex) requirements for the regulatory period. The key points that summarise this chapter and will be discussed further are:

- ElectraNet SA can demonstrate an efficient cost structure, which is supported by independent benchmarking.
- The current EPO allowance for operating and maintenance expenditure is at an unsustainably low level and if left uncorrected ElectraNet SA could not continue to comply with Code reliability standards.
- An increase is required in the level of operating and maintenance expenditure, particularly in the area of asset refurbishment over the regulatory period to ensure ongoing supply reliability consistent with good electricity industry practice and expenditure levels of other Australian TNSPs.

Transmission charges are some 10% of the end use customer electricity bill. Of this the operating and maintenance component represents about 30% of total revenue or about 3% of end use customer bills. A prudent level of opex is needed to maintain a safe and sustainably reliable network while providing customers with access to the most competitively priced wholesale electricity suppliers.

The transmission network forms the backbone of the electricity system between generators and distributors. A highly reliable transmission network is fundamental in an economy that is dependent on electricity for economic growth and high standards of living. Maintaining a safe and reliable transmission network is not simply a matter of constructing it and retiring it at end of life. The network infrastructure requires targeted asset management, including appropriate levels of maintenance and refurbishment throughout its life to ensure the required level of performance.

The consequences of a low reliability network are far reaching. Besides a reduction in the standard of living and inconvenience to the wider community there are potentially higher prices for customers, collateral costs for commercial customers and higher risks for the network service provider and market participants. The flow on effects of higher costs for commercial customers is a lower competitive position for those industries, which potentially leads to lower business investment and closing of industries in the State and a consequential increase in unemployment and running down of the regional economy.

Some larger industrial customers with electricity dependent processes can suffer direct and indirect losses of millions of dollars per interruption of supply. One only needs to look to the economic impacts of the cable failures in Auckland New Zealand to see the effects of a network that did not have, in hindsight, an appropriate level of asset management. It is therefore important to be able to detect early warning signals, sometimes referred to as "weak signals" regarding network performance so that appropriate remedial actions can be taken before catastrophic failures occur.

As important as the commercial impacts of a low reliability network, is the aspect of safety. Although the majority of ElectraNet SA's assets cover large and sparsely populated geographic areas, there are a significant number of assets located in highly populated areas. The community expects that effective asset management practices be in place to avoid foreseeable risk of injury to employees, contractors and the general public. This is a particular concern for ElectraNet SA with its ageing assets and large areas of high bushfire risk.

Some transmission assets have catastrophic failure modes and when coupled with the high energy levels of the transmission network can be literally explosive (e.g. current transformers, circuit breakers and power transformers). These events cause damage to associated equipment and put at risk the safety of employees and the public. It is these assets in particular that ElectraNet SA is targeting for additional maintenance, refurbishment and monitoring expenditure.

In preparing this Application, ElectraNet SA has undertaken a comprehensive review of its asset management plan with a focus on long-term reliability and safety. The asset management plan underpins both the capex and opex forecasts outlined in this Application.

The proposed opex plan is consistent with a responsible approach to risk management and maintaining the levels of transmission network reliability required by the NEC and South Australian Transmission Code.

8.2 Overview of Key Factors

ElectraNet SA has taken into consideration the following key factors in arriving at the proposed opex plan.

8.2.1 Opex Efficiency

ElectraNet SA has a proven track record of opex efficiency.

International and national network cost and performance benchmarking demonstrates that ElectraNet SA is a leading performer in cost efficiency amongst transmission companies worldwide. Substantial cost efficiencies have been achieved during the years of electricity industry reform in South Australia and the pursuit of best practices. These have primarily been driven by the following factors:

- The creation of a stand-alone transmission entity from the vertically integrated ETSA in 1995 that only transferred personnel with core asset management, business management and contract and project management skills into the transmission business.

- A high proportion of business activities, including all construction and field maintenance, are competitively outsourced. Service contracts are, in general, performance based. Approximately 60% of ElectraNet SA's total operating and maintenance expenditure relates to contracted services.

- Business process reviews and a strong cost minimisation focus have achieved significant labour and other cost reductions through improved business systems, processes and risk management techniques.

- Implementation of a "start of the art" computerised maintenance management system.

- Rollout of remote on–line real time asset condition monitoring for selected high risk equipment.

Since acquiring the transmission network in October 2000, ElectraNet SA has continued to pursue the provision of cost effective and high quality transmission services as one of its key objectives.

Non-network costs including corporate costs have been benchmarked against the 2001 Victorian ORG Pricing Review Benchmarks for Electricity Distribution Pricing. ElectraNet SA's non-network costs are 25% below the benchmarks used in the Victorian ORG Distribution Review.

International and national cost benchmarking shows that ElectraNet SA is a leading performer amongst transmission companies worldwide.

8.2.2 Ageing Assets – An emerging liability

ElectraNet SA's transmission network originated in the early 1950's with a 132 kV system. This was followed by a high growth phase in the mid to late 1960's resulting in the establishment of a 275 kV network. Many of these original assets are still in service. Some 24% of ElectraNet SA's assets are over 40 years old.

ElectraNet SA has traditionally focussed on asset development and improving efficiencies. Replacement and refurbishment have mainly occurred in reaction to catastrophic equipment failures and have generally been 'one off projects'. Asset replacement is a relatively new issue for TNSPs as the earliest assets have only recently reached the end of their technical and economic life. Therefore it is not an expenditure line that can be trended from historical figures, however, it will be an ongoing issue in the future.

Falling equipment reliability is an inescapable consequence of ageing assets brought about by the effects of insulation deterioration, mechanical wear and technological obsolescence. Neglecting or deferring the issue will cause a spiral of decline in reliability of both the aged assets and associated parts of the interconnected transmission network.

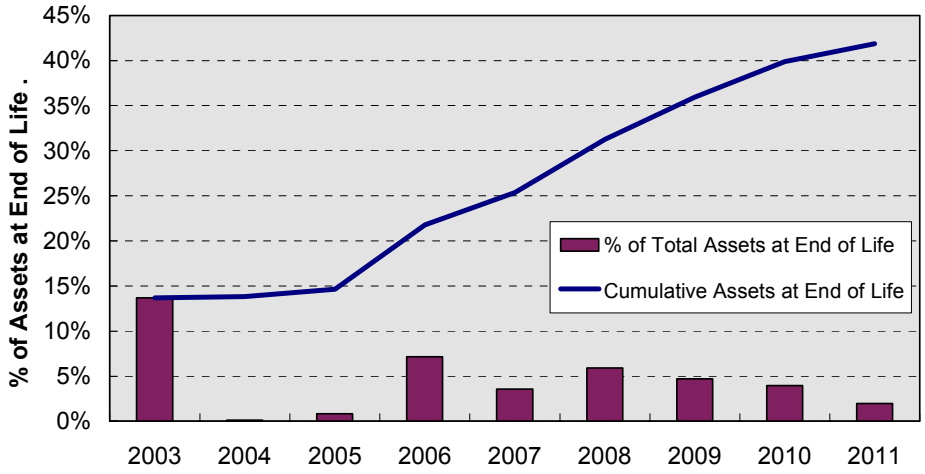
A recent reliability study commissioned by ElectraNet SA analysing trends over the past 5 years revealed an increase in the frequency of equipment failure events that caused supply interruptions of > 0.2 minutes. The results of this study confirmed that the age related decline in equipment reliability has already commenced. The study has provided a very useful "leading indicator" to assist in developing strategies to reduce or eliminate catastrophic events and has been incorporated into the recently reviewed asset management plan.

Figure 8.1 illustrates the status of ElectraNet SA's substation assets in terms of percentage of assets at end of life based on asset replacement costs from 2003 – 2011. The average end of life age criterion was

conservatively set at 45 years for all substation assets. The high initial figure in 2003 represents the accumulated backlog of assets as at 2003 that are greater than 45 years old. In addition to this backlog, there is an impending 'peak' or 'bow wave' of assets that were installed in the 1960's that will reach the end of their life during the regulatory period. On average, some 5% of substation assets per year will reach the end of their life during the next 8 years. This situation must be addressed through refurbishment or replacement of aged assets to avoid increased risks to supply reliability, cost and safety.

ElectraNet SA has incorporated a risk based asset refurbishment program as an integral part of its asset management plan.

Figure 8.1: ElectraNet SA Substation Assets End of Life Profile



Some 24% of ElectraNet SA's assets are currently older than 40 years, which translates to an increased risk to supply reliability.

8.2.3 Transmission Network Reliability

Whilst ElectraNet SA has an efficient network cost structure and has met or exceeded the high-level service standards required by the SA Transmission Code, a review of its asset management plan has revealed that expenditure in some areas is below sustainable levels. The transmission network is inherently robust in its design as required by the SA Transmission Code, however this can mask underlying problems that could potentially lead to major network reliability and safety issues, if not appropriately examined and addressed. While major parts of the network provide contingency cover for the loss of the most critical network element ("N – 1" design), there are still large parts of the network that are radial. Common (and largely hidden) modes of failure can also lead to widespread interruptions. These risks have provided a focus for ElectraNet SA's improved asset monitoring and refurbishment programs.

As previously stated, the transmission network provides access for customers via retailers to the most competitively priced wholesale electricity suppliers at the required level of reliability. The effects of a low reliability

network can have significant social and economic effects on businesses and the community as a whole. Businesses can become uncompetitive, potentially causing unemployment, a slowdown in regional growth with adverse affects on the level of investor confidence in the region. This can be caused by unnecessary transmission network constraints or direct losses through supply interruptions.

In order to prevent circumstances where major disruptions occur due to asset failure, ElectraNet SA monitors its asset performance at a number of levels. The results of a recent reliability study using Extreme Value Statistical Techniques is shown in Figures 8.2(a) and 8.2(b). This technique establishes performance indicators that provide early warning signals of potential major network problems (i.e. leading indicators).

Figure 8.2(a): Extreme Value Chart for Events > 0.2 System Minutes (1995 – 2000)

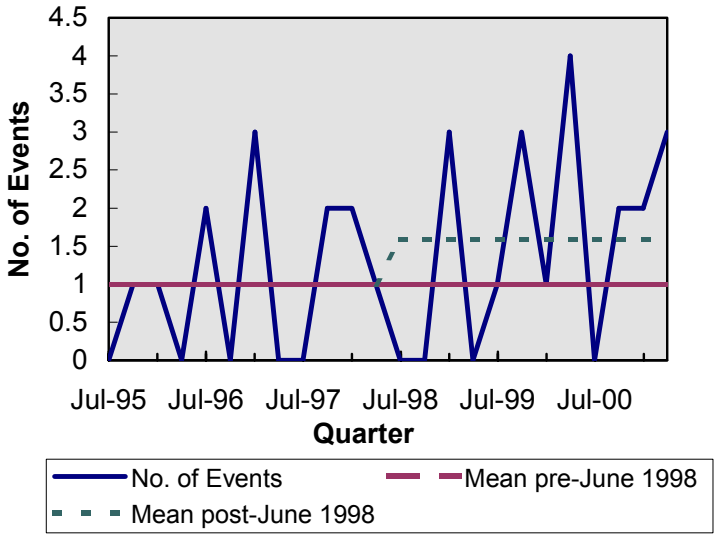
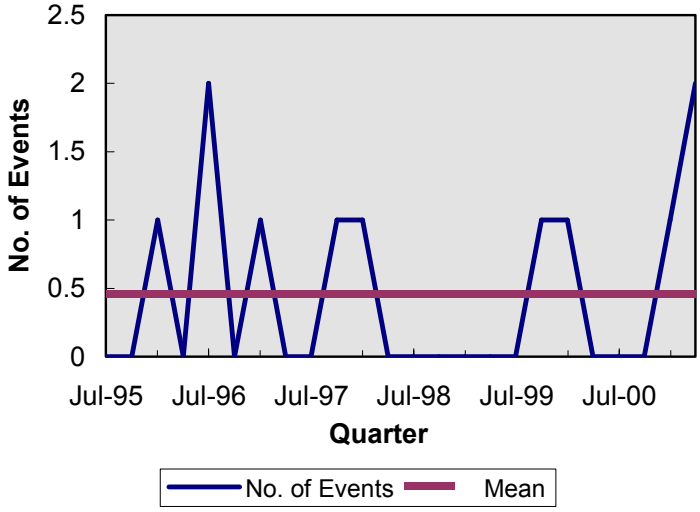


Figure 8.2(b): Extreme Value Chart for Events > 1.0 System Minutes (1995 – 2000)

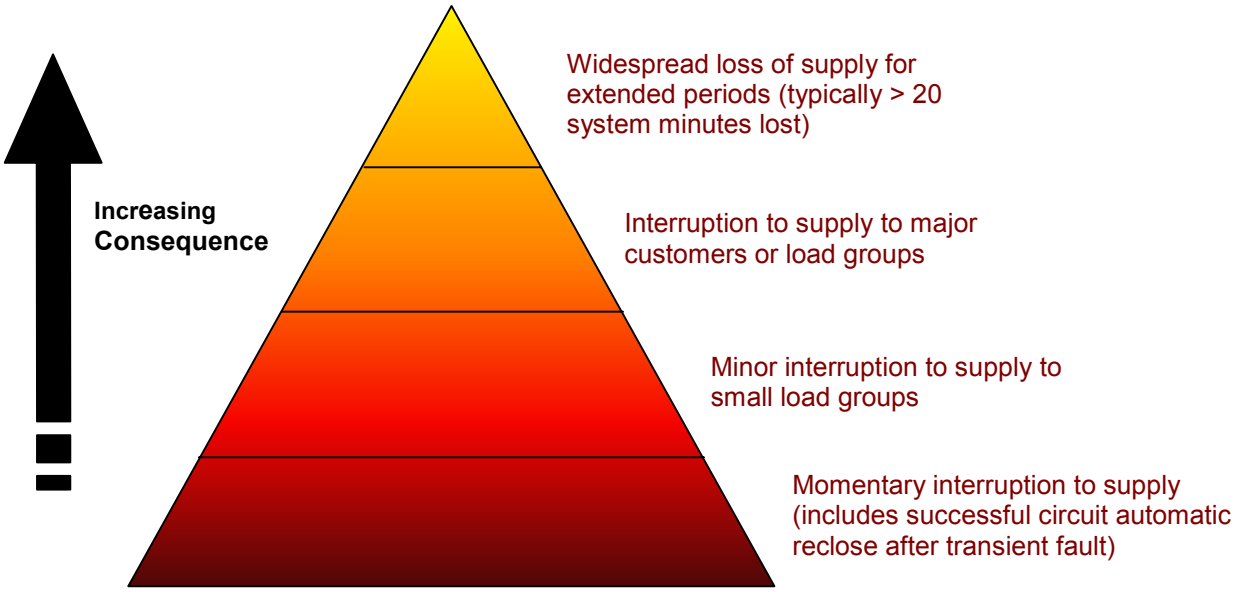


The technique involves monitoring changes in system minutes using extreme limits (within suitable data sample populations) against the return period over a period of time, in this case 5 years. One system minute is defined as a loss of load equivalent to the loss of the whole network at peak load for one minute.

Figures 8.2(a) and 8.2(b) show that since 1995 there has been an increasing trend of events that cause a loss of supply greater than 0.2 system minutes, while the frequency of events greater than 1.0 system minute is stable.

Figure 8.3 shows a reliability hierarchy typically used in risk management in describing consequences.

Figure 8.3: Reliability Consequence Hierarchy



The purpose of using leading indicators or "weak signals" is to detect changes in the lower end of the reliability hierarchy before significant or catastrophic events occur. Research into the Longford gas explosion in 1998 and Moura mine disaster found that a core issue in these events was a failure to properly monitor, report and act on operational warning signs[63].

The reliability study concluded that there has been an increase in equipment failures and human error events in the five years to 30 June 2001, which is of concern to ElectraNet SA. The equipment failures are symptomatic of the ageing network (due to obsolete technology and end of life issues), whilst the human error events are likely to reflect the loss of experienced personnel from service providers in the Electricity Supply Industry and insufficient levels of investment in training and development of replacement resources. Typically the equipment failures included critical

[63] "Lessons from Longford" – Andrew Hopkins pages 139 - 144

elements of the transmission network such as air blast circuit breakers, instrument transformers, line structures and insulators.

The study also concluded that increased maintenance, monitoring, asset refurbishment and replacement and investment in additional training/selection procedures to improve field skills could reverse the increasing trend of network outages. As a result, ElectraNet SA has developed an asset management plan focussed on long-term reliability and safety in line with our understanding of reasonable customer expectations.

Failure to increase expenditure now by reinvesting in the transmission network will have a detrimental impact on transmission network reliability in the future with severe impact on electricity consumers.

8.2.4 Risk Exposure

There are risks associated with owning a transmission business. ElectraNet SA follows a rigorous process to identify and manage these risks through a combination of control measures (i.e. removal of the risk or specific work practices), brokered insurance and self-insurance where economic. This process is discussed further in Section 8.6.5 "Risk Management".

Recently there have been indications of a "hardening" of the insurance market, particularly since the HIH collapse and World Trade Centre incident that have impacted on the likely cost to ElectraNet SA of obtaining appropriate insurance cover. Insurance industry experts and commentators have indicated that premiums (if available) could rise more than 50%, with some industries already experiencing increases greater than 100%[64].

There are additional risks associated with being a regulated entity in the NEM. In particular, the risk of increased exposure and direct costs arising from proposed changes to TNSP responsibilities in the NEM, including transfer of Market and System Operation (MSO) responsibilities to TNSPs, additional planning, public consultation, and dispute resolution obligations.

In a highly regulated business sector where returns are commensurate with a perceived low level of risk, all credible risks need to be quantified and an appropriate provision made to minimise the likelihood and consequence of the risk.

ElectraNet SA is presently exposed to and uncompensated for a number of uninsured risks.

8.3 Synthesis of Opex Plan

The following process has been used to develop the forecast requirement for opex over the regulatory period:

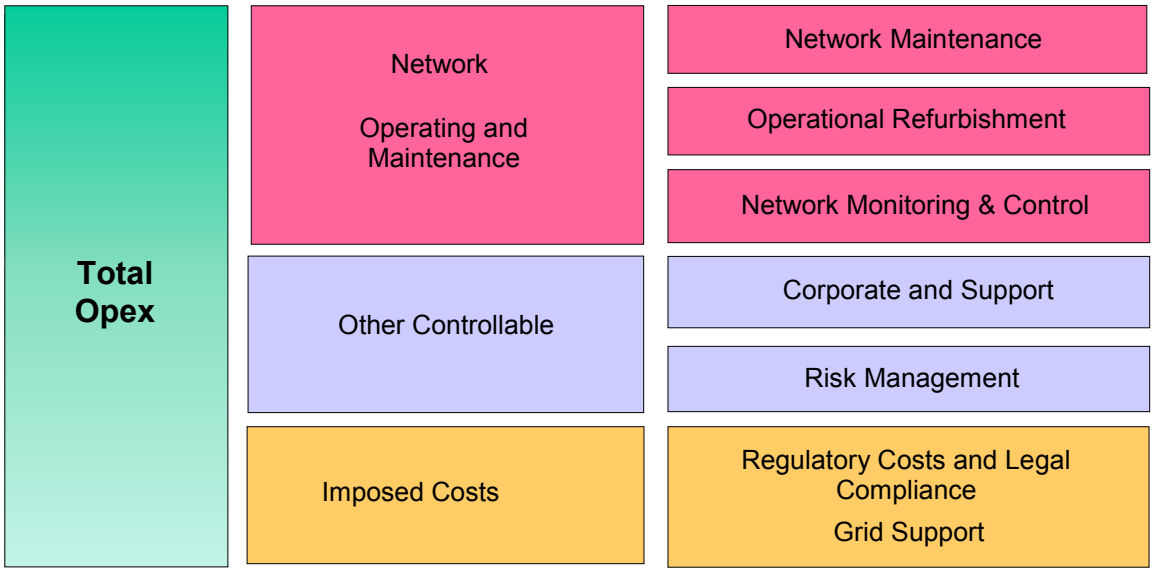
- The opex accounts were restructured into a functional costing format;

[64] "An Insurance Market overview – *In the Wake of Disaster", 4th update, January 15 2002,* by AON.

- The 2001/2002 financial year was established as the base year for the opex plan;
- Key cost drivers were identified for each function and any potential for efficiencies;
- The cost drivers were applied to the base opex to derive the required opex allowance over the regulatory period.

The structure of the base opex requirements is illustrated in Figure 8.4.

Figure 8.4: Components of Opex



8.4 Efficient Practices

In meeting the challenges presented by significant cost reductions during the 1990's and ageing network risks, ElectraNet SA has put in place many work practices, processes and systems that are best practice and in some cases world class. These practices include:

- Outsourcing of non-core business activities through competitive tendering and performance based contracts;
- Deployment of best practice maintenance techniques including the use of live line techniques and helicopter patrols where economic;
- Implementation of simple, robust and reliable continuous remote asset monitoring systems for key assets;
- Leveraging "off the shelf" proven operational asset information systems;
- A comprehensive computerised asset management system that is remotely accessible by service providers; and

- Consistent use of risk management tools in decision making.

The cost savings of these initiatives are implicit in ElectraNet SA's cost structure. Having applied all of the above initiatives there are minimal further efficiency and productivity gains to be achieved. This is confirmed by ElectraNet SA's leading position in international benchmarking.

8.5 Benchmarking

ElectraNet SA has benchmarked its costs in both the network maintenance and non-network areas. With regard to network maintenance benchmarking, ElectraNet SA has taken part in an international maintenance benchmarking exercise (ITOMS) involving all Australian and New Zealand TNSPs and about 15 other international TNSPs. The study is repeated every 2 years and utilises the performance data of the TNSP for those 2 years. With regard to non-network benchmarking, little comparison data is available and even that is subject to legitimate challenge because of differing company specific characteristics. The best comparative study available on electricity networks, albeit distribution, was undertaken by the ORG for the recent Victorian Distribution Pricing Review. This study created benchmarks at the sub-function level that are considered to be directly comparable to ElectraNet SA.

The ITOMS Study is designed to provide a forum for the exchange of best practice maintenance strategies and practices as well as the opportunity to assess overall maintenance performance in terms of maintenance cost against service level (i.e. level of equipment unplanned outages). The ITOMS benchmarking study breaks down the maintenance of both the line and substation assets into 27 sub categories in order to identify specific practices and trends. The benchmarks are also summarised at the combined asset level to provide an overview of the effectiveness of the maintenance regimes applied by the participating TNSPs.

With reference to the 2001 ITOMS results in Figure 8.5, it can be seen that in 1999, ElectraNet SA was recognised as a leading performer in the quadrant of low cost and high service level. This is a particularly good result considering the low energy density and the large geographic coverage of the network, which are not normalised for in the ITOMS study. The 2001 ITOMS study has revealed that whilst the cost efficiency of ElectraNet SA is still high with it being among the lowest cost performers, the service level indicator has dropped dramatically. The driver for this is in the area of substations, which is shown in Figure 8.6. This confirms the findings of the Transmission Reliability Studies in Section 8.2.3.

8.5.1 Network Benchmarking

The ITOMS results must be viewed in perspective. Firstly, the ITOMS service level axis measures all unplanned equipment outages and therefore includes a lot of the lower reliability hierarchy indicators including protection operations in accordance with the network's design, which don't result in any interruption to customer supply. Secondly, and most importantly, ElectraNet SA is currently meeting all of its Code reliability customer service standards under both the NEC and the more prescriptive SA Transmission Code. The service standards relate to customer interruptions and yet do not reflect the deterioration in network performance that is evident from the ITOMS measures. The real issue is the sustainability of

this position. The results accord with other trends that ElectraNet SA has observed and indicate that additional expenditures over and above current regulatory allowances must occur particularly in the area of substations.

Figure 8.5: 2001 ITOMS Combined Line and Substation Maintenance Performance Compared to 1999 Performance

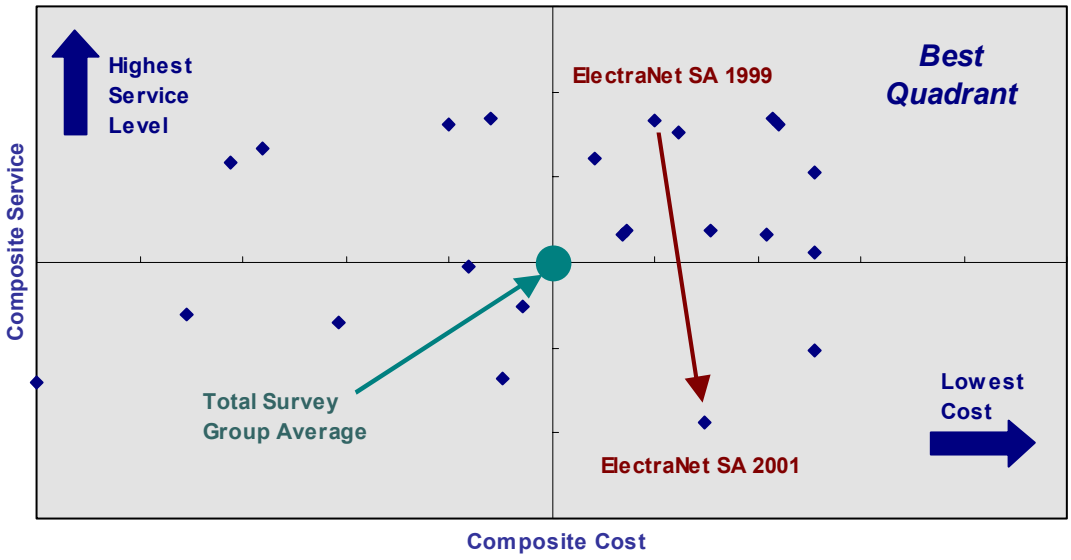
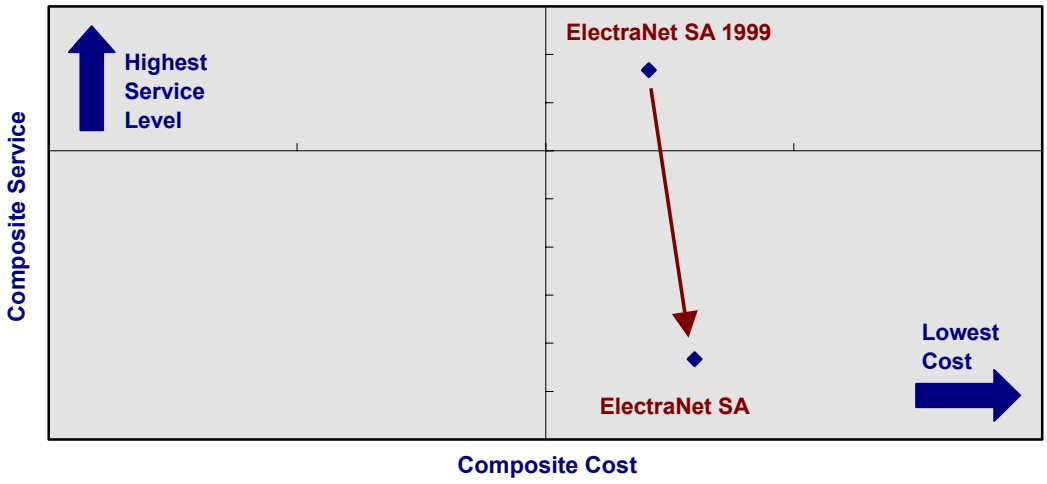


Figure 8.6: 2001 ITOMS Substations Maintenance Performance Compared to 1999 Performance



ElectraNet SA's proposed provision for refurbishment and replacement of aged assets falls well within the range that other Australian TNSPs are already spending. What has become clear is that the EPO made insufficient allowance for refurbishment and replacement costs. The resultant deterioration in network performance has highlighted the need for significant re-investment in this area.

8.5.2 Non - Network Benchmarking

ElectraNet SA commissioned an independent benchmarking study in 2001 to develop a Stand Alone Indirect Cost Model for benchmarking non-network costs. The study compares ElectraNet SA's corporate and overhead costs with the cost and ratio benchmarks developed for the 2001 Victorian ORG Pricing Review for Electricity Distribution Businesses. The conclusion of the study is that ElectraNet SA's *"benchmark ratios are in accordance with best practice in the recently privatised Victorian rail and electricity distribution assets."* In summary, the study found that ElectraNet SA's non-network costs are 25% below the benchmark costs.

Various benchmark ratios have been used to compare TNSP operating costs including ratios of opex to asset base (either written down or replacement cost and including or excluding easements etc.), MW-hr throughput (which favours higher energy density networks), km of lines, number of substations, transformer MVA etc. Comparing generic ratios such as these has little relevance unless underlying cost drivers are factored into the comparisons (including local regulatory requirements, load/duration profiles, load density, asset age profiles etc.) under which each TNSP must operate. Therefore, there is no one single measure that can be used as a "yardstick" for all TNSPs. This point was acknowledged in the PB Associates report as consultants to the ACCC in their review of the Powerlink 2001 revenue cap application. In fact, there is considerable danger that inappropriate benchmarking could lead to erroneous conclusions that will retard investment and lower service and reliability levels for customers.

The key cost drivers for the ElectraNet SA network that must be factored into comparisons with other TNSPs are:

- An extremely peaky load profile which drives investment but has a very limited cost recovery;
- South Australia has the lowest load duration profile in Australia (i.e. the most peak loaded network; the top 25% of demand occurs for less than 4% of the time, a system maximum demand of 2850 MW for an energy throughput of only 12.4 GWh);
- Low load density (i.e. 5,600 km of lines and 68 substations to service the state; a state population of 1.5 million people with only 0.4 million living outside of Adelaide);
- Large geographic area which increases maintenance costs (i.e. a service delivery area of approximately 200,000 square km);
- Ageing network – average asset age is 28 years;
- High dependency on the SA-Victorian interconnector during peak periods, which requires maintenance to be undertaken out of hours at much higher costs (i.e. maximum import represents 500 MW of a 2850 MW system maximum demand);
- ElectraNet SA is a relatively small stand alone business, but has similar fixed costs to larger transmission businesses; and

- The most prescriptive customer reliability standards in the NEM due to the need to comply with both the SA Transmission Code and the National Electricity Code.

8.6 Opex Categories

8.6.1 Network Maintenance

Network maintenance includes the cost of field maintenance services and ElectraNet SA's costs to directly manage and support these external service contracts.

All field maintenance activities are competitively outsourced. Contracts are performance based with financial incentives linked to the achievement of specified targets. ElectraNet SA has outsourced maintenance since 1995 and over time has improved the performance-based provisions of its service contracts to maximise efficiency. The financial benefits of competitively outsourcing maintenance are reflected in ElectraNet SA's excellent cost performance in the ITOMS benchmarking results.

Forecast

Maintenance costs have been projected over the regulatory period taking into account the growth in assets and changes in work practices to maintain customer service levels. All of the material cost saving opportunities have already been harnessed over the past 5 years including competitive outsourcing, restructuring and bundling of contracts, reducing and automating interfaces with service providers, introducing condition based maintenance and optimising work planning through efficient deployment and leveraging off other planned outages. ElectraNet SA is continuing to pursue any remaining opportunities for achieving efficiencies in network maintenance. The potential savings from these initiatives have been included in the forecasts of operating costs.

8.6.2 Network Refurbishment

ElectraNet SA has an ageing asset base with 24% of the assets over 40 years old. In the past, efforts have been concentrated on improving cost efficiencies and network development with little investment directed into replacement of ageing assets. The aged equipment related failures, which have included air blast circuit breaker, instrument transformers and line structure and insulator failures, demand significant reinvestment in the network.

If transmission equipment is well maintained, its average technical and economic life will be between 40 – 50 years. Consequently, an appropriate allowance for the replacement of aged equipment will on average be of the order of 2% – 2.5% of the replacement cost of the assets. In ElectraNet SA's case this would equate to approximately $26 – $32 million per annum. Replacing all assets, that are currently 40 years old or more would require an expenditure of 4% per annum over the next 6 years (i.e. 6 x 4% = 24%). To optimise expenditure on aged assets, ElectraNet SA has applied a very pragmatic and rigorous approach using risk management

techniques to prioritise the assets to be replaced. This has resulted in a focus on key assets including line insulation, circuit breakers, protection systems, telecommunication systems and instrument transformers. The refurbishment and replacement plan, harnesses available economies of scale by scheduling asset replacement programs to coincide with other capital projects and, where risks are considered acceptable, defers expenditure by installing asset monitoring systems.

Expenditure has also been minimised by targeting plant components (including insulators, circuit breakers etc) rather than replacing the full "unit of property" in the regulated asset base (i.e. substation bay or transmission line). Accounting standards and the ACCC's approach to asset valuation require this expenditure to be expensed rather than create a new capital asset. This is in accordance with ElectraNet SA's capitalisation policy, which is consistent with that adopted by other transmission entities, and accepted accounting principles.

As part of ElectraNet SA's integrated asset management plan, the refurbishment works are planned to be co-ordinated with other capital projects wherever possible to maximise efficiencies of scale and minimise the risk of unnecessary supply interruptions to customers.

Forecast

Due to the clear signals that reinvestment in asset refurbishment is now essential to correct a deterioration in reliability, ElectraNet SA is proposing to increase expenditure in this area during the regulatory period. The forecast has been smoothed to take into account a peak in assets created in the 1960's that will reach the end of their economic life during the regulatory period. The forecast also incorporates an element of "catch up" refurbishment covering the current "backlog" of aged assets, which it is proposed to eliminate over a 10-year period. Clearly, this approach increases the risk exposure for ElectraNet SA, but is considered to be prudent and responsible.

ElectraNet SA is proposing a total average refurbishment and replacement expenditure program that equates to 1.5% of asset replacement value over the regulatory period, which includes the "catch up" expenditure referred to earlier. This is still well below the 2-2.5% long-term average expenditure required or the 4% that would be required to replace all assets already over 40 years of age.

8.6.3 Network Monitoring & Control

The costs included in this category are the network switching centre, operational control systems and asset monitoring. The key cost driver in this category is the requirement to implement asset monitoring functions to defer expenditure on aged assets and to improve reliability and reduce the associated risks. The proposed expenditure includes the installation of equipment and systems that provide early warning of changes in the condition of assets with particular emphasis on indicators linked to catastrophic failure modes.

ElectraNet SA has commenced a trial of asset monitoring with encouraging results to date. Typical equipment that is monitored includes instrument transformers, power transformers, circuit breakers and insulators. Asset monitoring provides an increased level of information to enhance the management and corrective response of assets post fault, which translates to reduced repair times. In effect, the installation of this type of equipment, in particular to the "middle aged" assets assists in offsetting some of the risks associated with an ageing network.

8.6.4 Corporate Costs

ElectraNet SA has established many cost saving initiatives including the ones outlined in 8.4. As a result of these achievements, ElectraNet SA has a lean corporate and overhead cost structure confirmed through a recent independent benchmarking study commissioned by ElectraNet SA in 2001. The study used cost and ratio benchmarks developed for the 2001 Victorian ORG Pricing Review for Electricity Distribution Pricing. The conclusion of the study was that ElectraNet SA's "*benchmark ratios are in accordance with best practice in the recently privatised Victorian rail and electricity distribution assets.*" In particular, ElectraNet SA's non-network costs are 25% below the benchmark costs.

Forecast

ElectraNet SA will continue to build on efficiencies and economics of scale and absorb higher costs driven by an increase in the size of the business. It has been assumed that ElectraNet SA will deliver savings in these costs to offset the additional corporate costs associated with a growing asset base and significant capital expenditure program.

8.6.5 Risk Management

This category comprises costs associated with insurance and risk mitigation. The items of expenditure covered in this category include risk mitigation projects (site security, environmental and safety related projects), resource costs associated with auditing and maintaining the risk management process, insurance premiums and a self insurance provision.

ElectraNet SA is faced with a number of risks, some of which are common to all TNSPs and some that are perceived, by insurers, to be much greater, such as bushfire risk. South Eastern Australia comprising South Australia and Victoria has been recognised by the insurance industry as one of the most bushfire prone areas of the world. The following issues were considered in determining the appropriate treatment of ElectraNet SA's risks

- Identifying and quantifying business risks;
- The current level of risk control measures;
- Loss history and outlook over the regulatory period;

- Level of incentive for ElectraNet SA to minimise the costs associated with the risk, both in terms of ongoing mitigation, and in terms of responding to the event if it eventuates.

A comprehensive business risk review is carried out annually to identify and quantify risks and apply appropriate risk control measures. This has included the use of independent consultants to review ElectraNet SA's treatment and quantification of business risks.

The risk management process follows the Australian Standard on Risk Management including a fully developed probability and consequence matrix. The risk control measures involve a combination of removal of the risk, investment in mitigating equipment and changes in business processes. The residual risk is further quantified, and where economic an appropriate level of insurance cover is obtained. For the residual risks that are not economically insurable, ElectraNet SA is taking a responsible and pragmatic position by making an appropriate provision. ElectraNet SA takes the view following the principles of incentive regulation as outlined in the ACCC *Draft Regulatory Principles* that wherever possible incentive should be provided for TNSPs to manage their business efficiently. Consistent with this view, ElectraNet SA proposes that a self-insurance provision be made for credible risks and that a pass through will only be sought for catastrophic events that exceed ElectraNet SA's insurance cover or where insufficient self-insurance provision is built up.

Over recent years insurance premiums have been steadily increasing between 5–10% per annum despite ElectraNet SA's low loss history. However, the past 6 months has seen numerous industry reports of step increases in insurance premiums, and in some cases certain types of cover not being made available at all reflecting a significant hardening of the insurance market due to losses such as the World Trade Centre disaster and other issues such as the HIH collapse. ElectraNet SA has provided for a prudent 64% increase in premiums in the first year of the regulatory period.

Forecast

ElectraNet SA forecasts an increase in costs due to the hardening of the insurance market and the establishment of an appropriate self-insurance provision where economic to do so. It is important to note that insurance premium estimates have been conservatively based on a continuing no claims assumption.

8.6.6 Imposed Costs

There are some costs to ElectraNet SA, which are imposed by Regulators, Government and law. The costs incorporated under this category include:

- Regulatory charges;
- Internal costs associated with managing regulatory affairs and reporting to Regulators;
- Maintaining electrical safety clearances to prescribed SA Regulations;

- Interest rate hedging costs associated with the regulated capex program; and
- Existing grid support contracts.

Grid support is an alternative to transmission network augmentation for ElectraNet SA to meet its NEC and SA Transmission Code reliability requirements. Grid support contracts have been established where they are more economic or practical than a transmission solution. It should be noted that there is an associated risk issue regarding the comparative reliability and availability of a generator, MNSP asset or demand side management solution as compared to a regulated transmission asset. To date, ElectraNet SA has contracted with generators to provide the appropriate level of grid support in accordance with contracts put in place before privatisation. Grid support is essential in certain parts of the network to provide adequate but not necessarily continuous levels of transmission support to maintain supply reliability during planned and unplanned outages.

ElectraNet SA notes that in the Powerlink determination, grid support was treated as essentially a pass through cost. ElectraNet SA has included an estimate based on the current grid support contracts as a proposed opex allowance. However, ElectraNet SA is considering alternative treatments for future grid support arrangements guided by the principle of incentive regulation and proposes to discuss this with the ACCC during the review process.

ElectraNet SA considers these costs as outside of its control and has made best endeavours to forecast these costs based on information from various sources including relevant Government agencies.

8.7 Proposed Pass Through Costs

There are other potential additional costs to which ElectraNet SA is exposed. Due to their uncertain nature, ElectraNet SA proposes that these costs be treated as pass through event costs if and when they eventuate. The type of events include:

- Additional contracted grid support services (subject to outcomes of discussions with the ACCC);
- Material increases in ElectraNet SA's operating costs or risk exposures resulting from future NEM changes including firm access;
- A change in the way or rate at which any rates and taxes are imposed on ElectraNet SA;
- Catastrophic events such as bushfires, major earthquakes or terrorist attacks that either exceed ElectraNet SA's insurance cover and deductible limits or for which insurance is unavailable and for which insufficient provision has been made in the revenue cap;
- Changes to service obligations, ODRC Guidelines or other requirements imposed upon ElectraNet SA through changes to the Transmission Code, the NEC or other regulatory arrangements after the date of this Application.

ElectraNet SA proposes to negotiate a pragmatic process to manage pass through events and associated costs with the ACCC during the revenue application review process.

8.8 Conclusion on Opex

The majority of the network opex categories indicate moderate cost increases over the regulatory period primarily due to an increase in the asset base. Importantly, there is no real cost increase in the corporate area, despite increases in the asset size. The major cost increases are in the areas of asset refurbishment, asset monitoring and risk management. The level of opex proposed by ElectraNet SA to manage the credible risks faced by ElectraNet SA and to maintain the levels of reliability required by the NEC and SA Transmission Code over the Regulatory period is summarised in Table 8.7.

Table 8.7: Regulated Opex Forecast ($2001/02)

Cost Category	Jan-Jun 2003 ($'000)	2003/04 ($'000)	2004/05 ($'000)	2005/06 ($'000)	2006/07 ($'000)	2007/08 ($'000)
Network Maintenance	9,250	18,891	19,350	19,825	20,281	20,636
Monitoring and Control	4,709	6,809	6,853	6,840	7,012	6,955
Refurbishment	6,780	14,774	14,288	14,129	14,286	13,147
Corporate Costs	4,135	8,260	8,260	8,260	8,260	8,260
Risk Management	4,286	8,846	9,321	9,582	9,856	10,144
Total Controllable Opex	**29,161**	**57,580**	**58,073**	**58,636**	**59,696**	**59,142**
Imposed Costs	6,840	13,254	13,076	12,824	12,904	12,342
Total Opex ($2001/02)	**36,001**	**70,834**	**71,149**	**71,460**	**72,600**	**71,484**
Total Opex ($nominal)	**36,843**	**74,187**	**76,261**	**78,386**	**81,500**	**82,124**

Six-month transitional period

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9. TOTAL REVENUE

9.1 Introduction

ElectraNet SA's revenue cap application is based on the post-tax nominal accrual building block approach adopted by the ACCC. The previous chapters have discussed ElectraNet SA's requirements for each of the major building block elements. This chapter brings these elements together to set out the total revenue requirement for the regulatory period from 1 January 2003 to 30 June 2008.

The revenue cap determined must be sufficient to allow the business to fund new investment while at the same time providing the business with a *"fair and reasonable risk-adjusted cash flow rate of return"*, as required by the NEC[65].

9.2 Accrual Building Block Formula

ElectraNet SA's Maximum Allowable Revenue (MAR) is determined from the following building block formula:

MAR = return on capital + return of capital + opex + tax + adjustments

= (WACC * ODRC) + D + opex + tax + adjustments

where:

WACC = post-tax nominal weighted average cost of capital (the nominal vanilla WACC);

ODRC = optimised depreciated replacement cost of the asset base;

D = depreciation;

opex = operating and maintenance expenditure allowance;

tax = expected regulated business income tax payable.

As the following events are outside of ElectraNet SA's control, it is proposed that pass through adjustments to the MAR be allowed for material costs in relation to the following events, if these costs arise during the regulatory period. No allowance for these events has been made in the total revenue requirement:

- Additional contracted network support services (subject to the outcome of discussions with the ACCC);
- Material increases in ElectraNet SA's operating costs or risk exposures resulting from future NEM changes;
- A change in the way or rate at which any rates and taxes are imposed on ElectraNet SA;

[65] Clause 6.2.4(c).

- Catastrophic events such as bushfires, major earthquakes or terrorist attacks where the cost of these events exceeds either ElectraNet SA's insurance cover and deductible limits, or where insurance is unavailable, the self-insurance provision made in the revenue cap; and

- Changes to service obligations, ODRC Guidelines or other requirements imposed upon ElectraNet SA through changes to the South Australian Transmission Code, the NEC or other regulatory arrangements after the date of this Application.

9.3 Summary of Building Block Components

9.3.1 Weighted Average Cost of Capital

ElectraNet SA proposes a nominal post-tax cost of equity of 13.66%, which equates to a post-tax nominal WACC of 8.66%. The nominal vanilla WACC used to calculate the return on capital equates to 10.03%. In arriving at these figures, ElectraNet SA has adopted:

- A nominal risk free rate of 5.90%, based on the 40-day average yield on 10-year Commonwealth Government bonds, as of 4 March 2002;

- An expected inflation rate of 2.34%;

- A debt margin of 1.72% above the nominal risk free interest rate leading to a nominal pre-tax cost of debt of 7.62%;

- A market risk premium of 6.5%;

- An asset beta of 0.45 and an equity beta of 1.12;

- An asymmetric risk premium of 0.5%; and

- An imputation factor (gamma) of 0.5.

The required rate of return is based on a Network Economics Consulting Group (NECG) submission on WACC that accompanies this application.

9.3.2 Opening Asset Value

ElectraNet SA's opening asset value as of 1 January 2003 has been established by rolling forward the 1 July 1999 asset base established by the South Australian Government. Adjustments have been made to recognise significant omissions from the jurisdictional asset base for allowable easement and financing costs.

The closing value of the asset base from year to year is constructed by taking the opening value, including capital additions, subtracting disposals and depreciation for the year and escalating it by an inflation adjustment. The closing value for one year becomes the opening value for the following year.

The inflation adjustment is derived from the June quarter eight cities weighted CPI.

Based on the above approach, the opening value of ElectraNet SA's assets is $994.4 million as of 1 January 2003.

9.3.3 Capital Expenditure

ElectraNet SA has a capital expenditure program over the regulatory period, which is largely driven by increasing levels of forecast growth in customer demand while maintaining the requirements of the National Electricity Code and the South Australian Transmission Code, and significant numbers of new generation and interconnector development proposals.

ElectraNet SA has applied a probabilistic methodology to forecasting capex due to the uncertainties involved in forecasting future developments.

Forecast capex of $409 million in nominal price terms, including interest during construction, has been included in the calculation of ElectraNet SA's revenue cap.

9.3.4 Depreciation

Consistent with the approach previously adopted by the ACCC, ElectraNet SA has made an allowance for "economic depreciation" which sums straight-line depreciation and the annual inflation effect on the asset base.

This depreciation has been used to model the movements of asset values during the regulatory period (Table 9.1) and for determining the return of capital component of revenue (Table 9.2).

On the basis of this approach ElectraNet SA has calculated an allowance for economic depreciation that trends from $13.8 million in 2003/04 to $17.6 million in 2007/08 in nominal price terms.

9.3.5 Operating and Maintenance Expenditure

ElectraNet SA's opex requirements for each year of the regulatory period are set out in detail in Chapter 6 of this Application.

The opex requirements, which are summarised in Table 9.2, amount to $429.3 million over the regulatory period in nominal price terms.

9.3.6 Estimated Taxes Payable

Based on the benchmark gearing level of 60% assumed in the WACC calculation and the network's tax depreciation profile, ElectraNet SA's estimated taxes payable trends from $13.3 million in 2003/04 to $17.8 million in 2007/08 in nominal price terms.

9.4 Asset Base Roll Forward

Based on the above elements of the ACCC's building block methodology and the ACCC's approach to modelling capital additions, ElectraNet SA's regulated asset base has been modelled over the regulatory period as shown in Table 9.1.

Table 9.1: Summary of Regulated Asset Base Roll Forward ($nominal)

	Jan-Jun 2003 ($m)	2003/04 ($m)	2004/05 ($m)	2005/06 ($m)	2006/07 ($m)	2007/08 ($m)
Opening asset base	994.4	994.8	1,070.7	1,137.9	1,211.2	1,285.4
Capital expenditure	4.4	85.3	78.1	84.9	86.8	69.5
Capitalised return on capex[66]	0.2	4.3	3.9	4.3	4.4	3.5
Economic depreciation	(4.2)	(13.8)	(14.7)	(15.9)	(16.9)	(17.6)
Closing asset base	994.8	1,070.7	1,137.9	1,211.2	1,285.4	1,340.8

Six-month transitional period

9.5 Total Revenue

Based on the elements of the ACCC's building block approach and the ACCC's approach to modelling capital additions, ElectraNet SA has determined its total unadjusted revenue requirement to increase from $194.5 million in 2003/04 to $237.6 million in 2007/08 ($nominal), as shown in Table 9.2.

Table 9.2: Summary of ElectraNet SA's MAR Calculation ($nominal)

	Jan-Jun 2003 ($m)	2003/04 ($m)	2004/05 ($m)	2005/06 ($m)	2006/07 ($m)	2007/08 ($m)
Return on capital	48.4	99.8	107.4	114.2	121.5	129.0
Return of capital	4.2	13.8	14.7	15.9	16.9	17.6
Operating expenses	36.8	74.2	76.3	78.4	81.5	82.1
Taxes payable	5.5	13.3	14.7	15.8	16.7	17.8
Less franking credits	(2.7)	(6.7)	(7.4)	(7.9)	(8.4)	(8.9)
Unadjusted revenue allowance	92.1	194.5	205.8	216.4	228.3	237.6
Smoothed MAR	**92.1**	**194.5**	**205.0**	**216.0**	**227.6**	**239.9**

Six-month transitional period

Applying a NPV neutral smoothing process to the unadjusted revenue amounts results in a smoothed revenue path that increases from $194.5 million in 2003/04 to $239.9 million in 2007/08 ($nominal). The revenue path is derived using an X factor of –3.04%.

[66] This component is explained in Section 9.6.

9.6 Approach to Modelling Capital Additions

The ACCC approach to modelling capital additions rolls assets into the regulated asset base on the last day of the year in which they are brought into service. This is equivalent to making the assumption that all assets come into service on the last day of the financial year. The return on capital is calculated using the opening asset value and a return on half of the capital additions is added to the asset base to compensate for the fact that capital additions actually come into service progressively throughout the year (even this assumption is conservative because most projects are commissioned by December each year to meet summer peak demands).

An alternative and more accurate modelling approach that is used by other regulators is to add the appropriate return on capital additions to the total revenue requirement for the year in which they are made.

The two modelling approaches can be shown to be equivalent in NPV terms. However, the ACCC approach has significant cash flow implications during the regulatory period and given the large capital investment program that must be funded, it is essential that the alternative modelling approach be adopted for ElectraNet SA.

9.7 Conclusion

This chapter has summarised ElectraNet SA's total revenue requirement, which has been determined using the ACCC's post-tax nominal accrual building block approach and the ACCC's approach to modelling capital additions to the regulated asset base.

On this basis, the 2003/04 revenue figure of $194.5 million would be rolled forward during the regulatory period according to an annual adjustment of CPI – X using the eight weighted capital city CPI and an X factor of –3.04%. Using forecast inflation, ElectraNet SA's revenue cap would increase from $194.5 million in 2003/04 to $239.9 million in 2007/08.

ElectraNet SA proposes that this revenue cap be adjusted by the ACCC adopting a more appropriate approach to modelling capital additions (refer to Section 9.6). ElectraNet SA intends to pursue this matter with the ACCC during the review process that follows the submission of this Application.

Chapter 10 uses financial ratios analysis as a reasonableness check against this revenue cap and shows that the revenue is necessary to fund the major investment program that is required to upgrade and expand the transmission network without adversely affecting the ongoing financial viability of the business.

ElectraNet SA proposes additional adjustments to the annual revenue cap for the following events that are outside of its control, if they arise during the regulatory period:

- Additional contracted network support services (subject to the outcome of discussions with the ACCC);

- Material increases in ElectraNet SA's operating costs or risk exposures resulting from future NEM changes; and

- A change in the way or rate at which any rates and taxes are imposed on ElectraNet SA;

- Catastrophic events such as bushfires, major earthquakes or terrorist attacks where the cost of these events exceed either ElectraNet SA's insurance cover and deductible limits or, where insurance is unavailable, the self-insurance provision made in the revenue cap; and

- Changes to service standards, ODRC Guidelines or other requirements imposed upon ElectraNet SA through changes to the South Australian Transmission Code, the NEC or other regulatory arrangements after the date of this Application.

No allowance for these costs has been made in the total revenue requirement. A definition of what is material and rules for implementing a pass through amount will be discussed with the ACCC during the review process that follows the submission of this application.

10. FINANCIAL INDICATORS

10.1 Introduction

Clause 6.2.4(c) of the NEC requires that, in setting a revenue cap, the ACCC must have regard for the ongoing commercial viability of the transmission industry and relevant financial indicators.

This provision recognises that setting a revenue cap using the building block approach is not just a matter of determining the individual building block components and adding them together. Rather a holistic approach needs to be taken in which the overall implications of the various components acting upon one another and the cash needs and financial performance of the business are assessed.

The primary requirement is that the revenue cap determined must be sufficient to allow the business to fund new investment while at the same time providing the business with a *"fair and reasonable risk-adjusted cash flow rate of return"*[67].

Financial indicators analysis allows such an assessment to be made. Investors, financiers and credit rating agencies examine financial performance indicators as part of their assessment of a company's credit worthiness. Companies with lower ratings are less likely to gain access to funds in debt and equity markets without incurring higher costs. It is imperative that the revenue outcome for ElectraNet SA ensures that its actual credit rating is maintained at investment grade otherwise the ACCC would have failed in its obligations under Clause 6.2 of the NEC

Financial indicators analysis is used in this chapter to provide a reasonableness check against the revenue cap that was determined in Chapter 9 using the building block approach. This analysis has been undertaken in a manner that is consistent with that outlined in the ACCC's Queensland and NSW revenue cap decisions.

10.2 Financial Indicator Analysis

ElectraNet SA has taken the smoothed revenue path determined in Table 9.2 together with the associated costs and incorporated these values into the set of financial indicators shown in Table 10.1.

The financial indicators are those that have been used by the ACCC and include measures of ElectraNet SA's:

- Ability to cover operating costs;
- Profitability;
- Ability to service and repay debt; and
- Ability to finance new expenditure from operations.

[67] National Electricity Code, Clause 6.2.4(c).

Table 10.1: ElectraNet SA Financial Indicators

Financial Indicators	2003/04	2004/05	2005/06	2006/07	2007/08
EBIT to revenues (%)	55	56	56	57	58
EBITD to revenues (%)	62	63	64	64	66
EBIT to funds employed (%)	12	12	12	12	12
Pre-tax interest cover (times)	1.88	1.89	1.91	1.92	1.98
Funds flow net interest cover (times)	2.65	2.63	2.65	2.64	2.69
Rating (excellent business profile)	**BBB**	**BBB**	**BBB**	**BBB**	**BBB**
Rating (above average business profile)	**BBB**	**BBB**	**BBB**	**BBB**	**BBB**
Funds flow net debt payback (years)	9.70	9.87	9.79	9.81	9.50
Rating (excellent business profile)	**BBB**	**BBB**	**BBB**	**BBB**	**BBB**
Rating (above average business profile)	**BB**	**BB**	**BB**	**BB**	**BB**
Internal financing ratio (%)	43	49	48	49	64
Rating (excellent business profile)	**BBB**	**BBB**	**BBB**	**BBB**	**A**
Rating (above average business profile)	**<BB**	**BB**	**BB**	**BB**	**BBB**
Gearing	60	60	60	60	60
Dividend payout ratio	86	86	86	86	86

Note: Financial indicators formulae:

EBIT/funds employed	EBIT/ (debt + equity)
Net profit after tax (NPAT)	Revenue – depreciation – opex – interest – tax
Dividend payout ratio	Dividends/ NPAT
Funds flow interest cover	(NPAT + depreciation + interest + tax)/ interest
Funds flow net debt payback	(Debt – (investments + cash))/ (NPAT + depreciation)
Internal financing ratio	(NPAT + depreciation – dividends)/ capex
Pre-tax interest cover	EBIT/ interest
Gearing	Debt/ (debt + equity)

The financial indicators have been calculated from the regulatory model using standard regulatory assumptions such as 60% gearing. These assumptions overstate ElectraNet SA's actual business position.

10.3 Assessment and Conclusion

Table 10.1 considers credit rating implications for ElectraNet SA's regulated business assuming a business profile lying between excellent and above average. This assumption is consistent with the ACCC's treatment in the Queensland and NSW revenue cap decisions. The indicative credit ratings have been interpreted from the classifications used by the ACCC in its Queensland revenue cap decision.

The analysis shows that over the regulatory period:

- Funds flow interest cover varies from 2.63 to 2.69 times with an implied credit rating between BBB and just under A;
- The net debt payback period varies from 9.50 to 9.87 years over the regulatory period with an implied credit rating from just under BBB to just under A; and
- The internal financing ratio varies from 43% to 64% with an implied credit rating from under BB to A.

The above assessment delivers, on average, an indicative BBB+ credit rating, which is consistent with ElectraNet SA's actual business position and the assumptions made in determining the cost of debt component of the WACC.

However, credit ratings are generally based on the lowest range outcomes of all indicators within the analysis, which would indicate a rating as low as BB may be possible. Any rating lower than BBB+ would be inappropriate and unacceptable.

In summary, the financial indicators analysis shows that the revenue cap that has been determined in this application is necessary to fund the major investment program that is required to upgrade and expand the transmission network. Lower levels of revenue would seriously impact on ElectraNet SA's ability to fund the required investments and would adversely affect the ongoing financial viability of the network.

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11. SERVICE STANDARDS

11.1 Introduction

The ACCC's *Draft Regulatory Principles* requires TNSPs to propose a set of service standards, and proposed benchmarks for each standard, as part of their regulatory review application.

This chapter reviews ElectraNet SA's current service levels, addresses a number of important issues concerning the setting of service standards, and proposes a set of service standard measures for the purpose of monitoring and setting future performance targets. These proposed measures are subject to the outcomes of the ACCC's Service Standards Review, which is in progress at the time of this Application. For this reason, this Application does not propose performance targets.

11.2 Code Requirements

Clause 6.2.4(c)(2) of the NEC states that in setting a revenue cap, the ACCC must have regard to:

- the service standards referred to in the NEC applicable to the regulated transmission network; and
- any other standards imposed on the network by agreement with the relevant network users.

11.3 The Regulatory Compact

The *Draft Regulatory Principles* states that:

> *"Effective incentive-based regulation will include an explicit level of service, for which the TNSP has been provided by the regulator with sufficient income to maintain the assets necessary to provide that level of service. Service standards should balance good industry practice against customer expectations. Further, the regulatory compact should specify service standards that are reasonable and appropriate for each regulated TNSP".*

Service levels as part of the regulatory compact comprise both service quantities (volume) as well as standards of service.

ElectraNet SA's connection agreements with its customers set out the specific terms and conditions that have been agreed for the provision of connection and transmission network services.

The service quantities required by the customer at each connection point are specified in the connection agreement in the form of an Agreed Maximum Demand (kW).

The customer Agreed Maximum Demand (AMD) and agreed level of service reliability at each connection point determine the required capacity of the shared

transmission network and are principal determinants of ElectraNet SA's total revenue requirement.

11.4 Service Quantities

ElectraNet SA's required capex allowance and total revenue requirement for the regulatory period have been determined on the basis of customer forecasts of maximum electricity demand at each exit point. The aggregated totals of these forecast maximum demands are shown in Table 11.1.

These forecasts have been incorporated into the analysis to determine required transmission network developments by taking into account connection point load diversities observed during summer peak conditions in February 2000 and required project lead times. The diversified aggregate demand forecasts are broadly consistent with the medium growth demand forecast for South Australia (with 10% probability of exceedance), which was published in the NEMMCO Statement of Opportunities in March 2001.

Figure 6.2 plots the NEMMCO electricity demand forecast for South Australia with 10% probability of exceedance. The diversified maximum demand forecasts in Table 11.1 have been used as the basis for developing network augmentation requirements and ElectraNet SA's total revenue requirement for the regulatory period. Growth in customer electricity demand that exceeds the levels set out in Table 11.1 has not been taken into account in determining the total revenue requirement and is, therefore, excluded from the regulatory compact.

Should customers require higher levels of service than those agreed in the regulatory compact then ElectraNet SA would require additional revenue compensation for providing these higher levels of service.

Table 11.1: Aggregate Maximum Electricity Demand Forecasts (MW)

Forecast	2003/04	2004/05	2005/06	2006/07	2007/08
Undiversified Customer Agreed Maximum Demand (MW)	3,275	3,400	3,536	3,663	3,795
Diversified Maximum Demand (MW)[68]	3,029	3,206	3,316	3,460	3,594

[68] These forecasts have been used for planning purposes and are broadly consistent with the medium growth demand forecasts for South Australia (with 10% probability of exceedance), published in the NEMMCO Statement of Opportunities, March 2001.

11.5 Principles for Setting Network Performance Standards

Network performance standards must be consistent with the following principles:

- Service standards should be *"reasonable and appropriate for each regulated TNSP"* as stated in the *Draft Regulatory Principles*. In other words standards for network performance cannot follow a "one size fits all" approach. Each network has its own inherent performance characteristics, which amongst other things are a function of the historical expectations of network users, the history of network growth and development, geography, environmental factors and design standards.

- ElectraNet SA should only be held accountable for things that are within its control (such as interruptions or availability driven by maintenance strategy, quality of maintenance work, planning/ scheduling of outages etc.), and conversely, cannot be held accountable for things that are outside of its control. Examples of factors outside of the control of a TNSP include such things as storms and other natural events, NEMMCO intervention, and the actions of other market participants.

- Network performance standards must be consistent with the standards set for planning and developing the network.

- Network performance standards must be consistent with the standards and criteria set for operation of the network. It is important to recognise that NEMMCO is responsible for power system security and that the decisions and actions of NEMMCO have an impact on the operation of the network. TNSPs cannot be held accountable for achieving a standard that exceeds the criteria used by NEMMCO to operate the power system.

- Standards set for network performance must be consistent with the capex and opex allowances included in the total revenue requirement by the regulator. It follows that a change in network service standards during a regulatory period would be outside of the regulatory compact and, if the resulting cost impacts were material, would require the pass through of additional costs to customers.

- Increased performance risk associated with potential revenue adjustments linked to performance outcomes must be compensated appropriately. These potential adjustments would introduce additional revenue volatility and risk (performance risk) that has not previously been included in determining estimates of the weighted average cost of capital (WACC) used in establishing the revenue cap.

11.6 Setting Performance Targets

The service standards included in the service level side of the regulatory compact should reflect the inherent underlying performance of the transmission network, which is consistent with the historical development of the network. In other words, service standards should represent the performance that the TNSP would be expected to achieve on average over a long period consistent with good asset management practices in the context of the underlying network infrastructure and environment.

Valid performance trends in relation to these service standards can only be identified by monitoring performance over a period of many years.

Setting meaningful performance targets requires the availability of long-term performance data. It is also important that measures and targets can be influenced by TNSP behaviour and that they are not diminished in value by including the strong influence that random events can have on performance.

Care must also be taken in interpreting TNSP performance, particularly in relation to output measures (such as number of supply interruptions and system minutes off supply) because of the weak link that exists between these measures and TNSP performance. For example, a TNSP can stop maintaining and repairing equipment and the relative high levels of redundancy in the transmission network can mean there are still no interruptions to end users. Conversely a well performing TNSP can still have end user outage issues despite good asset management practices.

ElectraNet SA supports the careful use of output measures as *reliability indicators* in establishing and monitoring performance trends. However, the use of performance benchmarks for making pass or fail assessments of TNSP performance can be unduly simplistic.

In the event that unsatisfactory trends become apparent detailed analysis of the causes of those trends should be initiated taking into account network topography, asset history and prudent asset management practices and corrective action taken as appropriate.

11.7 Financial Incentives for Network Performance

The *Draft Regulatory Principles* states *"quality of service monitoring by a regulator, assisted by penalties for non-performance, can ensure that TNSPs maintain service quality".*

The NEC also identifies that the regulatory regime to apply to TNSPs is to be "incentive based". This concept aims to encourage TNSPs to be innovative in their business operations to improve performance and reduce costs, which will ultimately provide economic benefits to the market as a whole. Accordingly, financial performance incentives in the service standards regime should include positive incentives by allowing the TNSP to earn additional revenue over and above the revenue cap.

ElectraNet SA is of the view that any financial incentive scheme should be designed to provide financial incentives on an annual basis within a low risk reward framework. It follows that such financial incentives should only be applied to short to medium term performance measures that can be influenced by relatively small expenditures and changes in asset management practices (as opposed to measures that require substantial capital expenditure and longer term strategies to be implemented before any noticeable change in performance occurs).

ElectraNet SA has been subject to such a low risk reward framework for several years under the Performance Incentive Scheme, which was established in the South Australian Transmission Code and Electricity Pricing Order. This scheme was the first of its kind to be applied to an electricity network in Australia.

Whilst recognising that there are a number of deficiencies with the performance measures included in the current scheme, the scheme has introduced positive incentives for operational performance improvements.

Introduction of revenue adjustments related to performance outcomes introduces additional revenue volatility and performance risk that has not previously been included in determining estimates of the weighted average cost of capital (WACC) used in establishing the revenue cap.

The level of performance risk and therefore the amount of additional compensation required in the WACC is dependent on the degree of exposure to additional revenue volatility. Placing caps and collars on the financial impact of performance to deliver a low risk reward framework can limit this exposure.

It is important to recognise that there are circumstances where performance levels will necessarily degrade over the short-term. However, only genuinely inappropriate performance should be penalised.

For example, higher levels of maintenance and construction activity, particularly in relation to radial supply exit points, may have a negative impact on short-term reliability, even though their aim is specifically to improve long term reliability. The TNSP should not be penalised under these circumstances. Interruptions associated with successful protection reclose operations are another example of appropriate behaviour that should not be penalised.

11.8 ACCC Service Standards Review

In December 2001, the ACCC commenced a review to develop appropriate service standards and benchmarks to apply across the NEM and for each transmission network, including market based service standards and incorporating existing statutory requirements.

The terms of reference also required the review to assess the viability of financial service incentives and to consider possible forms that such incentives may take.

The ACCC review has developed a focus on establishing an appropriate set of performance measures for a TNSP Performance Incentive Scheme with financial service incentives. A draft Stage 1 Discussion Paper was released on 25 March 2002, which proposes five initial measures for such as scheme. The paper proposes that the scheme be implemented using short to medium term performance measures within a low risk reward framework similar to what has been proposed by ElectraNet SA in Section 11.7.

The performance measures that have been proposed by the ACCC review are not intended on their own to define the service standards side of the regulatory compact.

11.9 Current ElectraNet SA Service Standard Obligations

The South Australian Transmission Code imposes obligations on ElectraNet SA in addition to those imposed by in the National Electricity Code – a factor that differentiates ElectraNet SA from other TNSPs.

The South Australian Government established service standards in the Transmission Code to maintain historical customer expectations of transmission network performance.

11.9.1 Exit Point Reliability Standards

ElectraNet SA is required to plan and develop its transmission system to meet the standards of reliability set out for each exit point or group of exit points in Section 2.2.2 of the Transmission Code.

Each exit point or group of exit points is allocated to one of five categories of load with each category having a specific reliability standard. The reliability standards are specified in terms of limiting the amount of Agreed Maximum Demand for which ElectraNet SA may contract with customers at the exit point or group of exit points under normal operating conditions, and the amount of line and/or transformer capacity which ElectraNet SA must provide against contingencies.

The capacity of exit points and when necessary the shared transmission network requires augmentation as load growth takes place, customers request increases in Agreed Maximum Demands and the specified reliability standards can no longer be met.

In the case of N-1 or contingency capacity, ElectraNet SA is required to consider providing the necessary capacity by the alternative means of implementation of distribution system capability, generating unit capability and load interruptibility. ElectraNet SA actively considers these options and currently has in place network support arrangements at a number of locations.

ElectraNet SA proposes that the exit point reliability standards in the Transmission Code are the principal service standards upon which the regulatory compact should be based.

ElectraNet SA proposes to supplement these with a number of exit point reliability indices that will provide a direct link to the impact of network performance on customers. In particular, these indices are proposed to include exit point interruption frequency and duration.

11.9.2 Global Output Measures

The Transmission Code requires ElectraNet SA to use its best endeavours to achieve the following network service standards:

- Transmission circuit availability;
- Restoration times for transformers and transmission lines;
- SAIIR system minutes off supply; and
- Number of supply interruptions.

ElectraNet SA has included these measures in the set of indicators proposed for performance monitoring in Section 11.11, but the definitions of

some of these indicators need to be amended to ensure that they are consistent with the principle of accountability outlined above.

ElectraNet SA agrees with Powerlink and others that performance measures such as system minutes off supply are of questionable value because of their high degree of variability caused by the impact of relatively few incidents from year to year. Seeking to address this variability by calculating rolling averages has been shown to be statistically unsound.

ElectraNet SA recommends investigation of the more rigorous statistical analysis of performance trends that has been proposed by Powerlink. Consequently, the set of indicators proposed in Section 11.11 includes the number of loss of supply events greater than 0.2 system minutes and the number of loss of supply events greater than 1.0 system minute, as adopted in the Powerlink Final Decision.

11.10 Interconnector Availability Measure

There has been much talk in recent times about the market impact of network outages and the need to provide financial incentives to TNSPs in order to minimise the financial impact of network outages.

The prime concern of market participants has been that settlements residues do not provide a firm hedge of price differences between regions because of binding constraints below nominal interconnector transfer capability.

The transfer capability of interconnectors is affected by numerous factors including plant ratings, market dispatch and loading patterns as well as network outages. Many of these factors are outside of the control of TNSPs.

Analysis of binding constraints on the SA-Victorian interconnector has shown that only a small proportion of constraints are caused by factors that are within the control of ElectraNet SA.

However, subject to the findings of the ACCC Service Standards Review, ElectraNet SA remains committed to including a suitably defined interconnector performance measure in its set of performance indicators.

In the short term, any performance measures aimed at minimising the market impact of transmission outages should focus on the physical availability of ElectraNet SA assets that make up the SA-Victorian interconnector with financial incentives to take planned and emergency network outages at times that will minimise the market impact of these outages and minimise their duration.

11.11 ElectraNet SA Proposed Performance Indicators

Subject to the findings of the ACCC Service Standards Review, ElectraNet SA proposes the following network performance indicators as suitable for the purpose of monitoring performance trends and in some cases setting future performance targets.

- Transmission circuit availability;

- Connection point interruption frequency;
- Connection point interruption duration;
- Number of loss of supply events greater than 0.2 system minutes;
- Number of loss of supply events greater than 1.0 system minutes;
- Unplanned transmission circuit outage frequency and average duration broken down by meshed and radial network; and
- Interconnector Available Capacity Factor (to be defined).

11.12 Summary

ElectraNet SA proposes the service quantities set out in Section 11.4 and the exit point reliability standards specified in Clause 2.2.2 of the Transmission Code as the principal service levels upon which the regulatory compact should be based.

Subject to the findings of the ACCC Service Standards Review, ElectraNet SA also proposes the network performance indicators listed in Section 11.11 as suitable for the purpose of performance monitoring and in some cases setting future performance targets.