Draft Decision

Queensland Transmission Network Revenue Cap 2002-2006/07

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Contents

Glossary

ASX	Australian Stock Exchange
Capex	Capital Expenditure
CAPM	Capital Asset Pricing Model
COAG	Council of Australian Governments
Code	National Electricity Code
Commission	The Australian Competition and Consumer Commission
DAC	Depreciated Actual Cost
DCST	Double Circuit Steel Tower
Ergon	Ergon Energy
EUAA	Energy Users Association of Australia
Gamma (γ)	Likely Utilisation of Imputation Credits
GHD	Gutteridge Haskin and Davey
ICTP	International Comparison of Transmission Performance
Guidelines	Information Requirements Guidelines
IPART	Independent Pricing and Regulatory Tribunal
IRPC	Inter-Regional Planning Committee
ITOMS	International Transmission Operations and Maintenance Study
kV	Kilovolt
MAR	Maximum Allowable Revenue
MRP	Market risk Premium
MSOIAC	Market Systems Operations Insurance Advisory Committee
MVA	Mega Volt Ampere
MW	Mega Watt
NECA	National Electricity Code Administrator
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NIEIR	National Institute of Economic and Industrial Research
ODRC	Optimised Depreciated Replacement Cost
ODV	Optimised Deprival Value
OFFER	Great Britain's Office of Electricity Regulation
OFFGAS	Great Britain's Office of Gas Regulation
OFGEM	Great Britain's Office of Gas and Electricity Markets
Opex	Operating and Maintenance Expenditure
ORC	Optimised Replacement Cost
ORG	Office of the Regulator-General
QCA	Queensland Competition Authority
QERU	Queensland Energy Reform Unit
QMC	Queensland Mining Council
QNI	Queensland - NSW Interconnector
Regulatory Principles	Statement of Principles for the regulation of Transmission Revenues
Reverse Capex	Past Capital Expenditure
SCST	Single Circuit Steel Tower
SMHEA	Snowy Mountain Hydro-Electric Authority
SNNS	Specification and Negotiation of Network Services
Stanwell	Stanwell Corporation
TNSP	Transmission Network Service Providers

TUOS	Transmission Use of System
VAR	Voltage Amperes Reactive
WACC	Weighted Average Cost of Capital
WDV	Written Down (Depreciated) Value

1 Introduction

The National Electricity Code (code) was developed out of a number of resolutions made by the Council of Australian Governments (COAG) concerning the large potential for efficiency gains to the Australian economy available from reform of the electricity industry.

The code provides the framework for the National Electricity Market (NEM) which establishes a single wholesale market across southern and eastern Australia and an access regime for the transmission and distribution networks in participating jurisdictions. The NEM commenced on 13 December 1998. The code also establishes a regulatory framework which:

- provides that the Australian Competition and Consumer Commission (the Commission) will determine the revenue caps to be applied to the non-contestable elements of participating transmission networks; and
- sets out how those regulated revenues, combined with the networks' contestable revenues, will be translated into network charges.

In accordance with its responsibilities under the code, the Commission commenced regulating the revenues of transmission networks in the NEM on 1 July 1999, with the timetable outlining the date at which the Commission commences responsibility in each jurisdiction outlined below.

Table 1.1: NEM transmission network regulation timetable

Jurisdiction	Commission transmission regulation start date
New South Wales	1 July 1999
Victoria	1 January 2003 [1]
Queensland	1 January 2002
South Australia	1 January 2003 [2]
Australian Capital Territory	1 July 1999

1 The Commission commenced administration of the Victorian Tariff Order on 1 January 2001

2 The Commission commenced administration of the South Australian Electricity Pricing Order on 1 January 2001

This document sets out the Commission's decision in respect of the non-contestable elements of the Queensland transmission network, operated by Powerlink. Commencing from 1 January 2002, this decision will apply for a period of five and a half years, bringing Powerlink's regulatory period in line with the Australian financial year. Alignment with the financial year will simplify, and provide consistency with, reporting and forecasting processes outlined in the Commission's *Draft Statement of Principles for the Regulation of Transmission Revenues – Information Requirements Guidelines (Guidelines),* and will minimise the cost of the regulatory process.

It is important to note that this decision does not extend to the parallel network assets owned and operated by Ergon Energy (Ergon) and Energex, which are the regulatory

responsibility of the Queensland Competition Authority (QCA), in accordance with chapter 9 of the code.

The remainder of this chapter sets out:

- the regulatory framework according to which the Commission will determine the revenue caps to be applied to Powerlink's transmission assets;
- the results of the Commission's Draft Statement of Principles for the Regulation of Transmission Revenue;
- the review and public consultation processes followed by the Commission in reaching its decisions; and
- an introductory overview of the Queensland transmission networks.

1.1 The Commission's role as regulator of transmission revenues

1.1.1 Scope of the regulatory review

The code outlines the general principles and objectives for the transmission revenue regulatory regime to be applied by the Commission (see Box 1 for further details). It also grants the Commission the flexibility to use alternative methodologies, providing they are consistent with code's 'objectives, principles, broad forms and mechanisms, and information disclosure requirements'.

For example, the code requires the Commission to set revenue caps for the non-contestable elements of Powerlink transmission assets. That is, to determine the maximum allowable revenues (MAR) which the owners of those assets can earn from the use of those non-contestable elements. However, if the Commission considers there is sufficient competition to warrant a more light handed regulatory approach, it may determine and apply such an approach.

Note that, to the extent that those assets also provide contestable services, the revenues associated with those services can be competitively sourced. Such revenues are, therefore, excluded from the revenue capping process and may be determined separately by Powerlink.

1.1.2 Form of transmission revenue regulation

In assuming its role as the regulator of NEM transmission revenues, the Commission's aim is to adopt a regulatory process which eliminates monopoly pricing, provides a fair return to network owners and creates incentives for managers to pursue ongoing efficiency gains through cost reductions. In achieving these aims the Commission is aware of the need to ensure compliance costs are minimised and that the regulatory process is objective, transparent and as light handed as possible.

As this review was being undertaken, the Commission was also developing its *Statement of the Principles for the Regulation of Transmission Revenues* (*Regulatory Principles*) which sets out how the Commission proposes to regulate transmission revenues in the longer term. A draft of that document was released in May 1999 and a summary of the proposed framework is set out in Section 1.2.2. The Commission is

currently considering submissions on the draft made by interested parties and expects to finalise the *Regulatory Principles* in the near future.

However, at this time the *Regulatory Principles* remains unfinalised and it has not been possible to apply all the elements of that approach to this decision. This document, therefore, sets out the methodology used to determine the revenue caps which will apply to Powerlink's transmission revenues during the first regulatory revenue cap period between 1 January 2002 and 30 June 2007. Nevertheless, it should be noted that there are significant areas of consistency between the proposed *Regulatory Principles* framework and the methodology applied in this decision.

Box 1: Objectives and principles of the transmission revenue regulatory regime

The code establishes that:

1. the transmission revenue regulatory regime must achieve outcomes which:
   - (a) are efficient and cost effective;
   - (b) are incentive based, including the sharing of efficiency gains between network users and owners as well as the provision of a reasonable rate of return (without monopoly rents) to network owners;
   - (c) foster efficient investment, operation, maintenance and use of network assets;
   - (d) recognise pre-existing government policies on asset values, revenue paths and prices;
   - (e) promote competition; and
   - (f) are reasonably accountable, transparent and consistent over time;
2. the regulation of aggregate revenue of transmission networks must:
   - (a) be consistent with the regulatory objectives (see 1 above);
   - (b) address monopoly pricing concerns, wherever possible, through the competitive supply of network services but otherwise through a revenue cap;
   - (c) promote efficiency gains and a reasonable balance between supply and demand side options;
   - (d) promote a reasonable rate of return to network owners on an efficient asset base where:
     - (i) the value of new assets is consistent with take-or-pay contracts or NEMMCO augmentation determinations;
     - (ii) the value of existing assets are determined by jurisdictional regulators and must not exceed than their deprival value; and
     - (iii) any asset revaluations undertaken by the Commission are consistent with COAG decisions;
3. the form of the economic regulation shall:
   - (a) be a revenue cap with a CPI-X incentive mechanism, or some other incentive based variant, for each network owner;
   - (b) have a regulatory control period of not less than five years;
   - (c) take into account expected demand growth, service standards, weighted average cost of capital, potential efficiency gains, a fair and reasonable risk adjusted return on efficient investment and ongoing commercial viability of the transmission industry; and
   - (d) only apply to those assets the Commission does not expect to be offered on a contestable basis.

Source: National Electricity Code, clauses 6.2.2 – 6.2.5.

Consistent with the proposals contained in its *Draft Regulatory Principles*, the Commission has adopted an accrual building block approach in the present revenue cap decisions.

In its post-tax nominal form, the accrual building block approach calculates the MAR as the sum of the return on capital, the return of capital, an allowance for operating and maintenance (non-capital) expenditure and income tax payable; that is:

MAR = return on capital + return of capital + opex + taxes

= (WACC * WDV) + D + opex + taxes

where: WACC = post-tax nominal weighted average cost of capital;

WDV = written down (depreciated) value of the asset base;

D = depreciation allowance;

opex = operating and maintenance expenditure; and

taxes = tax liability allowance.

Consistent with its position as outlined in the *Draft Regulatory Principles*, the Commission has adopted a post-tax nominal framework for the purposes of this draft decision. The code also requires the Commission to include in the revenue cap decision a CPI-X incentive driver or some variant of this form. Again, consistently with the *Draft Regulatory Principles*, the Commission has adopted the CPI-X form for the current decision. Under this arrangement, the revenue cap will increase each year in line with inflation but decrease by an efficiency driver (and smoothing factor) determined by the Commission for each network.

1.1.3 Structure of this document

The remainder of this document broadly follows the structure inherent in the methodology described above. That is, in relation to the Powerlink decision:

- Chapter 2 concerns the network's weighted average cost of capital (WACC);
- Chapter 3 sets out the Commission's assessment of Powerlink's opening asset base as at 1 July 2001;
- Chapter 4 determines the network's projected future capital expenditure requirements;
- Chapter 5 concerns operating and maintenance expenditure;
- Chapter 6 summarises the Commission's assessment of each element of the building block (including depreciation), applies the CPI-X incentive regime and discusses options for revenue smoothing to determine the final revenue path;
- Chapter 7 sets out the service standards appropriate to the level of the revenue cap determined.

1.2 The Draft Statement of Principles for the Regulation of Transmission Revenues

Chapter 6 of the code envisages that the Commission will develop a set of guidelines outlining how it will exercise its power to regulate transmission network revenues in the NEM. As mentioned above, the proposed guidelines are contained in the *Draft Regulatory Principles* document which in summary, proposes determining transmission revenues according to the following principles:

- an accrual building block approach based on forecast costs of service;
- for the initial asset value, using the jurisdiction asset value, provided it is below the optimised deprival value (ODV) as part of an optimised deprival valuation assessment;
- at each regulatory reset, networks being given the opportunity to identify assets subject to bypass risk — such assets would be subject to accelerated depreciation to compensate the network for that risk prior to their removal from the asset base;
- planned capital expenditures being subject to an *ex ante* prudency test and an *ex post* examination of the actual expenditure which has taken place;
- the rate of return on the asset base being determined using a post-tax nominal framework;
- return of capital will be determined by way of competition depreciation which links the long-term depreciation profile of the assets to a measure of the rate of technological change;
- the required efficiency regime will be of the CPI-X form;
- operating and maintenance expenditures will be subject to a one regulatory period glide path while other components of the building block will face a P0 adjustment;
- the revenues determined will be 'sanity checked' through the use of financial indicator analysis; and
- each network will be required to provide a set of service standards for approval by the Commission — those standards will be included in the revenue cap decision and a penalty system will apply if the network fails to comply with those standards.

A number of submissions were received in response to the *Draft Regulatory Principles*. As noted, the Commission is currently reviewing that material and working towards finalising the *Regulatory Principles*.

1.3 Review and public consultation processes

The key aspects of the review of Powerlink's revenue cap which have occurred to date are as follows:

- *Powerlink conducted an initial public consultation process*:
  This involved Powerlink identifying areas of concern prior to preparing its

application, releasing an issues paper, conducting a public forum in Brisbane and requesting comments from interested parties. The papers and corresponding submissions received in response to the issues paper and public forum are available on the Commissions website.

- *Powerlink submitted its application for the Commission's consideration*:
  The application outlines its views on key elements of the revenue cap decision. The application is also available on the Commissions website.

- *The Commission engaged a consultant to review a recent valuation of Powerlink's asset base and its proposed capex, opex and service standards*:
  PB Associates was engaged to conduct these consultancies. Copies of the PB Associates reports are available on the Commissions website.

- *The Commission conducted a public consultation process*:
  This involved the Commission inviting interested parties to provide comments on Powerlink's application and PB Associates' reports.

- *The Commission conducted discussions with Powerlink*:
  The information provided by Powerlink subsequent to its submission is included in this draft decision.

The Commission invites written submissions in response to this document, which close on 31 August 2001. If requested, the Commission will also conduct a public forum in Brisbane on 21 August 2001 at a venue and a time to be announced at a later date. The Commission will take into consideration issues raised by interested parties in submissions and at the public forum in its final decision. The Commission anticipates that it will make a decision in September 2001.

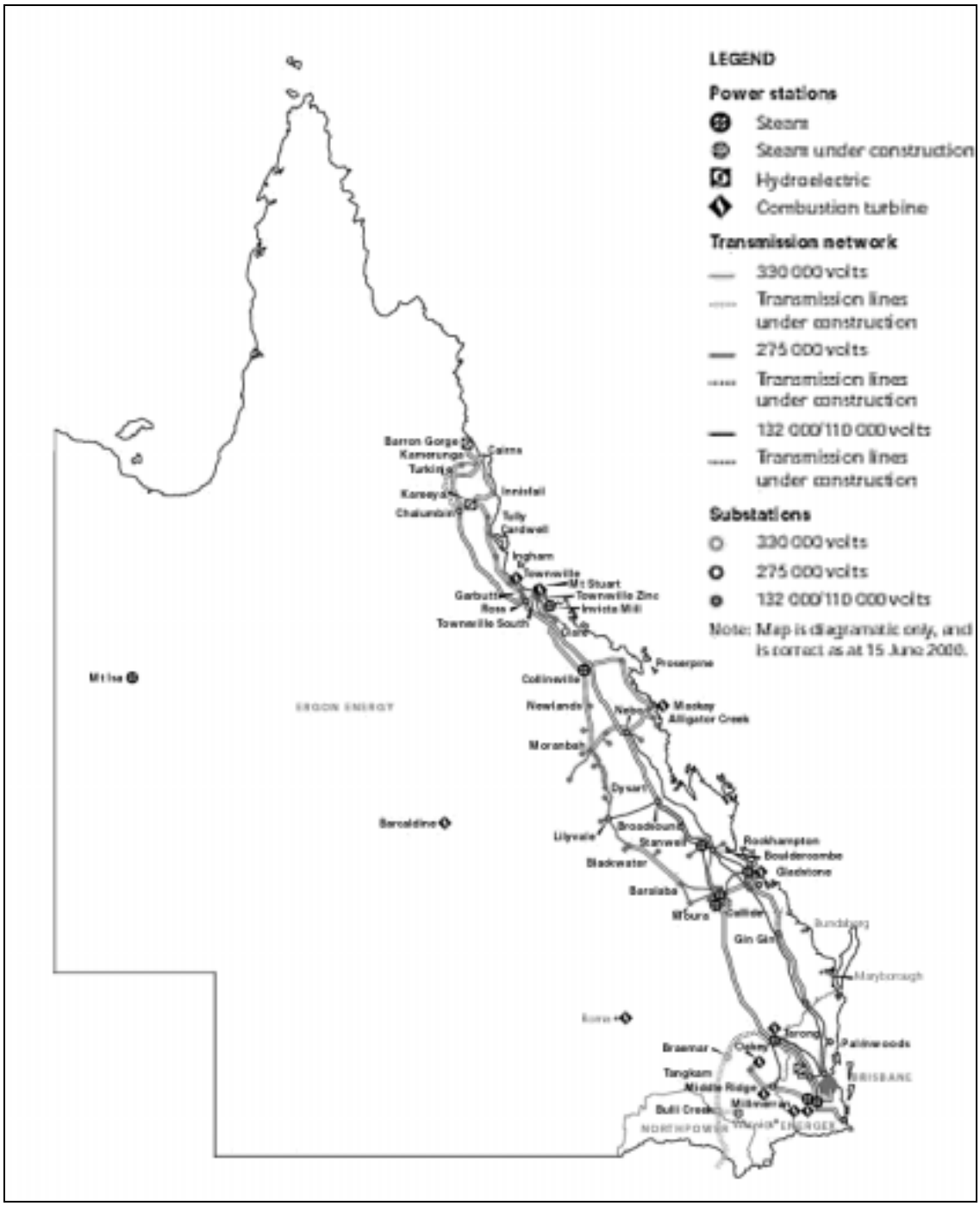
1.4 Overview of Powerlink's transmission network

Powerlink operates over 10,300 circuit kilometres of transmission lines, as well as 80 substations throughout Queensland. Powerlink's network spans 1700 km from Cairns in the far north to the New South Wales border in the south via the recently completed Queensland - NSW Interconnector (QNI). Figure 1.1 illustrates the length of Powerlink's network and highlights the major load centres in Queensland.

Major sources of generation are located in central Queensland and the Surat Basin resulting in the need for power to be transmitted over very long distances (500km to 1,000km) to the major load centres of the state.

Powerlink's network supplied a maximum demand for electricity of 6,584 megawatts (MW) over the 2000/01 summer peak. Further extreme weather conditions could increase this demand by a further 200 MW. Queensland's constant hot and humid climate produces high and constant air conditioning load throughout the summer months. Therefore, the peak summer demand experienced by Queensland occurs for the entire summer period, rather than for a few days as in the southern states. Powerlink forecasts demand growth of 3.1 per cent per annum on average over the next 10 years an annual increase in demand of around 220 MW.

Figure 1.1: Powerlink's transmission network



2 The cost of capital

2.1 Introduction

Clause 6.2.2(b)(2) of the code requires the Commission to seek to achieve a fair and reasonable rate of return on efficient investment as one of the objectives of economic regulation. Further guidance is provided in clause 6.2.4(c)(3) of the code in which it states that the Commission must have regard to the WACC of the transmission network. In addition, the Commission is to have regard to the risk adjusted cash flow rate of return required by investors in commercial enterprises facing similar business risks to the transmission network.

The importance of correctly assessing, and expressing, the return on capital is highlighted by the capital-intensive nature of the electricity industry, where generally, return on capital accounts for around two thirds of the MAR. Therefore, relatively small changes to the cost of capital can have a significant impact on the total revenue requirement and, ultimately, end user prices.

The importance of the return on equity is that, if it is too low, the regulated network will be unable to recover the efficient (and fair) costs of service provision and perhaps, more importantly, may not provide sufficient return to the owner, thereby reducing its incentive to re-invest in the business. Conversely, if the return on equity is too high, the network will have a strong incentive to over-capitalise ('gold plate'), thus creating inefficient investment.

In the *Draft Regulatory Principles* the Commission outlines its view on the appropriate expression of the return on equity that is to be achieved, and how it is to be used for deriving the regulated revenues. This view is summarised in the proposed statement 6.3:

> The Commission will apply the nominal post-tax return on equity as a benchmark. The revenues will be calculated on the basis of the cash-flows associated with the regulatory accounts necessary to deliver this return after taking into account liabilities and the assessed value of franking credits based on existing tax provisions and foreshadowed tax changes due to occur during the regulatory period.[1]

For this decision, the Commission has chosen to adopt the cash flow modelling approach as specified in the code and outlined in the *Draft Regulatory Principles*. This approach extracts the parameters relating to business income tax from the WACC formula. Rather, the approach is to explicitly models the impact of tax and franking credits on the required post-tax distributions in the cash flows. The remaining WACC formula, which has been termed the vanilla WACC, is merely the weighted average of the gross post-tax returns on debt and equity.

There are several regulatory benefits provided by the post-tax cash flow approach. Firstly, it eliminates the need to utilise a conversion sequence, required in a pre-tax real

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[1] ACCC, *Draft Statement of Principles for the Regulation of Transmission Rev*enues, 27 May 1999, p. 84.

approach. There has been significant discussion and divided opinion on the appropriateness of the sequences, which can have a significant impact on the revenue decision. The post-tax cash flow modelling avoids this problem, as it does not attempt to convert the revenues into real terms. In addition the cash flow modelling enables exogenous changes that may impact upon the accruing, and recovery, of income taxes.

Secondly, the modelling of income taxes in the cash flows enables the Commission to adjust for changes in the tax regime that alter the tax liabilities of a transmission network to ensure that it achieves the benchmarked return on equity over the life of the assets.

Thirdly, the Commission's approach also ensures that pre-payments of, or deferrals in, the recovery of income tax liabilities under previous regulatory regimes applied to the transmission network are also appropriately accounted for to ensure that it achieves the benchmarked return on equity.

Powerlink expresses concerns regarding the Commission's preference for a post-tax nominal WACC framework suggesting it fails the crucial test of an effective incentive regulation. Powerlink also argues that the post-tax WACC framework results in a rate of return, which is unacceptably low and that long-term efficiency gains are sacrificed in exchange for short-term gains. However, it submits its proposals in a post-tax nominal framework.

The Commission notes the recent Victorian Supreme Court ruling in which Judge Gillard ruled that the Office of the Regulator-General's (ORG's) approach to setting a price cap using the building block methodology was appropriate.

The Queensland Mining Council (QMC) suggests that the Commission disregards Powerlink's arguments for a pre-tax approach and derive a post-tax nominal WACC in accordance with the *Draft Regulatory Principles* and recent regulatory decisions.

The Commission notes that pre-tax rates of return implicitly provide for an allowance in revenues to cover the expected tax liabilities over the life of the asset. As discussed in the context of the Commission's Victorian gas decision and draft *Regulatory Principles*[2], the application of such a rate of return concept in the regulatory framework creates a number of problems.

The first is how to convert from the nominal post-tax return on equity benchmark provided by the CAPM to an equivalent real pre-tax weighted average cost of capital (WACC). The formula based method has been shown to be significantly in error. However, a consistent real-pre-tax WACC can be estimated by modelling expected cash-flows and taxes over the life of the assets as was done in the case of the Victorian decision.

The second is related to uncertainties in making long-run forecasts of future tax liabilities, which vary with actual inflation outcomes and changes in the tax regime.

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[2] See especially the Supplementary Papers included in the draft *Regulatory Principles* (May 1999).

A third problem has become known as the S-bend problem. It arises because, in the pre-tax approach, the rate of return provides for a fixed proportion of the return on capital to provide compensation in the revenue stream for current and future tax liabilities. However, because of a range of tax concessions such as accelerated depreciation, there is generally little tax payable early in the life of an asset and tax liabilities increase significantly later in the life of the asset after such concessions have been fully utilised.

Theoretically, this is less of a problem since the pre-tax return is intended to assume an effective tax rate over the life of the asset just sufficient to compensate the regulated entity/investor for the net taxes that it has to pay. The regulatory problem is a practical one and a political one. The uncertainty over the long-term tax forecasts already mentioned is one issue. The second relates to the adequacy of cash flows to enable the regulated entity to sustain a level of investments adequate to maintain its level of service later in the life of the assets when tax liabilities greatly exceed the provision for them within the then current regulatory revenue.

The regulated entity has been, in principle, already compensated for those tax liabilities in earlier cash flows so it is inappropriate to ask users to pay extra to meet the cash flow needs of the regulated entity. Nevertheless, there is likely to be significant pressure for the regulator to concede to such a measure. Again the post-tax approach suggested by the experts provides a ready solution since taxes are assessed on an *as you go basis* and the regulated entity does not suffer tax liability uncertainty or potential shortfall.

Therefore, a methodology based on post-tax returns and assessment of near term tax liabilities using cash flow analysis readily overcomes most of the regulatory difficulties linked to a real pre-tax based framework.

2.2 The capital asset pricing model

Clause 6.2.2 of the code requires that one of the key outcomes that the revenue regulatory regime, to be administered by the Commission, must provide for is:

> 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…

Schedule 6.1(2.2.2) of the code states that there are a variety of methods that can be applied to estimate this key return on equity (R_e) component - for example, prices to earnings ratios, dividend growth model and arbitrage pricing theory. However, the code states that the capital asset pricing model (CAPM) remains the most widely accepted tool applied in practice to estimate the cost of equity.

The CAPM calculates the required return given the opportunity cost of investing in the market, the markets own volatility and the systematic risk of holding equity in the particular company. The CAPM determines the rate of return from the perspective of the investor measured in cashflow terms. This includes the returns from year to year as well as the value to the investor accruing as the result of any net appreciation in the capital base.

The CAPM formula is:

$$R_e = R_f + \beta_e(R_m - R_f)$$

where: R_f = the risk free rate of return — usually based on government bond rates of an appropriate tenure;

(R_m-R_f) = the market risk premium (MRP) — the return of the market as a whole less the risk free rate; and

β_e = the relative systematic risk of the individual company's equity.

The CAPM expresses the rate of return as the **post-tax nominal return on equity**. This can be adjusted to allow for debt to derive the corresponding return on assets, otherwise known as the WACC.

Key parameters

The key parameters relevant to WACC/CAPM analysis are:

- the risk free interest rate (R_f);
- the expected rate of inflation (F);
- the cost of debt (R_d);
- the market risk premium (MRP);
- the likely utilisation of imputation credits (γ);
- the likely level of debt funding (D/V);
- the equity beta (β_e) of the company; and
- the effective tax rates on equity (T_e).

The Commission's assessment of each of these measures will be discussed in turn.

2.3 Estimate of the risk free interest rate

2.3.1 Historical average or use of 'on the day' rate

In the CAPM framework all information for deriving the rate of return should, in principle, be as up to date as possible at the time the decision comes into effect. In the case of interest rates and inflation expectations, for which parameters are set by the financial markets on a daily basis, it may be argued that there is little justification for using historical data.

On this issue Statement 6.7 of the *Draft Regulatory Principles* states:

> The risk free rate will be estimated from the (nominal) observable rate on five year Commonwealth bonds.

> The risk free rate will be normally based on a 40 trading day moving average covering the eight weeks prior to the reset date unless there is evidence to suggest that the current rate of the day represents a transition to a new level which is expected to be maintained.

The Commission adopted the forty-day trading average in *NSW and ACT* and *SMHEA* revenue cap decisions.

However, Powerlink expresses concern with the Commission's approach arguing that it exposes the regulated entity to excessive interest rate and refinancing risk. It contends that a forty-day average creates mismatch between the risk-free rate underpinning the WACC and the cost of debt. Powerlink further argues that as a result, it will be unable to increase prices in order to recover any higher interest costs. Therefore, Powerlink suggests that the Commission considers two alternative methodologies for determining the risk free rate:

- lengthening the term of the moving average from forty days to twelve months; or
- using an average of five twelve month moving averages for each year from the previous five years.

Commission's considerations and conclusion

The Commission acknowledges that the finance theory underlying the CAPM explicitly specifies the use of *ex ante* returns. It also acknowledges the risk associated with using forecasted information. Although using both an 'on the day' rate and a "historical average" approach are theoretically inconsistent with the workings of the CAPM, the Commission understands the need to ensure that the information provided can be justified.

By using an 'on the day' rate in the CAPM, rates may reflect short term fluctuations which differ to long term trends. Such differences could arise from market volatility. Exposure to short term volatility can be minimised by averaging rates over a short term prior to the start of the regulatory period. The average rate can then be used in the CAPM. For regulatory purposes, regulators traditionally adopt an historical average when dealing with the risk free rate. This is to ensure that market volatility and recent trends are not borne out in the decision.

Footnote The Commission notes that the QCA, in its recent determination on regulation of electricity distribution networks[3], adopts a twenty-day moving average, concluding that whilst an 'on the day' rate is theoretically correct, it may cause distortions to the total cost of borrowing. However, the QCA also notes that whilst long-term averages may smooth the interest rate cycle, the prevailing average would not represent current market expectations.

In the *Draft Regulatory Principles* the Commission states that forty day moving average would be the appropriate approximation of the risk free rate. This is seen as the appropriate period to smooth out the short-term volatility of bond rates. This position has been the Commission's approach through its regulatory decisions. Most

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[3] Queensland Competition Authority, *final determination - Regulation of Electricity Distribution*, May 2001.

recent examples include the *NSW and ACT* and *SMHEA* revenue cap decisions, *Sydney airports*[4] and *NT Gas*[5] access arrangement decisions.

While the Commission acknowledges the concerns raised by Powerlink, particularly, with regard to refinancing risk, the Commission believes that it would be inconsistent at this stage to depart from its currently stated position. However, the Commission will address this issue through the ongoing refinement of its *Regulatory Principles*. Therefore, for the purposes of this draft decision, the Commission will adopt an historical forty-day trading average to model the risk free rate.

2.3.2 Selection of the bond rate

The code suggests that the risk free rate be determined by reference to the yield to maturity on long-term ten-year Commonwealth Government bonds being the least risky debt instrument traded in the market. Powerlink also suggests that the Commission adopt the ten-year government bond as the benchmark of risk, arguing that this will better align the risk free rate with the actual life of the assets.

However, a factor that may influence the selection of the risk free rate is the frequency of regulatory determinations to which the WACC is applied. If the WACC is revised at relatively short intervals, then it may be more appropriate to use a shorter-term bond rate in deriving the WACC for the regulated entity. Thus, it could be argued that an appropriate term for calculating the risk free interest rate in the present context is the term between regulatory reviews, in this context initially five and a half years.

Commission's considerations and conclusion

As this decision will be for a period of five and a half years, the Commission will interpolate a five and half-year bond rate based on the five-year and ten-year nominal bond rates. While there is considerable support for the use of bond rates with terms corresponding to the life of the assets, the Commission has stated in previous decisions that they are not the appropriate approximation of the risk free rate. The CAPM model used by the Commission is a single period model and given that investors review investments over short periods, a shorter-term bond rate is the appropriate measure of the risk free rate.

The Commission believes that using a bond rate corresponding to the regulatory review period is the appropriate measure of the risk free rate because the asset owner's inflation risk is compensated exactly by an inflation risk premium implicit in the yield on the corresponding government bond. As the code specifies that the Commission must set a revenue cap for a period of not less than five years, revenues will be re-adjusted to take account of actual inflation. Therefore the risk of actual inflation diverging from anticipated inflation is limited to a five-year period in most cases and five and a half years in the case of Powerlink. To compensate the asset owners exactly for this inflation risk, the return of a bond subject to similar risk must be used. The yield on five-year bonds will include a premium for inflation risk of a five-year period,

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4 ACCC, *decision - Sydney Airports Corporation Ltd. - Aeronautical Pricing Proposal*, May 2001.

5 ACCC, *Access Arrangement Proposed by NT Gas Pty Ltd. for Amadeus Basin to Darwin Pipeline*, May 2001.

making it the appropriate term to approximate the risk free rate in regulatory decisions. The Commission believes that using the ten-year or longer yield would over compensate the business for this inflation risk.

The Commission notes that using a five and a half year bond rate is consistent with the Commission's statement in the *Draft Regulatory Principles* and with recent Commission decisions such as *SMHEA, Sydney Airports* and *NT Gas*, where the bond rate corresponds to the length of the regulatory period. The Commission notes that this approach is also consistent with the QCA's recent determination for the Queensland distribution networks

The Commission recognises that this is in contrast to the ten-year rate proposed in the *NSW and ACT Revenue Caps* decision, where it was noted that the ten-year rate was chosen to maintain regulatory consistency with IPART's regulatory decisions for the NSW distribution networks. It was further noted that the decision did not reflect the final position of the Commission.

If the Commission is to maintain consistency with the jurisdictional regulator's decision and recent Commission thinking then a five and a half-year bond rate is the appropriate risk free rate to use.

At the time of the draft decision, the five and a half year, forty day moving average for bond rates provided a rate of 5.71 per cent.

2.4 Expected inflation rate

While the expected inflation rate is not an explicit parameter in the return on equity calculation, it is an inherent aspect of the risk free rate and is also implicit in the cost of debt. There are two sources of information for determining inflationary expectations: financial markets and government estimates. The financial market's indicator of inflation is derived from the difference between the nominal and indexed bonds over a corresponding period. Alternatively, the Commonwealth Treasury releases inflationary forecasts based on internal modelling. On this issue Statement 6.10 of the *Draft Regulatory Principles* states:

> The Commission will estimate the cost of debt for a firm conforming to the financial structures implied by the regulatory accounts in consultation with relevant financial agencies.

The Commission adopted this approach in the *NSW and ACT* and *SMHEA Revenue Cap* decisions. However, the maturity dates on the nominal and indexed bonds rarely correspond, requiring realignment using either interpolation or extrapolation. The process of interpolation and extrapolation performs a mathematical line of best fit, estimating an indexed bond rate at a given point in time.

Powerlink agrees with the use of this approach, noting that it is consistent with the *NSW and ACT* and *SMHEA* revenue cap decisions.

Commission's considerations and conclusion

Deriving the inflation rate from the nominal and indexed bond rates has been adopted by the QCA, which argues that the benefit of such an approach is that it delivers a forward looking estimate of inflation rather than an historic measure.

Consistent with the proposal in the *Draft Regulatory Principles* and the method adopted in the *NSW and ACT* and *SMHEA* revenue cap decisions, the QCA's determination and Powerlink's application, the Commission will adopt the financial markets expectations of inflation. Extrapolating the nominal and real bond rates, for this draft decision, the Commission forecasts inflation of 2.22 per cent.

2.5 Cost of debt

The cost of debt is the debt margin over the risk free rate on commercial loans. The cost of debt factor varies depending on the entity's gearing, its credit rating and the term of the debt. The application of the cost of debt to the asset base, using the assumed gearing, will generate the interest costs for regulatory purposes.

On this issue Statement 6.10 of the *Draft Regulatory Principles* states:

> The Commission will estimate the cost of debt for a firm conforming to the financial structures implied by the regulatory accounts in consultation with relevant finance agencies.

Powerlink proposes a cost of debt of 167 basis points above the nominal risk free rate of return, sighting as precedents the draft decisions by the QCA and the Office of the Regulator-General (ORG) with cost of debt margins of 165 and 150 respectively.

Commission's considerations and conclusion

In considering an appropriate debt margin the Commission adopts industry wide benchmarking. This provides an incentive for minimising inefficient debt financing. The Commission is of the view that a benchmarked industry wide cost of debt, in the region of 80 to 160 basis points above the nominal risk free rate of return, is appropriate for Powerlink. The Commission notes that this higher than that debt margin of 100 basis points used in the *NSW and ACT* and *SMHEA Revenue Cap* decisions, this was determined on the basis that a ten-year nominal bond rate was applied in the case of *NSW and ACT*. The Commission, for the purposes of the draft decision, will use a margin of 120 basis points, being the mid-point of the range and is consistent with the Commission's approach when adopting the five-year bond rate.

2.6 Market risk premium

The market risk premium (MRP) is the premium above the risk free rate of return that investors expect to earn on a well diversified portfolio. That is, the return of the market as a whole less the risk free rate:

$$MRP = R_m - R_f$$

On this issue Statement 6.8 of the *Draft Regulatory Principles* states:

> The Commission will adopt what it perceives to be the accepted value of the market risk premium available at the time of the regulatory decision.

Under a classical tax system, conventional thinking suggests a value for the MRP of around 6.0 per cent.

While the concept of the WACC and its application for determining regulated revenues is unambiguously forward looking, estimates of the future cost of equity are not readily

available. Practical applications of the CAPM, therefore, rely on the analysis of historic returns to equity to estimate the MRP.

In its recent regulatory decisions, such as the *NSW and ACT* and *SMHEA Revenue Cap* decisions, *NT Gas* and Sydney airports, the Commission has adopted a MRP of 6.00 per cent. Powerlink also proposes a MRP of 6.00.

The Energy Users Association of Australia (EUAA) suggests that the Commission adopt a MRP below 5.5 per cent, arguing that the research cited by the Commission in previous decisions does not cover the period since 1998, in which there are indications showing a downward trend in the market risk premium.

Commission's considerations and conclusion

The Commission has noted the research indicating that the market risk premium has fallen over recent years. However, the Commission is wary that this may reflect short-term market trends. Based on the more traditional views, the Commission's assessment of the MRP suggests that it lies between 5.0 per cent and 7.0 per cent, and for the purposes of this draft decision, the Commission choses the mid point of this range, that is an MRP of 6.0 per cent. This figure is consistent with recent Commission decisions. It is also consistent with Powerlink's proposal. If in the longer term, the Commission is satisfied that MRP is trending downwards, it will adopt a lower MRP as appropriate.

2.7 Value of franking credits

As outlined in the code, under an imputation tax system, a proportion of the tax paid at the company level is, in effect, personal tax withheld at the company level. Australia has a full imputation tax system. However, the proportion of company tax paid that can be claimed as a tax credit against personal tax varies and depends on factors such as the marginal tax rate of the recipient of the franked dividend.

The analysis of imputation credits and its impact on assessed costs of capital in Australia is a developing field and some issues remain contentious. In any event, the rate of utilisation of tax credits, γ (gamma), has a significant effect on the WACC.

However, there is little empirical doubt that franking credits do have some value. As stated in Schedule 6.1(5.2) of the code:

> as the ultimate owners of government business enterprises, tax payers would value their equity on exactly the same basis as they would value an investment in any other corporate tax paying entity. On this basis, it would be reasonable to assume the average franking credit value (of 50 per cent) in the calculation of the network owner's pre tax WACC.

Assigning a γ of this magnitude for Powerlink, a government owned business, is also important in maintaining competitive neutrality. As stated in the Competition Principles Agreements:

> The objective of competitive neutrality policy is the elimination of resource allocation distortions arising out of the public ownership of entities engaged in significant business activities: Government businesses should not enjoy any net competitive advantage simply as a result of their public sector ownership. (Schedule 6.1(1) of the code).

There is considerable debate as to the precise value of franking credits. As with other inputs to the WACC and CAPM equations, selection of a value for this particular

parameter is ultimately a matter of judgement having regard to the available empirical evidence.

Powerlink proposes a γ in the range of 40 to 50 per cent, noting that a value of 50 per cent should represent the upper end of the feasible range, requesting a mid-point of the range of 45 per cent. KPMG, acting as Powerlink's financial adviser, notes that the value of 50 per cent for γ may overstate the value of imputation tax credits. Although there is a lack of definitive empirical evidence, KPMG argues that undistributed franking credits would have some value, dependent on the timing of their distribution. It states that the longer a company retains franking credits, the lesser their present value to shareholders. Therefore, KPMG believes that an appropriate value of γ should take into account the value of both distributed and retained franking credits.

Commission's considerations and conclusion

While noting KPMG's comments, the Commission recognises that increases in the value of the business represents a return on equity. The business will therefore, capture the full value of franking credits regardless of actual distribution. It would not be appropriate to model the retained franking credits within the regulated entity as it is an equity item that would be over-ridden by the Commission's regulatory assumptions on gearing. Therefore, the Commission believes it is more appropriate to assume that the benefits of franking credits are fully distributed as the shareholders will receive the value of franking credits either attached to dividends or via an increase in the value of their investment. Furthermore, the Commission's regulatory regime attempts to ensure that the return on capital allowance in the revenue cap is equivalent, and only equivalent, to the risk adjusted market rate of return required to maintain investment.

Additionally, on 30 June 2000, Australia's taxation legislation was modified to accommodate the Ralph review recommendations on franking credits. The alteration to the tax law ensures that resident individuals receive the full benefit of franked dividends regardless of their tax position. Previously, resident individuals whose taxable income was not sufficient to generate tax expenses sufficient to utilise the franking rebates lost that benefit.

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 deductable 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 on gamma.

Therefore, in line with recent Commission decisions, a gamma of 0.5 will be used in the draft decision.

2.8 Gearing

A benchmark gearing ratio needs to be established for Powerlink to identify the appropriate weighted average cost of debt and equity in the WACC.

Schedule 6.1(5.5.1) of the code states that:

> gearing should not affect a government trading enterprise's target rate of return…. For practical ranges of capital structure (say less than 80 per cent debt), the required rate of return on total assets for a government trading enterprise should not be affected by changing debt to equity ratios.

Powerlink proposes a gearing ratio of 60 per cent debt to equity for its business.

In the *NSW, ACT and SMHEA Revenue Cap* decisions the Commission adopted a gearing ratio of 60 per cent based on industry wide benchmarking. The QCA has also used a gearing ratio of 60 per cent in relation to the Queensland distribution companies.

Commission's considerations and conclusion

In the *Draft Regulatory Principles* the Commission noted that it would not be using the actual gearing of a transmission network, instead it would utilise an appropriate benchmarked ratio. A survey conducted by Standard & Poor's[6] suggests the upper and lower band of the gearing ratio for a transmission and distribution business is given as 65 per cent to 55 per cent. Therefore, consistent with recent regulatory decisions, Powerlink's application and the mid-point of Standard & Poor's appropriate range, the Commission will adopt a gearing ratio of 60 per cent for this draft decision.

2.9 Betas and risk

The equity beta is a measure of the expected volatility of a particular stock relative to the market as a whole. It measures the systematic risk of the stock. That is, the risk that cannot be eliminated in a balanced, diversified portfolio. Generally, the Australian Stock Exchange (ASX) is used as a proxy for the whole market. An equity beta of less than one indicates the stock has a low systematic risk relative to the market as a whole (the market average being equal to one). Conversely an equity beta of more than one indicates the stock has a high risk relative to the market.

For publicly listed companies, betas can be calculated on the basis of information on the value of their dividend stream plus the change in the capital value of the stock. Where an equity beta is calculated for a particular company, it is only applicable for the particular capital structure of the firm. A change in the gearing will change the level of financial risk borne by the equity holders and hence the equity beta. A common approach to enable betas to be compared across companies with different capital structures is to derive the beta that would apply if the firm were financed with 100 per cent equity, known as the 'asset' or 'unlevered beta', and then to calculate the equivalent equity beta for that level of gearing (known as 're-levering' the asset beta).

Table 2.1 highlights the average equity beta by industry listed on the Australian stock exchange (ASX) at March 2001. However, where a firm is not listed, betas cannot be calculated directly from economic returns. In such cases, conventional practice has been to benchmark the firm's equity beta relative to other companies or sectoral averages. In the context of regulated electricity networks even this approach is problematic, as there are limited Australian reference stocks for such businesses, traditionally the Commission has used the infrastructure and utilities group average.

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[6] 'Standard & Poor's Rating Methodology for Global Power Companies'- 1999.

Table 2.1: Average equity beta by industry listed on the ASX

Industry	Average Equity Beta
Property Trusts	0.481
Food and Household	0.500
Transport	0.506
Alcohol and Tobacco	0.582
Diversified Industrials	0.686
Engineering	0.702
Building Materials	0.778
Banks and Finance	0.801
Tourism and Leisure	0.917
Investment and Financial Services	0.924
Infrastructure and Utilities	0.962
Chemicals	0.985
Insurance	1.032
Developers and Contractors	1.060
Retail	1.079
Mining and Energy	1.146
Paper and Packaging	1.198
Miscellaneous Industrials	1.217
Other Metals	1.236
Healthcare and Bio-Technology	1.338
Media	1.379
Gold	1.517
Diversified resources	1.660
Telecommunications	2.448

Source: Australian Graduate School of Management centre for research in finance; risk measurement service

Powerlink proposes an asset beta in the range of 0.40 to 0.50, which equates to an equity beta of between 0.77 to 1.12. Powerlink believes that the Commission should use an equity beta towards the higher end of its feasible range arguing that it faces higher risk resulting from several factors.

Firstly, Powerlink contends that third party liability risk associated with third party claims resulting from network events are greater in Queensland due to higher loading of the grid and lack of meshed network.

Secondly, Powerlink suggests that insurance of transmission lines is difficult to obtain and many TNSPs are forced to self-insure their lines, it argues that the risk of damage to transmission lines are greater in Queensland due to the tropical/cyclonic environment. Under current regulatory arrangements no allowance is made for the

forecast of operating costs for such contingency costs and, therefore, should be included as an explicit risk margin.

Thirdly, Powerlink argues that asset stranding risks would significantly increase due to the impacts of excessive generation capacity and introduction of a new gas transmission networks. It suggests that these market risks could either be ameliorated either by allowing for an explicit additional depreciation allowance at each regulatory reset or by allowing an additional explicit equity risk premium.

Finally, Powerlink contends that risks surrounding the "newness" of the regulatory regime should be compensated through a risk margin adjustment. Powerlink notes that a range of code changes have emerged which signal a greater emphasis on asymmetrical risk being assigned to the TNSPs, and pressures from participants to pursue property right and firm access proposals

ElectraNet and TransGrid contend that the Commission has yet to fully integrate the effects of asymmetric risks into its assessment of regulated returns and that neither optimisation risk or regulatory risk has been fully compensated for in current levels of regulated return.

Ergon, EUAA and the QMC argued that the Commission should reject Powerlink's request and apply the Commission's established principles, in deriving its allowable rate of return. They believe that the risks faced by Powerlink are overstated, with no weight given to the benefits that may arise from its monopoly position.

QMC further states that the specific risk factors mentioned by Powerlink should not figure in the WACC calculation. It also notes that the Commission's benchmarking approach to deriving the asset beta is intended to extract from such risks which should not be built into the rate of return that will apply whether or not the risks are actually realised.

Commission's considerations

As noted above, Powerlink has identified several specific elements of potential risk in support of this claim for compensation of asymmetric risk. Each of these elements is discussed in turn.

Third party liability insurance risk

This risk stems from the likelihood that the third party liability potentially faced by Powerlink will be higher than in the past. In the *NSW and ACT* and *SMHEA Revenue Cap* decisions the Commission addressed the risk of third party liability over the historic levels as a pass-through, due to the level of uncertainty. However, the Commission notes that TransGrid has recently formed a firm view on the cost of the increase in third party liability. Therefore, the Commission believes that Powerlink should be able to supply the Commission with an indicative figure of the perceived increase in third party liability costs.

The cost of self insurance

On Powerlink's concerns regarding the cost of self-insurance on transmission assets, the Commission believes that to some extent, this has already been addressed in

Powerlink's asset base. The Commission's consultant PB Associates found that in Comparison with TransGrid's asset base, Powerlink's average replacement cost is higher, and that:

> there could be a number of reasons for these differences, including the fact that 60 per cent of Powerlink's 275 kV lines are designed for cyclonic wind loading.

Therefore, the Commission does not believe that it should provide additional compensation to Powerlink through the CAPM framework which does not deal with diversifiable risks, when an allowance has been provided in Powerlink's asset base.

However, if it is demonstrated that extraordinary contingencies have arisen, then the Commission will consider these on a case by case basis and will address them by way of a pass-through. Again, the Commission will not allow Powerlink complete discretion in the extent of the pass-through amount. Powerlink will be required to obtain the Commission's approval prior to incorporating any pass-through charge, in relation to the size of the adjustment and demonstrate the materiality and reasonableness of such an adjustment.

Asset stranding risk

The Commission agrees with the EUAA that the risk of asset write-downs occurring is a normal aspect of the business environment faced by competitive firms everyday. Thus, in the marketplace, there is a risk that a firm's assets may become stranded by the actions taken by a competitor at any time. In the case of a regulated firm, the regulator, when making a decision to optimise, acts as a proxy for the effects of a more competitive solution becoming available in the relevant market.

The Commission is of the view that the industry-derived betas used to determine the regulatory asset beta would normally include an element representing stranding risk. However, this is *not* to say that a regulated entity will not face additional stranding risk such that the firm bears a material asymmetric risk justifying a form of compensation.

However in the *Draft Regulatory Principles*, the Commission states that it will allow regulated entities to adjust its depreciation allowances in response to identifiable asset stranding risks when those risks are properly assessed as being material:

> most reductions in RAB value due to re-optimisation or redundancy will be reflected in depreciation without the need for immediate write-offs of asset values and therefore will not represent a financial loss to the TNSP. For such arrangements to work efficiently it will be important for the TNSP to advise the regulator well in advance of by-pass risk actually occurring. To the degree that the approach imposes some residual risks on the regulated entity, this is normally reflected in the return on capital.

The Commission acknowledges that there is sufficient uncertainty in the Queensland market, making it difficult for Powerlink to identify assets subject to stranding. Although at this stage, the Commission believes that some of this uncertainty has been reduced given that it is unlikely that some of the gas developments will occur until the next regulatory period. Therefore, in light of the present uncertainty, at the regulatory reset, the Commission will conduct an assessment of Powerlink's network to determine whether elements of its network were stranded during this current regulatory period. Where the Commission identifies that asset stranding occurred, it will provide an

additional depreciation allowance to compensate for lost revenues. It will therefore, not adjust the depreciation profile during this regulatory period.

Newness of the regulatory regime

The Commission concurs with the EUAA sentiments that the trend where regulators once accepted the "newness" of the regulatory regime, as a basis for adding a premium to the WACC it has since ceased to do so. This approach is consistent with *NSW and ACT* and *SMHEA* regulatory decisions, where no provision for the newness of the regulatory regime was allowed for.

Conclusion

As was highlighted in table 2.1, Powerlink's proposed equity beta of 1.12 lies closer to the equity beta expected in the mining and energy, the retail sector and paper and packaging. As previously noted, the Commission's traditionally used infrastructure and utilities group average, at the present time lies just below 1.0. As discussed previously, the Commission will not compensate Powerlink for the specific risks identified in its application. Therefore, for the purposes of this draft decision, the Commission will adopt an asset beta of 0.4, which equates to an equity beta of around 1.0, which is consistent with the equity beta's used in the QCA decision.

2.10 Treatment of taxation

The Commission WACC calculations requires deriving a value for the effective tax rate[7]. That is, that the adoption of a post-tax nominal framework requires using an effective tax rate in determining the regulated revenue stream.

The effective tax rate is defined as the difference between pre-tax and post-tax rates of return. It is sensitive to a number of factors, which include the corporate tax rate and the range of available tax concessions that serve to lessen tax liabilities or defer them to a later period. Although the tax rate on accounting income is always at the corporate tax rate, in any year the income assessable for tax purposes can be quite different from the net revenues available to the business. The timing aspect and the fact that taxes are assessed on the basis of nominal income means that the prevailing inflation rate also has a significant impact on the effective tax rate. The effect that deferral of tax has on the timing of cash flows does not generally cause administrative difficulties for a corporate entity that are well accustomed with uneven cash flows.

Commission's considerations

Based on the Commission's approach to modelling the effective tax rate, the Commission has derived an effective tax rate of 22.29 per cent.

2.11 Conclusion

The Commission has given careful consideration to the values that should be assigned to the Powerlink's cost of equity given the nature of its business and current financial

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[7] The Monkhouse formula is $\beta_e = \beta_a + (\beta_a - \beta_d) \{1 - [r_d/(1+r_d)](1-\gamma)T_e\}$ D/E

circumstances. Accordingly, the parameter values used are those considered most appropriate. Mostly these fall near the middle of a range based on the information available.

The Commission has decided to adopt a nominal risk free interest rate of 5.71 per cent, reflecting the forty-day moving average an interpolated five and a half-year government bond. Based on its benchmarking, the Commission has arrived at a debt margin of 1.20 per cent above the nominal risk free interest rate. This provides a cost of debt of 6.91 per cent.

The Commission has looked at market evidence and accepted the traditional view of financial experts in determining a market risk premium of 6.00 per cent.

The Commission has examined the risks faced by Powerlink and the betas of similar businesses in arriving at an asset beta of 0.40. This figure is above the current average asset beta for the infrastructure and utilities industry group listed on the ASX. This asset beta converts to an equity beta of around 1.0.

In line with the Commission's current position on the value of franking credits, the Commission will allow an utilisation ratio of 50 per cent. The Commission's modelling of Powerlink's tax payments provides an effective tax rate of 22.29 per cent.

The Commission has estimated a feasible range for the cost of capital parameters, which are illustrated in Table 2.2. Within that range, and consistent with the discussion above, the Commission has adopted a post-tax nominal return on equity of 11.71 per cent for the purposes of this decision. This translates to a post-tax nominal WACC of 7.00 per cent and a pre tax real WACC of 7.04 per cent.

Table 2.2: Comparison of cost of capital parameters proposed by the Commission

Parameter	Powerlink's proposal	Draft decision
Nominal Risk Free Interest Rate (R_f) %	6.00%	5.71%
Expected Inflation Rate (F) %	2.50%	2.22%
Debt margin (over R_f) %	1.67%	1.20%
Cost of debt $R_d = R_f$ + debt margin %	7.70%	6.91%
Market Risk Premium (R_m-R_f) %	6.00%	6.00%
Debt Funding (D/V) %	60%	60%
Value of imputation credits γ	45%	50%
Asset Beta β_a	0.45	0.40
Debt Beta	0.00	0.00
Equity Beta	1.12	1.00
Nominal Post Tax Return on Equity	13.97%	11.71%
Post Tax Nominal WACC	7.91%	7.00%
Pre Tax Real WACC		7.04%
Nominal Vanilla WACC		8.83%

3 Opening asset base

3.1 Introduction

The revenue cap set by the Commission for Powerlink commences from 1 January 2002. As part of its decision, the Commission must reach a view as to the value of the non-contestable elements of Powerlink's transmission assets at that time.

The Commission's discretion in this regard is constrained by the code. The principal limitation set out in the code are that assets in existence and in service on 1 July 1999 are valued by the jurisdictional regulator and that the value provided to the Commission must not exceed the deprival value of those assets. Deprival value is generally defined as being the lesser of an asset's optimised depreciated replacement cost (ODRC) or economic cost.

To assist the Commission in assessing the opening value to apply to Powerlink's assets, the Commission engaged PB Associates to undertake a review of the 1999 jurisdictional regulator's valuation, Powerlink's proposed adjustments to the jurisdictional regulator's valuation and Powerlink's asset roll forward proposal. The main findings of PB Associates' review are outlined in section 3.5.

The remainder of this chapter:

- sets out the code requirements associated with valuing Powerlink's opening asset base (section 3.2);
- summarises the Commission's draft decision concerning the opening asset base as well as other relevant information including:
  - Powerlink's proposal;
  - the views of interested parties; and
  - a summary of the major findings of Arthur Andersen's valuation and PB Associates' review.

3.2 Code requirement

The code places limits on the ability of the Commission to exercise its regulatory discretion in arriving at an opening value for the existing asset base. Clause 6.2.3(d)(4) of the code states that the Commission is to regulate transmission network revenues according to the principles (amongst others) that:

> (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 to 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 and in determining the basis of asset valuation to be used, the ACCC must have regard to:

(A) the agreement of the Council of Australian Governments of 19 August 1994, that deprival value should be the preferred approach to valuing network assets;

(B) any subsequent decisions of the Council of Australian Governments; and

(C) such other matters reasonably required to ensure consistency with the objectives specified in clause 6.2.2.

3.3 Powerlink's proposal

3.3.1 Setting the opening asset valuation

Powerlink's application details its proposed opening asset value for the period commencing 1 July 2001. It suggests that as the first regulatory period commences on 1 January 2002, which is midway through Powerlink's financial year, the opening asset value should be set as at 1 July 2001.

Powerlink's application details its opening asset base as at 1 July 2001, which is derived from:

- an independent ODRC valuation undertaken by Arthur Andersen, Gutteridge, Haskins and Davey, and Worley for the former Queensland Energy Reform Unit (QERU) at 1 July 1999;
- adjustments which Powerlink considers need to be made to the QERU valuation;
- rolling forward the adjusted jurisdictional valuation to 1 July 2000, based on actual capex, disposals, depreciation and its revaluation; and
- rolling forward the 1 July 2000 valuation to 1 July 2001, based on estimated capex, disposals depreciation and its revaluation.

The main findings of the Arthur Andersen review are outlined in section 3.5.

3.3.2 Adjustments to the jurisdictional regulator's valuation

Powerlink notes that, while it was generally satisfied with the outcome of Arthur Andersen's valuation, there were elements that it believed required reviewing. Powerlink's subsequent review of Arthur Andersen's valuation concluded that the asset values should be approximately 8 per cent higher than the values used by Arthur Andersen. Powerlink's adjustments are based on detailed studies of:

- Powerlink's 110kV and 132kV substation bay costs which indicates that they were under valued;
- finance during construction;

- costs based on the latest construction and material costs; and
- easement valuations, which recommends using an indexed Depreciated Actual Cost (DAC) approach.

Table 3.1 compares the QERU ODRC valuation for Powerlink's non-contestable assets, with Powerlink's proposed valuation, incorporating its adjustments to the valuation.

Table 3.1: Powerlink's proposed revisions to the QERU valuation as at 1 July 1999

Asset Class	QERU valuation (ODRC) ($'000)	Powerlink's proposal (ODRC) ($'000)	Difference ($'000)
Substation	465,764	489,024	23,260
Transmission lines	1,178,836	1,221,471	42,635
Communications	25,127	26,032	905
Network Switching Centres	0	0	-
Easements	114,397	198,074	83,677
Land	30,411	30,411	-
Commercial Buildings and Houses	12,343	12,343	-
Computer Equipment	4,836	4,836	-
Office Furniture and Misc	416	416	-
Office Machines	177	177	-
Vehicles	5,416	5,416	-
Moveable Plant	1,955	1,955	-
Insurance Spares	1,976	1,976	-
Total	1,841,654	1,992,131	150,477

3.3.3 Roll forward of Powerlink's asset base

Table 3.2 highlights Powerlink's roll forward schedule, based on actual asset acquisition, write-downs, and depreciation for the period 1 July 1999 to 30 June 2000 and expected asset acquisition, write-downs, and depreciation for the period 30 July 2000 to 30 June 2001.

Table 3.2: Powerlink's proposed roll forward schedule from 1999/00 to 2000/01

	1999/00 ($'000)	2000/01 ($'000)
Opening asset base	1,992,131	2,187,414
Capital expenditure 1	229,047	319,478
Economic depreciation 2	33,764	36,603
Closing asset base	2,187,414	2,470,289

1 Net of disposals
2 Straight line depreciation less inflation

3.4 Consultant's reports

3.4.1 Arthur Andersen's valuation

As noted previously, in 1999 QERU engaged Arthur Andersen, in conjunction with Worley International Ltd and Gutteridge Haskins and Davey Pty. Ltd. (Arthur Andersen) to:

- undertake a sample audit prepared by Powerlink in respect of quantities, systems and processes to ensure that the asset data has integrity and therefore that the asset valuation is valid;
- determine, in agreement with Powerlink, standard costs, standard lives and standard modelling assumptions based on industry costs, interstate and commercial benchmarks;
- advise on the appropriateness and consistency of the methodology being adopted for remaining life assumptions and other valuation related issues;
- determine, in agreement with Powerlink, optimisation guidelines and apply these guidelines to calculate ODRC values; and
- establish a formal certified ODRC valuation of the subject assets.

Arthur Andersen categorised Powerlink's assets as follows:

- network assets, including substations, transmission lines, communication systems, work in progress and insurance spares;
- easements;
- land and buildings; and
- non-network assets.

As part of the valuation process, Arthur Andersen conducted a review of Powerlink's systems and processes used to identify and record assets, physically inspected sampled assets, reviewed other data sources, such as operating diagrams and drawings and compared the recorded asset data with independently sourced data in respect of content, description, capacity age and condition. Following this process, Arthur Andersen concluded that Powerlink's data had sufficient integrity for the purposes of conducting an ODRC valuation.

Other issues of note in Arthur Andersen's report are:

- interest during construction was sourced from the Department of mines and energy transmission and distribution pricing principles paper;

- two easement valuations were conducted. The first was based on a deprival value concept, which is based on the cost that an entity is likely to acquire current existing assets $1.1 million**.** The second was based on an historical roll forward valuation, which is a summation of the previous easement valuations escalated at an appropriate index plus any additional easements acquired $0.115 million. This is based on Arthur Andersen's view that movements in property value generally exceed the CPI by 100 basis points; and

- an assessment of the effective lives of Powerlink's assets was conducted following an examination of asset service records, discussions with Powerlink staff, physical inspection and benchmarking against known retirement, whilst also allowing for environmental conditions, level of use and maintenance schedules. In line with the recommendations of NSW Treasury Guidelines for asset valuation, Arthur Andersen, also allowed for a three year minimum remaining life for all assets in use in the valuation.

On the basis of this information, Arthur Andersen valued Powerlink's assets, using the ODRC methodology for both assets and easements at $2.827 billion as at 1 July 1999. Arthur Andersen's findings are summarised in table 3.3.

Table 3.3: Arthur Andersen's ODRC valuation as at 1 July 1999

Asset Class	**ODRC ($'000)**
Substation	466,472
Transmission lines	1,178,836
Communications	25,127
Network Switching Centres	0
Easements	1,099,059
Land	30,411
Commercial Buildings and Houses	12,343
Computer Equipment	4,836
Office Furniture and Misc	416
Office Machines	177
Vehicles	5,416
Moveable Plant	1,955
Insurance Spares	1,976
Total	**$2,827,024**

While Arthur Andersen valued the transmission easements on a replacement cost basis, for revenue determination purposes, QERU adopted a value for easements based on

Arthur Anderesen's historical roll forward methodology of $114 million. Consequently, QERU valued Powerlink's assets at 1,842 million as at 1 July 1999.

3.4.2 PB Associates' review

The Commission engaged PB Associates to undertake a review of the assumptions, methodology and findings contained in the Arthur Andersen report. PB Associates was also asked to assess any matter necessary to enable the Commission to make a code-compliant valuation. PB Associates also considered the additional information provided to the Commission by Powerlink relating to its proposed adjustments to the 1999 jurisdictional regulator's valuation and its asset roll forward schedule which was analysed in its review of Powerlink's capex proposals.

The main findings of the PB Associates report are:

- while Powerlink's methodology for estimating the replacement cost of transmission lines is generally sound, when compared with estimated replacement costs elsewhere in the industry and with the costs that might be achievable in a competitive environment, PB Associates is unable to reach any firm conclusion on the accuracy of the replacement costs used by Powerlink in its revised valuation;

- during discussions with Powerlink, PB Associates had no reason to believe that the deprival value of the network assets should be written down below the assessed ODRC value;

- the processes used by Arthur Andersen to verify and validate Powerlink's register of network assets were robust and PB Associates concurs with the Arthur Andersen's conclusion that the asset register has sufficient integrity for the purposes of an ODRC valuation;

- while PB Associates find no evidence to suggests that Arthur Andersen used 6.5 per cent for interest during construction, it concurs with Powerlink's view that 7.6 per cent maybe a more realistic value for interest during;

- none of the three transmission line easement valuations reviewed demonstrated the degree of rigour and depth of analysis that has been applied to the estimation of asset replacement costs. While Powerlink's valuation is the most robust of the three easement valuations, PB Associates is unable to endorse the methodology used as conforming to an accepted method of valuing easements;

- the asset lives used in the Arthur Andersen valuation is consistent with those used in other regulatory jurisdictions. Further, the treatment of residual lives is generally consistent with the NSW Treasury Guidelines;

- while PB Associates was unable to exclude the possibility that legitimate optimisation has been overlooked, it believes that the Consortium's valuation incorporates a thorough optimisation process; and

- the relationship between the actual costs of transmission projects and movements in the CPI is not necessarily consistent. One approach is to develop a composite industry-specific index reflecting changes in the costs of inputs used for

transmission system construction. A second approach is to undertake a periodic revaluation of assets, basing each revaluation on current replacement costs.

Analysis of adjustments to the jurisdiction regulator's valuation

As noted previously, as part of its review, PB Associates conducted an analysis of Powerlink's adjustments to QERU's valuation. Each of Powerlink's adjustments is discussed in turn.

Transmission line replacement costs

PB Associates conducted a high level benchmarking study comparing the transmission line replacement costs used in the Powerlink valuation costs with those accepted by regulators in other jurisdictions. PB Associates states that its analysis indicates that Powerlink's methodology for estimating the replacement cost of transmission lines is generally sound. It found that the unit rates in Powerlink's data bases are continually updated and compared to actual construction costs, which gives weight to the reasoning that the variation factor approach used by Powerlink results in reasonable estimates being produced. It also notes that the base replacement costs for similar construction types in each asset class are the same, which is based on replacements with a modern equivalent asset.

PB Associates found that while Arthur Andersen used the same correction factors as Powerlink in estimating its replacement costs, Powerlink uses different unit rates based on the latest data on transmission line construction. However, PB Associates analysis suggests that the average replacement cost of Powerlink's 275 kilovolts (kV) lines is approximately 6 per cent higher than the average replacement cost of TransGrid's 330 kV lines when normalised by route length and 1 per cent lower when normalised by circuit length[8]. It notes that TransGrid has a higher proportion of single circuit lines, which would have a higher replacement cost per circuit kilometre. Following consultation with Powerlink, PB Associates suggests that there could be a number of reasons for these differences, including the fact that 60 per cent of Powerlink's 275 kV lines are designed for cyclonic wind loading.

PB Associates' analysis also notes that when normalised by circuit kilometre, Powerlink's 132 kV line replacement costs are approximately 66 per cent higher than those of TransGrid. PB Associates postulates that there may be differences that generally explain the disparities. It suggests that most of TransGrid's 132 kV lines are wood pole lines with light conductors, while, most of Powerlink's 132 kV lines are substantial steel tower lines with heavy conductors. It hypothesises that as Powerlink has relatively short lengths of 132 kV construction and its 132 kV lines are concentrated in the central and northern areas, where construction costs are higher, this will have an effect on construction costs. It also suggests that in the northern parts of its network, Powerlink must design for increased wind loading due to cyclonic conditions.

PB Associates therefore, concludes that there may be valid explanations for Powerlink's transmission line replacement costs appearing higher than TransGrid's. It

[8] This is after TransGrid's costs have been escalated forward to July 2000 dollars.

is, however, unable to reach any firm conclusion on the efficiency of the replacement costs proposed by Powerlink.

Substation replacement costs

PB Associates high level comparison of the substation replacement costs proposed by Powerlink with those used by TransGrid, highlights that:

- Powerlink's proposed replacement cost is $85k per megavolts ampere (MVA) of installed transformer capacity, and TransGrid's was $45k;
- Powerlink's proposed replacement cost is $12.5 million per substation whereas TransGrid's was $17 million;
- Powerlink's proposed replacement cost is $1.4m per circuit breaker bay whereas TransGrid's was $1.5m; and
- Powerlink's proposed replacement cost is $7.8m per transformer whereas TransGrid's was $8.6m per transformer.

Powerlink's independent study, undertaken by Gutteridge Haskin and Davey (GHD) found that Arthur Andersen's replacement cost estimate was based on capital city prices and did not take due account of location and the cost of 132 kV substations bays which it believes are significantly affected by the size of the project. Powerlink therefore considers that the substation replacement costs should be adjusted upwards using a locational factor.

PB Associates notes that while Powerlink argues that locality factors result in an increase in the cost of construction, it believes that they are not appropriate for the purchase of electrical plant, given that delivery costs for locations beyond Brisbane are likely to be only a small proportion of equipment purchase costs. PB Associates also considers that it is not clear why the Consortium's 275 kV construction costs were more consistent than its 132 kV costs with Powerlink's own database, given that they also did not include locational factors.

PB Associates states that substation costs vary widely and are influenced by a number of factors and while significant differences were identified, it is possible that these could be accounted for by differences in network configuration. However, as with the transmission lines, it is unable to reach any firm conclusion on the efficiency of the replacement costs proposed by Powerlink.

Interest during construction

Powerlink argues that Arthur Andersen used 6.5 per cent for determining interest during construction and engaged Price Waterhouse Coopers to undertake an analysis of interest during construction. PB Associates notes that while the Price Waterhouse Coopers analysis is rigorous, there is nothing in the Arthur Andersen report to indicate that 6.5 per cent was the value used for interest during construction. PB Associates further notes that the report indicated that its assessment of interest during construction is based on an appropriate interest rate rather than the WACC. It further states that if the regulatory asset valuation used for regulatory pricing includes work in progress, provision should not be made for interest during construction when estimating asset

replacement costs, since an appropriate return for the funds invested would be provided for in the revenue cap. To this end, PB Associates notes that the Arthur Andersen report included a line item for work in progress.

Valuation of easements

PB Associates conducted an assessment of the three methodologies used in valuing easements, being the ODRC approach adopted by Arthur Andersen, the historical roll forward approach adopted by QERU and Powerlink's interpolation method.

PB Associates postulates that it is simplistic to value easements using a pure replacement cost methodology, as it ignores the significant economic differences between easements and other physical transmission assets such as lines and substations. It contends that some of these differences are that while transmission lines and substation equipment can be generally traded on an open market, land owners are becoming more sensitive to environmental issues and would prevent the acquisition of some easements. It postulates that there is likely to be an upper limit to what a prudent network owner would be willing to pay.

Regarding Arthur Andersen's historic roll forward valuation, PB Associates expresses concerns with the lack of rigour given to developing a roll forward index and does not consider it to be sufficiently reliable to be used as a basis for regulatory pricing.

Powerlink's interpolation methodology includes the direct cost of purchasing the easement from the owner of the land and the additional or assemblage factors that impact on the cost, while PB Associates notes that although Powerlink's approach is the most robust of the three methodologies it does not recommend it for regulatory pricing. It considers that if the Commission accepts this alternative approach, there is a possibility that a precedent may be set that could evolve into a number of potential problems for Powerlink, the Commission and other regulators and utilities. It also believes that there could be numerous assessments of value between book value and ODRC value, all with equally supportable justification and recommends that further discussion be undertaken on this issue with key stakeholders.

Indexing the asset base

Regarding the indexation of the asset base, PB Associates raises concern that in its experience transmission line and substation costs do not necessarily move in line with CPI and therefore an annual CPI adjustment may not be a valid method for updating asset valuations. It states that it is likely that movements in replacement costs are influenced by two different drivers, each operating in a different direction:

- resource inputs, particularly local plant and labour; and
- market pressures and the influence of a competitive environment encouraging the more efficient use of resources.

PB Associates argues that movements in replacement costs with time will depend on the relative influence of each of the above drivers and that over a short period of time, replacement cost movements will be primarily driven by changes in the cost of resource

inputs. However, it notes that over the longer run, the influence of cost reductions due to competition and technology change should become apparent.

As an alternative to CPI, PB Associates recommends two approaches to capturing movements in replacement costs:

- develop a composite index reflecting changes in the costs of inputs used for transmission systems construction; and
- undertake a period revaluation of the asset base, basing each revaluation on current replacement costs, which will require some indexation of the value between asset base valuations.

3.5 Submissions by interested parties

In commenting on Powerlink's proposed opening asset values, most interested parties focused on the treatment of easements and the inflation indexation. Ergon contends that the indexed DAC approach, as proposed by Powerlink, is inappropriate as accounting standards do not permit the depreciation of land. Ergon therefore, argues that the Commission should adopt the generally accepted accounting principles in relation to the valuation of easements. Ergon also questions the assumption that the land will be consistently subject to inflationary effects. It argues that as Powerlink's easements are located in rural and remote regions, it does not believe that land valuations will necessarily increase and therefore questions whether they should be inflation indexed. On this basis, Ergon concludes that easements should be valued at historic cost, without an indexation adjustment. Similarly, the EUAA argues that the Commission should value the easements at actual cost.

Ergon argues that Powerlink has failed to justify the reasons for the indexation amounts added to the 1 July 1999 valuation, or the basis from which the indexation amount has been calculated.

In commenting on the initial asset valuation, TransGrid expresses surprise with PB Associates' approach to indexation without providing a sound alternative.

Ergon suggests that a 'purchase least cost' approach should be adopted in settling the amounts for 'asset acquisitions' that are added into the cost base.

ElectraNet supports the adjustment of the independent jurisdictional asset valuation particularly for easements and interest during construction.

3.6 Commission's considerations

3.6.1 Setting the opening asset valuation

Clause 6.2.3(d)(4)(iii) of the code provides that one of the principles under which TNSPs are to be regulated is that the regulatory regime must have regard to the need to provide a fair and reasonable rate of return, where sunk assets are valued by the jurisdictional regulator provided that the value of these existing assets must not exceed the deprival value of the assets. It also states that the Commission may require the

opening asset values to be independently verified through a process agreed to by the National Competition Council (NCC).

The Commission understands this to mean that in the initial revenue cap decision it must roll forward the 1999 jurisdictional regulator's valuation as long as the value provided by the jurisdictional regulator does not exceed the deprival value of those assets. Powerlink does not agree with the Commission's interpretation of this provision, arguing that the Commission is not bound to accept the jurisdictional regulator's valuation. It further contends that the Commission has the discretion to accept or adopt an alternative valuation. Powerlink suggests that clause 6.2 of the code does not limit or prescribe the methodologies to be applied by the Commission in exercising its regulatory powers, as long as it exercises its powers in a manner that is consistent with the objectives and principles set out in clauses 6.2.2 and 6.2.6.

While clause 6.2.3(d) provides the Commission some flexibility as to the regime that it can adopt to achieve the objective of providing a fair and reasonable rate of return, the Commission does not believe that it provides complete discretion. The Commission considers that it is consistent with the objectives of clause 6.2.2 that some factors to be used by the Commission are pre-determined by, or under, the code, one of which is the opening value of the sunk assets. While the Commission may exercise some degree of flexibility in deciding how it will regulate revenues in order to achieve the objective of providing a fair and reasonable rate of return, the Commission does not believe that this discretion extends to valuing the sunk assets in a manner that is contrary to the intention of 6.2.3(d)(4)(iii).

Powerlink suggests that in administering the regime, the Commission must only 'have regard to' the stated principles outlined in clause 6.2.3(d). It is not required to adopt the principles. While the Commission acknowledges that the words "have regard to" apply to the need to provide a fair and reasonable rate of return, it is arguable that it does not apply to each of the factors listed under the provisions. Put another way, clause 6.2.3(d)(4)(iii) could be construed as providing that the regime must have regard to the need to provide a fair and reasonable rate of return, but in circumstances where, or assuming that, the opening asset value of the sunk assets is set by the jurisdictional regulator.

Powerlink also argues that since the Commission engaged PB Associates, an independent specialist consultants to examine the asset valuation, it is within its power to accept Powerlink's revaluation. While the Commission agrees with Powerlink that this provision of the code provides that it can have the valuation by QERU independently verified, it does not consider that this provision necessarily provides the Commission to set the opening asset values of the sunk assets. The Commission believes that the process is one of verification of the review. It is not a valuation in itself. The Commission understands that the review must start with the valuation prepared for the QERU and examine whether the valuation is correct. Importantly, this provision notes that the verification must be independent. The Commission believes that this process requires independence of the jurisdictional regulator, Powerlink and the Commission. While the Commission has the power to require independent verification of the opening asset values of the sunk assets, this is not necessary if the Commission does not believe it to be appropriate. Further, the code only provides that if the value exceeds the deprival value, the Commission may require the opening asset value to be independently verified through a process agreed to by the NCC.

The Commission is seeking further clarification on this issue prior to the completion of the final decision.

Moreover, the Commission believes that it was always the intention of the Code's authors that the Commission has limited flexibility and discretion setting the opening asset valuation. It has always been the Commission's understanding that in undertaking its role as transmission network revenue regulator, it would accept the 1999 jurisdictional regulator's valuation without revisiting the sunk valuation of the assets until the first regulatory reset, where the Commission will be able to undertake a ground up valuation of the networks assets.

Furthermore, the NSW Treasury in its dealings with the Commission during the *NSW and ACT revenue caps* decision shared this view. In that decision, the Commission initially accepted the opening asset valuation provided by the Independent Pricing and Regulatory Tribunal (IPART). However, IPART's valuation methodology was incompatible with the Commission's building block approach to regulation resulting in a low depreciation component. NSW Treasury submitted a derogation, which transferred the responsibility of the jurisdictional regulator to the Commission for the purposes of setting a revenue cap from 1 July 1999. However, even then, the asset valuation used by the Commission was derived from IPART's assessment and a desktop review undertaken by Sinclair Knight Merz.

3.6.2 Analysis of adjustments to the jurisdiction regulator's valuation

Should the Commission have the ability to adjust the 1999 jurisdictional regulators valuation, it does not believe that it should adjust Powerlink's valuation in line with it's proposals, given the recommendations of PB Associates' review.

Regarding Powerlink's claim for an adjustment to reflect its study into the latest construction and materials cost, PB Associates notes that:

> while such comparisons do not indicate whether Powerlink's increased costs are reasonable in comparison with costs elsewhere in the industry and with the costs that might be achievable in a highly competitive environment significant differences were identified.

While PB Associates acknowledges that there were possible reasons for these differences, it stops short of recommending that the Commission increase the opening asset valuation to reflect Powerlink's claims.

Regarding the valuation of easements, PB Associates believes that Powerlink's approach was the most robust. However, it could not recommend it for the purposes of regulatory pricing.

As noted in the *Draft Regulatory Principles* the Commission's preferred approach to easement valuation would require that:

- the contribution to the asset base be based on the actual cost to the network of obtaining the easement rights updated periodically in line with what would be the ODRC based valuation of easements. On the basis of legislated mechanisms for the purchase of easements, both these valuations would normally be in line with what was considered the loss of amenity to the previous owner of conceding the easements right (that is, its social cost);

- to the extent that easement valuations are judged to vary over time, those variations should be reflected in depreciation allowances linked with the asset in precisely the same way as other assets. If the easement appreciates over time then the associated depreciation would be negative in nominal terms and serve to offset the higher capital returns associated with the appreciating asset value; and

- if the easement right was resold, the value in the asset base should be close to the sale price given the basis for valuation updates. Should there be a residual capital gain or loss it is anticipated to be small enough in magnitude to be accommodated by depreciation adjustments to the regulatory asset base at the start of the next review in a way similar to that used to account for errors in depreciation associated with forecast capital expenditure that does not take place as planned.

As was noted in the *NSW and ACT revenue cap* decision:

> During the *Regulatory Principles* process, the Commission will give further consideration to the merits of allowing TransGrid to transition to a properly established ODRC/ODV valuation approach (including an assessment of whether using undergrounded cables instead would be more efficient) over a time frame which enables it to balance its business cash needs with the 'negative depreciation' charges which those assets are likely to generate. Such an approach would also have the advantage that it would ensure that network customers would not face price shocks as a result.

In the *NSW and ACT revenue cap* decision, the Commission adopted a historical purchase cost rolled forward to 1 July 1999 using the CPI as the index. This approach is similar to the approach adopted by QERU (the only difference being the indexation method used). In Powerlink's case any changes to the valuation of easements arising from the finalisation of the *Regulatory Principles* will be incorporated at the next regulatory reset.

On the final adjustment relating to interest during construction, while PB Associates believes that, under current market circumstances, finance during construction would be closer to 7.6 per cent, it did not find significant evidence in Arthur Andersen's valuation to suggest that its allowances for interest during construction was inappropriately low.

Therefore, in accordance with the relevant provisions of the code and the recommendations of PB Associates' assessment of Arthur Andersen's valuation and Powerlink's proposed adjustments, the Commission will take the 1 July 1999 QERU valuation as its starting base.

3.6.3 Indexing the opening asset base

PB Associates expresses concern with Powerlink's proposal to indexing the opening asset base. In the *Draft Regulatory Principles* the Commission notes that:

> A more difficult question is the assessment of how costs of infrastructure are likely to vary over time. This will depend on the nature of technological change in the industry and the rate of inflation. Fortunately, the rate of technological change in electricity transmission is relatively slow and as far as the regulatory framework is concerned it is only necessary to look ahead as far as the next regulatory period.
>
> Over this period, the CPI-X framework already requires forecasts of inflation. Hence the only additional requirement is an indication of changes in the cost of replacement assets. Abstracting from depreciation and optimisation, this should essentially be identical to the expected change in the

> DORC valuation over the period. The difference from the CPI forecast would be attributable to the impact of technological change and the relative pricing of materials and labour required for capital construction. Alternatively it is possible to index solely to the CPI, but this could cause the asset base and the rate of productivity to diverge creating the potential for rate shock when the assets are revalued. This indexation means that if the rate at which the cost of replacing assets is falling the rate of economic depreciation is rising.
>
> The Commission proposes to establish an initial asset base and apply an indexation factor to it for each year based on forecasts of the rate of technological change and inflation.

At the time of the development of the *Draft Regulatory Principles* the Commission did not develop a composite index. In practice the Commission has rolled forward the asset base using the June quarter, eight weighted cities CPI.

While the Commission acknowledges the concerns raised by PB Associates that indexing the asset base by the CPI may not reflect changes in the actual replacement cost over time, the Commission believes that some form of indexation is required to ensure that changes to replacement costs are reflected in the revenue cap. The Commission concurs with Powerlink that that the CPI should be used, given that it is independently published and cannot be influenced by the purchasing activities of transmission entities.

Through the development of the *Regulatory Principles*, the Commission will give further consideration to the development of a composite index, which includes factors such as the construction/engineering labour rates, cost of copper and aluminium, and other construction materials. To this end, the Commission notes Powerlink's support for the development and application of an industry specific composite index.

3.6.4 Asset roll forward

PB Associates notes that in Powerlink's proposed roll forward schedule, a total provision of $255.4 million is included representing the construction of QNI, with $50.2 million rolled into the Tarong-Braemer section and the $205.2 million included in the current year ended 30 June 2001. However, as discussed in section 4.6, Powerlink's actual cost of constructing QNI was $214.9 million. Therefore in accordance with the Commission's methodology for rolling in capex at actual construction cost, the Commission has only included $214.9 million in its roll forward of QNI. This amount excludes Powerlink's claimed efficiencies of $40.5 million in the construction of QNI. Powerlink's claimed efficiencies are discussed further in section 4.6

The Commission notes that at the time of writing of the draft decision, Powerlink's actual acquisition, depreciation and write offs may differ slightly from those proposed in the application for the period 1 July 2000 to 30 June 2001. Subject to receiving any updated material, the Commission will make the appropriate amendments to the opening asset base and any subsequent changes to the Powerlink's capital expenditure program in the final decision.

3.7 Conclusion

The Commission has determined that the value to be attributed to Powerlink's opening asset base as at 1 July 2001 is $2,279 million, being the value established by the QERU as at 1 July 1999 rolled forward to include asset additions, deletions and depreciation.

Table 3.4: Powerlink's roll forward schedule from 1999/00 to 2000/01

	1999/00 ($'000)	2000/01 ($'000)
Opening asset base	1,841,654	2,036,936
Capital expenditure [1]	235,108	279,978
Economic depreciation [2]	39,826	36,187
Closing asset base	2,036,936	2,279,727

[1] Net of disposals

[2] Straight line depreciation less inflation

4 Capital expenditure

4.1 Introduction

In setting Powerlink's MAR, the Commission must form a view on the prudency of Powerlink's proposed capital expenditure (capex), with regard to future demand and service quality as well as the efficiency of past capital expenditure (reverse capex). The Commission is mindful that it is examining Powerlink's proposed capex program for the purpose of establishing a revenue cap and for creating the appropriate economic drivers for investment. Under the code, the Commission is removed from the network planning processes which is largely the responsibility of the networks, the Inter-Regional Planning Committee (IRPC) and the National Electricity Market Management Company (NEMMCO).

In examining Powerlink's proposed capex program, the Commission is also mindful that alternatives to capex proposals can include improvements in operating expenditure (opex) programs, demand side management and new generation. The Commission will also consider whether or not Powerlink has struck an appropriate balance between capex, opex and overall reliability. Finally, the Commission is aware that a careful distinction needs to be made between ongoing opex programs on the one hand and the asset renewals portion of capex on the other. Some judgement is needed as to whether such proposals should be expensed or capitalised.

These issues are included in the Commission's consideration of both the proposed capex and opex programs and their significance to the overall revenue cap.

The remainder of this chapter:

- sets out the code requirements relevant to the inclusion of capital expenditure in a transmission network's asset base; and
- summarises the Commission's draft decision concerning the inclusion of Powerlink's projected capex into the present regulatory period as well as the information considered by the Commission in arriving at that conclusion. This includes:
  - Powerlink's proposal;
  - the views of interested parties; and
  - a summary of the major findings of PB Associates review.

4.2 Code requirement

The Commission's task in assessing Powerlink's capex is specified in the code. In particular, Part B of Chapter 6 of the code requires *inter alia* that:

- in setting the revenue cap, the Commission must have regard to the potential for efficiency gains in expected operating, maintenance and capital costs, taking into account the expected demand growth and service standards; and
- the regulatory regime seek to achieve an environment which fosters efficient use of existing infrastructure, efficient operating and maintenance practices and an efficient level of investment.

To undertake its task, the Commission needs to make informed decisions on the adequacy, efficiency and appropriateness of the capital expenditure planned by Powerlink to meet its present and future service requirements. To this end the Commission engaged PB Associates to review Powerlink's proposed capex program. The results of PB Associates' review are summarised in section 4.5.

4.3 Powerlink's proposal

Probabilistic capex forecasting

Powerlink states in its submission that with the:

> Arrival of significant new committed generation capacity in Queensland over the next few years, there is considerable uncertainty about the generation patterns which will emerge, and consequently about the network developments required to meet the continuing high load growths in Queensland.

Powerlink engaged ROAM Consulting to model the wholesale market and to identify plausible generation patterns in Queensland from 1999/00 to 2009/10. ROAM identified 72 possible scenarios and the probability of each occurring (table 4.1).

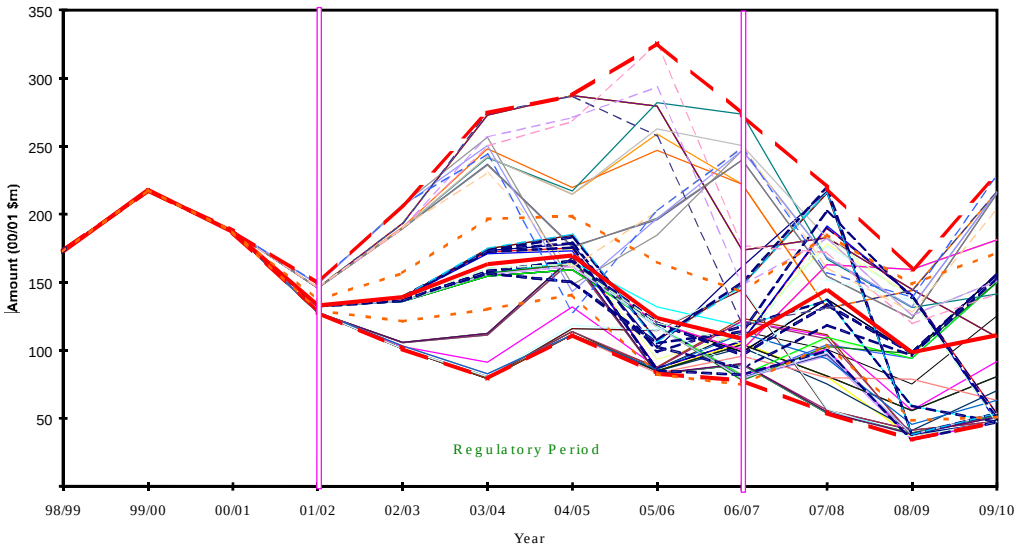
Table 4.1: Possible scenarios identified by ROAM Consulting

Possible Outcome	Notes
Queensland Energy Policy – outcomes vs expectations	
Outcomes lower than expectations	At 2005, less than 3 major gas-fired plants are in operation.
Outcomes equal expectations	At 2005, 3 major gas-fired plants are in operation.
Outcomes exceed expectations	At 2005, more than 3 major gas-fired plants are in operation.
Load Growth	
Low load growth	As in the Annual Planning Statement 2000
Medium load growth	As in the Annual Planning Statement 2000
Medium load growth with added new loads	Included in this scenario is an additional load for the following projects: • 300MW allowance for AMC magnesium project; and • 100MW allowance for Korea zinc stage 2.
High load growth	As in the Annual Planning Statement 2000
Kyoto targets – outcomes vs expectations	
Outcomes lower than expectations	Less than 6 combined cycle generators are operating in Queensland by 2010.
Outcomes equal expectations	6 combined cycle generators are operating in Queensland by 2010.
Outcomes exceed expectations	More than 6 combined cycle generators are operating in Queensland by 2010.
Impact of Committed New Coal-based Generation	
Low impact	In this theme, it is assumed that the new coal plant will win market share slowly.
High impact	In this theme, it is assumed that the new coal plant will win market share quickly.

As a result of the number of scenarios identified by ROAM, Powerlink argues that a probabilistic approach to determine an appropriate allowance for capex rather than the traditional single-scenario approach outlining a list of planned projects, is the most appropriate methodology for forecasting its capex requirements over the regulatory period. It contends that a probabilistic approach is a logical and widely accepted way of addressing uncertainty where there is a range of plausible outcomes and scenarios.

Based on ROAM Consulting's projected scenarios, Powerlink identified 72 different capex programs, as highlighted in figure 4.1.

Figure 4.1: Powerlink's forecast capex scenarios



At the Commission's request, Powerlink released an issues paper, conducted a public forum in Brisbane on 2 November 2000 and invited interested parties to comment on its proposed approach. All interested parties supported Powerlink's approach subject to the testing of the outcomes, such as benchmarking of individual projects and reasonableness and net public benefit tests[9].

Therefore, on the basis of the likely uncertainty in generating patterns and location and the support from interested parties, Powerlink's capex forecast over the regulatory period is based on the probability weighted expected value of the 72 scenarios.

As a sanity check of its forecast capex over the regulatory period, Powerlink presents a test, which is an estimate of the long run average capex. The test is based on an estimation of likely augmentation capex, based on the expected load growth in the Queensland region, and replacement capex, based on the current ageing schedule of Powerlink's assets.

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9 Copies of the submissions from interested parties on Powerlink's issues papers are available from the Commission's website at www.accc.gov.au

Dividing Powerlink's optimised replacement cost (ORC) as at 1 July 2001, by an average life of 40 years provides replacement expenditure of $83 million per annum. In estimating the projected augmentation driven capex, Powerlink makes an allowance for non-network augmentations, which assumes that some of the load growth is met by options other than regulated transmission network augmentations. Powerlink assumes an allowance for non-network augmentations of 75 per cent, and the medium demand growth scenario with growth projected to be around 3 per cent. This provides an augmentation allowance of $87 million per annum. In total, Powerlink calculates that an allowance for capex of $170 million per annum, which is above Powerlink's average expenditure allowance of $155 million per annum.

4.3.1 Mid term review

In Powerlink's original submission it stated that due to the uncertainties associated with forecasting future capex, an arrangement is required to enable it to adjust the revenues to reflect actual capex. It proposed that an adjustment be made midway through the regulatory period using a formularised approach which adjusts the difference between the actual and forecast capex, based on the cumulative capex difference multiplied by the WACC and economic depreciation. It suggested that the adjustment only be made if the cumulative difference between actual and estimated capex exceeds 5 per cent of the estimated quantity.

However, in subsequent discussions with the Commission, Powerlink notes that there is still a range of outstanding issues that need to be resolved before a formularised mid-term revenue adjustment to account for capex variations can be implemented. It states that the unresolved issues include:

- developing a robust formula;
- testing that formula;
- dealing with capex efficiency incentives; and
- ensuring the adjustment is limited to capex variations only.

Powerlink, therefore, states that at this point in time, the Commission should not consider its proposed mid-term adjustment.

4.3.2 Construction of QNI - Efficiency gains

Powerlink argues that it has been able to achieve some management induced efficiency gains through the construction of QNI. It contends that the Queensland portion of QNI represents an ideal example for the demonstration of the Commission's incentive-based regulatory mechanisms. It states that an independent consultant estimated the capital cost of each portion of QNI and the actual cost of the Queensland portion is significantly less that the independent estimate. It argues that it has achieved efficiency gains of:

- $18.5 million from transmission line route acquisition;
- $6.0 million from the selection of line contractor;

- $6.5 million from the hedging aluminium prices;
- $2.5 million from the use of 100% imported steel; and
- $6.9 million from innovative project management.

Powerlink states that, in line with the principle 7.2 of the *Draft Regulatory Principles*, it has identified and quantified capital savings that have arisen from management induced efficiency gains and believes that in an incentive based regulatory regime, it should be entitled to benefit from those efficiency gains.

4.4 Consultant's report

PB Associates was engaged by the Commission to analyse and comment on the assumptions, methodology and findings on capital expenditure contained in Powerlink's application and assess and comment on the appropriateness of Powerlink's use of a probabilistic methodology to forecast capex scenarios and budgets.

The main conclusions of the PB Associates review are:

- the process used by Powerlink for development of the load growth forecasts is in accordance with industry best practice;
- the analysis of the different development scenarios and their associated probabilities shows that the main driver for the level of capital expenditure is load growth;
- asset replacement capital expenditure accounts for 14.5 per cent of the total capital expenditure forecast. Replacement projects, are integrated with augmentation projects where possible;
- five major projects most likely to be required were examined and the requirement for and timing of these proposed projects appears to be reasonable;
- the asset management processes used by Powerlink are in accordance with code requirements;
- given the level of uncertainty in Powerlink's capital requirements, a mid-term reset of the augmentation related capital is appropriate; and
- of the $40.5 million in efficiency gains claimed in the construction of QNI against the estimated cost of the project, all but $6.5 million, relating to the hedging of aluminium construction, should be allowed.

4.4.1 Analysis of Powerlink's proposed capex program

As noted above, in its assessment of Powerlink's forecasting methodology, PB Associates assessed the details of the individual network projects that build up the generation/demand related capital expenditure forecast. A summary of the major

unapproved projects (> $ 30 million)[10] contained within the scenario project list is outlined in table 4.2. The cost estimate is the expected capital expenditure requirement in 2000/01 dollars and a range of service dates indicates the possible service date for all studied scenarios.

Table 4.2: Summary of Powerlink's proposed major projects for 2001/02 – 06/07

Project	Cost estimate ($'000)	Range of service dates	Probable service date
Greenbank 275 kV establishment	91,000	2003-2004	03/04
Greenbank-Molendinar 275 kV DCST	45,000	2003-2006	04/05
2nd Tarong-Murphy Creek 275 kV SCST	36,000	2003-….	04/05
Murphy Creek-Blackwall 275 kV	55,000	2004-2008	05/06
Yabulu N-Tully 275/132 kV DCST	39,000	2005	05/06

PB Associates notes that the aforementioned projects have a very high probability of occurring on the probable service date and are required in all scenarios. It states that they account for $266 million of capex, which is nearly half of the total scenario driven capex. Each of these projects are discussed in turn.

Greenbank 275 kV establishment

PB Associates notes that this project is required due to a number of network capacity limitations developing in the South East Brisbane and Gold Coast areas. These may result in circuit overloading and low voltages under single contingency conditions, and the loss of large amount of load following the total loss of a double circuit line. The requirement for this project is very much driven by the loading in this region. The Powerlink scenarios place the most likely commissioning date of this project in 2003/04.

PB Associates further notes that Powerlink has performed a major planning study to identify a program of network augmentations that will address these capacity limitations[11]. The first phase of this project was the establishment of the Loganlea 275 kV substation, which has already received approval. Consultation for the first stage was carried out in 1999 under the code requirements of the day. PB Associates states that this consultation process included an examination of options, consultation with affected parties, co-ordination with distribution options, and notification of possible interested parties via the annual planning statement.

The Greenbank 275 kV establishment is the second phase of this network augmentation and includes the construction of a 500 kV single circuit line (operating initially at

[10] This is not the Powerlink and code definition of major (large) and minor (small) projects, where major projects are those greater than $ 10 million.

[11] The Powerlink detailed planning study has not been reviewed as part of this review.

275 kV); establishment of the Greenbank 275 kV substation; construction of a 275 kV double circuit line; and the installation of a 275 kV capacitor bank at Greenbank.

Greenbank-Molendinar 275 kV DCST

PB Associates states that this project forms the third stage in the South East Queensland reinforcement, of which the Greenbank 275 kV establishment (discussed above) was the second stage. The timing of this stage is mainly dependent on the loading in the region, but also the operation of Directlink and possible new generation. PB Associates analysis slows that the most likely commissioning of this project is in 2004/05.

This phase of network augmentation includes construction of a 275 kV double circuit line; extension of the Greenbank 275 kV substation to connect the Molendinar circuit; further development of the Molendinar 110 kV substation; and installation of 300 MVA 275/110 kV transformers.

Murphy Creek-Blackwall 275 kV

PB Associates notes that there are network limitations on the amount of power that can be transferred from the North of Tarong to the South East Queensland region. For various scenarios this network limitation may constrain generation in the Queensland system. It believes that there may be a net market benefit in removing this constraint by augmenting the network. The requirement and timing of this project are related to the generation developments and the loading; however the main driver appears to be the loading. The Powerlink scenarios place the most likely commissioning of this project, to remove the constraint in 2005/06.

The work assumed for this project includes the construction of a 275 kV double circuit line; establishment of a 275 kV switching station, and an addition of a further bay to the Blackwall 275 kV substation.

Second Tarong-Murphy Creek 275 kV SCST

PB Associates states that the South West Queensland network is prone to voltage depressions under single circuit contingencies of the lines supplying this area. Powerlink and the distributor have plans to add reactive support in the form of capacitor banks in order to support the voltage. However, Powerlink considers that these measures will only defer the requirement for the proposed network augmentation. The requirement for this project is driven by the loading in South West Queensland region. The most likely commissioning of this project in 2004/05.

The work assumed for this project includes the acquisition of an easement, construction of a 275 kV single circuit line and modifications to substation arrangements.

Yabulu North - Tully 275/132 kV DCST

PB Associates notes that Powerlink considers that these lines will need to be replaced due to their condition. The replacement date is considered to be 2006. Powerlink does not consider the timing of this project to be related to the load or generation forecasts, but instead it will be driven by the cost of maintaining the line and the risk of leaving the line in service.

The work assumed for this project includes the acquisition of a 275 kV double circuit easement, and construction of a 275 kV double circuit line (operating at 132 kV); and establishment of a 132 kV substation.

4.4.2 Construction of QNI - Efficiency gains

As is noted in section 4.3 Powerlink argues that it has been able to achieve some management induced efficiency gains in the construction of QNI. PB Associates conducted an analysis of Powerlink's proposed management induced efficiency gains. In undertaking its analysis, PB Associates summarises Powerlink's proposals into four categories. Each of these categories are discussed in turn.

Asset Avoidance

Asset avoidance is, the efficiency created by avoiding the need to build an asset that was planned and thought to be required. The savings due to a reduction in the route length fall into this category. PB Associates notes that QNI was approved based on a route that was politically acceptable to the government of the day and the project budget reflected that route. In the event, due to proactive management by Powerlink, some 42 kilometres of the planned line was not required. PB Associates, therefore, believes that it is fully consistent with the intent of the incentive regime that Powerlink be given credit for the savings made. It also notes that this saving is a one-off efficiency gain specific to QNI and it cannot be assumed that similar efficiencies will be available for future projects.

Speculative Gain

The speculative gain was achieved through the hedging of aluminium prices. PB Associates asserts that these savings are speculative in that the savings made could, in different circumstances, have been a loss. It states that in determining the appropriate treatment of such transactions, the Commission needs to consider the issue of symmetry. It believes that from a regulatory perspective it would be inappropriate for gains from the trading of hedge contracts to be subject to a glide path unless losses are also subjected to a similar glide path.

PB Associates notes that in the *Draft Regulatory Principles*, the Commission makes no provision for a glide path where capital expenditure exceeds that forecast. In this case, while the TNSP may carry the loss for the remainder of the regulatory period, after a reset the losses are assumed by the customers, since the allowed revenue will increase to support the higher value of the asset base. Therefore, PB Associates does not recommend that gains made from commodity hedge contracts be subject to a glide path.

Contractor Selection Gains

Powerlink believes that its QNI contractor priced the work very competitively in order to gain a foothold in the Queensland market. PB Associates notes that to the extent that this is correct, this is a one-off gain. PB Associates also notes that if more contractors remain active in the market, it may be more competitive and the construction costs of future projects can be expected to decrease as a result. PB Associates thus recommend

that the Commission allow the efficiency gains made from construction efficiency to be glide pathed.

Construction Efficiencies

PB Associates notes that these savings are derived from the introduction of construction efficiencies, including the use of 100 per cent imported steel and project management gains. These efficiencies are not project specific and are measures that the TNSP might equally apply to other new projects. It contends that as these efficiencies were available to Powerlink during the construction of QNI indicates that there may be ongoing opportunities for Powerlink to reduce the cost of new project construction. PB Associates believes that in a competitive environment, there would be strong incentives for Powerlink to do so. PB Associates notes that for this regulatory reset, it is understood that the Commission is likely to determine a revenue cap based on an asset valuation using replacement costs, based on existing project management and construction practices that do not take into account additional efficiencies that may be available. PB Associates, thus, recommends that the Commission subject the efficiency gains made from construction efficiency to a glide path.

On the basis of its analysis, PB Associates considers the construction efficiencies identified by Powerlink, except for the speculative gain made through the hedging of aluminium prices, should be allowed. It believes that failure to take this approach would mean that efficient construction is penalised, which is not consistent with the intent of the regulatory regime. However, PB Associates believes that increased market competitiveness and more efficient project management may provide scope for a reduction in the construction cost of future projects, particularly larger ones.

4.5 Submissions by interested parties

Probabilistic capex

Ergon and Stanwell Corporation (Stanwell) agree that there is uncertainty surrounding the location and timing of the necessary network augmentations, generation capacity construction and the retirement of existing plants in Queensland. Consequently, Ergon and Stanwell both, support Powerlink's probabilistic approach to forecasting capex. However, Ergon believes, that any probabilistic forecast can be demonstrated as being reasonable against benchmarked capex of other transmission systems. It also argues that future capex assessments must have regard to concurrent market development, including risk management and the changing regulatory environment.

Mid–term review

Ergon, Stanwell and ElectraNet support Powerlink's mid-term review, suggesting that this is the most appropriate method for forecasting capex given the uncertainty in generating locations and patters. However, Ergon suggests that any review should only focus on capex and its impact on prices and ensure that an adjustment is triggered where actual capex is both higher and lower than actual capex.

TransGrid advocates a cautious approach to any review that may be undertaken to ensure that the Commission maintains the light handed principles of incentive based regulation.

Management induced efficiency gains

ElectraNet concurs with Powerlink's claims that incentive regulation must reward efficiency gains and that valid claims be considered on their merits.

General

The EUAA argues that Powerlink's application does not provide adequate information on the proportion of capex augmentations and refurbishment's, nor the cost and timing of each project. It contends that this information should be made available to allow interested parties to assess the viability of Powerlink's proposals.

4.6 Powerlink's response to submissions by interested parties

However, in response to concerns raised by interested parties regarding the nature of its capex forecasts, Powerlink submitted its proposed capex for the next two years. The major project are outlined in table 4.3 and are discussed turn.

Table 4.3 Major projects rolled-in during the years 2002/03 and 2003/04.

Project	Cost estimate ($'000)	Range of service dates	Probable service date
Woree establishment	20,000	2002	02/03
Strathmore 275/132kV transformer	10,000	2002	02/03
Tully - Innisfail line replacement	25,000	2002	02/03
Innisfail - Edmonton line replacement	14,000	2003-04	03/04
Capital re-investment of substations and communications	52,000	2003-04	02/04
Static var compensator at Cairns	16,000	2003-04	03/04

Woree Establishment

Electricity demand in the Cairns area is forecast to continue to grow at a very high level of about 5% per year. Existing transmission lines into the Cairns area are operating at or near capacity. Powerlink has conducted a major investigation into the timing at which the very high level of demand growth would cause a violation in the reliability standards set out in the code. The investigation included a consultation process to identify alternatives to network augmentations, the examination of options and consultation with affected parties. This project is part of a strategy resulting from the conclusions of the investigation.

The project includes the establishment of the 275kV Woree substation at Cairns and uprating the Chalumbin to Woree line to 275kV. The most likely commissioning of the project is in 2002/03.

Strathmore 275/132kV Transformer Augmentation

The two, 324km long 275kV circuits from Nebo to Ross represent a critical part of the North Queensland transmission system. The establishment of a 275kV switching

station at Strathmore in 2001/02 will extend the capability of these circuits, which would otherwise be exceeded. The switching of the 275kV Nebo-Ross lines will reduce the impact of a 275kV line outage, which will extend the transmission capability between Nebo and Ross.

Powerlink has informed the Commission that extending the Strathmore substation to include a 132kV bus and the switching of a Collinsville-Clare 132kV circuit will further improve system security and access to 132kV assets for maintenance. The project also has additional benefits of reducing transmission losses and reducing the loading of the Nebo and Ross 275/132kV transformer thereby deferring their augmentation. Powerlink's scenarios place the most likely commissioning date of this project in 2002/03.

The work assumed for this project includes the installation of a new 300MVA 275/132kV transformer at Strathmore; the construction of a new 132kV busbar and associated switchgear, protection and control equipment.

Tully - Innisfail Line Replacement

Powerlink contends that the northern coastal 132kV double circuit lines have been in operation for over 40 years and, although continuously maintained, have suffered from the hostile environment of the area resulting in severe tower and footing corrosion.

The replacement of these lines is projected to take place over a number of years. The work assumed for this project includes the acquisition of an easement over a direct route between Tully and Innisfail, construction of a double circuit line and related substation works. The Commission understands that the most likely commissioning of this project is in 2002/03.

Innisfail - Edmonton Line Replacement

As in the case of the Tully to Innisfail line, the Innisfail to Edmonton line is another of the ageing northern coastal lines reaching the end of its physical life and in need of replacement.

Work assumed for this project includes the replacement of the existing Innisfail to Edmonton line with a double circuit, dual voltage 275/132kV line, initially operating at 132kV, directly replacing the existing line. The most likely timing appears in 2003/04.

Capital Re-investment of Substations and Communications

As part of its replacement program, Powerlink has included projects for the replacement of ageing and obsolete substation and communication assets. The main trigger for assets considered for replacement are ageing. The age profile of Powerlink assets is such that a number of substations are approaching the end of their technical life. Their condition is closely monitored to optimise their replacement. Over the 2002/03 and 2003/04 years, the investment required will be $52 million. The main projects assumed in this category are the replacement of substations at Clare, Kareeya and Innisfail.

Static Var Compensator at Cairns

Powerlink believes that potential difficulties in maintaining voltage stability in Far North Queensland anticipated over the forthcoming period. Studies carried out by Powerlink predict that the dynamic reactive range of the local Barron Gorge generators in the area becomes insufficient to maintain voltage stability from the summer of 2003/04. This places the most likely timing of the project in 2003/04.

The work assumed for this project includes the installation of a 132kV static var compensator and associated switchgear at the Woree substation.

4.7 Commission's considerations

4.7.1 2001/02 capex roll in

Powerlink has proposed a capex roll in for 2001/02 of $148.6 million. The Commission notes that of this $148.6 million, $52.6 million is in excess of the capex allowed for in the QERU determination. In discussions with the Commission, Powerlink noted that the difference between the 2001/02 forecast capex roll-in in the QERU decision and its forecast roll-in as outlined in its application is largely attributable to the inclusion of asset replacements in the latest forecast. At the time, in its probabilistic capex forecast presented to QERU, Powerlink only included augmentation driven projects in its capex scenarios, omitting replacement projects, particularly in view of existing assets entering into the 40+ year age band. This was observed by the QERU's consultant, Arthur Andersen, which reviewed Powerlink's capex forecast at the time, and flagged this as a deficiency. It commented that:

> As a further part to the implementation of 'Asset Life Cycle Plan', and to aid in the determination of asset refurbishment and replacement, an 'Optimised Replacement Policy in Electricity Transmission Networks' working paper has been prepared. The development of processes such as this one at Powerlink will result in a far more functional asset management process.

As part of its Asset Management Plan, Powerlink has developed a forward-looking model, which identifies future asset replacement requirements. As discussed in later sections, PB Associates examined this process and was satisfied that it modelled future asset replacement expenditure appropriately.

4.7.2 Analysis of Powerlink's proposed capex program

The Commission acknowledges the uncertainty surrounding forecasting generator locations and patterns in Queensland and, like Ergon and Stanwell, believes that Powerlink's probabilistic approach to forecasting capex, rather than the traditional single scenario approach, is the most appropriate given the circumstances. As a consequence, while the Commission has not been able to analyse individual projects their adequacy and efficiency, it has relied on PB Associate's detailed review of Powerlink's forecasting methodology.

For instance, in its reviews, PB Associates conducted a general overview of Powerlink's transmission system including the main load centres and existing generation plant, committed generation commissioning/decommissioning, possible uncommitted generation, existing network constraints and the impact of generation size, location and dispatch on these constraints, and general uncertainty in level of

augmentation required in future. It also conducted an overview of the internal review procedures and public consultation process adopted by Powerlink when considering a major augmentation. The Cairns transmission line augmentation project was used as an example. Furthermore, PB Associates conducted an analysis of the load forecasting methodology used by Powerlink including the rationalisation of distributor supplied forecasts, and independent NIER forecasts and of the joint planning process undertaken with Distributors to identify economic distribution solutions. It also conducted an analysis of the generation scenarios used by Powerlink in the development of their capital expenditure forecast and the methodology and inputs used to generate these scenarios and the associated probabilities.

Additionally, as was noted in PB Associates' report, Powerlink's probability forecasts indicate that about 85 per cent of the total capex will be between $220 million and $260 million over the first three years of the regulatory period. However, while there is less certainty in the remaining years, Powerlink has forecast that it is likely that 80 per cent of capex in that period will be between $260 million and $340 million. Powerlink's application includes capex of between $79 million in 2006/07 and $209 million in 2003/04.

Furthermore, as was noted in section 4.4, PB Associates conducted an analysis of the major projects that are likely to occur over the regulatory period. PB Associate's review determined that the methodology used by Powerlink to forecast capex was robust and appropriate. The Commission notes that the five projects reviewed by PB Associates account for around $90 million per year, or nearly half, of the forecast capex amount for 2003/04, 2004/05 and 2005/06. Therefore, in addition to reviews of Powerlink's capex forecasting methodology about one third of Powerlink's forecast capex has been subject to a detailed review for its adequacy and efficiency.

The Commission notes that Powerlink has provided a test of its proposed capex. While Powerlink's test notes that its capex forecasts for the period is appropriate, the Commission believes that it would appear to be an inappropriate method for assessing the adequacy of Powerlink's forecasts given that only 14.5 per cent of its proposed capex is replacement capex. Powerlink's reasonableness test estimates that around $80 million per annum would be required given the asset-ageing schedule. Therefore, the Commission will not use the reasonableness test to assess Powerlink's proposals.

Based on PB Associates' review of Powerlink's forecasting methodology, it's analysis of Powerlink's five major projects and the Commission's review of Powerlink's proposed capex for 2002/03 and 2003/04, the requirement to use a probabilistic approach to forecasting capex, the Commission does not believe it is appropriate at this stage, to adjust Powerlink's forecast capex. Given that its capex is based on the expected value of 72 different scenarios, not actual projects, adjustment to Powerlink's capex may prevent construction from occurring. However, should information come to hand, on the likely occurrence of particular scenarios developed by Powerlink prior to the completion of the final decision, the Commission will asses its likely impact on Powerlink's capex forecasts and consider whether an adjustment to Powerlink's capex allowance is appropriate. Furthermore, to ensure that only prudent expenditure is undertaken, the Commission will test the validity of Powerlink's forecasts throughout the regulatory period through its *Information Requirements Guidelines*. These guidelines currently contain provisions for the annual reporting of actual capex. The

Commission will also conduct a reserve capex assessment at the next regulatory reset to assess the prudency of Powerlink's capex claims.

4.7.3 Construction of QNI - Efficiency gains

The Commission states in the *Draft Regulatory Principles* that:

> the regulated TNSP is invited to demonstrate at each regulatory review that any capital expenditure below forecast levels has arisen because of management induced efficiency gains. Where it is clearly demonstrated by the TNSP that capital expenditure shortfalls have resulted because of management efficiencies or innovation, the capital expenditure efficiency gains may be subject to a glide path, similar to the operations and maintenance expenditure. If the regulated TNSP does not clearly demonstrate the case for retaining efficiency gains, then a full P_0 adjustment is more likely to be applied to the capital expenditure linked component of cost reductions

To this end, PB Associates' review analysed Powerlink's proposed efficiency claims. The efficiency claim was assessed against an independent consultant's estimated cost of constructing QNI, which was used as the basis for the cost-benefit analysis on which the decision to proceed with the project was based.

PB Associates' review concluded that of Powerlink's identified efficiencies all except for the speculative gain made through the hedging of aluminium prices should be allowed.

While the Commission concurs with most of PB Associates findings, it believes the hedging of aluminium prices should be included as an efficiency gain. The Commission agrees with Powerlink that the exclusion of this efficiency claim will not deliver appropriate incentives to the TNSP and encourage TNSPs to pass on higher costs to customers. In an incentive-based regime, the Commission must ensure that it provides TNSPs with appropriate incentives to deliver the most cost-effective outcomes. The Commission will, therefore, include the $40.5 million of efficiency gains, in net present value terms, in Powerlink's revenue cap using the glide path mechanism as foreshadowed in the *Draft Regulatory Principles*

Regarding PB Associates' concerns regarding Powerlink's claimed efficiencies from the selection of a contractor, asset avoidance and construction efficiencies will be closely monitored by the Commission.

At the regulatory resets, the Commission will undertake an assessment of Powerlink's actual capex for the current regulatory period. If the Commission finds that Powerlink's management induced efficiency gains are repeatable, the Commission will not only ensure that future efficiency claims are not provided to Powerlink, but that the current efficiency gains provided in this decision are clawed back. Furthermore, the Commission notes PB Associates' comments that increasing market competitiveness and more efficient project management may provide scope for a reduction in the construction cost of future projects.

4.8 Conclusion

On the basis of its own analysis, and that of its consultant PB Associates, the Commission accepts the prudency of Powerlink's proposed capex program. Consequently for the purposes of determining Powerlink's revenue cap for the period

1 July 2001 to 30 June 2007, the Commission has included $1,040.5 million of capex set out in table 4.4. This decision is made on the basis of Powerlink's proposed commissioning date and includes an allowance for interest during construction of 8.83 per cent, which represents the nominal vanilla WACC as set out in chapter 2.

In making this decision the Commission notes that Powerlink must apply the regulatory test in order to justify the inclusion of the projects within it capex program. The Commission will consider these matters further when it comes to including these capex projects into Powerlink's asset base at the next regulatory review.

Table 4.4: Powerlink capital expenditure from 2001/02 to 2006/07

	2001/02 ($'000)	2002/03 ($'000)	2003/04 ($'000)	2004/05 ($'000)	2005/06 ($'000)	2006/07 ($'000)
Total capex rolled in	**155,241**	**178,862**	**187,225**	**229,434**	**198,782**	**91,009**

5 Operating and maintenance expenditure

5.1 Introduction

In setting Powerlink's revenue requirement, the Commission must assess its capacity to achieve realistic efficiency gains in its proposed operating and maintenance expenditure (opex) with regard to future demand and service quality.

At the same time, because it represents a large proportion of the network's variable costs, opex is also an important source of savings and productive efficiencies over the short to medium term.

An important focus of the Commission's assessment is Powerlink's use of benchmarking, based on domestic and international best practice, as a guide to setting, testing and adjusting targets in the planning and management of opex programs. In addition, the Commission will consider whether or not Powerlink has adopted an appropriate balance between opex and capex and its effects on service standards. Finally, efficient opex is a key source of the overall productivity gains that the Commission will consider in determining the incentive outcomes for Powerlink's revenue cap.

The remainder of this chapter:

- sets out the requirements of the code;
- summarises the Commission's draft decision concerning the appropriate level of opex to be allowed in the present regulatory period as well as the information considered by the Commission in arriving at that conclusion. This includes:
  - Powerlink's opex proposal for the regulatory period;
  - submissions by other interested parties; and
  - a summary of the major findings of PB Associates review.

5.2 Code requirement

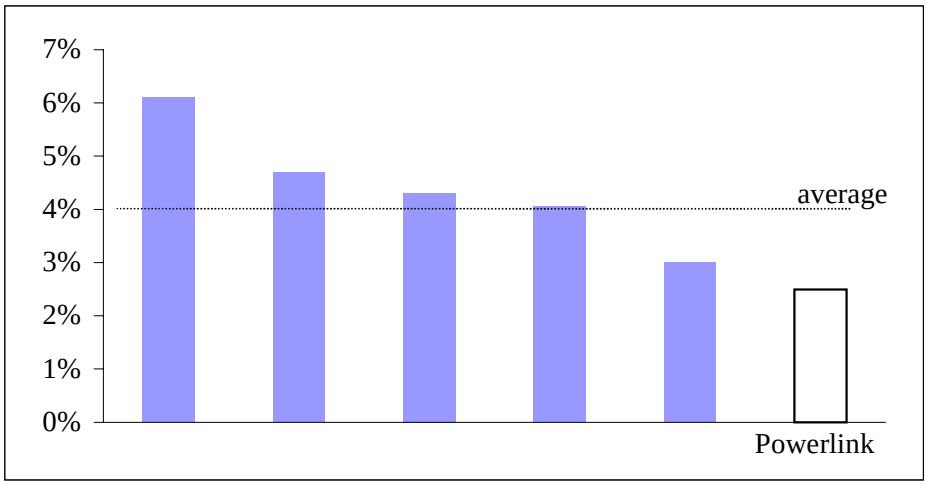
The Commission's task in assessing Powerlink's opex is specified in the code. In particular, Part B of Chapter 6 of the code requires *inter alia* that:

- in setting the revenue cap, the Commission must have regard to the potential for efficiency gains in expected operating, maintenance and capital costs, taking into account expected demand growth and service standards; and
- the regulatory regime must seek to achieve an environment, which fosters efficient use of existing infrastructure, efficient operating and maintenance practices and an efficient level of investment.

5.3 Powerlink's application

Powerlink argues that international benchmarking shows that it is the most efficient transmission entity in Australia and one of the most cost-efficient in the world. Powerlink's controllable operating costs in 1999/00 were 2.4 per cent of transmission asset values, in contrast to the Australian/New Zealand average of 4.2 per cent. Figure 5.1 provides a comparison of total operating cost as a percentage of transmission entities in Australia and New Zealand.

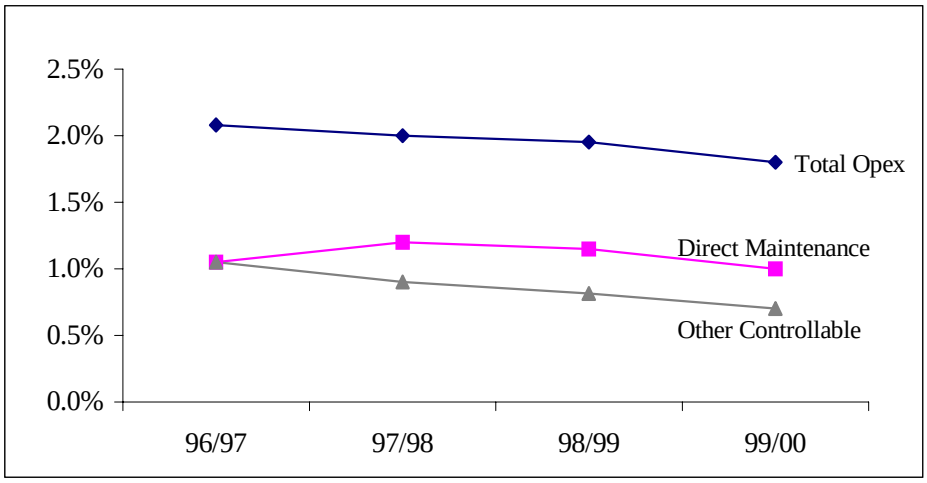
Figure 5.1: Comparison of total operating costs as a percentage of transmission assets (ODRC) for transmission entities in Australia and New-Zealand.



Source: International Transmission Operations and Maintenance Study 1999.

Powerlink contends that, on a replacement asset value basis, its total operating costs have declined from 2.2 per cent of transmission asset values in 1996/97 to 1.7 per cent in 1999/00, a reduction of 7.2 per cent per annum. This is highlighted in table 5.2.

Figure 5.2: Operating costs as a percentage of assets (replacement value)



Source: Powerlink Queensland - application – transmission network revenue cap 2000

Powerlink predicts that underlying operating costs will decline further by 1.6 per cent of transmission asset replacement value by the end of 2006/07, which represents an annualised reduction of 0.8 per cent.

Powerlink argues that some of the reasons for the decline in its annualised reduction include:

- the need to increase maintenance costs especially on refurbishment; and
- the offsetting impacts of diseconomies of geography.

In addition to the underlying operating costs, Powerlink argues that there are cost increases imposed by the NEM and its agencies, which include:

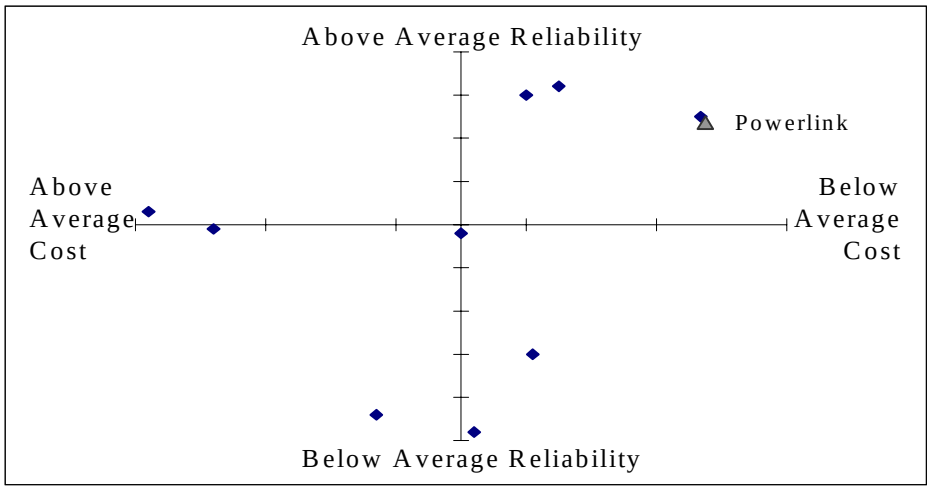
- the administrative costs of the code process for network augmentations;
- having to fund Market System Operator functions from TUOS rather than via NEMMCO market fees, in addition, having to undertake more Market System Operator functions than presently funded by NEMMCO;
- the increasing cost of insurance arising from the ongoing removal of statutory protection liabilities; and
- a new cost component to cover contracted services, such as grid support obtained from generators under the provisions of the code.

These are discussed in further detail in turn.

5.3.1 Controllable operating and maintenance costs

Powerlink notes that the latest benchmarking studies indicate that it is already efficient, implementing efficiency measures identified in earlier benchmarking studies such the results the International Comparison of Transmission Performance (ICTP) presented in Figure 5.3.

Figure 5.3: Results from the 1998/99 ICTP benchmarking study



Source: International Comparison of Transmission Performance 1998/99.

Powerlink therefore, believes that there is minimal scope for future efficiency gains in direct operating and maintenance costs. Furthermore, Powerlink argues that its benchmarking suggests that it should spend more on operational refurbishment to improve reliability.

Powerlink also contends that there are minimal opportunities for efficiency gains in direct operating and maintenance costs as it has already undertaken initiatives such as office relocation and implementation of modern, fully integrated business computing systems.

Geographical remoteness of new assets

Powerlink assert that recent additions to its network have occurred away from the existing maintenance service areas and service depots. Therefore, it argues that the maintenance cost of these remote assets will be proportionally higher than the average costs experienced by the rest of the network.

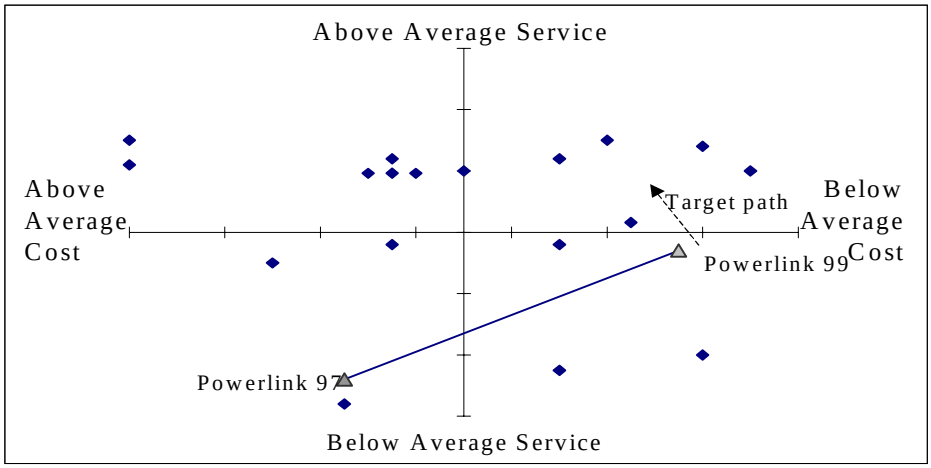
NEM pressure on outages

Powerlink notes that NEMMCO and market participants are encouraging TNSPs to amend their approach to maintenance outages to minimise the impact on the market and system security. Powerlink therefore notes that while the overall benefit to the market outweighs the additional costs, it would require Powerlink to engage in higher cost activities such as out of hours work and payments to generators for short-term grid support.

Operational Refurbishment

Powerlink argues that the regulatory environment under which it operates places significant pressure on it to purse ongoing reductions in opex. Powerlink notes that while the latest detailed International Transmission Operations and Maintenance Study (ITOMS) benchmarking highlights its cost performance, it also highlights a sub-optimal trade-off between costs and reliability, particularly pertaining to substations. Therefore, Powerlink argues that it requires significant refurbishment of aged plant to ensure the functionality can be maintained throughout the full working life.

Figure 5.4: Results from the 1999 ITOMS study for substation maintenance



Source: International Transmission Operations and Maintenance Study 1999.

Network monitoring and control

Powerlink contends that in pursuing efficiencies it has consolidated its network monitoring and control into a single central network centre. However, it argues that the cost burden of network monitoring functions will increase over the coming regulatory period as a number of code derogations lapse in early 2001. Powerlink further argues this reduces the current network operational standards in Queensland, and when added to the commissioning of QNI will mean Powerlink's operation and monitoring of the network will become more complex.

5.3.2 Other controllable costs

Powerlink believes that support costs, including the corporate, administrative, planning and engineering support costs for the business association with meeting present obligations will decrease from 0.6% to 0.5% of transmission assets over the regulatory period. However, Powerlink identifies the following support areas, which will impose an additional cost burden over the regulatory period:

- calculation of network constraint equations;
- administrative costs of the code process for new network augmentations; and
- administrative costs of regulatory reporting requirements to the Commission.

Insurance

Powerlink states that changes to the National Electricity Law in 1999 resulted in a significant increase in the liabilities of TNSPs. It notes that its insurance costs have increased correspondingly and are continuing to rise, reflecting insurance providers understanding of the NEM risks. Powerlink contends that the market systems operations insurance advisory committee (MSOIAC) process may further increase the cost of insurance. Therefore, Powerlink argues that as future insurance costs are outside of its control, any additional cost should be allowed on a cost pass-through basis.

Contracted services

Powerlink notes that, in accordance with clause 5.6.2 of the code, it must consider a number of transmission plans including non-network grid support options, such as local generation. It adds that a generation grid support option has been included when:

- a generator exists in an area which is a generation-deficient area;
- security standards would be violated in the area only if the generator was offline or operating below maximum capacity; and
- contracting for sufficient generation output is likely to be economic compared with a transmission reinforcement.

Powerlink argues that certain transmission plans include obtaining grid support from generation sources in both North Queensland and South Queensland.

Powerlink notes that it has attempted to forecast a grid support allowance, however due to the uncertainty created by the generating patterns and location, it proposes an annual adjustment to be made to cover any difference between allowed and actual grid support payments.

Table 5.1 shows the proposed estimate of future regulated operating and maintenance requirements of the Queensland transmission network.

Table 5.1: Regulated opex forecast

	2001/02 ($'000)	2002/03 ($'000)	2003/04 ($'000)	2004/05 ($'000)	2005/06 ($'000)	2006/07 ($'000)
Maintenance	36,487	38,979	42,032	44,528	46,942	50,399
Network Monitoring and Control	4,882	6,659	7,014	7,383	7,766	8,163
Support / Corporate	23,134	24,705	25,579	26,525	27,672	28,564
Grid Support	3,687	5,197	16,617	15,427	698	2,257
Total Opex	**68,190**	**75,540**	**91,243**	**93,863**	**83,078**	**89,384**

Powerlink notes that operating costs as a percentage of network transmission assets are expected to decrease from 1.77 per cent at the start of the regulatory period to 1.72 per cent in the final year, a reduction of 0.7 per cent per annum. The estimates of grid support costs have been developed in conjunction with the capital forecasts to avoid 'double counting'. However, since no asset has been created, the estimates have been recorded as opex rather than capex.

5.4 Consultant's report

PB Associates was engaged by the Commission to undertake a review which analyses and comments on matters in relation to the contribution of opex to Powerlink's delivery of transmission services.

The main findings of the PB Associates report are:

- Powerlink has a comprehensive asset management plan that links their asset management strategies to corporate visions, performance requirements and resource plans;
- Powerlink's guidelines for classifying operating and capital expenditure are appropriate and are being applied in a consistent manner;
- Powerlink's internal maintenance rates, incorporating full overhead allocation, are within 10-15 per cent of the external service provider rates. KPMG, in an audit reviewed by PB Associates, has confirmed that Powerlink is applying the allocation of overheads consistently and that the practices adopted comply with the Commission's requirements and code requirements;

- the maintenance costs proposed by Powerlink are appropriate. Powerlink has also developed a high-level opex model to forecast future maintenance costs based on asset growth. Detailed and high-level maintenance forecasts show consistent trends. Reasonable savings have been made in the last three years but costs will now increase with new investments. Reduced availability of plant for maintenance and increasingly remote sites are increasing maintenance costs. Maintenance practices are considered to be consistent and effective. Refurbishment costs have increased above historical levels and the need for this has been confirmed by benchmarking studies and recent plant failures. Network monitoring and control costs will increase when NEMMCO shifts more responsibilities to Transmission Network Service Providers and terminates their payment for system security services;

- new NEM functions increase costs by $2.4 million due to the need for more detailed network analysis and public consultation for network development, code compliance and regulatory reporting. Based on the information provided, these costs are considered reasonable;

- additional insurance premiums to cover any additional liabilities imposed on it should be allowed on a cost pass through basis;

- due to the variability and uncertainty of grid support costs, the provision to cover these costs should be subject to a mid term reset in line with the proposed capex review;

- PB Associates' review of Powerlink's performance in the ICTP and the ITOMS comparative benchmarking studies, revealing Powerlink's operating expenditure to be appropriate; and

- further opportunities for cost savings could include achieving greater maintenance synergies for new assets so that overall maintenance costs increase at a rate slower than that assumed, and treating related dismantling work as capital project instead of the current classification as an operating expenditure.

Forecasting of opex

In its review of Powerlink's opex forecasts, PB Associates notes that Powerlink has a comprehensive asset management plan that links their asset management strategies to performance requirements and resource plans. It notes that Powerlink has developed an in-depth planning approach based on scenario planning principles to consider plausible plans for both asset enhancement and maintenance. It also believes that the SAP accounting system provides Powerlink with an effective tool in managing and monitoring the condition of network assets, by trending the relationship between expenditure on routine, condition-based and corrective maintenance. It considers that this system also allows for the full separation of costs for both regulated and unregulated activities, and allows costs to be allocated to the appropriate capital and operating activities. Maintenance activities are segregated at source, so that each job or activity is associated with an asset which has already been identified as regulated or unregulated thus enabling asset related costs to be captured accurately and appropriately.

PB Associates notes that Powerlink has developed a set of guidelines for the classification of expenditure between capex and opex. All expenses necessary to place an asset in service are treated as capital. The policy states that site preparation, survey costs, site clearing and dismantling associated with a capital project are also treated as capital. Expenditure that contributes to a unit of plant being restored to the condition when first acquired or which reduces future deterioration of the unit of plant but does not significantly extend its life is classified as operating expenditure. PB Associates considers these guidelines for classifying capex and opex are appropriate and are being applied in a consistent manner.

Benchmarking

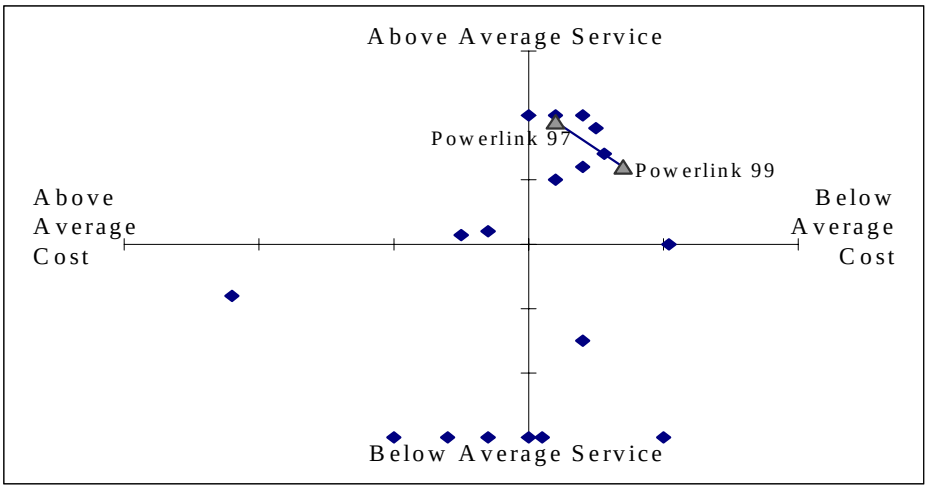
PB Associates has reviewed Powerlink's performance in the ICTP and ITOMS comparative benchmarking studies. In making performance comparisons, PB Associates states that the change in the performance trends is as important as the actual relative position of the different TNSPs. It notes that is not possible to make absolute comparisons between TNSPs, due to differing network topologies and commercial factors. However, it consider that the variation in a TNSP's performance compared against previous period reveal whether the TNSP's performance is getting better or worse.

PB Associates notes the ITOMS study focuses on maintenance comparing operating expenditure against reliability and involves twenty TNSPs from throughout the world. Through the development of normalisers that take into account currency differences and asset configurations, PB Associates believes that the ITOMS study provides an accurate comparison of the direct costs of maintenance.

It notes that Powerlink's substation reliability improved between 1997 and 1999. However, Powerlink's reliability still remains just below the group average. Powerlink have identified 110/132 kV circuit breakers as being the area affecting performance, and has developed proposed refurbishment programs to address this reliability concern.

Powerlink has been in the desired upper right quartile throughout 1997 –1999 although Powerlink's reliability reduced slightly during this period, the average for the group as a whole also reduced.

Figure 5.5: Results from the 1999 ITOMS study for transmission line maintenance



Source: International Transmission Operations and Maintenance Study 1999.

Overall, PB Associates believes, these studies show Powerlink opex to be very comparable with the best performers. PB Associates, therefore, considers that the Commission should allow Powerlink's proposed opex.

5.5 Submissions by interested parties

The EUAA, Ergon, SPI PowerNet and the QMC agree that, opex should be benchmarked for efficiency, reliability and service levels. However, the EUAA and SPI PowerNet believe that the current benchmarking conducted on Powerlink's network is inappropriate, arguing that the benchmarks have been conducted at a high level. SPI PowerNet also contends that the benchmarks fail to provide a realistic view of the relative efficiencies of Powerlink to other TNSPs. It also argues that, as a relatively small proportion of a TNSPs total operating and maintenance expenditure is directly related to line maintenance costs, the measure of operating and maintenance costs per circuit kilometre is not an adequate indicator of total efficiency.

Ergon does not believe that adequate consideration has been given to Powerlink's management of provision of firm access, the scheduling of network outages and efficiency measures implemented to date. Ergon believes that age, construction and kilometres of line within a network must be analysed to substantiate Powerlink's claim for any increase.

Ergon and the QMC believe that Powerlink should also justify why it believes that there is no further scope for future efficiency gains. Ergon contends that Powerlink's argument that greater development to the west of the existing network will increase its opex requirement, is contrary to its claim that one of the major efficiency gains has been derived from the out-sourcing of maintenance work.

The EUAA argues that Powerlink's methodology for calculating identifiable opex is inadequate, believing that the use of two years of historical data is insufficient to derive a trend. It contends that a data series of ten years prove more appropriate.

SPI PowerNet and Ergon suggest that proposed increased maintenance should only be accepted where the Commission is satisfied that there is no double counting of operating and capital costs and can be demonstrated that maintenance is effective in creating a higher sustained level of reliability.

5.6 Commission's considerations

2001/02 Opex forecast

In discussions with Powerlink, the Commission was informed that a difference between the forecast opex in Powerlink's application and that of the opex allowed in the QERU determination can be attributed to the following factors:

- the inclusion of grid support as a regulated operating expense in the latest forecast. This is consistent with the provisions of the code and the Regulatory test which require TNSPs to consider, and select where appropriate, non-network alternatives to network augmentations. Grid support costs are an operating expense, but are effectively substitutes for network capex;

- increased refurbishment requirements identified by Powerlink; and

- new obligations on TNSPs resulting from recent changes in the NEM, which were not anticipated in QERU's opex forecast. These new obligations have already had an impact on Powerlink's 2000/01 operating costs with the introduction of an Asset Monitoring Team and dedicated coordination of network outages with market participants.

PB Associates' review of Powerlink's forecast grid support, the costs associated with additional NEM functions and the level of refurbishment, concluding that such forecasts are reasonable and appropriate. The Commission is therefore, satisfied that the difference in forecast opex is justified and reasonable.

Future opex forecasts

The Commission is satisfied that PB Associates thoroughly reviewed the methodology and underlying assumptions employed by Powerlink in forecasting opex are sound, robust and appropriate. PB Associates' examination of the classification of opex was also comprehensive and detailed. The Commission is therefore satisfied in line with the consultants recommendation that cost are assigned appropriately and consistently.

Powerlink requests a provision for opex excluding grid support that increases from $64.5 million to $77 million over the regulatory period, an increase of 16.24 per cent. PB Associates assessed the proposed figures and methodology used in the forecasting and verifies the validity and reasonableness of the figures. The Commission notes the findings of PB Associates' review, which indicates the Powerlink is one of the most cost-effective networks in the NEM. PB Associates' examination of both the ITOMS and ICTP studies, concluded that the results where based on correct and comparable information. The Commission believes, in line with the consultants' recommendations, that there is limited scope for Powerlink to undertake further substantial cost cutting over the regulatory period.

As noted in Chapters 2, the Commission considers that at this stage, Powerlink should be able to supply the Commission with the cost of the increase to third party liability. This draft decision does not include an allowance for that increase in insurance costs but the Commission expects that it would be included in the final decision.

The Commission will allow an annual revenue cap adjustment, to cover any difference between the allowed and actual grid support. The Commission believes that this is a more effective method of dealing with the forecasting uncertainty than PB Associates' recommendation that the Commission adopt a mid-term review, the Commission will assess any adjustments to Powerlink's revenue cap at the time of its annual compliance reporting. Prior to incorporating any pass-through charge, Powerlink will be required to obtain the Commission's approval regarding the size of the adjustment. The amount must be demonstrated to be material, efficient and reasonable.

5.7 Conclusion

As the result of the analysis provided by PB Associates, the Commission accepts the information provided by Powerlink and grants the proposed opex over the regulatory period.

Table 5.2: Powerlink operating and maintenance expenditure from 2001/02 to 2006/07

	2001/02 ($'000)	2002/03 ($'000)	2003/04 ($'000)	2004/05 ($'000)	2005/06 ($'000)	2006/07 ($'000)
Total Opex	**68,190**	**75,540**	**91,243**	**93,863**	**83,078**	**89,384**

6 Total revenue

The previous chapters discussed each of the major elements of the Commission's building block approach to setting Powerlink's revenue cap. This chapter brings this work together, along with a discussion of depreciation and other related matters, to set out the Commission's decision on Powerlink's revenue cap for the period 1 January 2002 to 30 June 2007.

6.1 Code requirement

As explained in Chapter 1, the code requires the Commission to set a revenue cap with an incentive mechanism for non-contestable transmission network services. The Commission's role as regulator of transmission revenue is limited to determining the MAR while Powerlink will calculate the resulting network prices in accordance with Chapter 6, part C of the code.

The code outlines the general principles and objectives for the transmission revenue regulatory regime to be applied by the Commission. The code grants the Commission flexibility to use alternative, but consistent, methodologies. In fulfilling its role as regulator, the Commission's aim is to adopt a process which eliminates monopoly pricing, provides a fair return to network owners and creates incentives for owners to pursue ongoing efficiency gains through cost reductions. The Commission will continue to develop the regulatory framework through its *Regulatory Principles*.

6.2 The accrual building block approach

As detailed in Chapter 1, the Commission's decision on Powerlink's MAR relies on the accrual building block approach, while having regard to financial indicators. At this time, the Commission considers that its work on financial indicators is speculative. Consequently, the Commission has not included this analysis in its draft decision. The Commission will seek further information from Powerlink so that the financial indicator analysis can be included in the final decision. The basic building block approach calculates the MAR as the sum of the return on capital, the return of capital, opex and taxes.

The revised building block formula thus becomes:

	MAR	=	return on capital + return of capital + opex + tax
		=	(WACC * WDV) + D + opex + tax
where:	WACC	=	post-tax nominal weighted average cost of capital;
	WDV	=	written down (depreciated) value of the asset base;
	D	=	depreciation;
	opex	=	operating and maintenance expenditure;
	tax	=	expected business income tax payable; and

The expected tax has been discussed in Chapters 2 and 5 respectively.

6.3 Powerlink's proposal

Powerlink's previous revenue cap was determined by the QERU for the period 1 July 1999 to 30 June 2002. For the 2001/02 financial year, QERU determined a revenue cap for Powerlink of $318.5 million.

Powerlink's application has been made on the basis that while the Commission will commence its regulation of Powerlink's network from 1 January 2002, in accordance with the code, to align Powerlink's reporting with the financial year, the information has been provided to the Commission on the basis that the opening asset base will be set on 1 July 2001.

Powerlink proposes a revenue cap of $376.9 million for 2001/02 which trends up over the regulatory period to $494.2 in 2006/07. This is largely as a result of:

- the increase in capex to accommodate the likely generation in Queensland; and
- a post-tax nominal cost of capital of 13.97 per cent to reflect the uncertainty in the Queensland market.

6.4 Commission's assessment of building block components

The Commission's assessment of the various components of the revenue cap, in the context of the building block framework, are discussed below.

6.4.1 Asset value

In order to establish the appropriate return on the funds invested in Powerlink, the Commission has modelled Powerlink's asset base over the life of the regulatory period and estimated a weighted average cost of capital (WACC) based on the most recent financial information.

The basic methodology underlying the roll-forward of Powerlink's asset base is that the closing value of the asset base from year to year is constructed by taking the opening value, adding in any capital expenditure, subtracting disposals and depreciation for the year and converting it to a nominal figure by adding in an inflation adjustment. The closing value for one year's asset base becomes the opening value for the following year's asset base.

Clause 6.2.3(d)(4)(iii) of the code states that the assets in existence and in service from 1 July 1999 are valued at the value determined by the jurisdictional regulator. In accordance with this provision, the Commission has rolled forward the QERU valuation of 1 July 1999 to include asset additions, deletions and depreciation and setting an opening asset base as at 1 July 2001, in accordance with Powerlink's request.

Powerlink argued however that the QERU, valuation underestimated the value of its network assets. The Commission engaged PB Associates to conduct a review of an earlier valuation undertaken by Arthur Andersen, including Powerlink's proposed adjustments and asset roll forward schedule.

PB Associates' review of the assumptions and methodology used in Arthur Andersen's valuation concluded that the Commission should use the QERU valuation as the starting valuation for the purposes of setting Powerlink's asset base.

The Commission has assessed Powerlink's proposed roll forward schedule and believes that it is consistent with the Commission's methodology of rolling assets in at the actual cost of construction. The asset roll forward also includes an inflationary component derived from the June quarter, eight cities weighted CPI.

Regarding the construction of QNI, the Commission has rolled in the actual construction cost into the asset base. However, this value is lower than an independent consultant's valuation of the cost of the project. The difference between the actual cost of construction and the forecast cost has been treated as an efficiency gain and has been included in Powerlink's opex. Therefore, Powerlink is able to keep the efficiency gain for one regulatory period, providing it with an incentive to operate efficiently.

Based on the above elements, the Commission has set the opening value of Powerlink's assets at $2,279 million as at 1 July 2001.

6.4.2 Capital expenditure

Powerlink has plans for an extensive capital expenditure program over the regulatory period. However, due to the uncertainty in generating locations and timing, Powerlink proposes a probabilistic methodology to forecasting capex and based its proposals on the expected value of the scenarios that it identified. The Commission engaged PB Associates to provide an independent assessment of Powerlink's forecasting methodology.

On the basis of PB Associates' assessment of Powerlink's forecasting methodology and assumptions, the Commission will include, in nominal terms, $1,040.6 million of capital expenditure in the calculation of Powerlink's revenue cap, which includes interest during construction.

As was noted previously the Commission will also allow for $40.5 million, in net present value terms, of management induced efficiency gains over the regulatory period, which Powerlink achieved in the construction of QNI. This amount is included in Powerlink's opex allowance.

6.4.3 Depreciation

Using a post-tax nominal framework, the Commission has made an allowance for "economic depreciation" which adds together the (negative) straight line depreciation with the (positive) annual inflation effect on the asset base. Powerlink notes that the straight line method of depreciation, is considered to provide the best approximation of the pattern of asset exhaustion.

This economic depreciation has been used to model the movements of asset values over the life of the regulatory period (table 6.1) and for determining the return of capital (table 6.2). Calculation of the applicable straight-line depreciation component has been based on the remaining life per asset class of existing assets and the standard life for new assets.

On the basis of this approach the Commission has calculated a straight-line depreciation allowance that trends from $50.65 million in 2001/02 to $50.79 million, $56.92 million, $64.17 million, $68.34 million and $72.15 million in each of the following years.

6.4.4 Weighted average cost of capital

In determining Powerlink's revenue cap, the Commission must have regard to Powerlink's WACC. The WACC is a method commonly used for determining the return expected on an asset base.

While the WACC framework provides a well recognised theoretical model for establishing the cost of capital, there is less than full agreement on the precise magnitude of the various financial parameters that need to be applied. The Commission has given careful consideration to the value that should be assigned to Powerlink given the nature of its business and current financial circumstances. Accordingly, the parameter values used are those considered most appropriate.

The Commission has chosen to apply a post-tax nominal return on equity of 11.71 per cent, which equates to a post-tax nominal WACC of 7.00 per cent. In arriving at those figures, the Commission has adopted:

- a nominal risk free interest rate of 5.71 per cent, reflecting the short term average yield on five a half year Commonwealth Government bonds;
- a real risk free rate of 3.41 per cent based on the short term average yield on the interpolated five and ten year capital indexed bonds;
- an expected inflation rate of 2.22 per cent derived from the difference between the two yields;
- a debt margin of 1.2 per cent above the nominal risk free interest rate leading to a nominal pre-tax cost of debt of 6.91 per cent.

The Commission has examined market evidence and accepted the advice of financial experts in determining a market risk premium of 6 per cent and a dividend imputation figure (gamma) of 0.5. However, in doing so, the Commission notes recent evidence, which suggests that a gamma closer to 1 may be more appropriate.

The Commission has examined the risks faced by Powerlink and the equity betas of similar businesses, derived principally from the average equity beta for the infrastructure and utilities industry group listed on the ASX. Therefore, based on the analysis, the Commission has determined an equity beta for Powerlink of just below 1.

The Commission's chosen post-tax nominal return on equity is 11.71 per cent. This number lies below Powerlink's proposal of a nominal post tax return on equity of 13.97 per cent. This largely reflects the prevailing market conditions and Powerlink's contention that it requires a higher rate of return to reflect the level of risk faced by its network from competing energy sources, which the Commission has not approved.

6.4.5 Asset base roll-forward

Based on the above elements of the Commission's building block methodology, the Commission has modelled Powerlink's asset base over the life of the regulatory period (see Table 6.1). Note that, under the post-tax nominal framework adopted by the Commission, the return on capital building block has been calculated using the nominal vanilla WACC (8.83 per cent) consistent with the post-tax WACC determined from the cost of capital parameters.

Table 6.1: Powerlink's return on capital, 2001/02 to 2006/07

	2001/02 ($'000)	2002/03 ($'000)	2003/04 ($'000)	2004/05 ($'000)	2005/06 ($'000)	2006/07 ($'000)
Opening asset base	2,279,727	2,384,320	2,512,391	2,642,698	2,807,965	2,938,408
Capital expenditure	155,241	178,862	187,225	229,434	198,782	91,009
Economic depreciation	50,648	50,791	56,918	64,166	68,338	72,149
Closing asset base	2,384.320	2,512,391	2,642,698	2,807,965	2,938,408	2,957,268
Return on capital	201,344	210,581	221,892	233,401	247,997	259,518

6.4.6 Operating and maintenance expenses

Powerlink argues that international benchmarking shows that it is the most efficient transmission entity in Australia and one of the most cost-efficient in the world. Powerlink's controllable operating costs in 1999/00 were 2.4 per cent of transmission asset values, compared with the Australian/New Zealand average of 4.2 per cent. The Commission's consultant, PB Associates concurs with Powerlink's opex claims, particularly in light of previous efficiency gains and Powerlink's need to improve service standards. Therefore, the Commission recognises opex of $497.09 million over the regulatory period.

6.4.7 Estimated taxes payable

Based on the assumptions underlying the above building block components and taking into account the network's tax depreciation profile, the Commission assesses Powerlink as being in a positive tax paying position during the regulatory period.

The Commission's assessment of taxes payable are based on the 60 per cent gearing level assumed in the WACC parameters, not Powerlink's current gearing level. Further, the tax estimates relate only to the network's regulated activities. The Commission's estimated taxes payable trend from $20.57 million in the first year of the regulatory period to $31.54 million in 2006/07.

6.5 Total revenue

6.5.1 Total revenue and CPI-X smoothing

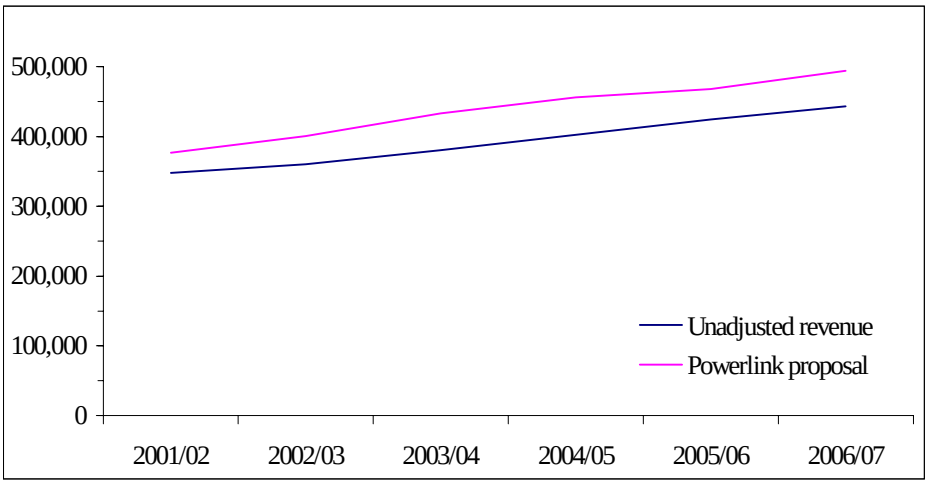
Based on the various elements of the Commission's building block approach, the Commission proposes an unsmoothed revenue allowance that increases from $348.02 million in 2001/02 to $360.16 million, $380.59 million, $402.46 million, $424.56 million and $443.14 million in the subsequent years of the regulatory period (Table 6.2).

Table 6.2: Powerlink's MAR, 2001/02 to 2006/07

	2001/02 ($'000)	2002/03 ($'000)	2003/04 ($'000)	2004/05 ($'000)	2005/06 ($'000)	2006/07 ($'000)
Return on capital	201,344	210,581	221,892	233,401	247,997	259,518
Return of capital	50,648	50,791	56,918	64,166	68,338	72,149
Operating expenses	85,737	87,644	89,593	91,585	93,622	95,704
Unadjusted revenue allowance	348,015	360,156	380,590	402,461	424,556	443,144

The Commission's MAR provides a revenue stream around 10.29 per cent lower than Powerlink's proposed MAR (see Figure 6.1).

Figure 6.1: Comparison of maximum annual revenue for Powerlink, 2001/02 to 2006/07 ($'000)



The difference between the Commission's final MAR and Powerlink's figures is mainly the result of:

- a lower opening asset base arising from the Commission rolling forward the 1 July 1999 valuation as determined by QERU and not Powerlink's adjustment;
- different inflationary assumptions in rolling forward the asset base; and

- different cost of capital parameters used in deriving at the post-tax nominal return on equity.

6.5.2 Additional revenue smoothing

Powerlink requested the Commission to undertake additional revenue smoothing to ensure that there is a consistent price path between QERU decision and the Commission's decision. It argues that as the revenue reset commences on 1 January 2002, which is midway through a pricing year, that the revenue for the first year of the reset period, 2001/02 be taken from the jurisdictional regulator, and any discontinuity arising from the new reset decision will need to be deferred until 2002/03.

It further argues that the introduction of QNI into the rolled forward asset base will create an additional revenue requirement of around $35 million. However, some of this shock can be reduced by deferring part of the increase until later years of the regulatory period when this increase can be met through increased energy usage.

Powerlink proposes an alternative smoothing approach in which the price increase is minimised where the price path is kept at constant real level over the five years.

The Commission believes that there is merit in providing additional smoothing to Powerlink's revenue numbers to ensure that customers do not face a large initial increase in prices followed by a price reduction in subsequent years. However, the Commission's CPI-X methodology precludes it from deferring part of the increase until later years in line with Powerlink's request. Therefore, the Commission will derive a revenue path that incorporates the 2001/02 QERU valuation and apply a NPV neutral smoothing process to derive Powerlink's revenue path in the following years. The result will be a gradual increase in the price of energy to Powerlink's customers.

Based on this approach, the Commission has derived a smoothed revenue allowance that increases from $318.50 million in 2001/02 to $345.66 million, $375.61 million, $408.64 million, $445.08 million and $485.30 million in the subsequent years of the regulatory period. This price path is derived using an X factor of –8.44 per cent.

Table 6.3: Powerlink's smoothed MAR, 2001/02 to 2006/07

	2001/02 ($'000)	2002/03 ($'000)	2003/04 ($'000)	2004/05 ($'000)	2005/06 ($'000)	2006/07 ($'000)
Smoothed MAR	**318,500**	**345,664**	**375,611**	**408,640**	**445,080**	**485,299**

The Commission will assess the feedback from interested parties, particularly Queensland energy consumers, on whether it should maintain this approach in the final decision or adopt its tradition smoothing process which will result in a larger initial increase in energy charges to customers.

6.6 Conclusion

On the basis of the Commission's decision, Powerlink can roll forward the opening revenue figure of $318.50 million, incorporating an annual adjustment based on the eight weighted capital city CPI plus an X factor of –8.44 per cent. On the basis of the Commission's forecast inflation, the Commission has determined a revenue cap for Powerlink that from $318.50 million in 2001/02 to $345.66 million, $375.61 million, $408.64 million, $445.08 million and $485.30 million in 2006/07.

7 Service standards

7.1 Introduction

It is important for the Commission to determine Powerlink's revenue cap in the context of a set of defined service standards (sometimes called a service charter). The Commission's approach to regulation not only provides an incentive for networks to improve productivity but also provides the transmission network with an incentive to lower service standards to reduce costs and increase profits.

In determining the revenue cap, the code requires the Commission to take into account the standards (mainly quality of supply standards) as specified and any standards as determined between the TNSP and its customers. In general, the Commission is supportive of service standards negotiated between the parties to connection agreements as such negotiations result in service standards based on commercial considerations. This approach also recognises that levels of service may vary depending on the location of a connection point in a transmission network.

The proposed code changes resulting from NECA's review of transmission and distribution pricing, requires the TNSPs to publish and adhere to the service standards imposed on the networks by the regulatory regime administered by the Commission. The code changes also provide for the development of a regime to allow for the negotiation of, and payment for, higher levels of service.

The remainder of this chapter:

- sets out the code requirements relevant to the inclusion of service standards in a revenue cap decision;
- summarises the findings of NECA's review and the Commission's amendments to the network pricing code changes relating to service standards; and
- outlines:
  - Powerlink's proposed service standards;
  - the major findings of the PB Associates review; and
  - the views of interested parties.

7.2 Code requirement

In addition to the general requirements that the Commission establish a regulatory framework that allows the regulated transmission networks to undertake efficient levels of investment and appropriate operating and maintenance practices, clause 6.2.4(c)(2) of the code states that in setting a revenue cap, the Commission must have regard to:

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

Clause 5.2.3(b) and schedule 5.1 of the code specify the quality of supply service standards to be achieved by the networks. Clause 5.2.3(b) states that a network must comply with the power system performance and quality of supply standards specified in either Schedule 5.1 or in a connection agreement. In the event that a requirement in a connection agreement would adversely affect any other network user, then the Schedule 5.1 requirements are to prevail.

Schedule 5.1 outlines the planning, design and operating criteria that a network must achieve. The design of a network has a clear impact on its performance over time. Specifically, S5.1.1 of the code states that:

> a Network Service Provider must:
>
> fully describe the quantity and quality of network services which it agrees to provide to a person under a connection agreement in terms that apply to the connection point as well as to the transmission or distribution system as a whole; and
>
> ensure that the quantity and quality of those network services are not less than could be provided to the relevant person if the national grid were planned, designed and operated in accordance with the criteria set out in this schedule S5.1.1 and recognising that levels of service will vary depending on location of the connection point in the network.
>
> To the extent that this schedule 5.1 does not contain criteria that are relevant to the description of a particular network service, the Network Service Provider must describe the network service in terms which are fair and reasonable.

The code defines 'satisfactory operating state' for the power system in Section 4.4.2. Basically the system is in a satisfactory operating state when the quality of supply indicators of Schedule 5.1 are within the limits set out in the schedule. These quality of supply indicators are:

- *power transfer capability* (MW) — the maximum electrical power flow permitted between two points in a transmission or distribution network as determined by line ratings, equipment ratings, reliability requirements and quality of supply requirements;
- *frequency variation* (hertz) — the variation of the power frequency on a transmission or distribution network from the target frequency of 50 hertz;
- *voltage control* — the control of network voltages to a target band by means of transformer tap changers reactive plant or generating plant;
- *system stability* — the inherent capability of an interconnected system to correct imbalances between generated power (MW) and absorbed power (MW) during abnormal disturbances;
- *fault clearance time* (milliseconds) — time taken by an automatic protection system to detect a short circuit or other fault condition and to interrupt the flow of current into the fault;
- *load shedding capability* — total amount of network load (MW) which is either automatically disconnected or manually disconnected from a remote central location, in an emergency situation resulting from a sudden large loss of generation (MW);

- *line rating* (amperes) — the maximum electrical current which can be safely carried by an overhead line under specified ambient conditions as determined by thermal or voltage drop limits;
- *remote control and monitoring technologies* is the combination of modern communications and data processing technologies into systems which enable:
  - control of large numbers of remotely located network equipment from a central location; and
  - interrogation of large numbers of remotely located network equipment and/ or metering stations in the field from a central location;
- *voltage magnitude* (volts) — the measured value of steady state network voltage; usually interpreted over a 5 minute period;
- *voltage fluctuation* (volts or %, seconds) — the measured value and duration of a fluctuation from steady state voltage lasting up to a few seconds, usually caused by fluctuations in load currents;
- *harmonic distortion* (%) — a departure of the supply voltage wave from its ideal sinusoidal shape, usually caused by harmonic load, currents or by converter notching; and
- *automatic reclosure of overhead lines* — a method of minimising line outage time caused by temporary faults, eg. those caused by bark, animals, birds etc. The faulted line is automatically disconnected, then automatically reconnected after a preset time delay.

7.3 Network pricing code changes

NECA's review of service standards concludes that service standards should be set for tariffed services provided by all networks from 1 July 2001 and that NSPs would propose service standards and the regulators would determine service standards as part of the regulatory review process. NECA's review also concludes that NSPs should publish consistent and compatible annual statistics on operational performance. It suggests that this should be based on a combination of those currently published by Great Britain's Office of Gas and Electricity Markets (OFGEM)[12], the ORG, IPART and those suggested by the Specification Negotiation of Network Services (SNNS) working group. It also considers that the regulators' forum should commission a benchmarking study, which includes a comparison of the relevant financial performance measures commencing with 2000/01 statistics.

In its draft decision, the Commission accepted NECA's finding but also suggested that the code be amended to provide the Commission with the flexibility to adjust revenue caps where necessary to take account of TNSPs' performance in delivering prescribed services to agreed standards.

[12] Office of the Gas and Electricity Markets (OFGEM) is an amalgamation of the Office of Gas Regulation (OFFGAS) and the Office of Electricity Regulation (OFFER).

7.4 Powerlink's proposal

Powerlink believes that service standards for network performance must:

- reflect the fundamental accountability principle that one should be held accountable for things which are within one's control, and conversely, one cannot be held accountable for things which are outside one's control;
- be consistent with the standards set for planning and developing the network;
- be consistent with the standards and criteria set for operation of the network;
- be consistent with the capex and opex allowed by the economic regulator; and
- not be "one size fits all".

Powerlink addresses these principles by proposing a three-step approach for setting service standards. It states that over the regulatory period it will:

1. compile ongoing quality of supply statistics relating to the total network and individual connection points. This will be provided to the Commission on an annual basis and will align generally with the proposed data set in Annex 8.1 of the *Draft Regulatory Principles*;
2. adopt the set of performance measures it currently uses for its monitoring process. That is:

Controllable

- total number of events (loss supply) greater than 0.2 systems;
- total number of events (loss of supply) greater than 1.0 system minutes.

Frequency

- static voltage amperes reactive (VAR) compensator events;
- equipment events per 1000 circuit breakers;
- secondary system events per 1000 circuit breakers;
- incident (human error) events per 1000 circuit breakers;
- total internal events per 1000 circuit breakers (sum of above);
- total external events per 1000 circuit kilometres;
- ratio of loss of supply events to total external events; and
- ratio of loss of supply events to total internal events.

Customer Feedback measures

- frequency of customer visits;
- list significant issues raised;
- steps taken to deal with issues; and
- perform annual customer satisfaction survey.

and comply with the following targets:

Total number of events (loss of supply) greater than 0.2 system minutes (per quarter)	**1.3 (summer), 0.8 (winter)**
Total number events (loss of supply) greater than 1.0 system minutes (per month)	**20.4 (summer), 0.07 (winter)**
Static Var Compensator events (per month)	**2.2**
Equipment events per 1,000 circuit breakers (per month)	**4.3**
Secondary system events per 1,000 circuit breakers (per month)	**3.1**
Incident (human error) events per 1,000 circuit breakers (per month)	**2.4**
Total internal events per 1,000 circuit breakers (per month)	**10.1**
Total external events per 1,000 circuit kms (per month)	**0.6 (summer), 0.4 (winter)**

3. develop measures and targets that are linked to market impact and other measures in consultation with the Commission.

7.5 Submissions by interested parties

The EUAA and Stanwell suggest that the Commission considers linking incentive mechanisms to service standards and developing market based service standards similar to those used by the ORG and OFGEM in the United Kingdom. The EUAA also suggests that the Commission impose minimum service standards for Powerlink, along the lines of those the Commission established for TransGrid.

TransGrid supports both Powerlink's statistical analysis approach to setting service standards and suggests that TNSPs should only be held accountable for areas of performance over which it does not have control.

7.6 Consultant's report

PB Associates was engaged by the Commission to:

- carry out a high level review of the set of service standards proposed by Powerlink in respect of their relevance and adequacy relative to the transmission company's current and forecast load and assess the service standards in accordance with the requirements of the code;
- review the set of service standards proposed by Powerlink in terms of their suitability for a comprehensive quality of service monitoring program, taking into account other programs (imposed either by regulators or used internally for monitoring purposes) in place for Australian transmission companies; and

- identify any deficiencies in the proposed set of service standards, including any deficiencies in the benchmark levels of performance proposed, and recommend any requirement for new service standards or change in the proposed level of performance.

In undertaking these assessments, PB Associates also considered the impact of Powerlink's proposed capex and opex on service standards.

The main findings of PB Associates' review are:

- external benchmarking studies show that Powerlink's present level of system reliability compares well with other transmission network service providers;

- Powerlink should be fully accountable for managing all external and environmental risks that it is in a better position than other participants in the industry to mitigate and that Powerlink should be fully accountable for the availability of the network, and for all power outages, whether planned or unplanned.

- Powerlink's system minutes not supplied shows a high level of variability from year to year and therefore, have limited suitability for regulatory oversight.

- the network reliability measures proposed by Powerlink are deficient in that they generally do not take account of the external and environmental risks that Powerlink must mitigate in the management of its network. They should, therefore, only be used on an interim basis only for the 2001/02 regulatory period.

- the target means proposed by Powerlink for the normalised network reliability indicators measured on a monthly basis are a fair reflection of the network's current performance and should be adopted for the 2001/02 regulatory period;

- the use of mean values as targets for the number of loss of supply events is not meaningful. It is recommended that targets for the number of loss of supply events be expressed in terms of the number of events per year and that the targets below be used in place of the ones proposed by Powerlink.

Total number of loss of supply events greater than 0.2 system minutes – summer	**3**
Total number of loss of supply events greater than 0.2 system minutes – winter	**2**
Total number of loss of supply events greater than 1.0 system minutes – summer	**1**
Total number of loss of supply events greater than 1.0 system minutes – winter	**0**

- PB Associates also recommended that during the regulatory period covered by this review Powerlink should report annually on the following indicators:
  - system minutes not supplied,
  - the ten-year rolling average of system minutes not supplied,
  - transmission circuit availability overall and for each voltage (330 kV, 220 kV, 132/110 kV) broken down into northern, central and southern areas,
  - transformer availability, overall and broken down by voltage (at the high voltage terminals) and area as above,
  - connection point interruption frequency (averaged for all connection points), overall and broken down by area,
  - connection point interruption duration (averaged for all connection points), overall and broken down by area, and
  - percentage of unplanned connection point interruptions not restored within three hours, overall and broken down by area.
- Powerlink's proposal that indicators relating to the manner in which it relates to its customers on a day-to-day basis be included in the regulatory compact is not supported.

7.7 Commission's considerations

While the Commission welcomes Powerlink's commitment to developing service standards along the lines of those proposed in the *Draft Regulatory Principles*, the Commission notes the concerns raised by PB Associates in its assessment of Powerlink's proposals. PB Associates, in discussions with the Commission and Powerlink raised some concerns with the benefits derived from the measures outlined in Annex 8.1 of the *Draft Regulatory Principles*. Whilst acknowledging that the list was comprehensive, it raised some concerns including:

- the statistics do not adequately differentiate between the responsibilities of NEMMCO and the responsibilities of TNSPs;
- some of the indicators are poorly defined and are likely to be interpreted in different ways by different TNSPs;
- statistics in relation to voltage quality are only valid if all TNSPs have the measuring equipment in place to ensure that all quality excursions are captured;
- it is not clear how the Commission intends that some of the SNNS proposed measures in relation to connection points be reported; and
- the measures in relation to connection points are not normalised and are therefore meaningless as a comparative measure.

At the time of developing the proposed measures in the *Draft Regulatory Principles* the Commission was unable to assess whether the performance indicators were appropriate. The Commission will therefore, not require Powerlink to report on the service standards outlined in Annex 8.1 of the *Draft Regulatory Principles* at this stage. However, given PB Associates' concerns that Powerlink's proposed performance indicators are inappropriate for regulatory purposes, the Commission must form a view on setting appropriate service standards.

However, as Powerlink requests additional opex to undertake maintenance during weekends to satisfies NEMMCO's requirements that maintenance outages not be undertaken during normal working hours and in line with the recommendations of the ITOMS studies, the Commission must be satisfied that Powerlink is undertaking the necessary maintenance during appropriate times. The Commission therefore requires Powerlink to report on those service standards as described by PB Associates with a view to highlighting this information during peak and off peak times.

In the longer term, the Commission intends to further develop the service standards outlined in the *Draft Regulatory Principles* in consultation with all TNSPs. The Commission envisages that it will undertake this process over the coming months. The process will involve a review of existing transmission network service standards and the service standards outlined in Annex 8.1 of the *Draft Regulatory Principles*. The review will also report on transmission network service standards used internationally, highlighting the similarities and differences between the international service standards and those used in the NEM and review the appropriateness of a statistical based approach to setting service standards.

The Commission will then develop a set of service standards and benchmarks suitable for regulatory purposes that will include performance indicators for Interconnector availability and market-based outcomes to apply to each TNSP and individually. The Commission will also consider existing statutory obligations imposed by licensing authorities on TNSPs and incorporate these into the service standards developed. Where possible, the Commission will also consider the measures currently proposed by the joint jurisdictional regulators Steering Committee on National Reporting Requirements (SCNRR).

These service standards will also be linked to financial incentives as is currently being undertaken by the ORG in Victoria and OFGEM in the United Kingdom. As has been recently undertaken by the ORG, the Commission will also determine an appropriate *"S"* term to be used in its CPI-X mechanism.

In undertaking these assessments the Commission will consider how best to incorporate performance indicators on internal and external risks to the TNSP.

Until such time that the Commission has developed an appropriate database of TNSPs performances relative to the established benchmarks, the Commission believes that it would be inappropriate to impose a set of financial indicators linked to service standards.

7.8 Conclusions

Powerlink is required to report annually on the following statistics until such time that they are superseded:

- system minutes not supplied,
- the ten-year rolling average of system minutes not supplied,
- transmission circuit availability overall and for each voltage (330 kV, 220 kV, 132/110 kV) broken down into northern, central and southern areas,
- transformer availability, overall and broken down by voltage (at the high voltage terminals) and area as above,
- connection point interruption frequency (averaged for all connection points), overall and broken down by area,
- connection point interruption duration (averaged for all connection points), overall and broken down by area, and
- percentage of unplanned connection point interruptions not restored within three hours, overall and broken down by area.

All of the above information must be provided to the Commission identifying peak and off peak occurrences, where peak occurrences are defined as those occurring between 7am and 10pm.

Powerlink is also required to meet the following targets for loss of supply events.

Total number of loss of supply events greater than 0.2 system minutes – summer	**3**
Total number of loss of supply events greater than 0.2 system minutes – winter	**2**
Total number of loss of supply events greater than 1.0 system minutes – summer	**1**
Total number of loss of supply events greater than 1.0 system minutes – winter	**0**

Attachment A – Submissions

In response to the Commission's call for submissions on Powerlink's application and the consultants reports, submissions where received from:

- ElectraNet
- Energy Users Association of Australia
- Ergon Energy
- Powerlink
- Stanwell Corporation Ltd
- Queensland Mining Council
- SPI PowerNet
- TransGrid