Decision

NSW and ACT Transmission Network Revenue Caps 1999/00-2003/04

Date: 25 January 2000

File No:
CG98/118

Commissioners:

Fels
Shogren
Jones
Martin
Cousins

Contents

Abbreviations

AARR	Annual Aggregate Revenue Requirement
ACA	Australian Cogeneration Association
ACCC	Australian Competition and Consumer Commission
ACT	Australian Capital Territory
ACTEW	ACT Electricity and Water
BCA	Business Council of Australia
Capex	Capital expenditure
CAPM	Capital Asset Pricing Model
CBD	Central Business District
COAG	Council Of Australian Governments
CPI	Consumer Price Index
CPI-X	Consumer Price Index less a Commission determined efficiency and smoothing factor
DAC	Depreciated Actual Cost
DEA	Data Envelope Analysis
DNSP	Distribution Network Service Provider
DV	Deprival Value
EBIT	Earnings Before Interest and Taxes
EBITD	Earnings Before Interest, Taxes, and Depreciation
EICG	Electricity Industry Consultation Group
EMRF	Energy Markets Reform Forum
EUG	Energy Users Group
GDP	Gross Domestic Product
GHD	Gutteridge Haskin & Davey Pty Ltd
GST	Goods and Services Tax
IPART	Independent Pricing and Regulatory Tribunal
IRPC	Inter-Regional Planning Committee
ITOMS	International Transmission Operations and Maintenance Study
kV	kilovolt
MAR	Maximum Allowable Revenues
MoEU	New South Wales Ministry of Energy and Utilities
MW	Megawatt
MWh	Megawatt hour
NEC	National Electricity Code
NECA	National Electricity Code Administrator
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NPAT	Net Profit After Tax
NPV	Net Present Value

NSP	Network Service Provider
NSW	New South Wales
ODRC	Optimised Depreciated Replacement Cost
ODV	Optimised Deprival Value
Opex	Operating expenditure
ORC	Optimised Replacement Cost
PIAC	Public Interest Advocacy Centre
PV	Present Value
QNI	Queensland and New South Wales Interconnector
RC	Replacement Cost
S & P	Standard and Poor's
SANI	South Australia and New South Wales Interconnector
SCADA	System Control And Data Acquisition communication systems
SKM	Sinclair Knight Merz
TFP	Total Factor Productivity
TNSP	Transmission Network Service Provider
TPA	*Trade Practices Act 1974*
TUoS	Transmission Use of System
WACC	Weighted Average Cost of Capital
WDV	Written Down Value
WIP	Work In Progress
WST	Wholesale Sales Tax

Executive summary

Under the National Electricity Code (NEC), the Commission is the regulator of the revenues of the transmission networks in New South Wales (NSW) and the Australian Capital Territory (ACT) from 1 July 1999. The Commission will regulate the transmission networks in the remaining jurisdictions on a progressive basis in accordance with the derogations of each individual jurisdiction contained in Chapter 9 of the NEC. These transitional arrangements will cease on 31 December 2002, when uniform regulation of the transmission networks in the National Electricity Market (NEM) commences.

In June 1999, the NSW Government announced that it would be delaying the date on which the Commission's transmission revenue cap decisions would come into effect. The NSW derogations have the impact that the NSW transmission networks will be permitted to earn revenues in accordance with the pre-existing prices for the period between 1 July 1999 and 31 January 2000. For the period 1 February 2000 to 30 June 2000, the NSW transmission networks will earn revenues in accordance with this decision (*ie* the Commission's revenue determination for the full 1999/00 financial year will be implemented for the last five months of that period on a pro-rata basis).

As part of this review, the Commission conducted an on-going public consultation process. The Commission released an issues paper in December 1998, published independent reviews of various aspects of the transmission networks in March 1999 and published a draft decision in May 1999. Interested parties were invited to comment on the issues paper, the consultancy reports and the draft decision. The Commission conducted a public forum, on 3 June 1999 in Sydney, to discuss the draft decision.

At the same time that the Commission has been undertaking this review, the NSW Premier requested the Independent Pricing and Regulatory Tribunal (IPART) to review a range of matters including transmission and distribution network pricing and electricity retail tariffs in NSW. IPART completed that review in June 1999 and has subsequently published decisions setting distribution and franchise retail prices in NSW. To avoid unnecessary duplication, simplify processes and reduce the burden on the networks and interested parties, the Commission and IPART worked closely on those matters relating to transmission networks where possible.

Scope of this decision

The NEC largely defines transmission networks as those networks that operate at nominal voltages of 66 kilovolts (kV) and above. However, the NEC draws distinctions between the high voltage networks (220 kV and above) and those lower voltage transmission network (between 66 kV and 220 kV) which:

- operate in parallel to and support the higher voltage network; and
- do not operate parallel to and support the higher voltage network.

Many distribution companies operate non-parallel 66 kV to 220 kV networks. In order to minimise regulatory overlap and in accordance with the NEC (clause 6.2.1(d)), the Commission and IPART have agreed that IPART should regulate the non-parallel 66 kV to 220 kV networks operated by the NSW distributors for at least the initial

regulatory period from 1 July 1999 to 30 June 2004. In addition, this review has not covered the transmission network operated by the Snowy Mountains Hydro-Electric Authority which is located in the Snowy region of the NEM and forms the NSW and Victoria interconnection. The Commission is currently conducting a separate review of the Snowy transmission assets and a draft report will be released shortly.

Consequently, this decision relates to the high voltage network operated by TransGrid in NSW and the ACT and the parallel 66 kV to 220 kV transmission network operated by EnergyAustralia.

The Commission's approach to setting the revenue caps

The NEC requires the Commission to set a revenue cap with an incentive mechanism (such as CPI-X or some variant) for non-contestable transmission network services. The Commission's role as regulator of those services is limited to determining the maximum allowed revenue (MAR). TransGrid will calculate the network prices in accordance with NSW's transitional derogations and then Chapter 6, part C of the NEC.

The NEC outlines the general principles and objectives for the transmission revenue regulatory regime to be applied by the Commission. The NEC grants the Commission the 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 is developing the regulatory framework through its Statement of Principles for the Regulation of Transmission Revenues (*Regulatory Principles*). A draft of the *Regulatory Principles* statement was released in May 1999. In that context, the Commission sees this revenue cap decision for the NSW transmission networks as being part of the transition towards the Commission's *Regulatory Principles* framework. Consequently, this final decision encompasses a number, but not all, of the draft *Regulatory Principles* (*eg* a post tax nominal weighted average cost of capital). In line with the on-going development of the Commission's approach to revenue regulation, the Commission sees this decision as having limited precedent value. The Commission's approach to future revenue caps will evolve and the *Regulatory Principles* will set out that approach.

The Commission has adopted an accrual building block approach to determining the revenue caps for TransGrid's and EnergyAustralia's transmission networks. In the draft decision the Commission relied on a pre-tax real WACC formulation of the revenue cap which consisted of a return on capital, the return of capital and an allowance for operating expenditures. In finalising this decision, the Commission has recast the building block approach in to a post-tax nominal formulation which the Commission considers better reflects the NEC's regulatory principles. For example, it allows for a more accurate estimate of the network's tax liabilities. This final decision has also been recast to take account of the Goods and Services Tax (GST) and a possible pass-through increase in third part liability insurance premiums. Consistent with this approach, the revenue cap in this final decision is the sum of:

- a *return on capital* — which is the written down (depreciated) value of the asset base multiplied by the post-tax nominal weighted average cost of capital (WACC);
- the *return of capital* — depreciation allowance;
- an allowance for *operating and maintenance expenditure*;
- *tax* — expected business income tax payable;
- *insurance* — possible pass-through of material, efficient and reasonable additional third party liability insurance costs; and
- *GST* — pass-through of the net impact of the Goods and Services tax on the businesses (the Commission has set out a process for assessing this revenue element during the regulatory period).

The building block approach to setting the revenue cap determines the maximum revenue that a network can earn from its regulated assets on an annual basis. The NEC provides the Commission with the discretion to choose the length of the regulatory period. While choosing a longer regulatory period would provide a network with revenue certainty, this would be on the basis of increasingly uncertain estimates of future needs. On balance, the Commission has chosen to apply the minimum regulatory period allowable under the NEC; that is, a regulatory period for five years from 1 July 1999 to 30 June 2004. This decision will take effect from 1 February 2000 on a pro-rata basis in accordance with the NSW derogations.

Revenue cap for TransGrid

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

Asset value

In order to establish the appropriate return on the funds invested in TransGrid, the Commission has modelled TransGrid'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.

Broadly, the closing value of TransGrid's asset base is constructed by taking the opening real value of the asset base, converting it to a nominal figure by adding an inflation adjustment plus any capital expenditure and subtracting the depreciation and asset sales (disposals) for the year. The closing value for one year's asset base becomes the opening value for the following year's asset base.

The NEC indicates that in assessing asset values, the Commission should use a deprival value methodology. Moreover, recent NSW derogations specify that the Commission can set the opening asset value in line with the NEC principles which specify that this should be the deprival value or below.

Consistent with these principles, NSW Treasury engaged a consultant to undertake an optimised depreciated replacement cost (ODRC) valuation of TransGrid's assets and the Commission engaged Sinclair Knight Merz (SKM) to undertake a review of this valuation. The NSW Treasury valuation estimated that TransGrid's assets were worth $2 064 million as at 1 December 1998. The SKM review broadly supported the NSW

Treasury valuation and estimated that TransGrid's assets were worth $2 103 million. The SKM review included relevant non-network assets, while the Treasury valuation did not, and this accounts for much of the difference between the two.

By estimating a current ODRC value for TransGrid's assets, these reviews have indicated where an economic value for TransGrid's assets may lie. They have also highlighted a number of regulatory issues, including:

- the upwards revaluation of the transmission lines (from 330 kV to 500 kV) to support the Queensland-New South Wales interconnector (QNI) was to have taken effect at the start of the regulatory period rather than at the commissioning date of the interconnector — the Commission also notes that the upwards revaluation of these lines was not signalled in the earlier publicly available studies on the QNI project;
- while TransGrid's non-regulated assets may be immaterial for the time being, they are likely to grow and accounting systems will need to be developed so they can be handled appropriately for regulatory purposes;
- the potential value attributable to TransGrid's easements have increased significantly (from $312 million to $402 million) between the 1996 and current ODRC valuations.

The Commission has set the opening value of TransGrid's assets at $1 935 million. This figure is based on the ODRC value but has been adjusted downwards on the basis that:

- the re-optimised QNI assets will not be recognised at the start of the period but upon the commissioning of the interconnector; and
- easements have entered the opening asset base on the basis of the 1996 ODRC value rolled forward at the CPI rate to 1 July 1999.

In terms of modelling the movement in TransGrid's asset value over the regulatory period, the Commission has indexed the opening asset value by 3.15 per cent per annum, which is consistent with the inflationary expectations used in deriving the WACC.

Capital expenditure

TransGrid has plans for an extensive capital expenditure program ($946 million) over the coming years. Under the NEC, the Commission's role in network planning is limited to creating the appropriate economic drivers for investment. Network planning is largely the responsibility of the networks, the Inter-Regional Planning Committee (IRPC) and the National Electricity Market Management Company (NEMMCO). In these circumstances, the Commission's objective is to provide TransGrid with sufficient funds to allow it to undertake prudent investments but to assess the efficiency of the actual investments undertaken at the following revenue cap review. This may involve the optimisation of inefficient or inappropriate investments.

To gain a better understanding of the prudency of the proposed investments, the Commission and IPART engaged two consultants to provide an independent assessment of TransGrid's capital expenditure program. These assessments covered

both specific projects as well as TransGrid's asset management systems. On the basis of its assessments of these reviews, the Commission will include, in nominal terms, $881 million of capital expenditure in the calculation of TransGrid's revenue cap. This figure includes interest during construction as this decision only recognises the capital expenditure once the project is commissioned. The capital expenditure program and interest during construction allowed for in the revenue cap calculations is comprised of:

- $163 million for the Sydney CBD augmentation;
- $202 million for the Queensland-New South Wales interconnector;
- $93 million for the Wagga augmentation;
- $258 million for renewal and replacement expenditure; and
- $165 million for the smaller augmentation projects.

Given their projected timing and current uncertainty, the Commission has decided not to include budgeted capital expenditure for the Armidale-Lismore, South Australia-New South Wales interconnector, the Tamworth-Gunnedah 132 kV line and the Snowy transmission assets.

Depreciation

In recasting the revenue cap into a post-tax nominal framework, the Commission has made allowance for "economic depreciation" which adds together the (negative) straight line depreciation with the (positive) annual inflation effect on the asset base. This approach has also allowed the Commission:

- to normalise the tax payable estimates over the life cycle of the assets to address the so called 'S-bend' phenomenon; and
- to remove the additional return the networks would otherwise earn on the tax allowance that has been brought forward.

This economic depreciation has been used to model the movements of asset values over the life of the regulatory period (Table 1) and for determining the return of capital (Table 2).

Calculation of the applicable straight line depreciation component has been based on the remaining life per asset class. The Commission believes this approach has addressed TransGrid's concerns on the draft decision where depreciation was calculated on the basis of an initial asset value provided by IPART and the assumption of an overall average remaining life of 25 years. On the basis of this revised, more accurate, approach the Commission has calculated a straight line depreciation allowance that trends from $81.36m in 1999/00 to $87.03m, $93.94m, $106.54m and $113.41m in each of the following years.

Weighted average cost of capital

In determining TransGrid's revenue cap, the Commission must have regard to TransGrid's weighted average cost of capital. The WACC is a method commonly used for determining the return expected on an asset base. The WACC is seen as important as the return on capital can account for around one third of the revenue cap.

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 TransGrid given the nature of its business and current financial circumstances. Accordingly, the parameter values used are those considered most appropriate.

The Commission considers that the appropriate rate of return to apply to TransGrid is a post-tax nominal rate of return on equity of 13.85 per cent. This equates to a post tax nominal WACC of 8.30 per cent. The Commission believes these figures are towards the higher part of the feasible range. In arriving at this decision, the Commission has made an upward allowance to account for risk perceptions attributable to the newness of the regulatory regime.

The Commission's estimate of the rate of return is based on the available information relating to the financial parameters in the Capital Asset Pricing Model (CAPM)/WACC formula.

The Commission has decided to adopt a nominal risk free interest rate of 6.81 per cent, reflecting the short term average yield on 10 year government bonds. The Commission has also used a debt margin of 1.0 per cent above the nominal risk free interest rate. Together, these translate to a nominal pre-tax cost of debt of 7.81 per cent.

The Commission has looked at market evidence and taken into account the advice of financial experts in determining a market risk premium of 6.0 per cent and a gamma (the value attributable to the utilisation by shareholders of tax credits) of 0.5.

The Commission has examined the risks faced by TransGrid and the betas of similar businesses in arriving at an asset beta of between 0.35 and 0.50. This figure was derived primarily from the average equity beta for the infrastructure and utilities industry group listed on the Australian Stock Exchange. Using a debt beta in a range between 0.00 and 0.06, this converts to an equity beta of between 0.78 and 1.25 with a mid point of just above one.

In order to place this decision within the context of the earlier draft decision, the 13.85 per cent post-tax nominal return on equity figure assessed by the Commission converts to an equivalent pre-tax real WACC of 7.35 per cent which is slightly higher than the 7.25 per cent set out in the draft decision reached in May 1999. The main reason for the change is that, since that time, financial conditions have altered resulting in an upwards movement in real interest rates. In addition, as noted above, the Commission has made an adjustment in the cost of capital reflecting the risk of the relative 'newness' of the regulatory regime.

It is, however, important to note that, in pre-tax real terms, the 7.35 per cent WACC assessed by the Commission is lower than the pre-tax real figure of 8.3 per cent and range of 7.6 to 8.9 per cent submitted by TransGrid and NSW Treasury respectively in their post-draft submissions. It also lies towards the lower end of the 7 to 8 per cent feasible range assessed by IPART in its December 1999 determination. The principal reasons for these differences are that the Commission has factored into to its modelling the lower company tax rate foreshadowed in the Ralph business taxation review and has also been able to determine an effective tax rate for TransGrid.

The effect of recent movements in financial markets is compounded when comparing the assessed cost of capital in nominal terms. Thus, the Commission's nominal post tax return on equity of 13.85 per cent lies above the 10.8 per cent originally proposed by TransGrid and the 13.35 per cent suggested by the network in its submission on the Commission's draft decision. The Commission's figure also lies above the range of 11.7 to 13.2 per cent proposed by NSW Treasury in its post-draft submission. The comparisons largely reflect the fact that those submissions were made at times when both real and nominal interest rates were materially lower than they are at present.

For the same reasons, the Commission's 8.3 per cent post tax nominal WACC lies above the 7 per cent suggested by TransGrid and range of 6.3 to 7.1 per cent submitted by NSW Treasury in their submission on the draft decision. It is also why the nominal post tax return on equity figure and post-tax nominal WACC determined by the Commission sit slightly above the ranges of between 11 and 12 per cent and 6.6 and 7.5 per cent assessed by IPART in its December 1999 determination.

Asset base roll-forward

Based on the above components, the Commission has modelled TransGrid's asset base over the life of the regulatory period (see Table 1).

Table 1: TransGrid's return on capital, 1999/00 to 2003/04 ($ million)

	1999/00	2000/01	2001/02	2002/03	2003/04
Opening asset base	1934.54	1961.01	2011.95	2260.87	2309.44
Capital expenditure	52.61	82.08	285.95	90.53	370.42
Economic depreciation	(26.14)	(31.14)	(37.03)	(41.96)	(47.12)
Closing asset base	1961.01	2011.95	2260.87	2309.44	2632.74
Return on capital	197.72	200.42	205.63	231.07	236.03

Operating and maintenance expenses

TransGrid indicated to the Commission that it has set itself the target of achieving a 12 per cent saving in operating expenses over the three years from 1 July 1998. The Commission's consultant, PB Power, believes that these efficiency targets are achievable and that further on-going savings can be made during the last three years of the revenue cap period.

On the basis of this advice, the Commission has included in its revenue cap decision provision for a real saving in TransGrid's controllable regulated operating expenses of approximately seven and one half per cent over the regulatory period or approximately 1.5 per cent per annum.

Again, an issue which emerged from the operating expenses review is the treatment of unregulated income and expenses. While TransGrid's unregulated businesses may presently be relatively immaterial, this is unlikely to be the case in the future. Consequently, the Commission expects that TransGrid will develop for use in the regulatory accounts which it will be required to submit to the Commission mechanisms to clearly identify and account for unregulated incomes and expenses, including the

appropriate allocation of any costs common to both regulated and unregulated activities.

Estimated taxes payable

The Commission has made an assessment of TransGrid's taxation position based on the assumptions underlying the above building block components, TransGrid's tax depreciation profile and the taxation arrangements as proposed in the Ralph business taxation review. The last of these involve reducing the previously applicable 36 per cent company tax rate and removing accelerated depreciation allowances (although the latter is grandfathered for assets in service prior to September 1999). The Commission's allowance for taxes payable trend from $8.95m in the first year of the regulatory period to $15.31m in 2003/04.

Total revenue

Under the regulatory regime administered by IPART, over the last four years TransGrid's revenue has been around $350 million per annum and its regulated revenue was $339 million for 1998/99.

At the outset of this review process, TransGrid argued that its revenue cap for the next five years should be $351 million for the first year indexed annually by 4.5 per cent — comprised of an inflation rate of 2.5 per cent and an X factor of plus 2 per cent to principally reflect a growth in capital expenditure. Over the period of this review TransGrid has revised a number of the components of this revenue cap (e.g. capital expenditure) resulting in an increase in the suggested revenue cap trending from $357.94 million in 1999/00 to $455.45 million in 2003/04. This request was net of the GST effects and compensation for asymmetric risks.

Based on the various elements of the Commission's building block approach, in its draft decision the Commission proposed a revenue cap that trended in nominal terms from approximately $305 million in 1999/2000 to $317 million in 2003/04. The Commission's draft decision on TransGrid's revenue cap was 18.5 per cent below that initially proposed by TransGrid. However, the Commission noted in the draft decision its concern that this revenue stream may have been low in the circumstances.

Based on the Commission's assessment of both the financial parameters operating in the Australian economy at present as well as TransGrid's expenditure program, the Commission has determined a maximum annual revenue for TransGrid which trends in nominal terms from $329.63 million in 1999/00 to $393.12 million in 2003/04.

As required by the NEC, the revenue cap determined by the Commission has been constructed using a CPI-X efficiency regime. In the draft decision the Commission proposed a smoothing approach that attempted to avoid revenue shocks over the life of the current period. However, interested parties argued that this approach would result in a revenue shock at the next regulatory reset.

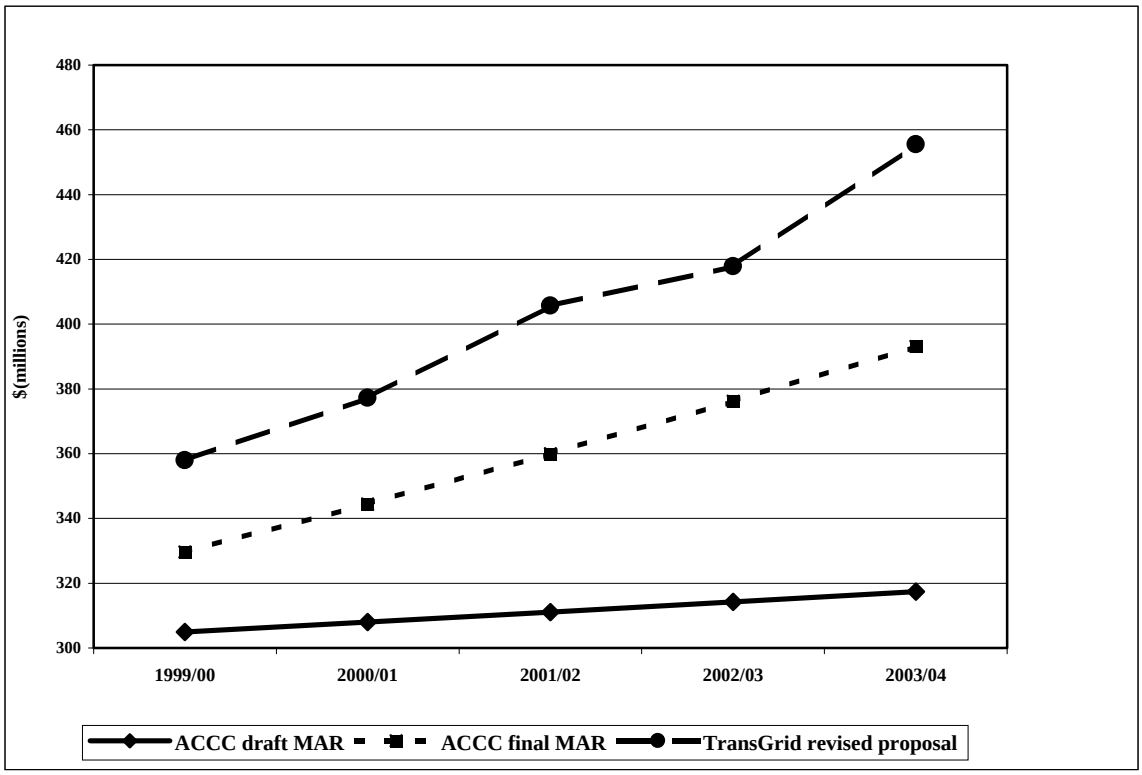
Accordingly, the Commission has altered its approach so that, on the basis of this decision, TransGrid can roll forward the opening revenue figure of $329.63 million adjusted from year to year for changes in the Consumer Prices Index (CPI) plus an X factor of 1.3 per cent per annum. The X factor ensures that TransGrid can receive the

real value of the projected revenue stream. The final revenue stream also reflects an efficiency driver on controllable operating expenses of 1.5 per cent per annum. It should also be noted that the CPI figure used during the regulatory period may need to be adjusted for the impact of the GST.

Table 2: Final MAR for TransGrid, 1999/00 to 2003/04 ($ million)

	1999/00	2000/01	2001/02	2002/03	2003/04
Return on capital	197.72	200.42	205.63	231.07	236.03
Return of capital	26.14	31.14	37.03	41.96	47.12
Operating expenses	101.30	102.93	104.57	106.25	107.95
Estimated taxes payable	8.95	9.75	10.04	13.33	15.31
Less value of franking credits	(4.47)	(4.88)	(5.02)	(6.67)	(7.66)
Unadjusted revenue allowance	329.63	339.36	352.25	385.94	398.76
Smoothed MAR	**329.63**	**344.47**	**359.98**	**376.19**	**393.12**

Figure 1: Comparison of MAR for TransGrid, 1999/00 to 2003/04 ($ million)



This Commission's final revenue figures are higher than the draft revenue figures. This increase is attributable to a number of factors, including:

- a higher value for the opening asset base;
- the inclusion of interest during construction in the capex assessed as prudent;
- an increase in the straight line depreciation allowance;

- using an effective tax rate rather than the statutory rate;
- revised cost of capital parameters leading to a higher post-tax nominal return on equity; and
- revisions to the revenue smoothing.

Despite the increase in the revenue cap since the draft decision, the Commission's final decision provides a revenue stream that is around ten per cent lower than TransGrid's revised proposal (Figure 1). The difference between the Commission's revenue cap and that proposal by TransGrid is largely due to:

- a lower opening asset base due to easements not being included at their 1999 ODRC value and the existing 500 kV QNI assets being revalued at commissioning;
- excluding several projects from the capital expenditure program;
- different inflation assumptions for the asset base roll-forward;
- different cost of capital parameters; and
- use of the CPI-X incentive mechanism.

The Commission's financial indicator analysis indicates that, after taking into consideration the impact of this decision, TransGrid's credit rating is likely to move from AA to A over the regulatory period. This trend is largely due to the network's ambitious planned capital expenditure program. On balance, the Commission is satisfied that, in the circumstances, the proposed revenue stream is appropriate and sustainable.

Finally, the Commission has proposed to include a pass through item for the 2000/2001 financial year to address the impact of the tax changes as part of the GST package. This pass through item will net out the impacts of introducing a GST against the impacts of removing the wholesale sales taxes. As TransGrid will be shielded from the impact of the GST through this mechanism, the Commission will not allow TransGrid to gain from the introduction of the GST by including the inflationary effects of the tax in the CPI incentive mechanism. The CPI incentive mechanism will therefore be exclusive of the inflationary effects of the GST. The Commission will work with the networks and the State regulators to derive an appropriate CPI adjustment factor.

Service standards

In establishing the revenue cap, the Commission is aware that it creates the incentive for TransGrid to minimise costs, perhaps at some detriment to the level of services provided. While the NEC provides some detail on the level of service standards appropriate for transmission networks in the NEM, these service standards are not comprehensive.

As a result, throughout this review process the Commission has sought to clarify the standard of service that TransGrid intends to provide over this regulatory period. The Commission's efforts in this area have not been resolved to the Commission's complete satisfaction. Despite this uncertainty, the Commission understands that the NSW Ministry of Energy and Utilities (MoEU) has began gathering information relating to the networks' performances against the network reliability and availability service standards.

As the licensing body in NSW, the MoEU will be requiring its identified service standards as part of the transmission and distributions network' reporting requirements under the licensing arrangements, and will be publishing its report on service standard performances annually. The Commission understands that the transmission reporting requirements will need to be met by TransGrid, EnergyAustralia and the Snowy Mountains Hydro-Electric Authority as foreshadowed in its discussion paper released in May 1999.

The Commission will consider the administrative efficiencies of relying on the reports published by the Ministry to satisfy itself that the revenue cap is commensurate with the level of service actually provided. The Commission will also continue to develop its views on service standards in the *Regulatory Principles*.

Other elements of the decision

The Commission is of the view that intermittent review of the cap should be restricted to very significant exogenous shocks, such as those that invalidate the value of the X adopted. Such review could occur at the request of TransGrid. It may also occur if this revenue cap is set on the basis of false and misleading information provided to the Commission. The early review may involve either variations in the value of X or introduction of a specific cost pass-through in the formula.

The Commission is addressing other regulatory issues relevant to this current review such as accounting information requirements, treatment of new interconnectors, ring-fencing guidelines and asset roll-forward through the development of the *Regulatory Principles*.

Revenue cap for EnergyAustralia's parallel transmission assets

The revenue cap the Commission has determined for EnergyAustralia relates to its parallel (66 kV to 220 kV) transmission network. IPART administers the regulatory arrangements for EnergyAustralia's non parallel transmission network and its distribution network.

To ensure competitive neutrality in the provision of transmission services by TransGrid and EnergyAustralia, the Commission has adopted a consistent approach, where possible, in establishing the revenue caps for TransGrid and for EnergyAustralia's parallel transmission assets. Nevertheless, EnergyAustralia's provision of transmission services are largely integrated with its provision of distribution services. This issue is relevant in terms of assessing operating costs and the scope for generating productivity improvements. In respect of these aspects of the business, therefore, the Commission has focussed on EnergyAustralia's integrated business rather than attempting to maintain consistency for its own sake.

As with TransGrid, NSW Treasury engaged a consultant to provide an ODRC estimate of EnergyAustralia's network assets. However, this valuation was not broken down into separate valuations of the transmission and distribution assets. Consequently, EnergyAustralia provided the Commission with an ODRC valuation of its parallel transmission assets based on the unit values contained in the Treasury estimate. That valuation was $864 million, of which $480 million related to easements.

In its draft decision the Commission adopted the business valuation provided to it by the IPART Secretariat. However, as NSW's recent derogations give the Commission the discretion to set the opening values of the electricity transmission assets, the Commission has moved to an ODRC value for network assets ($384.9 million) and an indexed historic cost for easements ($72.5 million).

EnergyAustralia proposed an $80 million capital expenditure program for its parallel transmission network, consisting of $46.4 million for augmentations, $24.9 for renewal expenditure for mains and $8.7 million for substations. An independent review conducted for IPART considered that this expenditure was prudent. On this basis, the Commission has included the proposed capital expenditure in the calculation of EnergyAustralia's revenue cap. In determining the revenue cap, the Commission will recognise this capital expenditure as the projects have been commissioned. Consistent with the proposals in the draft *Regulatory Principles* and as requested by EnergyAustralia, the Commission has included an additional $2.3 million for interest during construction.

In the draft decision, the Commission based its estimates of depreciation on IPART's business valuation of the assets separated into specific assets or classes of assets by approximation. EnergyAustralia argued that by adopting this approach the Commission had underestimated the depreciation on its transmission assets. In making this final decision, the Commission has revised its estimates of depreciation based on a consistent disaggregation of values by asset class.

To ensure competitive neutrality, the Commission adopted the same post tax return on equity for EnergyAustralia's parallel transmission assets that it has used for determining the revenue cap for TransGrid's transmission assets. That is, a post tax nominal return on equity of 13.85 per cent. This equates to post tax nominal WACC of 8.1 per cent. The difference between EnergyAustralia's post tax nominal WACC of 8.1 per cent and TransGrid's 8.3 per cent arises from the fact that the tax shield afforded to EnergyAustralia from depreciation is proportionately smaller.

The Commission believes these cost of capital figures are towards the higher end of the feasible range. As with TransGrid, the figures include an upwards adjustment to take account of the risks associated with the newness of the regulatory regime.

Based on these components of the building block, the Commission has determined a return on capital for EnergyAustralia's parallel transmission assets which trends from $46.70 million in 1999/00 to $46.81 million in 2003/04.

As noted above, EnergyAustralia's operation of its parallel transmission assets are integrated into the remainder of its activities to a large extent — some operating costs could be separately identified while others could not. EnergyAustralia provided the Commission with operating costs allocated on both an activity basis and by asset proportions.

Given the degree of integration of operating and maintenance across the entire EnergyAustralia network, the Commission has not sought to separately identify the scope for efficiency improvements in these activities as they relate to the business's parallel transmission network. The Commission has therefore used the same efficiency factor for the parallel network that IPART has used for EnergyAustralia's distribution

network. That is, the Commission anticipates that EnergyAustralia will be able to achieve real reductions in operating expenditures of one per cent per annum over the course of the regulatory period.

Based on the various elements of the Commission's building block approach, the Commission has derived a revenue allowance for EnergyAustralia's parallel transmission network that grows from $73.10 million in 1999/00 to $78.12 million in 2003/04 (see Table 3 for further details). Consistent with the TransGrid decision, these numbers are expressed in CPI-X format where X is 1.43 per cent. As discussed above, the actual revenue stream from year to year will be altered to take into account the impact of the GST.

Table 3: MAR for EnergyAustralia's parallel transmission assets, 1999-00 to 2003-04 ($ million)

	1999/00	2000/01	2001/02	2002/03	2003/04
Return on capital	46.70	46.19	46.13	47.00	46.81
Return of capital	8.51	9.50	10.61	11.53	10.32
Operating expenses	16.45	16.71	16.98	17.25	17.53
Estimated taxes payable	2.88	2.94	2.84	3.20	8.04
Less value of franking credits	(1.44)	(1.47)	(1.42)	(1.60)	(4.02)
Unadjusted revenue allowance	73.10	73.87	75.14	77.38	78.68
Smoothed MAR	**73.10**	**74.33**	**75.57**	**76.83**	**78.12**

1. Introduction

The National Electricity Code (NEC) 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 NEC provides the framework for the National Electricity Market (the 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 NEC 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.

Under the NEC, the Commission will assume its responsibility on a progressive basis. This commenced with New South Wales (NSW) and the Australian Capital Territory (ACT) on 1 July 1999. All transmission networks within the NEM will come under the Commission's regulation by 31 December 2002.

This document sets out the Commission's decisions in respect of the revenue caps which commenced on 1 July 1999 and which now apply to the non-contestable elements of the NSW and ACT transmission networks, namely:

- the transmission assets owned and operated by TransGrid; and
- the parallel transmission assets owned and operated by EnergyAustralia.

Those revenue caps will apply for a period of five years ie. until 30 June 2004. It should be noted that NSW recently sought authorisation from the Commission for a derogation from the NEC which provides that:

- the Commission must complete its revenue decisions no later than 31 January 2000;
- until that time, the Commission is to administer the existing NSW Independent Pricing and Regulatory Tribunal (IPART) 1996 pricing determination; and
- the NSW transmission networks will be permitted to earn revenues in accordance with the IPART determination for the period between 1 July 1999 and 31 January 2000 and in accordance with the Commission's determination for the period 1 February 2000 to 30 June 2000 (that is, the Commission's revenue determination for the full 1999/00 financial year will be implemented for the last five months of that period on a pro-rata basis).

The Commission granted an interim authorisation to the derogation on 15 December 1999. The Commission expects to make a final determination on the authorisation in the near future.

The remainder of this chapter sets out:

- the regulatory framework according to which the Commission will determine the revenue caps to be applied to TransGrid and EnergyAustralia's transmission assets (section 1.1);
- the results of several recent regulatory reviews and their relationship to the Commission's decisions (section 1.2);
- the review and public consultation processes followed by the Commission in reaching its decisions (section 1.3); and
- an introductory overview of the two networks the subjects of the revenue caps (section 1.4).

1.1 The Commission's role as regulator of transmission revenues

1.1.1 Scope of the regulatory review

The NEC 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 NEC's 'objectives, principles, broad forms and mechanisms, and information disclosure requirements'.

For example, the NEC requires the Commission to set revenue caps for the non-contestable elements of TransGrid and EnergyAustralia's transmission assets; that is, to determine the maximum allowable revenues (MAR) which the owners of those assets can earn from the use of those 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 TransGrid and EnergyAustralia.

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 below. 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 TransGrid and EnergyAustralia's transmission revenues during the first regulatory revenue cap period between 1 July 1999 and 30 June 2004. 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 NEC 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, Version 1.0, 1998, clauses 6.2.2 – 6.2.5.

The Commission has, consistent with the proposals contained in its draft *Regulatory Principles*, adopted an accrual building block approach in the present revenue cap decisions. In TransGrid's case, this has been supplemented by financial indicator analysis. The Commission has not included financial indicator analysis in its decision for the revenue cap to be applied to EnergyAustralia's parallel transmission assets. Such analysis would have little meaning since the revenue cap relates to only a portion of the distributor's total business.

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

MAR = return on capital + return of capital + opex

= (WACC * WDV) + D + opex

where WACC = pre-tax weighted average cost of capital (this includes an allowed return for the firm's estimated tax liabilities);
WDV = written down (depreciated) value of the asset base;
D = depreciation allowance; and
opex = operating and maintenance expenditure.

In its post-tax form, the allowance for estimated tax liabilities is removed from the return on capital component and added as a separate building block (taxes). Thus:

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

Consistent with its position as outlined in the draft *Regulatory Principles*, the Commission has decided to adopt a post-tax nominal framework for the purposes of the final revenue cap decisions. The reasons for the move to this framework are set out in Chapter 2 and further elaborated in Attachment 2.

The NEC also requires the Commission to include in the revenue cap decisions 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 decisions. Under this arrangement, both revenue caps will increase each year in line with inflation but decrease by an efficiency driver determined by the Commission for each network.

The MAR formula will also take into account the Federal Government's new Goods and Services Tax (GST) and a pass through of the reasonable cost of any increase in third party liability insurance. The CPI-X adjustment mechanism will also incorporate the effects of the GST. These matters are detailed in Chapters 5 and 6.

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 TransGrid decision:

- Chapter 2 concerns the network's weighted average cost of capital (WACC);
- Chapter 3 sets out the Commission's assessment of TransGrid's opening asset base as at 1 July 1999, the commencement of the regulatory period;

- 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 outlines the likely impact of the determined revenue path on TransGrid's financial indicators; and
- Chapter 8 sets out the service standards appropriate to the level of the revenue cap determined.

Chapter 9 follows broadly the same structure in respect of the Commission's revenue cap decision to be applied to EnergyAustralia's parallel transmission assets.

1.2 Other recent regulatory decisions

Since the Commission released its draft revenue cap decision in May 1999, three other, closely related, decisions have been published:

- IPART published its determination as to the revenue caps and prices to be applied to the six NSW distribution businesses from 1 February 2000 until 30 June 1994;
- as mentioned above, the Commission released the draft *Regulatory Principles* setting out its proposed longer term approach to the regulation of transmission networks; and
- the National Electricity Code Administrator (NECA) published its final report on transmission and distribution network pricing — the report proposes changes to the way in which revenue caps are translated into network prices for generators and network customers.

Each of these reviews, and the ways in which they relate to the Commission's present decisions, are summarised below.

1.2.1 The IPART determination

IPART's 1996 revenue and pricing determination applicable to TransGrid and the NSW distribution networks (Determination no. 5.1) expired on 30 June 1999. As noted above, the derogation submitted by the NSW Government and given interim authorisation by the Commission provides that that decision will continue to have effect until 31 January 2000 while the Commission and IPART finalised their new determinations. As also noted, the Commission's revenue cap decisions for TransGrid and EnergyAustralia's transmission assets will apply retrospectively from 1 July 1999 but will, in effect, allow those networks to earn the returns anticipated in the earlier IPART determination for the first seven months of that period.

In December 1999, IPART released its determination as to the revenue caps and prices to apply to the NSW distribution businesses from 1 February 2000 until 30 June 1994. This determination followed an earlier report to the NSW Premier that contained IPART's preliminary views as to the transmission and distribution revenue caps and

distribution prices that should be applied to the State's electricity networks during the new regulatory period. The report to the Premier was made under section 12A of the Independent Pricing and Regulatory Tribunal Act 1992 and was published in June 1999. Both reports are available from IPART's website[1].

In summary, in respect of the revenue caps to be applied to the NSW distribution businesses from 1 February 2000, IPART's December 1999 determination involved:

- the use of a building block approach to determining base revenue outcomes, supplemented by an analysis of pricing outcomes and reference to a range of financial indicators;
- the use of glide-pathing on the base revenues and the CPI-X mechanism on the annual aggregate revenue requirement (AARR) that the networks are entitled to collect under the NEC;
- valuation of opening regulated assets on a basis which took into account the interests of stakeholders and which provided reasonable recognition of pre-existing government policies in respect of those assets — easements in existence at 1 July 1999 were valued by IPART on the basis of their historic cost;
- application of a pre-tax real WACC rate of return of 7.5 per cent to the rolled forward asset base —the indicated WACC was considered to be consistent with a post-tax nominal return on equity of between 11 and 12 per cent;
- capital expenditure projections assessed as prudent being rolled-in to the asset base in the year the expenditure was projected to take place;
- depreciation being assessed on a straight line basis and applied to effective asset lives;
- real reductions in operating and maintenance expenses of between 5 and 15 per cent over the regulatory period (before allowances for growth); and
- total smoothed base revenues ranging from $11m in 1999/00 to $13m in 2003/04 for Australian Inland Energy to $691m in 1999/00 to $752m in 2003/04 for EnergyAustralia[2].

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

Chapter 6 of the NEC envisages that the Commission will develop a set of guidelines outlining how it will exercise its power to regulate transmission network revenues in

---

1 IPART's website is located at http://www.ipart.nsw.gov.au.

2 The revenue stream noted for EnergyAustralia represents an allowance for the network's total non-contestable business activities; that is, its transmission and distribution services. The proportion of those figures that relates to distribution is the total less the amount determined by the Commission as the MAR applicable to EnergyAustralia's transmission services set out in this determination.

the NEM. As mentioned above, the proposed guidelines are contained in the draft *Regulatory Principles* document which the Commission released in May 1999.

In summary, the Commission proposes determining future transmission revenues according to the following principles:

- an accrual building block approach based on forecast costs of service;
- use of optimised depreciated replacement cost (ODRC) as a cap on the initial asset valuation 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*.

1.2.3 NECA's review of transmission and distribution pricing

As noted in the introduction, the Commission's role as regulator of transmission revenues is limited to determining the MAR for the naturally monopolistic elements of the network businesses.

Over a transitional period, it is proposed that TransGrid and EnergyAustralia will calculate their network prices in accordance with a New South Wales derogation. However, in the longer term, TransGrid and EnergyAustralia will perform their calculation of network prices in accordance with Part C of Chapter 6 of the NEC, 'Transmission pricing'. Each network will calculate its prices by allocating the MAR

for monopolistic activities and the annual revenue requirement for contestable activities across the assets used in the provision of transmission network services. The Commission's MAR determinations will therefore flow directly through to network prices and influence consumption and investment.

These rules were recently the subject of a review conducted by NECA. The report in respect of that review on was published on 8 July 1999. While NECA's recommendations will not affect the way in which the Commission will determine revenue caps, if implemented, they will affect the way in which the Transmission Use of System (TUoS) charges are calculated and levied by networks.

As the NEC presently stands, TUoS charges will comprise:

- the settlements surplus that accrues to the network as part of the inter-regional flows of electricity;
- payments made by generators as part of their connection agreements;
- customer payments allocated by using the cost reflective network pricing methodology and recovering half the cost of providing TUoS services (excluding common services);
- the remaining half of TUoS costs recovered from customers allocated using the postage stamp methodology; and
- common services (for example, power system security services which cannot reasonably be allocated on a location basis) also recovered on a postage stamp basis.

In its report, NECA favours drawing a distinction between existing (sunk) network assets and assets installed after 1 July 1999 (new investment). The costs of new investment would be shared between generators and customers (allocated on the basis of anticipated benefits). The sunk network costs would be paid for by customers. Network prices would be determined on the basis of forward looking long run marginal costs. These proposals would require the regulator to be involved not only in the determination of the revenue cap but also in the calculation of the network prices, currently the sole responsibility of the transmission network service providers/owners.

NECA has incorporated its recommended changes into a series of alterations to the NEC. The NEC changes are currently the subject of a Commission assessment for authorisation and variation of an access code.

1.3 Review processes and public consultation

At the time the preparatory work for this review commenced, IPART had also begun work in relation to its Section 12A report to the NSW Premier. A joint process for the early stages of the two inquiries was adopted to avoid unnecessary duplication and to simplify the means by which interested parties participated in consultations with both

authorities. This joint public process was outlined in a paper released in November 1998[3] and involved:

- the release of a number of issues papers by both regulators and the receipt of a number of submissions from stakeholders in respect of those papers;
- receipt of major submissions from both TransGrid and EnergyAustralia as well as further information regarding asset breakdowns, capital and operating expenditure forecasts, service standards information and financial results and modelling;
- the use of a number of consultants to review the information provided — copies of the consultants' reports may be obtained from the regulators; and
- IPART convening, and the Commission participating in, a number of 'round table' discussions with members of the Electricity Industry Consultation Group (EICG) — the EICG was formed to facilitate consultation with networks, government agencies, consumer and community groups, environmental groups and generators.

The Commission released its draft decision in May 1999. A pre-decision conference in respect of that draft decision was held in Sydney on 3 June 1999 and written submissions were also invited. A list of the submissions provided by stakeholders appears in Attachment A. All submissions, including those made at the pre-decision conference and provided in writing, have been taken into consideration by the Commission in making this final determination.

1.4 Overview of the TransGrid and EnergyAustralia networks

1.4.1 TransGrid

TransGrid operates over 11,000 kilometres of transmission circuits as well as 73 terminal stations in NSW and the ACT. The nominal operating voltages involved are 500 kilovolts (kV), 330 kV, 220 kV and 132 kV.

The TransGrid network serviced a system maximum demand of 11,097 megawatts sent out (MW) during the 1998/99 financial year. TransGrid has forecasted demand to grow at about 2.2 per cent per annum on a system wide basis with a limited need to accommodate generation expansion in the next few years because of the current supply surplus in NSW. It expects that the main drivers of network expansion will be regions of NSW with above average growth rates and interstate interconnections.

TransGrid was separated from Pacific Power in February 1995 in line with the requirements of the NSW Electricity Transmission Authority Act. TransGrid became a State owned corporation on 14 December 1998 under the Energy Services Corporation Act 1995.

Upon separation from Pacific Power, TransGrid's revenue was set at $385 million per annum and was initially recovered from NSW distributors and ACT Electricity and

---

[3] ACCC and IPART, *NSW Transmission Network Service Pricing and Revenue Regulation Reviews – Statement of Process*, November 1998. The paper is available on both the Commission and IPART's websites. The Commission's site is located at http://www.accc.gov.au.

Water (ACTEW) on its behalf by Pacific Power. The Government Pricing Tribunal (as IPART was then known) subsequently endorsed this level of revenue pending a more comprehensive review. In March 1996, IPART established a revenue path for TransGrid to apply for three years.

At present, the vast majority of TransGrid's activities and assets are associated with providing regulated transmission network services within the NEM. Prior to the commencement of the national market, TransGrid had the role of developing and administering the competitive wholesale electricity market in NSW. In accordance with the new national arrangements, this role has now ceased.

1.4.2 EnergyAustralia

EnergyAustralia's network extends from south of Sydney to north of Newcastle and into the upper Hunter Valley. Its network consists of over 1,500 km of 132 kV cables and 400 km of 66 kV cables categorised either as parts of EnergyAustralia's parallel or non-parallel transmission network with the remainder classified as part of the distribution network which also includes 2,200 km of 33 kV cables.

EnergyAustralia was formed in October 1995, by the consolidation of the Sydney Electricity and Orion Energy distribution businesses, and was corporatised on 1 March 1996. Since that time EnergyAustralia has been regulated by IPART as an integrated distribution and retail business. However, certain aspects of EnergyAustralia's network meet the NEC test of a transmission network and are to be regulated separately.

EnergyAustralia is Australia's largest electricity retailer supplying 1.3 million customers (around 20 per cent of the national market), both within its franchise area and to contestable customers throughout the national market. At present, its network activities generate three quarters of its earnings, 65 per cent of its operating costs and represent 90 per cent of its total assets.

EnergyAustralia, whilst still predominantly an electricity distribution and retail business, is expanding into other utility and non-utility services. Energy Australia's corporate vision seeks to expand the portfolio of services provided in order to become the leading multi-utility company in the Asia/Pacific region[4]. Recently this vision has resulted in the moves to expand into the retail gas market, and has begun providing financial services with the launch of the clearChoice program.

[4] EnergyAustralia, Annual Report 1998, p.02.

2. The cost of capital

2.1 Introduction

As stated in Section 1.1 above, the NEC requires that, in determining the revenue cap, the Commission must have regard to the weighted average cost of capital (WACC) applicable to the regulated network service. The WACC is a method commonly used in the financial community for determining the return expected on an asset base.

Schedule 6.1(1) of the NEC states that use of the WACC is designed to promote efficient resource allocation by ensuring that government-owned networks operate under the same financial conditions as networks which are privately owned. That is, it will ensure the returns in the public sector are equal to the opportunity cost of capital in the private sector. This accords with the COAG Competition Principles Agreement that sought achievement of competitive neutrality as one of its objectives.[5]

Given the capital intensive nature of an electricity network business, the return on capital component can account for around one third of the MAR. Therefore relatively small changes to the WACC can have a significant impact on the total revenue requirement and, ultimately, end user prices.

The importance of the WACC 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 have adequate incentive to augment facilities when appropriate. Conversely, if the WACC is too high, the network will have a strong incentive to over-capitalise ('gold plate') thus affording it the opportunity to derive monopoly rents.

The WACC can be determined on either a post- or pre-tax and a real or nominal basis. The formulae for expressing the WACC in post-tax nominal and pre-tax real terms are as follows:

$$\text{Post-tax nominal WACC} = \frac{R_e (1 - T_e)}{1 - T_e(1 - \gamma)} \times \frac{E}{V} + R_d (1-T_d) \times \frac{D}{V}$$

$$\text{Pre-tax real WACC} = \frac{R_e}{1 - T_e(1 - \gamma)} \times \frac{E}{V} + R_d \times \frac{D}{V}$$

where:
- R_e = required rate of return on equity (after company tax);
- R_d = pre tax weighted average cost of debt;
- T_e = effective tax rate on equity;
- T_d = effective tax rate on debt;
- γ = value of franking credits or dividend imputation factor;
- E = market value of equity;
- D = market value of debt; and
- V = market value of debt plus equity.

---

[5] The Competition Principles Agreement executed by the Commonwealth, State and Territory Governments on 11 April 1995.

The WACC may also be determined and applied on an industry basis or it can be determined for each electricity network and benchmarked against other such networks or similar businesses. The NEC (clauses 6.2.2(b)(2) and 6.2.4(c)(4)) appears to allow for the WACC to be determined on either an industry wide or individual network basis.

There are a number of difficulties associated with assessing the cost of capital within the regulatory context. Those issues received considerable attention as part of the Commission's assessment of the Victorian Gas Access Arrangements during 1998. In the draft of the present revenue cap decision the Commission emphasised that it would continue to develop its approach to the issues throughout this review and the *Regulatory Principles* process. The Commission released a draft of the *Regulatory Principles* in May 1999 and a key proposal of the future regulatory strategy set out in that document involved the adoption of a post-tax nominal framework for determining network revenue caps.

Given the additional time provided by the NSW derogations, the Commission has decided to recast its decision from a pre-tax real framework into a post-tax nominal framework for the purposes of this final decision. The Commission considers that there are strong theoretical and practical reasons for doing so. Those reasons are set out in Section 2.10 below and discussed in further detail in Attachment B. In making this change, the Commission taken into account submissions received both on the draft revenue cap and draft *Regulatory Principles* decisions.

2.2 The capital asset pricing model

Clause 6.2.2 of the NEC 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 NEC states there 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, in practice the capital asset pricing model (CAPM) remains the most widely accepted.

The CAPM calculates the required return given the opportunity cost of investing in the market, the market's 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.

While CAPM has widespread support, it has been criticised for its shortcomings such as the detailed level of information required to enable a more rigorous application of the model. However, the Commission notes that alternative models are also subject to these problems.

Despite its drawbacks, CAPM commands widespread respect in overseas regulatory jurisdictions, particularly the UK, and is used almost universally in both corporate finance and regulatory applications in Australian because of its relative simplicity in defining and measuring risk factors. Its supporters argue there is extensive empirical evidence that the model provides a reasonably accurate estimate of returns required by the market. The use of the CAPM was supported at an early stage by EnergyAustralia[6] and by TransGrid which stated that:

> the traditional CAPM model is preferred. TransGrid would require the results of considerable research into alternative explicit risk models to be made available and comprehensively reviewed before it would be prepared to move away from current NEC proposals.[7]

The only parties that commented specifically on the use of CAPM in response to the Commission's draft decision were Texas Utilities Australia (Texas Utilities) and its consultant, Associate Professor Stephen Gray. Texas Utilities summarised their joint view as follows:

> The single-period CAPM (which fails to consider the multi-period nature of investments) considers only one dimension – correlation with aggregate wealth. Based on this dimension alone, it appears as though utilities would require a very low return.
>
> In the multi-period CAPM, required returns depend on the correlation of an asset's returns with aggregate wealth *and* the investment opportunity set. Utilities exhibit low correlation with aggregate wealth and hence a relatively low return would be justified on this dimension. However, utilities also exhibit low correlation with the investment opportunity set and hence a relatively high return would be justified on this dimension. Taking both dimensions into consideration yields the conclusion that a moderate return would be required by investors in utilities.
>
> This provides an explanation for why utilities might insist on projects meeting hurdle rates that are higher than the CAPM would predict. This is consistent with the single-period CAPM predicting a return that is too low, because it fails to consider the consequences of the multi-period nature of the investments.

The Commission notes that no other party supported the introduction of a multi-period CAPM, either in response to the draft revenue cap decision or to the draft *Regulatory Principles*. The proponents of the multi-period version do not explain how the periods should be determined in the context of the current regulatory cap nor submit what an appropriate rate of return derived from the multi-period model would be. Further, as noted above, the single period CAPM has considerable regulatory precedent both domestically and internationally.

---

6 Energy Australia, 'Submission to the ACCC on the Statement of Regulatory Intent Issues Paper,' July 1998, p. 22.

7 TransGrid, 'Submission to the ACCC on the Statement of Regulatory Intent,' August 1998, p. 5.

Accordingly, the Commission will continue to use the single-period CAPM for the present decision but invites further comment on the multi-period model within the context of the ongoing *Regulatory Principles* debate.

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 statutory tax rate (T) from which effective tax rates on debt (T_d) and equity (T_e) can be derived for individual firms.

The Commission's assessment of each of these measures is discussed below.

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.

NSW Treasury however initially submitted:

> that the risk free rate should be based on some form of averaging mechanism rather than a single current rate. The use of a single current rate would likely to lead to more volatility in tariffs from one regulatory period to the next… Given the historical perspective, we would propose an average over the last 12 months to smooth future potential rate shocks.[8]

TransGrid also stated that:

> the 10 year (nominal) observable rate on Commonwealth bonds should be used based on the short term historical average e.g. the 3 months prior to the reset date in question. (Page 6).

Commission's draft conclusion

In its draft decision, the Commission recognised the benefit of using a current measure of the risk free interest rate since the value was readily quantifiable with the resulting

---

[8] NSW Treasury, 'Submission to the ACCC on the Statement of Regulatory Intent Issues Paper,' September 1998, p. 19.

revenue requirements and network prices tending to reflect current costs. However, while agreeing that it may be theoretically correct to use the 'on the day' rate under CAPM, the Commission also acknowledged that use of such rates introduced a degree of short term variability.

The Commission therefore considered it appropriate to adopt an average over a relatively short period to smooth daily variations. It was noted that this method had also been used by IPART in its regulatory decisions[9].

Issues arising from the draft conclusion

TransGrid's submission moved away from its original position which had advocated the use of a three month moving average. TransGrid submitted that the use of the on the day rate was both theoretically and practically correct rate since, on any particular day, investors make their decisions based on the rate at that time and not on what returns might have been available in prior months. The network submitted that all the parameters should be estimated at a common date as close as practicable to the revenue determination date for consistency. Support for this view was provided by Professor Bob Officer and Texas Utilities.

Powerlink argued that a more stable approach was required for setting revenues and suggested that an average over the last several years would be appropriate. GPU PowerNet suggested that forecast movements in bond rates over the regulatory period ought to be used.

Commission considerations and conclusion

After taking into consideration the points raised above, the Commission remains of the view that it is appropriate to use a short-term average of the bond rate. This affords a degree of protection from transient volatility while ensuring that the rate selected is closely reflective of the most recent market activity. Accordingly, the Commission has used a 40-day moving average of bond rates in assessing TransGrid's revenue cap. This is consistent with the position adopted by the Commission in the draft *Regulatory Principles* and recent Adelaide airport and draft Central West Pipelines access arrangement decisions.

2.3.2 Selection of the bond rate

The NEC indicates that the yield to maturity on long term ten year Commonwealth Government bonds should normally be used as the proxy for the risk free rate (Commonwealth bonds are the least risky debt instrument traded in the market). The ten year bond yield gives a better picture of the true market rate than less liquid bonds such as 15 or 20 year bonds.

This approach was supported by NSW Treasury which submitted that:

> normal market practice is to use the 10 year bond rate as a proxy for the risk free rate. This is consistent with the method of funding normally adopted by investors in transmissions assets and is also the benchmark used for risk premium observations. (Page 19)

---

[9] For example, see IPART, 'Final Decision — Access Arrangement Great Southern Energy Gas Networks Pty Ltd', March 1999, p 168 and the 'Regulation of NSW Electricity Distribution Networks Determination', December 1999.

It has also been argued that use of the ten year bond yield also maintains consistency between the term of the risk free interest rate used in the WACC formula and the term used for deriving estimates of the MRP. The practice in Australia in the past has been to measure estimates of the MRP relative to the ten year bond rate.

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 (as stated above, in this context initially five years). This approach was adopted in the Commission's assessment of the Adelaide airports multi-user terminal proposal and was discussed in the May 1999 draft *Regulatory Principles*.

The ten year bond rate was been used by the Commission in its assessment of Telstra's Access Undertaking,[10] by the Victorian Office of the Regulator-General (ORG) in its assessment of the Victorian Gas Access Arrangements and IPART in its assessment of Great Southern Energy's Access Arrangements[11] and recent NSW electricity distribution networks revenue determination.

TransGrid initially submitted that the yield on ten year Commonwealth bonds should be used and that the appropriate risk free rate was 6.0 per cent.[12] At the time, NSW Treasury proposed a risk free rate of between 6.0 to 6.6 per cent.[13]

Commission's draft conclusion

In order to maintain consistency with contemporary regulatory decisions, in particular the approach which, at the time, it believed IPART was likely to adopt for the NSW distributors, the Commission used the ten year bond rate as the most appropriate benchmark for estimating the nominal risk free interest rate in the draft decision. The nominal risk free rate determined was 5.50 per cent and the real risk free rate was determined by deflating that rate using an estimate for inflation taken from a feasible range (see below).

National Economic Research Associates (NERA), in a consultancy engaged by the Commission for the purpose of this inquiry, concurred with the Commission's approach to determining the nominal risk free rate.[14]

---

10 All references to the cost of capital in relation to Telstra's Access Undertaking refer to ACCC, 'Assessment of Telstra's Undertaking for PSTN Originating and Terminating Access — Cost of Capital', January 1999.

11 ORG, 'Access Arrangement — Multinet, Westar, Stratus, Final Decision,' October 1998, pp. 200-201 and IPART, op. cit., pp. 167-168.

12 All TransGrid WACC parameters quoted from IPART, The Rate of Return for Electricity Distribution Networks — Discussion Paper, November 1998, p. 26.

13 All NSW Treasury WACC parameters are quoted from NSW Treasury, 'Submission to the ACCC on the Statement of Regulatory Intent Issues Paper,' September 1998, p. 7.

14 NERA, 'A Critique of the WACC Parameters Proposed for TransGrid,' March 1999, pp. 4–5.

Issues arising from the draft conclusion

TransGrid accepted the used of the ten year Commonwealth Government bond rate as the basis for determining the nominal risk free rate. As noted above, TransGrid submitted that the on the day rate should be used and indicated that, as at the date of its submission, the rate was 6.25 per cent.

NSW Treasury supported the use of the ten year bond rate, proposing a nominal bond rate at the date of its submission (July 1999) of 5.7 per cent based on a real risk free rate of 3.7 per cent and an inflation assumption of 2 per cent.

Texas Utilities and Powerlink supported the use of the 10 year rate. Powerlink submitted that, based on an average of historic numbers over a three year period, 6.3per cent would be the appropriate rate.

EnergyAustralia submitted that:

- it was inappropriate to determine the real risk free rate by using a "subjective assumption of expected inflation";
- the real risk free rate was more directly observed by reference to yields on indexed bonds which, in combination with the nominal Commonwealth bond rate yield, would provide an accurate forecast of inflation; and
- the nominal rate used by the Commission was 30 to 40 basis points below those determined by the Reserve Bank of Australia as at April 1999.

GPU PowerNet encouraged the Commission to consider the use of both forecast real and nominal rates over the next regulatory (five) year period.

Commission considerations and conclusion

The Commission agrees with EnergyAustralia that it would be more appropriate to determine the real risk free rate using indexed bonds. This approach has also been used by IPART in its recent NSW electricity distribution business revenue determination.

Like IPART, the Commission has used ten year bonds to determine the risk free rate for the purposes of this final decision. Doing so maintains consistency with the NSW regulator and also accords with the broad indication contained in the NEC. However, the Commission, as noted in the discussion contained in the draft *Regulatory Principles* and the recent Adelaide airports determination, considers that there may be merit in moving to the use of five year bonds for assessing the risk free rate parameter applicable to regulated networks in the future. The Commission's further consideration of this matter will be addressed in the final *Regulatory Principles* document.

Also consistent with the decisions noted and EnergyAustralia's submission, the Commission considers that the ten year Commonwealth Treasury nominal bond rate should be used with the indexed bond rate to determine the expected inflation rate (see below). From examination of the most recent information available, the Commission agrees that both the nominal and risk free rates have risen since the time of the draft decision. The most recent 40 day moving average assessed by the Commission for the former is 6.81 per cent and the latter is 3.55 per cent.

2.4 Expected inflation rate

While the expected inflation rate is not an explicit parameter in the WACC calculation, it is an inherent aspect of the risk free rate and cost of debt parameters. As noted above, an indication of the inflation rate anticipated by financial markets is provided by the difference in normal bond rates and inflation-indexed bonds for the same term. The difference at the time of the draft decision was around 1.5 per cent. This compared with the Commonwealth Treasury's inflation forecasts at the time of 2.0 to 2.5 per cent. TransGrid originally proposed an expected inflation rate of 2.0 per cent, while NSW Treasury's forecast concurred with the Commonwealth's estimate.

In the Commission's assessment of the Victorian Gas Access Arrangements, some commentators expressed concern about a possible price shock at the subsequent regulatory review if there was an inter-period upward movement in interest rates. NSW Treasury also raised this point in their initial submission to the Commission. The presumption underlying this concern is that interest rates applying at the next regulatory review will be higher.

Commission's draft conclusion

In the draft decision, the Commission indicated that a comparison of bond rates and Treasury forecasts suggested that the appropriate expected inflation rate lay in the region of 1.5 to 2.5 per cent. The Commission chose to use the mid point of this range, that is, an expected inflation rate of 2.0 per cent.

In relation to the possibility of rate shocks resulting from increases in interest rates, the Commission also noted that consumer representative groups at the public seminar on the Victorian Gas Access Arrangements were unanimous in expressing a preference for lower prices now, accepting the risk of a price rise in the future as a result of real interest rate movements.[15]

Issues arising from the draft conclusion

In its July 1999 submission, TransGrid noted that rates had moved upwards since the time of the draft decision. It pointed out that, as at 25 June 1999, the rate derived from the difference between the ten year Commonwealth bond rate and ten year capital indexed bond rate was 2.735 per cent and that this suggested that the minimum inflation rate that should be adopted by the Commission in its final decision was 2.5 per cent.

As noted, EnergyAustralia considered that the inflation forecast should be derived directly from the difference between the Commonwealth bond rate and the capital indexed bond rate and not from more speculative claims by stakeholders.

Commission considerations and conclusion

The Commission agrees that it is more appropriate to derive the expected inflation parameter from the Commonwealth and indexed bond rates. The use of the combination of the two rates is consistent with the approach used by IPART in its

---

[15] ORG, op. cit., p. 200.

recent reports on electricity revenues and prices and also with the Commission's own draft *Regulatory Principles*.

The bond rate information outlined above suggests that the current expected inflation rate is 3.15 per cent This rate will be used by the Commission in the present decision.

2.5 Cost of debt

The cost of debt varies depending on the degree of gearing of a business, its credit rating and the term of the debt.

Calculation of the WACC with reference to TransGrid's actual cost of debt may result in inefficient finance sourcing being rewarded because a high WACC would flow through to the revenue cap while efficient sourcing may be penalised by a relatively lower revenue cap since the WACC will be lower.

In recent years, Eastern Energy and National Power, credit rated A- and A respectively, have raised long term loans indicating debt raisings of an average margin of 70 basis points (0.7 per cent) above government bond yields.[16] However, since that time it has been suggested there is evidence that margins may have increased. For example, a number of submissions to the Commission's draft Victorian Gas Access Arrangements decision argued for a higher margin in the range of 100 to 155 basis points (1.0 to 1.55 per cent). Macquarie Risk Advisory Services, in a consultancy commissioned by the ORG, suggested a margin of 100 to 125 points. A higher margin will increase the WACC slightly, although not materially.

NSW Treasury originally proposed a cost of debt for TransGrid of 100 basis points above the nominal risk free rate of return, that is a cost of debt between 7.0 to 7.6 per cent. TransGrid did not propose a cost of debt in its submissions to the Commission prior to the draft decision.

Commission's draft conclusion

The Commission considered that a WACC based on an industry-wide cost of debt would act as a deterrent against inefficient debt financing as the revenue cap will contain a return on capital allowance consistent with the return requirements of efficient finance sources.

The Commission was of the view that a benchmarked industry wide cost of debt in the region of 80 to 120 basis points above the nominal risk free rate of return would be appropriate for TransGrid. Consistent with the requirements of the NEC, the Commission considered it important to ensure that the estimated WACC, including the cost of debt, was sufficiently high to enable TransGrid to raise the capital it requires to fund the regulated business. Accordingly, for the purposes of the draft decision, the Commission chose to use a margin of 100 basis points (which accorded with the proposal of NSW Treasury) above its assumption of the nominal risk free interest rate

[16] IPART, The Rate of Return for Electricity Distribution Networks – Discussion Paper, November 1998, p. 23.

(5.50 per cent), the mid point of the range. This equated to a nominal cost of debt of 6.50 per cent.

Issues arising from the draft conclusion

In response to the draft decision, TransGrid submitted a statement contained in the July 1999 edition of the Standard & Poor's Australia and New Zealand Credit Stats that:

> The trend to high gearing, combined with increased competition and greater regulatory pressure, will result in continuing pressure on credit quality.

That report noted that 10 of the 14 rated entries had had a rating change or a credit watch since January 1998. TransGrid claimed that this supported its view that the range quoted by the Commission in its draft decision was too low and that 120 points would be more appropriate. NSW Treasury supported the use of a range in the order of 100 to 120 basis points.

Commission's considerations and conclusion

While the general cost of financing has been at the lower end of the rate cycle (although now increasing), it is rational to expect there to be indications of a move to higher levels of gearing. Nevertheless, the Commission has seen little direct evidence to suggest that the increase in the average levels of gearing amongst electricity networks in recent times would have affected their debt premiums materially. Accordingly, the Commission has used 100 basis points in determining the WACC for TransGrid, noting that this figure is consistent with the margin used by the Commission in its draft Central West Pipelines decision and by IPART in its NSW electricity distribution network revenue and prices determination.

2.6 The market risk premium

The MRP is the premium above the risk free rate of return that investors expect to earn on a well diversified portfolio, namely:

$MRP = R_m - R_f$

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 analysis of historic returns to equity to estimate the MRP.

Under a classical tax system, the conventionally accepted value has in the past been six to seven per cent. Professor Kevin Davis suggested this may not be in keeping with the forward looking CAPM framework favoured by the Commission.[17] For example, the more stable inflationary environment that has prevailed in recent times may suggest that the premium is now less than has been observed than in earlier years. Also following the introduction of dividend imputation, the size of the premium, as

[17] ACCC, 'Access Arrangement by Transmission Pipelines Australia, Final Decision,' October 1998, p. 53.

measured in the conventional way, would have fallen to reflect the additional value of franking credits.

In a consultancy for the Commission prior to the release of the draft decision, Professor Davis derived figures based on a dividend growth model. Using this approach he estimated a range of between 4.5-7.0 per cent for the MRP. Professor Bob Officer also provided support for the view that the MRP may be trending downward[18].

Evidence from outside Australia obtained at the time also suggested that the premium had fallen as investors' perception of risk changed. For example, OFWAT, the UK water regulator, had asserted that the MRP was in the region of 2.75 to 3.75 percent. Against this, there is an argument that, by its very nature, the observed premium for the risk is inherently volatile and that using a long term average is the only valid approach.

TransGrid originally proposed an MRP of 6.0 per cent while NSW Treasury proposed an MRP in the range of 6.5 to 7.0 per cent.

Commission's draft conclusion

On the basis of the evidence referred to above, the Commission concluded that the MRP lay in the region of 5.0 to 7.0 per cent. For the purposes of its draft decision, the Commission chose the mid point of this range, that is an MRP of 6.0 per cent, noting that the figure was consistent with TransGrid's proposal and that used in the Commission's assessment of the Victorian Gas access arrangements.

Issues arising from the draft conclusion

In its submission in response to the draft decision, TransGrid agreed that the market risk premium used by the Commission is appropriate.

NSW Treasury cautioned against the appropriateness of interpreting short-term trends in the MRP given its volatility and the long-term historical period over which it is normally observed. NSW Treasury accepted the Commission's draft decision of 6 per cent was reasonable while noting that this was at the bottom of the 6 to 7 per cent range which it considered feasible.

Professor Gray, consultant for Texas Utilities, submitted that the MRP was conventionally derived from the All Ordinaries Index but suggested that it would in fact be more appropriate to use the All Industrials Index as the relevant proxy. This view was based on a statistical analysis which suggested that the All Ordinaries Index is not the tangency portfolio which generates the MRP from the set of possible investments but instead lies within the opportunity set.

In its submission to the Victorian Office of the Regulator-General in relation to the revenue methodology to be used with respect to the Victorian electricity distributors beyond 2000, Texas Utilities supported Professor Gray's concerning the question as to whether the All Ordinaries Index was the most appropriate basis for deriving the MRP. It also submitted that the MRP should be determined using historic information.

---

[18] ibid., p. 53.

Commission's considerations and conclusion

The implication to be drawn from Professor Gray's working paper is that the MRP, if drawn from the All Industrials Index, would be higher than that derived from the All Ordinaries Index. Analysis of what the premium should be was not included in the submission.

However, since the release of the Commission's draft decision in May 1999, several further assessments of the range within which the MRP may lie have become available. For example, IPART in its recent December 1999 report noted:

- a study by Tro Kortian (1998) that estimated the equity premium to be around three per cent in late 1998, an estimate that would remain appropriate during an environment of relatively low inflation;
- a discussion paper by Dr Gary Twite suggesting a long-term historical average between 4.1 and 8.1 per cent;
- measures by Ibbotson Associates of the US and Australian MRPs of 6.4 per cent and 3.4 per cent respectively (1999); and
- estimates by Cornell Hirshleifer and James (1997) and Goyal and Welsh (1999) that the MRP in the US was 5.6 per cent and 5 per cent respectively.

IPART concluded that the MRP lay within a range of 5 to 6 per cent and this is consistent with the range assessed by the Commission in its recent Adelaide airports and draft Central West Pipelines determinations.

The Commission notes the comments of Professor Davis, echoed in the draft *Regulatory Principles*, that the MRP is a very poorly defined parameter, that different ways to evaluate the MRP are evolving and that debate in this area continues to be rigorous. In this regard the Commission accepts that elements of judgement must be inevitable. Taking the evidence referred to above into consideration, the Commission has, on balance, used a premium of 6 per cent for this final decision.

In light of the diversity of views discussed above, the Commission cautions against the use of this particular assessment as a precedent for future regulatory decisions since those decisions will naturally rely on the evidence regarding the premium available at the time.

2.7 Value of franking credits (dividend imputation factor)

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

NSW Treasury originally proposed a γ in the range of 30 to 40 per cent. TransGrid suggested franking credits have no explicit value in the market place and requested the Commission to consider a γ equal to zero (page 30).

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

> 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[19]) in the calculation of the network owner's pre tax WACC.

Assigning a γ of this magnitude to TransGrid, 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 NEC).

This view is also supported by NERA (page 10):

> In our view, the objectives or regulatory stability and competitive neutrality provide a strong argument for assuming that TransGrid is owned by a typical average investor in Australian equities, rather than to take account of the specific tax circumstances or the current owner of the business. This principle warrants uniform application across all regulated utilities.

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.

The deferral of tax which occurs due to accelerated depreciation (and which, in the context of this industry, will continue to occur for some time) also defers imputation credits giving them diminished value in the hands of shareholders. Using the adjustments to γ recommended by Professor Davis, for less than a 100 per cent pay-out ratio and a stylised model of cash flows, the discounted value of credits relative to their nominal value suggests a modified range for γ of between 40 and 70 per cent based on dividend drop-off studies.[20] [21] In view of the fact there are likely to be other tax concessions not considered in that analysis, a reduced range of 40 and 60 per cent may arguably more appropriate.

Commission's draft conclusion

Based on the views noted above, the Commission accepted in its draft decision that a γ in the region of 40 to 60 per cent was appropriate. The Commission chose the mid point of 50 per cent as the γ that should be applied to TransGrid.

---

[19] A study conducted by the Melbourne University Graduate School of Management, which found that franking credits are, on average, valued by equity investors at approximately 50 cents in the dollar.

[20] Studies that examine the difference between pre- and post-dividend share prices.

[21] ACCC, op cit., p.55.

Issues arising from the draft conclusion

While noting that it does not accept any implicit assumption that, were TransGrid to be privatised, it would remain 100 per cent Australian owned, TransGrid accepts that the Commission's approach in selecting the mid-point of 50 per cent is appropriate.

To the extent that an allowance for franking credits is made in the cost of capital, Professor Officer considered that, without further information about the value of those credits to the company being available, the average rate of approximately 50 per cent was acceptable.

NSW Treasury accepted that the use of a gamma of 50 per cent was also relatively common but noted that the dividend drop-off studies referred to had not taken into account the possibility of deferred usage of franking credits due to lack of distributable profits or expected reductions in franking credit liquidity. It submitted that a range of 30 to 50 per cent was appropriate.

Professor Gray suggests that, if we observe that a significant proportion of a firm's shares are held by non-resident taxpayers, we should safely conclude that foreign investment is required to finance the firm's projects and that the firm's WACC must equal to the entire required return of shareholders. This would be equivalent to setting γ to zero.

Texas Utilities submitted that, in addition to the reasons provided by Professor Gray, the γ should be set at zero because setting the parameter at a value other than zero would mean making an assumption about the tax profile of the business.

Commission's considerations and conclusion

The Commission notes that TransGrid, a State owned corporation, is wholly domestically owned but that a number of the Victorian electricity networks are financed at least partly by foreign investment.

However, in response to Professor Gray's suggestion, the Commission also notes that this evidence alone is not sufficient to support a conclusion that, for even a partly foreign-owned network, foreign capital was required to finance the firm's projects. Even assuming that the Victorian example demonstrates that a significant proportion of foreign ownership is required, this does not prove that the benchmark γ should be set at zero as it does not rule out overseas investors obtaining foreign tax advantages not available to local investors.

The likelihood that such foreign tax benefits exist suggests that the γ in fact lies above zero. Given the practical difficulty of properly excluding the impact of those benefits and the evidence noted above which suggests that the value of the γ to domestic investors may in fact lie in a higher part of the range, on balance the Commission has decided to use the 50 per cent for the γ proposed in the draft decision. This conclusion is consistent with the comments made in the draft *Regulatory Principles* that the Commission should not infer the particular origins of investors in the regulated entity. It is also within the range recently identified by IPART as being appropriate to the NSW electricity distribution businesses and that used by the Commission in its recent Adelaide airport and Central West Pipeline decisions.

Finally, the Commission notes that it is possible that changes proposed as the result of the Ralph Business Taxation review may have implications for the value attributable to imputation credits in the longer term future. The Commission will take the impact of any such changes into consideration in future revenue cap assessments as appropriate evidence becomes available.

2.8 Gearing

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

The NEC (Schedule 6.1, 5.5.1) 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.

TransGrid initially proposed the proportion of debt funding applicable to its business should be 67 per cent, while NSW Treasury proposed 60 per cent. Acquisition statistics for the Victorian electricity distributors indicated gearing levels ranging from 55 to 78 per cent.[22]

Commission's draft conclusion

The Commission noted the WACC should be invariant over a broad range of gearing possibilities, particularly under a dividend imputation system. It therefore considered that the gearing assumption used for the calculation of the WACC was less likely to be a critical one.

The Commission also considered that the nature of regulation meant that it could be argued that the regulated entity faced relatively lower risk hence the gearing of the firm could be correspondingly higher without adverse credit consequences.

Based on comparable entities, the Commission concluded that the gearing assumption for TransGrid of 60 per cent as proposed by NSW Treasury was appropriate.

Issues arising from the draft conclusion

While TransGrid did not accept the Commission's statement that the WACC should be invariant over a range of gearing possibilities, it accepted that the 60 per cent gearing assumption proposed is reasonable.

Commission considerations and conclusion

While noting TransGrid's submission, the Commission remains of the view that an assumption of 60 per cent gearing remains appropriate. This is the same ratio adopted by IPART in its recent NSW distribution network revenue determination.

---

[22] IPART, op. cit., p. 7.

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).

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.

An alternative approach is to benchmark against overseas proxies, for example, from the US and UK. However, this approach is also not straightforward as the differences in market and country risks must be taken into account. For example, a UK equity beta of 0.8 is relative to the UK stock market while an Australian equity beta of 0.8 is relative to the Australian stock market. Further, the composition of the UK stock market is different to the composition of the Australian stock market. This means the risk of an electricity network business may be closer to the market mean in an industrial economy. In a higher risk more resource-based economy like Australia, these businesses could appear lower risk in comparison to the market mean.

At the time of the Commission's draft decision, the average asset beta of US electricity utilities was 0.45[23], while National Grid Group, the UK electricity transmission company had an asset beta of 0.46[24]. Transpower, the New Zealand electricity transmission company had an asset beta of 0.25.[25]

A further consideration is the form of regulation applied to the firm as this may also affect beta risk. For example, incentive regulation regimes imply a higher level of risk than rate of return regulation. Hence, the regulatory environment also needs to be considered when assessing the comparability of particular companies.

---

[23] IPART, op. cit., p. 30.
[24] OFFER, Review of Public Electricity Suppliers 1998 – 2000, Consultation Paper, May 1999, p. 86.
[25] Transpower, 1997/98 Annual Report.

TransGrid did not originally suggest an asset beta but proposed an equity beta of 0.8. The network also raised the issue of explicitly accounting for the risk of asset stranding prior to the Commission's draft decision.

NSW Treasury proposed an asset beta in the range of 0.45 to 0.50 and an equity beta of between 1.0 to 1.1. It also submitted that:

> it would seem to us as this stage that the regulator should be cognisant of the general market dynamics and refrain from being overly aggressive in such subjective areas as equity beta. On such a basis going down below 0.9 may establish a cost of capital that is below market requirements. The consequences of this could be significant for consumers in the long run. (Page 21)

Commission's draft conclusion

In the draft decision, the Commission believed it was difficult to justify a high asset beta for TransGrid as electricity transmission utilities are relatively low risk and subject to a regulated income set within a relatively well-defined framework. In particular, the revenue cap framework used means that TransGrid's maximum revenues were afforded protection from reductions arising from any general economic downturn.

The Commission considered the stranded asset risk faced by TransGrid to be relatively low as it is a mature network with a large established customer base. This view was supported by comments made by Sinclair Knight Merz (SKM) in its review of the opening asset base conducted for the Commission as part of this inquiry (see Chapter 3 below). Moreover, the Commission considered that such a level of stranded asset risk could, to a significant extent, be managed through TransGrid's approach to its network planning processes.

As subsequently discussed in the draft *Regulatory Principles*, the Commission stated that where stranded asset risk could be shown to be significant, it may be more appropriately addressed through the depreciation allowance (for example, by allowing a shorter economic asset life or an accelerated rate of depreciation). The Commission noted that this view was supported by Professor Davis who stated:

> There is no obvious argument which would suggest adjusting a beta estimate for stranded asset risk. Indeed that would be completely at variance with the notion of beta as a measure of systematic risk. The complications associated with stranded assets should be dealt with in the decision framework put in place for determination of the asset base and return of capital (depreciation).[26]

The Commission noted evidence that the asset beta of the infrastructure and utilities industry group listed on the ASX was 0.46, while the telecommunications group asset beta listed on the ASX was 0.41[27]. The Commission determined that an asset beta in the range of 0.40 to 0.50 was appropriate for estimating the WACC for TransGrid. For the purposes of the draft decision, it concluded that 0.45, the midpoint of that range, was appropriate. Using the Monkhouse formula and a debt beta, consistent with that used in the Victorian Gas decision, of 0.12, this converted to an equity beta of approximately 0.93.

---

[26] Davis, Professor Kevin, Comments on the Cost of Capital, A report prepared for the ACCC, April 1999, p. 4. This position was also supported by the ORG, see pp. 209–210 of the ORG, Access Arrangement — Multinet, Westar, Stratus, Final Decision, October 1998 and NERA, 'A Critique of the WACC Parameters Proposed for TransGrid,' March 1999, p. 13.

[27] IPART, op. cit., p. 32.

Issues arising from the draft conclusion

Following the release of the Commission's draft decision, one of the main issues to emerge was the appropriate treatment of asymmetric risk within the CAPM framework. At the pre decision conference TransGrid claimed that the stranded asset risk for electricity is higher than for gas and that the return on capital allowed should therefore be higher than that determined in the Victorian Gas Access arrangements. In response, the Energy Users Group noted that during that review, the Victorian Treasury's Energy Projects Division repeatedly contended that gas faced more stranded asset risk than electricity.

TransGrid submitted that the Commission's ability under the NEC to write down (optimise) assets prior to their being fully depreciated was an asymmetric risk not taken into consideration by the Commission in its draft decision. TransGrid claimed that it faced a significant risk of optimisation within the foreseeable future because:

- 20 per cent of the load it served related to four major customers who might close down within that timeframe;
- local generation and demand side management would become more significant as disincentives for the use of traditionally-generated power increased *eg* greenhouse gas emission taxes; and
- the increasing demand for such options is complemented by the emergence of new technologies which make those options cheaper, more feasible and competitive *eg* the Duke Energy gas pipeline from Bass Strait to Sydney.

TransGrid agreed in principle with Professor Davis' view that there was no argument for adjusting a beta estimate for this type of risk. Instead, it submitted that, in order to remove the asymmetry, the Commission should either:

- explicitly commit to never writing-down an asset before it was fully depreciated;
- follow its approach in the Victorian Gas Access decision and adjust the derived cost of capital; or
- allow TransGrid to depreciate assets exposed to stranding risk at an accelerated rate.

TransGrid submitted that, were the Commission to adopt the second or third option, the appropriate size of the adjustment or accelerated depreciation rate should correlate with the probability and timing of the future writedowns noted above. TransGrid also claimed that the following were also asymmetric risks for which the Commission should compensate the network:

- TransGrid's costs of managing its increasing exposure to third party liability;
- the network's expected costs of meeting higher service standards imposed by the Commission (including the cost of meeting any penalties the Commission proposed to make payable were the network to fail to meet those standards);

- the costs of changes in the business environment such as unexpected increases in operating expenditure; and

- the uncertainty of the present regulatory regime concerning whether changes in the above costs would be passed through or compensated for in other ways.

The network claimed that these risks should, consistent with Professor Davis' view, be compensated for through an increase in the cash flows or, in its own opinion, via an upwards adjustment to the WACC.

TransGrid also argued that the Commission's draft decision did not explain why it believed the asset betas of 0.46 and 0.41 for the ASX-listed infrastructure and utilities group and the telecommunications industry groups should have a bearing on the determination of TransGrid's WACC nor how the equity beta was in fact derived.

EnergyAustralia agreed with TransGrid's position that an adjustment to the WACC was appropriate to compensate for any regulatory uncertainty but that accelerated depreciation was more appropriate for specific instances of asset stranding. It also criticised the Commission for failing to provide details of the assessed asset beta and submitted that the debt beta, which combines with the asset beta to produce the equity beta, was derived in a manner which was inconsistent with the formula used in the Victorian Gas Access Decision.

NSW Treasury agreed that asymmetric risks should be captured in expense allowances if possible. It submitted that an appropriate range for TransGrid's asset beta lay between 0.45 and 0.55 reflecting the need to give weight to the risks associated with the relative newness of the regulatory regime, the presence of major insurance risks and risks associated with future revaluations of the capital base.

NorthPower submitted that the return set out in the draft decision was "still predisposed towards the lower end of the appropriate ranges for most parameters" but that of greater concern was the "abundance of risk introduced by the [presently high level of] uncertainty of the regulatory environment".

GPU PowerNet submitted that simply allowing accelerated depreciation for stranded asset risk would not fully compensate the network and that there would remain a residual risk which should be counterbalanced through an adjustment to the WACC.

Professor Officer argued that, where there were asymmetric risks such as stranding risks, the preferable solution would be to adjust the expected cash flows for the effect of the redundancy rather than reflect this in the WACC. Texas Utilities proposed that allowing an increase in the WACC was appropriate "for all but the most extreme of [unexpected] events [should the existence of bias be established]".

Professor Gray agreed with the draft decision that overseas proxies for industry betas should be treated with caution. He stated that use of benchmark betas derived from US and UK markets should be scaled upwards when converting to Australian equivalents as the Australian Stock Exchange was relatively overweight in favour of resource stocks compared with the markets of those countries.

Texas Utilities submitted that the use of foreign proxies for the betas of the local gas and electricity industries must take into account the differing characteristics of the foreign and local markets for those products.

The Public Interest Advocacy Centre (PIAC) submitted that the Commission had correctly recognised that the risk of the electricity industry was lower than that of the gas industry. It criticised the Commission for failing to provide some indication of the additional risk which it considered regulation brought to the industry but did not quantify the value itself.

Commission considerations

A number of interested parties made submissions on asymmetric risk. The concept is summarised in a William H Mercer and Allen Consulting Group (Mercer and Allen) report provided by TransGrid in its submission.

> When the effect of all [atypical/unexpected] events are taken into account, the expected value of the relevant cost or revenue item will differ from that used when determining regulatory [revenues] if the negative effects outweigh the positive effects or vice versa. If, when taken across all cost and revenue items, either the negative or positive effects are dominant, then the expected return on assets for the regulated entity would be lower or higher than the regulatory return on assets…
>
> Where either the negative or positive asymmetric risks dominate when all cost and revenue items are considered, an adjustment to the regulatory cash-flows of the regulated entity would be required in order for that entity to receive its cost of capital on average. This adjustment could be made either through an addition or subtraction from the benchmark revenue requirement or by setting the regulatory rate of return an increment above or below the estimated WACC for the project.

Thus, the Commission is being asked to conclude that there is a material overall negative effect on the likelihood that TransGrid will be able to earn the maximum revenues contemplated. If so, then the Commission is warranted in compensating for the asymmetric risk either by making an allowance in the firm's cash flows or by adjusting the WACC.

As noted above, TransGrid and others identified several specific elements of potential risk in support of this claim. Each of these elements is discussed below.

Third party liability insurance risk

This risk stems from the likelihood that the third party liability potential faced by TransGrid will be higher than in the past. Despite the evidence included in TransGrid's submission that attempts to forecast the potential impact of the increase, the network provided no material quantifying the actual likelihood of the liability occurring or the cost to it of being protected from that risk. As it noted in the draft decision, while the Commission accepts that making such an assessment is very difficult, it is in no better position than TransGrid in this regard.

However, the Commission is prepared, for the purposes of this decision, to treat the cost of an increase in managing the risk of third party liability over historic levels as a pass-through charge. The Commission will not allow TransGrid complete discretion in the extent of the pass-through amount. Prior to incorporating any pass-through charge, TransGrid 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 and, moreover, must not include the cost of self-insurance already provided by TransGrid's projected capital expenditure program.

By allowing the cost as a pass-through in addition to the stipulated revenue stream, the Commission considers that it has acted to remove any materiality associated with that risk. The Commission also expects that, by the time of the next regulatory reset, the appropriate projected cost of future insurance will be better able to be quantified and that, as such, it will no longer be treated as a pass through but will be subject to review by the Commission for reasonableness and efficiency as a normal part of operating expenditure.

Service standards risk

The second risk was claimed to be attributable to the costs of meeting possible future higher levels of service standards including any regulatory penalty for failure to meet those standards. In this regard, the Commission notes that, as part of this review, it had requested TransGrid to specify its service standards for the coming regulatory period. Thus, the service standards proposed in the decision are largely reflections of existing standards. The Commission notes that no party to the decision submitted that the proposed service standards would result in a measurable increase in costs.

In addition, the NEC provides scope for parties to negotiate higher levels of service than are specified in the NEC. The NEC also provides scope for those negotiations to cover payment arrangements for TransGrid so that the network can be compensated for providing higher levels of service. The negotiated premium would not be included as part of TransGrid's regulated revenues.

On the basis that this decision has been based on service standards submitted by TransGrid and that negotiation arrangements exist for any premium level of service, the Commission can see no basis for concluding that TransGrid faces a material negative risk with respect to service standards. Finally, the Commission does not consider the fact that a penalty may apply for failure to meet those standards as an element of risk which would justify an increase in revenues as this would remove the incentive the penalty provides for attempting to meet them in the first place.

Business risk

The third element suggested concerns the business risk faced by TransGrid. This risk was characterised in different ways in the submissions received by the Commission.

In the report annexed to TransGrid's post-draft decision submission, Mercer and Allen described asymmetric business risk as the risk that the regulatory regime would have the effect of preventing upside and downside differences between actual and forecast revenues from being recovered equally. It is the risk that, in a net sense, revenues are more likely to be under-recovered than over-recovered. The same risk was said to apply to the recovery of expenses. For example, it was suggested that:

- if demand turned out to be larger than expected, TransGrid should be able to recover the cost of the additional capital expenditure required to meet the load at the next regulatory reset as part of the ex-post adjustment process (see Chapter 4 for a description of how this process will operate); but

- if demand were less than forecast, TransGrid was likely to be unable to recover the cost of any capital expenditure already built for the purpose of meeting the expected load as the Commission would optimise those assets out of the regulated base.

The Commission notes that Mercer and Allen were unable to assess whether this risk was material. This was partly because that assessment depended on the way in which the regulator would carry out its forecasting and the making of any ex-post adjustments, a matter which has yet to take place under the present new regime. The question of whether the network should be compensated for the lack of certainty owing to the relative 'newness' of the regulatory framework is discussed below. However, without further information, the Commission is unable to conclude that the risk described by the consultants is material in the present context. In fact, Mercer and Allen noted that it was possible that the regulated entity had an information advantage over the regulator that would allow the entity to make better forecasts than the Commission which may serve to offset any such risk.

The asymmetric business risk may also be characterised as changes in the business environment faced by TransGrid during the regulatory period. The Commission's view is that any risk of substantial changes in the business environment should already be factored into the overall market risk or into the relevant industry benchmarked betas. It could be argued that this may be less true with respect to the inflationary environment. However, the Commission notes that the possibility (indeed, likelihood) of changes in the actual inflation rate will be managed under the CPI-X regime which will be applied to the network's revenues during the period, thus removing the materiality of any risk to the service provider.

Finally, TransGrid, in its submission, claimed that there would be an asymmetric business risk where the maximum revenues allowed failed to match the expected costs of managing third party liability plus the expected costs of meeting mandatory service standards. As noted above, the Commission is satisfied that the two types of costs referred to are either already provided for in the revenue cap or that explicit provision has been made to include them as required. Consequently, the Commission does not accept TransGrid's argument that it faces a material asymmetric risk in this regard.

Asset stranding risk

A number of interested parties submitted that TransGrid faced a material negative asymmetric risk due to the Commission's ability to writedown (optimise) assets in the regulatory base prior to the network ensuring the return of capital invested. This risk was said to arise from several possible sources of asset stranding, namely:

- the network's vulnerability to the loss of large customers which are the sole or predominant users of particular transmission assets;

- changes in market incentives leading to changes in the patterns of use of network assets;

- technological change which may lead to a reduction in the cost of constructing replacement assets or changes in the patterns of use of network assets; and

- changes in the location of generation or load leading to changes in the patterns of use of network assets.

Examples were provided in relation to each.

As TransGrid noted, the risk of asset writedowns 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.

It is worth noting that, were the Commission to make a decision to optimise, it would rely on evidence provided by parties qualified to make judgements in respect of the timing and quantum of such effects.

Thus, the Commission is of the view that the industry-derived betas used to determine the regulatory asset beta will 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.

Indeed, the Commission has proposed in its draft *Regulatory Principles* that, in future regulatory periods, it will allow regulated entities to adjust their depreciation allowances in response to identifiable asset stranding risks when those risks are properly assessed as being material. The Commission recognises that this proposal was not available to TransGrid in the current review as the regulatory regime has yet to be completely finalised. This can be characterised as an aspect of the relative 'newness' of the regulatory regime and, as it has done previously in the Victorian Gas and draft Central West Pipelines decisions, the Commission accepts that this newness represents an increase in risk for which the regulated networks should be compensated.

Rather than adjusting the beta, the Commission will take this risk into account by using a post-tax nominal return on equity and post-tax nominal WACC towards the higher end of the feasible range developed from the cost of capital parameters. It should be noted that the Commission expects that compensation for this risk noted will only be applicable while the *Regulatory Principles* remains unfinalised.

The remaining question is whether the Commission is satisfied that the adjustment allowed is sufficient to compensate the network for any material overall negative asymmetric risk established, attributable either to asset stranding alone or as a combination of the other risk elements discussed above. The Commission notes two points in this regard.

First, as set out in the extract from the Mercer and Allen report, for the Commission to make a determination that a material overall negative asymmetric risk exists requires it to be satisfied that, after weighing *all* the applicable risks, the effect of the negative risks outweighs that of the positive risks.

In this context, while those interested parties who made submissions on this issue identified a number of elements of risk:

- those elements were almost entirely claimed to be negative — few positive (and therefore offsetting) risks were identified; and

- despite the fact that material was provided which outlined the dollar consequences associated with several of the risk elements, the *probabilities of those risks actually occurring* during the regulatory period were generally not quantified — this was particularly the case in relation to the few positive risks that were identified[28].

Thus, while the Commission accepts that TransGrid possibly faces, for example, stranding risk arising from the loss of specific large customers or technological advances, this does not demonstrate that such risks exceeds the positive risks that, for example, growth in demand from different customers will be larger than expected or that savings will arise due to operating expenses being less than projected[29].

The Commission, in making its own assessment of stranding risk, has taken into account both the information contained in the submissions of interested parties and other material. The latter includes the views of Sinclair Knight Merz, the Commission's asset base valuation consultant (see Chapter 3, below), and IPART in its June 1999 Report to the NSW Premier. Both suggested that the risk to TransGrid of stranding occurring during the current regulatory period appeared to be low. Again, however, even if it were accepted that the element of risk related to asset stranding was material, that alone is not sufficient to answer the key question regarding whether the overall asymmetric risk faced by TransGrid is materially negative, particularly where the Commission is satisfied that the other three major risk elements identified are not material.

The second point the Commission notes is that, while TransGrid argued that it faced asset stranding (and other) risks, it did not provide material which quantified the size of the associated adjustment to the revenue cap.

EnergyAustralia referred in its submission to the possible scope of compensation with respect to asset stranding that may occur in the Sydney CBD due to improving technology and the development of cogeneration plants within the near future. A range of between minus one and two per cent adjustment to the WACC was claimed. However, the Commission notes that this claim relates to two risk elements only, not the net overall risk in respect of which any compensation must be based and, further:

- the adjustments referred to are also based on a pre-tax real WACC higher than that associated with the cost of capital outcomes set out in this final decision;

---

[28] In its submission on the draft decision, EnergyAustralia did provide one example which attempted to quantify the positive risk that could result from the writeup of easement values during the regulatory period. That example is discussed below. However, as noted, the Commission is not satisfied that a reliable conclusion is drawn.

[29]

- the cogeneration example is based on the construction of up to twice the amount of capacity for that source of supply identified by NERA in a report commissioned by EnergyAustralia and TransGrid concerning the merits of proceeding with the Sydney CBD capex project (see Chapter 4, below); and

- in both examples, the logic for deriving, and evidence supporting, the probabilities used was not provided.

The only other suggestion on this point was made by NERA in a consultancy performed for the Commission during the initial stages of this inquiry that an upwards adjustment of one per cent to the WACC *might* be reasonable. However, that suggestion was made in the absence of knowledge concerning TransGrid's specific circumstances. Thus, the Commission views the amount suggested as being speculative.

On balance, and in the absence of any further information, the Commission is satisfied that the adjustment it has made is appropriate in the circumstances.

TransGrid also questioned the relevance of the betas of the industry groups referred to in the Commission's draft decision. The Commission considers that they are the asset betas for the groups of firms which it believes to be most comparable to that of an Australian electricity transmission network. Use of the asset betas derived with respect to other industry groups would not seem to provide a better comparison and, in this regard, the Commission notes that TransGrid has not:

- explained why the use of the groups which the Commission has relied upon would in fact be inappropriate; nor

- indicated which types of firms TransGrid considers provides a stronger basis of comparison which justified its estimate of the asset beta being revised upwards to 0.55 as claimed.

Consequently, in the absence of better suggestions, the Commission has benchmarked TransGrid's asset betas to the betas of the nominated industry groups.

Recent market evidence suggests that the average gearing level for stocks listed within the utilities and infrastructure group have risen whereas average gearing levels within the telecommunications group have fallen. This has resulted in a lower equity beta for the former group (0.35) and a significantly higher beta for the latter (0.55), widening the potential feasible range for TransGrid.

Examination of the current average gearing levels suggests that the telecommunications group now provides a less suitable proxy for TransGrid in comparison with the infrastructure and utilities group. Thus, the Commission concludes that the appropriate feasible range for TransGrid's asset beta lies within 0.35 to 0.50.

The Commission has also, since the draft decision, reassessed the feasible range for the debt beta. The draft decision used the equation set out in the Commission's Victorian Gas access decision to determine the debt beta. This was:

$$\beta_a = (R_d - R_f - 0.50)/(R_m - R_f)$$

This equation included the refinement by the Commission of bank costs accounting for approximately 50 points of the debt margin. Such costs need to be deducted from the debt margin to determine the debt beta.

Since the release of the draft decision, the Commission has, as noted in its draft Central West Pipelines decision, undertaken further work in this area. As a result, the Commission now considers that the feasible range for the debt beta lies between 0.00 and 0.06.

This reflects the Commission's view that, although corporatised, debt holders would, in practice, attribute a lower non-performance risk to TransGrid owing to the fact that it remains a State owned entity responsible for the delivery of a fundamental business and household input. If taken alone, the impact of the adjustment would be a small increase in the feasible range for the equity beta commensurate with the slight increase in risk borne by equity holders.

Conclusion

Using the revised feasible ranges established for the asset and debt betas, the Commission estimates a feasible range for the equity beta of approximately 0.78 to 1.25[30]. This range is broadly consistent with the one determined by IPART in its December 1999 NSW distribution network revenue determination. For the purposes of this final decision, the Commission has taken the midpoint of this range which returns an equity beta of approximately one.

2.10 Post-tax nominal vs pre-tax real WACC

Introduction

The Commission used a pre-tax real framework to determine TransGrid's draft revenue cap. This involved assuming that TransGrid would pay taxes during the regulatory period at the statutory tax rate, not the network's (lower) effective rate. It also used two different methods to generate a feasible range for the pre-tax real WACC when converting from the post-tax nominal return on equity figure established by the CAPM.

As noted at the outset of this Chapter, the Commission considers that there are a number of difficulties associated with these, and other elements, of the pre-tax real framework in the regulatory context. This section discusses the relative merits of the pre-tax real and post-tax nominal frameworks and sets out the Commission's reasons for recasting the final revenue cap decision in post-tax nominal terms.

The two frameworks compared

One of the key outcomes required by the NEC of the revenue regulatory regime administered by the Commission is to ensure that the regulated business receives a fair and reasonable return on efficient investment after providing for the costs of efficient

---

[30] The Commission recognises there are a number of formulae used to convert an asset beta to an equity beta. As discussed in the Commission's assessment of the Victorian Gas Access Arrangements, the Commission considers the Monkhouse formula the most appropriate. The Monkhouse formula is $\beta_e = \beta_a + (\beta_a - \beta_d)(1-(r_d/(1+r_d))(1-\gamma)T_e)\ D/E$.

operating expenses. This is, in effect, the view summarised in the basic accrual building block MAR equation referred to in Chapter 1:

MAR = Return on capital + return of capital + operating costs

Focussing on the required rate of return element, this relationship can be recast as:

Return on equity = MAR – return of debt - return of capital – operating costs.

That is, after efficient costs have been met, it is the return on equity, the reward for the use of investor funds, which is the key driver for determining the final revenue stream.

As noted above, the return on equity for a particular type of investment can be assessed in several ways, most commonly the CAPM. The CAPM expresses the return on equity in post-tax terms since it is the net returns available to the investor which allows them to properly compare investment choices.

In this sense, once the appropriate rate of return for the particular type of investment and efficient debt and operating costs have been determined, the dependent variable becomes the WACC. That is, the WACC is the rate which, when applied to the rolled-forward asset base and combined with the other costs of service, guarantees the appropriate return on equity.

So, once the benchmark return on equity is known (say, through the CAPM) and the other costs of service have been assessed, the key question becomes whether or not the chosen WACC formula ensures that the benchmark return on equity is achieved. As discussed at the start of this Chapter, the WACC can be derived in two different primary ways: pre-tax or post-tax[31] (usually, pre-tax real or post-tax nominal).

As the Commission has discussed in the context of its 1998 Victorian Gas Access decision and draft *Regulatory Principles*, neither version is without its drawbacks. However, as will be discussed below, the Commission considers that a framework based upon the post-tax nominal WACC has a significant advantage which makes it more suitable for use in the regulatory context.

The first problem with the pre-tax real WACC is that the two formulae advocated for deriving the rate from the cost of capital parameters (the "forward' conversion which adjusts for tax first and inflation second and the "reverse" conversion which adjusts for inflation first and tax second) have been shown to be significantly in error in ensuring the correct return on equity. This is because both formulae are sensitive to the tax and inflation rate variables. As described in Attachment B to this paper, this problem can be overcome by modelling the expected cash-flows and taxes over the life cycle of the asset portfolio. This has been the practice in the Commission's final Victorian Gas Access, Adelaide Airports and draft Central West pipeline decisions.

However, the second and more significant problem relates to the ability of the pre-tax WACC to ensure the correct return on equity over multiple regulatory periods. Under

---

[31] Whether the WACC is expressed in real or nominal terms is less important as the two can be shown to be equivalent – see the Supplementary Papers to the Commission's draft *Regulatory Principles.*

the pre-tax approach, the WACC combines an allowance for expected taxes payable with the estimated post-tax return on equity. While this may be adequate for modelling revenues over a single period, it is unsuitable for assessing revenues over multiple periods where the business regime (principally taxes and inflation) is more likely to change.

The reason is that, in practical terms, it becomes extremely difficult to adjust the returns already allowed to take into account the new business regime. This means that the regulated entity will either over- or under-recover its costs with the result that the owner will not be guaranteed his or her benchmarked return on equity from period to period. An alternative description of the problem is that the pre-tax real approach is flawed insofar as it depends upon the accurate prediction of a single long-term effective tax rate for the business.

Use of the post-tax nominal framework avoids this problem as the return on equity and estimated taxes payable allowances are separated in the MAR formula. As the entity moves from period to period, the tax payable building block can adjust for changes in the business regime. In other words, the post-tax nominal approach only requires the prediction of effective tax rates over the short term. The impact of changes in those effective rates can be adjusted for at each regulatory reset. Thus, the return on equity is kept consistently accurate from regulatory period to period over the life of the assets[32].

The post-tax approach has received consistent academic support. For example, at the WACC forum held by the Commission during its assessment of the Victorian Gas Access arrangements, Professors Officer, Hathaway and Davis argued that capturing short-term estimates of taxes in the cashflows (the post-tax approach) was preferable to the uncertain outcomes generated under the pre-tax real framework[33].

One problem faced by the post-tax nominal framework is that, by ensuring that the regulatory revenue stream allows for the correct taxes from period to period, the profile of that revenue stream will initially be low when the firm takes advantage of tax concessions such as accelerated depreciation for its assets but becomes much higher as those concessions expire and tax liabilities become payable. This has been described as the "S-bend" problem in previous debate.

This feature of the post-tax nominal framework gives rise to a regulatory problem in that customers of the network at different points in time will pay different charges for the same set of assets as the result of the assets' changing tax position. This is an intergenerational equity issue. It raises the concern that different economic signals are being generated to users merely due to a timing issue which does not reflect the underlying value of the service provided.

Before addressing the solution to this problem, several matters should be noted, namely that:

---

[32] Although the actual returns may vary due to the operation of the efficiency incentive mechanism applied in this case.

[33] See the Commission's final Victorian Gas Access arrangements decision, p 57.

- the problem is usually described in the context of the ownership of a new (or newly acquired) single asset — in the context of many businesses, and particularly so in the cases of TransGrid and EnergyAustralia, it is not a single asset under consideration but a portfolio of many assets of different vintages and in different conditions. In such circumstances, the S-bend is far less pronounced; and

- the recent Ralph Business Taxation review recommended that the accelerated tax depreciation provisions should largely be abolished, effectively as part of a trade-off required to justify the lowering of the company statutory tax rate to 30 per cent. The legislation proposed as the result of the Ralph review has not yet been passed into law. However, the Commission expects that the two key recommendations noted are very likely to do so in the next twelve months. Thus, the S-bend issue will become gradually less important over time as the accelerated depreciation arrangements for existing assets wind out of the asset base.

With this perspective in mind, the solution may now be addressed. This is to "normalise" the basic post-tax nominal framework revenue stream so that it follows a more level profile over time. This is a device with considerable regulatory precedent in the United States and the mechanics of its implementation are more fully described in Attachment B to this decision.

The important matter to bear in mind is that, in adjusting the revenue stream, the framework's benefits of ensuring an accurate long-term return on equity and accurate period to period tax assessments are preserved — what occurs is simply that the timing of the revenues is adjusted to "flatten" the S-bend. The effective result is the pre-tax real revenue profile that would be achieved were an accurate effective long term tax rate able to be calculated.

This normalised post-tax revenue profile shares one disadvantage with the pre-tax profile in that the regulated entity may earn an additional return on any early allowance (prepayment) for taxes contained in the revenue stream. This can be overcome by ensuring that the rolled-forward asset base is adjusted to isolate the value of those prepayments until they are required to be used to meet the entity's tax liabilities as they fall due. The way this can be done is set out in detail in Attachment B to this decision[34].

In summary, the Commission considers that the post-tax nominal framework (when adjusted for the normalisation and tax prepayments issues noted above) produces an outcome which meets the economic and regulatory objectives set out in Chapter 6 of the NEC considerably more effectively than the pre-tax real framework.

Issues raised in submissions made to the Commission

As noted at the outset of this Chapter, the Commission received a number of submissions in response to its draft *Regulatory Principles* released in May 1999. A

---

[34] There is a further issue related to the adoption of a post-tax framework. Where the regulator has moved from using a pre-tax real framework and an assumption that taxes payable will equal those assessed at the statutory tax rate to a post-tax framework based on the regulated entity's effective tax rate, there is a question whether the revenue stream determined under the new framework should be adjusted for the possibly overgenerous allowances for tax provided under the previous framework. This matter is further discussed in Attachment B.

number of those submissions commented adversely on the Commission's proposal to implement a post-tax nominal framework in the future. Interested parties raised two principal objections[35], namely that:

- to determine revenues on the basis of the individual tax circumstances of the entity under consideration would give rise to regulatory gaming problems as the entity would seek to derive excessive returns from the Commission by manipulating its tax position; and

- applying the post-tax nominal framework with the adjustments just discussed would materially increase the regulatory burden on those entities and therefore reduce the scope of the benefits to customers which the NEC seeks to achieve — in particular, the work entailed in making adjustments to compensate for the differing tax positions within an asset portfolio as diverse as TransGrid's would be unjustifiably complicated and time-consuming.

While these concerns are pertinent to the debate, the Commission believes that they are outweighed by the benefits of moving to the post-tax framework.

The Commission acknowledges that it is possible that entities would seek to game the regulator. Nevertheless, the tax profiles of the capital assets under discussion (that is, electricity network assets) are relatively easy to discern and involve a limited number of complications. Such assets generate by far the larger portion of the network's total expenses. Thus, the potential for manipulation is more than likely to be relatively small and also more easily traced to non-capital item considerations. This being said, as part of its further development of the *Regulatory Principles*, the Commission is willing to accept more detailed information from networks as to the scope of the manipulation which they foresee as possible in the future.

In relation to the second objection raised, while the Commission accepts that the framework outlined involves a slightly steeper learning curve, there is no reason in practice why the regime should not be as transparent as the pre-tax real framework applied in the past, even if the calculations required are more involved. In addition, while those calculations may be more complicated, this does not mean that they are materially more time-consuming to perform or that the gathering of the extra information would pose any difficulty for the regulated entity given that those businesses should keep such information for other purposes (for example, the Australian Taxation Office or equivalent) in any event.

The Commission does note the desirability of ensuring that the regulated businesses and stakeholders are adequately informed about the mechanics of the revenue modelling under the new framework and that they are informed as to the exact types of information required to undertake the revenue cap reviews in the future. The Commission intends to continue to facilitate this within the *Regulatory Principles* process already underway.

---

[35] Both objections were also raised by NSW Treasury in its response to the Commissions' discussion in the draft revenue cap decision concerning the desirability of moving to the use of an effective tax rate.

Conclusion

For the reasons outlined above, the Commission remains of the view expressed in its draft *Regulatory Principles* released in May 1999 that the use of a post-tax nominal framework for the purpose of determining electricity network revenue caps is likely to have considerable advantages over the continued use of the pre-tax real framework used in past decisions.

Accordingly, the Commission has adopted the post-tax nominal framework for the purposes of the present final decision.

2.11 Treatment of taxation

Much of the discussion above concerned the Commission's proposed treatment of taxation for the purposes of this decision. That is, that the adoption of a post-tax nominal framework allows the use of an effective tax rate in determining the regulated revenue stream.

In the draft decision, the Commission applied the existing statutory company tax rate of 36 per cent. This was within the context of difficulties in determining a satisfactorily accurate long-term effective tax rate as part of the pre-tax real framework being used at the time. The capital intensive nature of electricity utilities has historically meant that the effective tax rate for such networks has been less than the statutory tax rate[36]. As noted above, the Commission considers that moving to the post-tax nominal framework which uses that effective tax rate has the potential to generate more appropriate and cost-reflective revenue cap outcomes.

Under either the pre- or post-tax framework, the statutory company tax rate remains a necessary input into the determination of the cost of capital. As discussed, since the release of the Commission's draft decision, the Government has adopted the outcomes suggested in the recent Ralph Business Taxation review. One of the key recommendations of that review was the lowering of the company tax rate from 36 to 30 per cent over a short period. Despite the fact that the relevant legislation has yet to formally pass into law, the Commission considers that there is little doubt that this aspect of the Ralph review will be implemented. Accordingly, the Commission has used the new rates for the purposes of its final decision.

2.12 Cost of capital - a feasible range and conclusion

Feasible range

As indicated above, the Commission has revised its consideration of the cost of capital parameters in light of the additional information and submissions by interested parties made since the draft decision.

---

[36] According to IPART calculations, the average effective tax rate paid by the NSW distributors amounted to 25 per cent in 1996/97 (see IPART, The Rate of Return for Electricity Distribution Networks, Discussion Paper, November 1998, p. 9).

From those parameters, the Commission has estimated a plausible range for the post-tax nominal return on equity of between 11.50 and 14.25 per cent. This is illustrated in Table 2.1 below.

Table 2.1 Comparison of recent cost of capital parameters and Commission revised estimates

Parameter	ACCC draft decision (May 1999)	Revised TransGrid submission (June 1999)	NSW Treas. submission (July 1999)	IPART determination (Dec 1999)	ACCC final decision (Jan 2000)
Real risk free rate (%)	3.12	3.66	3.70	3.52	3.55
Expected inflation rate (%)	2.00	2.50	2.00	3.00	3.15
Nominal risk free rate (%)	5.50	6.25	5.80	6.62	6.81
Cost of debt margin (%)	1.00	1.20	1.00	0.80 – 1.00	1.00
Nominal pre-tax cost of debt (%)	6.50	7.45	6.80	7.40 – 7.60	7.81
Market risk premium (%)	6.00	6.00	6.00	5.00 – 6.00	6.00
Corporate tax rate (%)	36.00	36.00	36.00	30.00 – 36.00	30.00
Usage of imputation credits (%)	50.00	50.00	30.00 – 50.00	30.00 – 50.00	50.00
Debt proportion (%)	60.00	60.00	60.00	60.00	60.00
Equity proportion (%)	40.00	40.00	40.00	40.00	40.00
Debt beta	0.12	0.12	0.08	0.06	0.00 – 0.06
Asset beta	0.45	0.55	0.45 – 0.55	0.35 – 0.50	0.35 – 0.50
Equity beta	0.93	1.18	0.99 – 1.23	0.78 – 1.14	0.78 – 1.25
Post-tax nominal return on equity	11.00 – 11.50	13.35	11.70 – 13.20	11.00 – 12.00	11.50 – 14.25

Within that range, and consistently with the discussion above**, the Commission has adopted a post-tax nominal return on equity of 13.85 per cent** for the purposes of this final decision. This translates to a post-tax nominal WACC of 8.3 per cent as noted below.

Table 2.2: Derived WACC parameters

WACC	ACCC draft decision (May 1999)	Revised TransGrid submission (June 1999)	NSW Treas. submission (July 1999)	IPART determination (Dec 1999)	ACCC final decision (Jan 2000)
Post-tax nominal WACC	**5.88**	**7.00**	**6.30 – 7.10**	**6.60 – 7.50**	**8.30**
Post-tax real WACC	3.81	4.40	--	--	5.00
Pre-tax nominal WACC (ACCC based on cashflow modelling)	9.00 – 9.50	11.00	--	--	10.75
Pre-tax real WACC (ACCC based on cashflow modelling)	7.25	>8.30	7.60 – 8.90	7.00 – 8.00	7.35

Concluding comments

The Commission has given careful consideration to the value that should be assigned to TransGrid given the nature of its business and current financial circumstances. Thus, the parameter values used are those considered most appropriate. Generally, these fall in the middle of a range based on the information available.

The Commission has compared the cost of capital it has assessed as being appropriate for TransGrid with the rates of return submitted by TransGrid and NSW Treasury during the inquiry as well as with the rate assessed by IPART in December 1999 in relation to the NSW distribution networks.

For the reasons set out earlier in this Chapter, the Commission considers that the most appropriate way to draw these comparisons is by reference to the post-tax nominal return on equity and associated post-tax nominal WACC. As noted, the Commission decided that a nominal post-tax return on equity of 13.85 per cent and, consequently, a post-tax nominal WACC of 8.3 per cent is appropriate for determining TransGrid's revenue cap.

In order to place this decision within the context of the earlier draft decision, these post-tax nominal figures convert to an equivalent pre-tax real WACC of 7.35 per cent which is slightly higher than the 7.25 per cent set out in the draft decision reached in May 1999. The main reason for the change is that, since that time, financial conditions have altered resulting in an upwards movement in real interest rates. In addition, the Commission has made an adjustment in the cost of capital reflecting the risk of the relative 'newness' of the regulatory regime.

Nevertheless, it is important to note that, in pre-tax real terms, the 7.35 per cent WACC assessed by the Commission is lower than the pre-tax real figure of 8.3 per cent and range of 7.6 to 8.9 per cent submitted by TransGrid and NSW Treasury respectively in their post-draft submissions. It also lies towards the lower end of the 7 to 8 per cent feasible range assessed by IPART in its December 1999 determination. The principal reasons for these differences are that the Commission has factored into to its modelling the lower company tax rate foreshadowed in the Ralph business taxation review and has also been able to determine an effective tax rate for TransGrid.

The effect of recent movements in financial markets is compounded when comparing the assessed cost of capital in nominal terms. Thus, the Commission's nominal post tax return on equity of 13.85 per cent lies above the 10.8 per cent originally proposed by TransGrid and the 13.35 per cent suggested by the network in its submission on the Commission's draft decision. The Commission's figure also lies above the range of 11.7 to 13.2 per cent proposed by NSW Treasury in its post-draft submission. The comparisons largely reflect the fact that those submissions were made at times when both real and nominal interest rates were materially lower than they are at present.

For the same reasons, the Commission's 8.3 per cent post tax nominal WACC lies above the 7 per cent suggested by TransGrid and range of 6.3 to 7.1 per cent submitted by NSW Treasury in their submission on the draft decision. It is also why the nominal post tax return on equity figure and post-tax nominal WACC determined by the

Commission sit slightly above the ranges of between 11 and 12 per cent and 6.6 and 7.5 per cent assessed by IPART in its December 1999 determination.

The post-tax nominal figures lie below the 15.61 per cent return on equity and 7.59 per cent WACC figures assessed in the Commission's recent final Adelaide airports multi-user integrated terminal access decision. The difference in this case is mainly attributable to the higher risk considered to be associated with the airport infrastructure proposal.

As discussed in Chapter 7 below, the Commission is of the view that this rate of return will contribute to a revenue stream which should be acceptable to the overall financial position of the business until the next regulatory review in five years.

Finally, while there may be some scope to alleviate problems should circumstances differ significantly from expectations, in general, any such adjustments will be limited to the provisions identified in the NEC. While these provisions may appear restrictive, they equally also protect the network in that the regulator can not capriciously make rulings to claw back gains made by the network should events prove more favourable than expected.

3. Opening asset base

3.1 Introduction

As mentioned in Chapter 1, the revenue cap set by the Commission for TransGrid commences from 1 July 1999 although it will take effect from 1 February 1999. As part of its decision, the Commission must reach a view as to the value of the non-contestable elements of TransGrid's transmission assets as at 1 July 1999.

The Commission's discretion in this regard is constrained by the NEC. The principal limitation set out in the NEC is that the value provided to the Commission must not exceed the deprival value of those assets. Deprival value is defined in the NEC as being the lesser of an asset's optimised depreciated replacement cost (ODRC) or economic cost. These, and other relevant valuation methodologies, are described in more detail below.

To assist the Commission in determining the appropriate opening value to apply to TransGrid's assets, the NSW Treasury commissioned Gutteridge Haskin & Davey Pty Ltd, Worley International Ltd and Arthur Anderson (GHD) to undertake a valuation of those assets using the ODRC methodology.

The Commission itself engaged Sinclair Knight Merz (SKM) to review the assessment undertaken by GHD and to consider the practicality of arriving at an economic valuation of those assets. Both reviews focussed on TransGrid's network assets. The results of those reviews have been supplemented by information provided by TransGrid to SKM on the value of those non-network assets necessary to carrying out its transmission operations.

The remainder of this chapter:

- briefly describes the asset valuation methodologies relevant to the Commission's decision (section 3.2);
- sets out the NEC requirements associated with the valuation of TransGrid's opening asset base (section 3.3);
- summarises the Commission's draft decision concerning the opening asset base as well as other relevant information including:
  - TransGrid's original valuation proposal;
  - the views of interested parties;
  - the asset base valuation provided to the Commission by IPART; and
  - a summary of the major findings of the GHD and SKM reviews (section 3.4);
- outlines the issues which arose from the Commission's draft decision (section 3.5); and
- sets out the Commission's revised considerations and final conclusion (sections 3.6 and 3.7).

3.2 Relevant asset valuation methodologies

The following sets out the relevant methodologies for valuing assets. As noted above, several are referred to directly in the provisions of the NEC.

Box 3.1: Asset valuation methodologies

The **historic** or **depreciated actual cost (DAC)** methodology values assets at their original purchase price. It has the advantages that it is administratively efficient and can be easily audited because the data should be available from financial statements; it is relatively inexpensive since it does not require experts to determine costs; and it is objective because it relies on actual data rather than judgment. There is also extensive regulatory precedence for its use.

The disadvantages of this valuation method are that it may understate asset prices in times of inflation and overstate asset prices in times of technological change. Secondly, it may lead to unstable prices (e.g. prices may rise when new, more expensive assets replace existing assets). Thirdly, data may not be available or may be inadequate.

The **replacement cost** methodology calculates the cost of replacing an asset with another asset (not necessarily the same) that will provide the same services and capacity as the existing asset. Advantages of this method are that assets are valued in current prices and it may provide an incentive for efficient investment decisions as it allows the regulator to reduce the value of the asset once it becomes aware a more efficient low cost alternative asset is available.

The disadvantages of replacement cost valuation are that it involves estimation and judgment. Secondly, the information is more expensive to collect than historic cost data because it requires expert advice (e.g. from engineers). Thirdly, assets may be overvalued. Finally, it may lead to price instability if the technology and input prices are unpredictable.

Optimised (depreciated) replacement cost (ODRC) is a variant of the replacement cost valuation methodology. It measures the cost of the most efficient method of providing the services of the current asset.

Optimised replacement cost has the advantage that asset values can be adjusted where, for example, the service capacity of current assets is excess to requirements as a result of changes in demand or over investment in the past (e.g. from gold plating or poor decisions). A disadvantage of this method is it involves a greater degree of judgment and expert advice than replacement cost approach.

Deprival value (DV) is the minimum loss that would result if the business were deprived of the asset. For example, where the asset can and should be replaced, the deprival value is the replacement cost. If the asset would not be replaced, then the deprival value is the greater of the net present value of expected cash flows from continued use of the asset or the net realisable value of disposing the asset. In other words, it is the minimum of an asset's replacement cost or its economic value.[37]

$DV_t = \min\{RC_t , EV_t\}$

where RC_t = replacement cost of the asset;

EV_t = $\max\{PV_t , NRV_t\}$;

PV_t = present value of future income streams; and

NRV_t = net realisable value, e.g. the amount the asset could be sold for.

Optimised deprival value (ODV) is a variant of the deprival value approach. It takes into account the most efficient method of providing the asset's services if the asset is to be replaced. The formula for ODV is the same as for DV except it uses the optimised replacement cost.

$ODV_t = \min\{O(D)RC_t , EV_t\}$

where $O(D)RC_t$= optimised (depreciated) replacement cost of the asset.

An advantage of this approach is it discourages inefficient investment because regulators will revalue inefficient assets down to their optimised (depreciated) replacement cost. A disadvantage of any valuation method involving optimisation is that it requires expert engineering opinion, which increases the complexity and cost of the valuation.

Both deprival value and ODV are criticised as introducing a circularity problem. This is because if the asset would not be replaced, DV and ODV require an estimation of the future returns on the asset, which is what the MAR set by the regulator is supposed to determine.

The **scrap value** approach attaches to an asset the value of the asset in its next best alternative use. The scrap value of sunk assets with no alternative use, will be close to zero. If an asset is valued below scrap value, it will be economic to transfer the asset to this alternative use.

Scrap value provides a useful lower limit to asset valuation. However, it may be considered unfair as the return on the investment may be below the opportunity cost of capital. Another disadvantage of this approach is it may not provide incentives for future investment.

Sources: Bonbright, J. et al 1988, *Principles of Public Utility Rates*, Public utilities reports Inc, Virginia.
Choy, E. 1996, *Asset Valuation by GTEs: an Evaluation of Pricing Issues*, Australian Society of CPA's Public Sector Accounting Centre of Excellence, Melbourne.
Steering Committee on National Performance Monitoring of GTEs 1994, *Overview: Guidelines on Accounting Policy for Valuation Assets of GTEs*, Industry Commission, Melbourne.

3.3 NEC requirement

As mentioned, the NEC 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 NEC states that the Commission is to regulate transmission network revenues according to the principles (amongst others) that:

[37] The NEC defines deprival value as inclusive of optimisation, that is, deprival value is the minimum of optimised replacement cost and economic value.

(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.

In relation to the valuation of sunk assets as at 1 July 1999, the Commission, in its draft decision, interpreted this to mean that it should accept, subject to certain limitations, the value ascribed to those assets by the existing jurisdictional regulator (in this case, IPART) or consistently with the way in which those assets have been valued in that jurisdiction (in effect, by the NSW government). A valuation was provided to the Commission by IPART in May 1999 and this was used as the opening value for TransGrid's assets in the draft decision.

TransGrid, in particular, disagreed with the Commission's interpretation of the NEC restrictions. In addition, the NSW Government submitted to the Commission a derogation from the NEC designed to clarify the Commission's discretion in determining the opening asset valuation. Both of these matters are discussed below.

3.4 Draft decision

3.4.1 TransGrid's original proposal

The following summarises TransGrid's submissions to the Commission in relation to this review, to IPART in the context of its Section 12A report to the NSW Premier and more broadly in response to a number of issues papers released by both the Commission and IPART during 1998 preparatory to both investigations.

In terms of asset valuation methodology, TransGrid argued that COAG and the NEC endorse the use of an ODV or, more pragmatically, the ODRC methodology. It submitted that a lack of verifiable records prevents the use of DAC. The network also argued that a cautious approach should be taken to revisiting the initial asset valuation once determined.

TransGrid stated that all assets required to deliver the regulated service economically should be included in the asset base. As a minimum, this should include all system assets which are not stranded and are being used for service provision as well as relevant non-network assets and working capital. While TransGrid's submission included valuations of its network assets, these estimates have been superseded by the evaluations undertaken by GHD and SKM (those valuations are presented in section 3.4 below).

TransGrid's relevant non-network assets include its system control and data acquisition (SCADA) and communications systems, mobile plant used for repair purposes, test and laboratory equipment and computer systems used to provide input to transmission service provision. TransGrid provided information to SKM valuing those relevant non-network assets using ODRC principles at $41.52m as at 1 December 1998.

TransGrid stated that it is normal practice for transmission operators to maintain a level of spare capacity to ensure:

- appropriate redundancy (necessary to meet periods of maximum utilisation and to cover reasonably foreseeable equipment shortages); and
- sufficient forward planning capability (to capture economies of scale and minimise the environmental impact of multiple line routes).

TransGrid argued that assets should not be excluded from the regulatory asset base simply because they provide stand-by capacity or spare capacity for growth within a normal planning horizon.

In responding to the Commission's revenue cap issues paper, TransGrid stated that, at present, it had no substantive assets that were used for unregulated activities. It did however acknowledge that this situation may change in the future and that the matter needed to be properly addressed by the Commission. Where assets were used to support both regulated and non-regulated business, an attribution of assets using an avoidable cost rule should be used to assign portions of the assets between these two functions. TransGrid also noted that, at present, capital contributions form a very minor component of its asset base.

TransGrid provided information to the Commission concerning the expected value of the financial assets (e.g. cash at hand, receivables) needed to support the network business as at 1 July 1999. These assets are not included in the regulated asset base since, although they form part of working capital, they generate their own market-driven returns.

3.4.2 Submissions by interested parties

A number of other interested parties made submissions on their preferred approaches to the valuation of network assets during the preliminary phase of the Commission's inquiry during late 1998.

The electricity transmissions networks, GPU PowerNet, Transend, TransGrid, Western Power and VPX, expressed a preference for the ODV asset valuation methodology, but stated that ODRC would be appropriate if ODV was not practical. The ODRC approach was also widely supported by the jurisdictional governments and other

networks (the NSW and South Australian Treasury departments, the Victorian Treasury's Energy Projects Division, EnergyAustralia and Powerlink).

The Australian Cogeneration Association (ACA), the Australian Gas Users Group, and the Energy Users Group (EUG) consider that efficient and fair asset valuations would tend to lie in a range between ODRC and DAC. The Business Council of Australia (BCA) said that the current market value or selling price of the assets was the only valuation that had any economic significance at the time of acquisition and after and that DAC might provide a reasonable surrogate for market value or selling price.

3.4.3 Asset base valuation information provided by IPART

IPART, acting in accordance with Clause 6.2.3(d)(4) of the NEC, provided the Commission with a total asset valuation for TransGrid as at 1 July 1999 of $1,845m. The figure is based on the valuation used by IPART in its 1996 determination of TransGrid's revenue cap rolled forward. As the valuation was based on an economic valuation, the total was not separated into values for specific asset classes.

3.4.4 Consultants' reports

As outlined above, in forming its draft view as to the appropriate value to apply to TransGrid's opening asset base, the Commission also had regard to the asset valuation reports provided by GHD and SKM. The contents of those two reports are discussed below.

The GHD review

NSW Treasury engaged GHD to conduct an ODRC valuation of the network assets of the NSW electricity businesses, including TransGrid. GHD categorised TransGrid's assets as follows:

- 500 kV, 330 kV, 220 kV and 132 kV transmission lines;
- 330 kV and 132 kV underground cables and pilot cables;
- 500 kV, 330 kV, 220 kV and 132 kV switching stations and substations;
- the Carlingford system control centre;
- SCADA and communications systems;
- metering assets;
- land and easements; and
- emergency spares.

In general, GHD commented that TransGrid's network asset database is well maintained and provides extensive details of the technical characteristics of the assets. The data is used by TransGrid as a primary source for asset management, load flow calculations, maintenance planning and for fixed asset financial records. GHD added that, although TransGrid's asset database and accounting records are not yet linked, it had been able to establish a clear audit trail for valuation purposes. GHD suggested that an integrated system, linking the accounting database and the technical data, should be adopted.

The main findings of the GHD valuation were as follows:

(a) replacement costs for transmission and subtransmission lines were predominantly based on TransGrid's 1996 valuations. Based on discussions between TransGrid and its major suppliers, those valuations had been increased by between two and five per cent (most by four per cent) to reflect cost movements since 1996. GHD believed that these cost increases were reasonable;

(b) the 500 kV assets, which were optimised down to 330 kV during the last asset base assessment carried out in 1996, should be reoptimised back to 500 kV due to the increased system usage expected to occur as the result of interconnection with the Queensland electricity system within the next 12 months;

(c) optimisation opportunities for the 132 kV assets were considered but no optimisation of the circuits was found to be applicable;

(d) substation costs were based on TransGrid's substation cost model, predominantly using the 1996 valuation but in some cases updated on the basis of recent construction projects. GHD concluded these replacement costs were reasonable;

(e) the SCADA and communications equipment was valued at historic cost depreciated over 10 years but the fact that these assets were not valued on an ODRC basis was insignificant in terms of the overall valuation;

(f) easements were revalued on the basis of more reliable area measurements and the increases in land values in some urban areas that had occurred since the 1996 valuation;

(g) TransGrid's asset lives were generally in accordance with the NSW Treasury's *Policy Guidelines for Valuation of Network Assets of Electricity Network Businesses* but GHD noted that:

    (i) although the 50 years used for lines met the guidelines, in the future they should be differentiated to reflect line type (e.g. steel lattice, wood, concrete and steel poles), geographical and climatic variations;

    (ii) the 40 years used for substation circuit breakers, although in line with the guidelines, could be differentiated further into bulk-oil, air-blast and SF6 types; and

    (iii) TransGrid has used 35 and 40 years for transformers which, although below the 50 years set out in the guidelines, had an immaterial effect on the valuation.

GHD concluded that TransGrid's network assets had combined valuation of $2,064m as at 1 December 1998. This compared with the value of $1,966m found in 1996. The two main reasons for the increase stemmed from:

- the higher values attributed to easements; and
- the reoptimisation of the 500 kV assets to operate at 500 kV rather than 330 kV as the result of the impending interconnection with Queensland.

GHD did not include the value of sales tax equivalents in its valuation as it considered that it was unclear whether sales tax was applicable to all of the assets examined.

Table 3.1 contains a comparison of the 1996 and 1998 ODRC valuations of TransGrid's network assets.

Table 3.1: GHD ODRC valuations of TransGrid network assets, 1996 and 1998 ($ thousand)

Description of asset	ODRC March 1996	ODRC December 1998
132 kV substation equipment & buildings	89 247	76 489
220 kV substation equipment & buildings	19 317	17 517
330 kV substation equipment & buildings	318 191	284 013
500 kV substation equipment & buildings	11 483	65 299
132 kV lines	222 208	230 408
220 kV lines	48 331	49 383
330 kV lines	527 161	484 462
500 kV lines	354 290	340 780
Underground cables	40 543	34 431
SCADA and communications equipment	22 700	14 170
Easements and land	312 759	428 100
Work in progress	included above	38 631
Total	**$1 966 230**	**$2 063 683**

The SKM review

The Commission engaged SKM to review the valuation prepared by GHD for NSW Treasury. As events transpired, SKM was required to review a wide range of source material within TransGrid and to conduct interviews with a number of personnel. In conducting its review, SKM relied upon the results of a wide sample of benchmarking reviews it had conducted previously.

SKM's primary conclusions regarding TransGrid's network assets were as follows:

(a) that there was good agreement within the estimating accuracy for most aspects of the valuation except for the 500 kV and heavier 330 kV lines. SKM considered that TransGrid's values for those lines were slightly high on a benchmarking basis for lines in straight forward terrain. However, given the difficult terrain and multiple easement deviations in densely populated regions, SKM were of the view that the TransGrid valuations were within a reasonable range of estimating accuracy;

(b) a value had been included in GHD's total representing a small number of 500 kV and 330 kV field terminated circuits which SKM considered should probably not have been part of the asset base. However, the effect of not including the assets in the total valuation was immaterial;

(c) the moderate escalation of the 1996 replacement costs appeared reasonable and that there was negligible differences between the substation valuations provided by TransGrid and SKM's benchmarked costs;

(d) in general, SKM believed that TransGrid has carried out optimisations which are generally in accordance with NSW Treasury guidelines and that most areas likely to result in material optimisations had been addressed. Where SKM identified further potential for optimisations (for example, in relation to the 132 kV assets), the benefit of doing so would be immaterial to the overall asset valuation;

(e) SKM questioned, however, whether the additional valuation effect of reoptimising the 500 kV assets associated with the Queensland interconnector (around $70 million) should be included in the opening asset base or deferred until the interconnector is commissioned during 2000/01;

(f) SKM agreed that the values attributed to TransGrid's easements properly related to the cost required to acquire them at current property values and that the values therefore conformed with the ODRC methodology. However, SKM noted that the unique characteristics of easements meant that it could be argued that the use of deprival value (including ODRC concepts) was inappropriate in relation to such assets and that the question of which valuation method was most suitable in the regulatory context would become an increasingly important issue in the future;

(g) while there is no universal agreement on the asset lives to be applied, those used by TransGrid were within the range of lives used by other transmission bodies. On balance, the shorter lives TransGrid used for some transformers (effectively decreasing the total valuation in the order of $11m) was outweighed by the longer lives used for wood poles (increasing valuation in the order of $90m). However, SKM noted that TransGrid's statistical records of pole conditions and failure rates supported the use of longer lives for wood poles; and

(h) SKM noted that there is not full agreement regarding the inclusion of sales tax equivalents or interest during construction. Like GHD, it did not recommend the inclusion of sales tax but suggested that it may be appropriate to include a component representing interest during construction on past major asset projects. This would add approximately $70m to the overall ODRC valuation.

In summary, SKM noted that, of the variations in the value of different network asset classes, some tend to increase the total valuation and some to reduce it. On a judgement basis, SKM concluded that the GHD total could be expected to have an accuracy of plus or minus seven per cent and that the valuation figure of $2,064m was likely to be within this range but towards the high end. If interest during construction were to be included, this would add to the total network asset valuation.

On the basis of information provided directly by TransGrid, SKM confirmed the value of the relevant non-network assets as $41.52m and the value of TransGrid's work in progress account as $36.7m at the valuation date. SKM concluded that the total ODRC opening asset valuation for TransGrid should be $2,103.27m. The difference from the GHD total arises principally from the inclusion of the non-network assets.

As part of the Commission's need to establish a deprival value for the assets, SKM was also asked to establish an economic value for those assets. SKM concluded that, as at 1 July 1999, there would be no real potential to derive an economic valuation which would be lower than the ODRC value arrived at. However, it suggested that this might be possible in the future; for example, as a national gas transmission grid developed.

SKM was also asked to establish whether it was possible to determine a historic cost for the opening assets. SKM observed that, as records were not retained when TransGrid's predecessor, Pacific Power, adopted current cost accounting, it would not be practicable to reconstruct an historic cost register for TransGrid. It was therefore impossible to determine a DAC value for the transmission assets.

SKM was asked to provide its opinion on two other related matters.

The first was to identify whether the asset base included assets which provided, either partly or wholly, unregulated income and which should therefore be excluded from the regulated asset base. SKM indicated that it was not possible to accurately assess the value of such unregulated assets but that, in the 1997/98 financial year, TransGrid derived $1.3m of unregulated revenue from their use. Although, at present, the value of unregulated assets is relatively very small, it is likely to grow in the future as the result of:

- TransGrid taking on an increasing amount of non-regulated activity; and
- some major network assets entering the unregulated category (for example, new contestable entry or exit assets).

SKM noted that, despite having acquired the capability in its accounting system, TransGrid had not, at the time of reporting, addressed the issue of formally identifying its regulated and unregulated assets and that careful implementation and design will be required to ensure that accurate and consistent information is available for submission to the Commission under the new regulatory regime.

On further investigation by the Commission, TransGrid disclosed that some $3m of existing microwave communications assets could be considered to be unregulated assets as TransGrid had licensed some frequencies used by that equipment to other businesses.

The second additional matter SKM was asked to comment on concerned whether the level of capital expenditure which TransGrid had, in 1996, expected to undertake during the period covered by IPART's determination was in fact spent. The Commission's concern was to ensure that TransGrid is not permitted to earn a return on and of that expenditure twice — as regulated expenditure under IPART's previous determination as well as that of the Commission.

On the basis of limited information, SKM tentatively concluded that TransGrid had significantly underspent its own projections for 1995/96 to 1998/99. That conclusion is supported by the Commission's own analysis. However, IPART's revenue cap for the period was based upon financial indicators and cash flow returns to the business and thus did not nominate what capital expenditure had been granted provisional approval. The Commission is therefore not in a position to conclude whether any 'double dipping' by TransGrid is likely to take place.

3.4.5 Commission considerations

A number of issues arose from the material discussed above. The following summarises the Commission's draft consideration of those matters.

Preparing a comprehensive valuation report in advance

In order to complete its consultancy, SKM indicated that it had to review a wide range of source material and interview a number of TransGrid personnel. Accordingly, it suggested that further such reviews would be made easier if TransGrid prepared a comprehensive valuation report - listing key assumptions and estimates – which could be made available to the Commission's consultants.

While noting that TransGrid has had its resources stretched as the result of undergoing corporatisation at the time which involved the completion of a number of overlapping reviews, the Commission agreed with SKM that, in future, the network should make such a report available at the outset of the revenue cap inquiry. Doing so would lower the costs of compliance and assist the Commission with meeting its goals under the NEC and, in this regard, notes that the NEC provides that the regulated business is obliged to provide that information if required.

To assist the network in this regard, the Commission has set out its reporting requirements in its draft *Regulatory Principles*. TransGrid, other NEM-participating transmission networks and other stakeholders were invited to provide their input into that set of requirements and further refinement of the documents is continuing.

Optimisation of the 500 kV lines

SKM noted that the 500 kV lines that had been previously optimised downward to 330 kV have been reinstated at 500 kV in the 1998 optimisation. SKM suggested that it would be more appropriate to include the lines at 500 kV when the Queensland interconnector (QNI) is commissioned or when the full 1,000 MW of southwards flow has first occurred.

The Commission questioned whether these revalued assets should be included in an assessment of the regulatory asset base at any time. The Commission's concern is that by revaluing these assets it would appear to attribute additional costs to the operation of QNI and these additional costs were not signalled in the assessments that were made publicly available in 1997. This concern is based on the notion that as an ODRC valuation attempts to impute an economic value to existing assets then any change in this economic value attributable to a network augmentation should be included in an economic assessment of that augmentation.

Thus, the Commission noted that valuation of the assets on ODRC principles would imply that it would be more appropriate to have recognised the revaluation as at the commissioning date. However at the time of the draft decision, and as outlined in Section 3.3 above, the Commission was of the view that it must accord precedence to the valuation provided by IPART, a valuation based on an overall business assessment which did not attribute specific values to particular asset classes. The Commission therefore did not defer the reoptimisation of the 500kV assets in its draft decision.

Regulated versus unregulated assets

As noted above, a key issue for the Commission as regulator is to ensure that regulated assets are not used to generate unregulated income. SKM concluded that, at the time of its valuation, unregulated income from activities involving network assets represented only one-third of one per cent of TransGrid's total income from operations. While suggesting this amount was presently immaterial, it noted statements made by TransGrid at the time that the network intended to grow its unregulated income by 10 per cent per annum. As such, the materiality of income generated by unregulated assets is likely to increase in the future and the identification of those assets will become increasingly important.

The Commission noted that TransGrid has identified approximately $3m of telecommunications assets which underpin unregulated income received from the licensing of microwave communications bandwidth. However, the Commission's acceptance of the asset base valuation provided by IPART, a base not broken down into asset classes, prevented it from separately deducting the value of those unregulated assets from the opening base.

The Commission agreed that it is imperative that TransGrid develop the capability to identify unregulated assets or a basis for allocating the relevant proportions of an asset used for unregulated purposes. In this regard, the Commission will expect TransGrid, when providing its annual regulatory accounts relating to each financial year of the revenue cap period, to quantify the value of such assets and explain the methodology for doing so once unregulated revenues reach a materiality level to be settled as part of the finalisation of the *Regulatory Principles* process. In arriving at the appropriate level, the Commission will consider the importance of allowing TransGrid to efficiently grow its small non-regulated income without the need for expensive ring fencing or other expensive accounting procedures.

The appropriate treatment of easements

As noted above, SKM confirmed that TransGrid's ODRC easement values rose from $312m in 1996 to $402m in late 1998. SKM went on to comment that electricity easements have unique characteristics:

- a registered [electricity] easement is a right to construct, operate and maintain a power line and does not involve ownership of the land under the line;
- a registered easement is usually granted in perpetuity. The corporation thereafter does not have to provide for replacement of the "asset" in the future, nor to provide for depreciation;
- there are only minimal administration costs to the corporation associated with maintaining or operating the 'asset'. The original vegetation clearing and access track construction are included in the line cost. Regrowth control and access track maintenance are included in the cost of line maintenance as it is mainly performed to ensure safety and the security of the line;
- if the line is removed the value in the books cannot necessarily be recovered. If an easement is extinguished it may be possible to recover the compensation paid to the original [land]owner or some greater amount but even this is dependent on the present owner agreeing to pay it. In addition, some easements for future lines are in developing areas where rezoning of areas may take place. These may not be able to be used as planned for future lines due to environmental or political pressures.

SKM stated that these characteristics meant that it could be argued that the use of deprival value (including ODRC concepts where the value of the easement is based

upon the value of the property over which it sits) is inappropriate in its application to this class of asset, particularly in the context of how a regulator should treat the issue of 'windfall' gains to the network generated by increases in the underlying property values.

SKM noted that the approaches presently used to value easements vary from one jurisdiction to the next and that it was desirable that a common methodology be developed for future valuations. The issue will become an increasingly important one as the values attributed to easements are likely to continue to rise at rates in excess of the general inflation rate.

As noted above in relation to the issue of the optimisation of TransGrid's 500 kV lines, use of the business valuation provided by IPART meant that the Commission was unable to assess values for specific classes of assets as part of the draft decision.

However, the Commission noted SKM's concerns and stated that this issue is germane not only to transmission networks. The Commission is concerned that the traditional basis for valuing such assets may serve to provide network owners with windfall gains which do not necessarily reflect the risk-adjusted cash flow rate of return appropriate to the efficient operation of those businesses.

Sales tax and interest during construction

Both GHD and SKM stated that no allowance had been made for sales tax equivalents in the present TransGrid valuation given concerns about the applicability of that tax to the business and, in addition, the uncertainty of the tax regime (at that time) as the result of the Federal Government's foreshadowed introduction of a Goods and Services Tax (GST). SKM also reported that no allowance for interest during construction was allowed in the valuations but suggested that doing so may be appropriate. GPU PowerNet, in its comments on SKM's report, was of the view that both sales tax and interest during construction should be included in the opening asset base.

Again, as the Commission utilised the business valuation provided by IPART at the draft stage, it was unable to determine which assets it might be appropriate to apply such values to and so made an allowance for neither.

Standardisation of asset lives

The Commission also noted that it would seem desirable for the purposes of regulatory consistency to take steps to ensure that the standard lives applied to transmission assets are consistent across the NEM-participating jurisdictions. GPU PowerNet, in its comments on the SKM consultancy report, expressed its support for such an approach.

3.4.6 Draft decision

The NEC provides the Commission with a degree of regulatory discretion in setting a revenue cap, including the valuation of assets. In particular, the NEC specifies that the regulatory regime administered by the Commission must seek to achieve an environment which *inter alia* fosters an efficient level of investment and which provides reasonable regulatory accountability through transparency and public disclosure of the basis for regulatory decisions (NEC clause 6.2.2). The NEC also

gives specific directions that assets in place on 1 July 1999 be capped at their deprival value (the lower of ODRC or economic value).

In this context, the Commission sought to identify the deprival value of TransGrid's assets. However, SKM was unable to establish an economic value for TransGrid's opening asset base. Moreover, no other party to the inquiry submitted a value for consideration by the Commission. Consequently, in the place of the deprival value associated with those assets, the Commission relied on the ODRC benchmark value established as the result of the consultants' two assessments.

The Commission also interpreted the NEC as requiring that it should adopt the values provided by the jurisdictional regulator or the participating jurisdiction, provided those valuations did not exceed the deprival value of the assets. As mentioned, IPART provided the Commission with an opening asset value of $1 845 million as at 1 July 1999. This asset valuation was consistent with the NEC requirement to the extent that it is below the current ODRC asset value. On that basis, the Commission used the IPART opening asset value to determine TransGrid's draft revenue cap.

3.5 Issues arising from the draft decision

The submissions received by the Commission in relation to the opening asset base fell into broad two groups.

The networks who responded (TransGrid, EnergyAustralia, PowerLink, NorthPower, Western Power and GPU PowerNet) considered that:

- the Commission's use of the business valuation provided by IPART was inconsistent with the asset-based accrual building block approach used in other parts of the decision; and
- the assets should be valued using the ODRC method — NorthPower stated that doing so would ensure that sunk assets were valued on the same basis as future capital expenditure; and
- easements were an essential part of the network's assets and it was also therefore appropriate to value them on an ODRC basis — particularly where, as TransGrid submitted, the Commission had indicated its intention to do so in the draft *Regulatory Principles* document released shortly after the draft of this decision.

In relation to the first point, EnergyAustralia criticised the IPART valuation for its "lack of consistency, transparency and for being extremely subjective". The network considered that the asset value proposed by IPART for TransGrid was inconsistent with that proposed for EnergyAustralia's transmission assets and that both were inconsistent with the ODRC adopted by PowerNet Victoria leading to "rail gauge" issues of risk, distorted pricing, asset management and investment. This was said to be particularly the case in relation to the valuation of easements in urban areas.

TransGrid submitted that the Commission should not adopt IPART's business valuation for the reasons that:

- to adopt the IPART valuation would be inconsistent with the overriding objectives for the transmission regulatory regime set out in Clause 6.2.2 of the NEC. For example, Clause 6.2.2.(b)(2) requires the Commission to "provide a sustainable commercial revenue stream which includes a fair and reasonable rate of return… on efficient investment";

- even if the Commission's adoption of IPART's valuation was consistent with those objectives, the valuation is not one which satisfies the requirements set out in Clause 6.2.3(d)(4)(iii). That is, it is not "a value of TransGrid's *assets* in existence and generally in service as at 1 July 1999 and… does not appear to be the regulatory asset base *established* in New South Wales" (emphasis added); and

- as the Commission had indicated its view in the draft decision that the revenue stream based on the IPART valuation "may be low", this implied that the adoption of that valuation would be an unreasonable exercise of the Commission's obligation to provide an appropriate revenue stream.

The networks (and NSW Treasury) supported using ODRC on the basis that it provides a transparent, readily understandable and repeatable valuation process. NorthPower added that the use of ODRC ensured that the risk of asset optimisation was left to the networks and not to more subjective forward-looking business valuation methods.

Mr G A Swan submitted that any valuation of TransGrid's land and easements should include the full cost of land resumption (including homes replaced and other infrastructure being relocated) were those assets to be acquired today.

Powerlink also submitted that to exclude the reoptimisation of the 500kV assets was inconsistent with the valuation principles used in other parts of the draft decision and that there may well have been sound reasons for not including the reoptimisation in the initial assessment of QNI's viability. It considered that the reoptimisation ought to be incorporated over the five year regulatory period following the initial asset base determination.

NSW Treasury submitted that the exclusion of sales tax and interest during construction would support its contention that the ODRC valuation determined by GHD and SKM was conservative.

The second group of responses (ACA, BCA, EMRF and PIAC) commented that:

- the initial asset value supplied by IPART was too high in that it included assets that should have been optimised out due to the mothballing of the Munmorah Power Stattion and units of the Liddell and Vales Point Power Stations and that there may be a number of contestable assets contained in the valuation;

- the 500kV assets should not be reoptimised until QNI has been commissioned; and

- the use of the ODRC valuation method would be inappropriate, particularly in relation to easements.

In relation to the second point, the ACA went further submitting that the 500kV assets should not be reoptimised at all since the benefits anticipated at the time QNI was

originally approved will clearly no longer occur due to the recent commitment of increased generation and coal capacity in Queensland.

With respect to easements, the BCA submitted that the Commission should adopt the approach used in the United States. That is, easements should initially be valued at cost and the benefits of any subsequent revaluation should be shared between networks and customers.

3.6 Commission considerations

Use of the IPART valuation and ODRC

The Commission understands the arguments that there may be an inconsistency in using a "business valuation" to establish a network's asset base in the context of determining revenues via the accrual building block approach. Whether or not this will in fact be the case in specific instances will of course depend on the particular methodologies used to generate the valuation in question.

It would also have been helpful had the terms of Clause 6.2.3(d)(4)(iii) of the NEC been more clear. As noted above, the Commission is presently of the view that the clause requires it to, at a minimum, take into account one or possibly more valuations of the opening asset base provided by stakeholders within the jurisdiction where those assets operate. This is subject to the proviso that such a valuation or valuations do not exceed the deprival value of those assets and the possibility of verification being required in accordance with the rest of that part of the clause.

This view is consistent with the approach taken in the draft *Regulatory Principles*.

The Commission notes the reasons provided by TransGrid in support of its contention that the Commission should not be bound to accept the valuation provided by IPART in this particular case. However, in this instance the Commission does not have to make a final decision as to how it should interpret the requirements of that part of the NEC since the NSW Government has submitted, and the Commission has given interim authorisation to, a transitional derogation from the NEC which provides greater clarity as to the freedom with which the Commission may, for the purposes of this review, determine the method according to which TransGrid's opening asset base should be valued.

Thus, on the basis that SKM was unable to establish an economic (deprival) value for those assets which was lower than the result which the Commission has arrived at on an ODRC basis, the Commission will accordingly value TransGrid's network assets as at 1 July 1999 using the ODRC methodology. This is consistent with the position outlined in the draft *Regulatory Principles* where the Commission noted that the ODRC approach has some significant advantages as a methodology on economic efficiency grounds over other possible approaches:

> First, regulators often look to competitive or contestable markets for guidance on efficient decision rules for regulating natural monopoly markets. Such comparisons can provide a number of guiding principles for a range of complex regulatory problems.
>
> Second, the maintenance of revenue streams over time at a level that is consistent with an ODRC asset valuation will minimise the likelihood of significant shocks to tariffs as the replacement of

assets becomes necessary. As the existing assets will dominate the capital base and therefore tariffs for a number of years, the objective of minimising shocks to tariffs can only be achieved if the existing assets are valued at or close to ODRC.

Third, any value that is in excess of ODRC is likely to imply pricing of services that will expose the service provider to being bypassed. While the significant entry and exit costs that characterise electricity transmission make large-scale duplication of the existing system unlikely, bypass may be feasible at the edges of the network. In such circumstances, some of the cost of the bypass will inevitably be absorbed by the remaining customers who do not have bypass options.

Easements

As discussed in Sections 3.3 and 3.4 above, the appropriate valuation of easements is arguably more problematic than that of other types of network assets. The draft *Regulatory Principles* stated that:

> The normal [ODRC] methodology would assign values to such assets reflective of their market value. Given the strong link with real estate values there is a likelihood that the value of easements will escalate continuously over time, at rates in excess of the rate of increase in the CPI. The question is how to introduce such assets into the regulatory framework in a consistent way.

The Commission then outlined its preferred approach which 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 will hopefully 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.

The Commission is currently reviewing the submissions made in response to this and other elements of its proposed *Regulatory Principles* before finalising its longer-term approach.

Accordingly, for the purpose of the present decision, and bearing in mind the need of the networks to be allowed to earn an adequate return on their investments and the desirability that customers should not be required to face an immediate price shock, the Commission considers it appropriate to include TransGrid's existing easements in the regulated asset base at their historic purchase cost rolled-forward to 1 July 1999. In the absence of properly documented historic cost records, the Commission has used the

values identified in the oldest available valuation as a proxy for those costs, being the ODRC value determined during the 1996 SKM valuation.

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.

Reoptimisation of the 500 kV assets

At the time of the draft decision, the Commission adopted the IPART valuation as it did not consider the NEC allowed it to make a decision to accept the recommendation by its consultant SKM. SKM noted that with the commissioning of QNI there should be an increase in the value of the 500kV lines. However, in the draft decision, the Commission noted that re-optimising the 500kV lines would be consistent with valuation of the assets on ODRC principles, that is, that the value imputed should correspond with the most efficient method of providing the required level of service.

In applying such principles, the Commission considers that a balance must be struck between the objectives of providing revenue certainty to network owners and ensuring that only such assets that are properly required to meet service levels are included in the asset base and paid for by network customers. Thus, the Commission would not be prepared to reoptimise assets in response to small, incremental changes in the level of service required during the forecast period.

However, where evidence has been provided that demonstrates a clearly identifiable and material step-change at a specific time during the period under consideration, the Commission is of the view that the move in the service level to be provided should be identified to customers through the appropriate adjustment to the timing of the introduction or removal of the relevant assets in the network's asset base. This is consistent with the approach indicated in the draft *Regulatory Principles* which noted that the Commission expects the occurrence of such cases to be relatively rare. To this end, although exact criteria cannot be set, the Commission intends to develop more specific indicia in an ODRC valuation guideline to be completed prior to 31 December 2002.

Until that time, the Commission will rely upon its technical consultants to raise specific instances and will do so only at each regulatory reset as part of any revaluation. Accordingly, in this case, the Commission accepts SKM's recommendation to defer the introduction of the reoptimisation to the extent indicated until 2001/02.

The Commission reiterates its own concerns, and notes those of the ACA, regarding TransGrid's entitlement to the benefit of reoptimising the assets when the likelihood of the need to do so was not made clear in the original evaluation of the QNI proposal. Again, consistent with the draft *Regulatory Principles*, the Commission is of the view that a network is far better placed to identify the costs and benefits that would accrue to specific augmentation projects. Accordingly, there is an argument that the network

should bear the risk of optimisation should the actual costs or benefits turn out to be materially different.

Although some interested parties argued that the future development of generation options in Queensland should preclude the need for re-optimisation, the Commission believes that the future pattern of generation investment in Queensland remain highly uncertain. On this basis, the Commission is not in a position to conclude that the reoptimisation suggested by its technical consultant is inappropriate at this time. Nevertheless, this situation could change by the time of the next regulatory review. For instance, if at that time there is evidence that new generation investment has meant that TransGrid's 500kV assets have functioned, and are likely to continue to function, at a lower service level, then the Commission will have no hesitation in optimising the value of those assets accordingly.

Inclusion of mothballed generation assets

It was claimed that TransGrid's asset base should not include the value of those assets connected to generation units no longer in service in NSW. The Commission notes that the units that were decommissioned were removed from service prior to the GHD and SKM valuations taking place and that the consultant's ODRC asset base figure was adjusted to take into account the optimisation of the relevant connection assets as appropriate.

Sales tax and interest during construction

The Commission remains of the view that an allowance for sales tax paid on past inputs into the existing asset base would not be appropriate. There are several reasons for this. Most importantly, it has not been demonstrated that tax was in fact both payable and paid on those assets. Further, SKM did not recommend its inclusion in the asset base. Finally, no party, including TransGrid, provided information which would have allowed the Commission to properly quantify the value of any taxes in fact paid.

In relation to interest during construction, the Commission accepts that, where capital expenditure is to be rolled in to the existing asset base at the project's commissioning date, it would be appropriate to allow the efficient cost to the organisation of having to finance the project up to that point. This point is further addressed in relation to TransGrid's proposed future capital expenditure requirements discussed in Chapter 4, below.

In relation to making an allowance for interest during construction in respect of the existing asset base, the Commission notes SKM's comment that its examination of TransGrid's records do not indicate that interest on larger construction projects was separately included in the total cost. SKM suggested that a nominal sum representing interest on the opening asset base be included.

However, the Commission notes that TransGrid itself has neither requested or quantified such an amount in respect of the opening base (although it has done both in respect of its future capital expenditure projects). On the basis of SKM's comments as to the state of TransGrid's historic cost records, the Commission considers that it would be practically impossible to make a sound assessment of such a charge in any event. The Commission therefore remains unconvinced that it would be appropriate to include the nominal figure for the purposes of the current determination.

3.7 Conclusion

The Commission has determined that the value to be attributed to TransGrid's opening asset base as at 1 July 1999 is $1.935bn, being the ODRC value identified by SKM adjusted for the deferred reoptimisation of the 500kV assets, including work in progress relating to outstanding past capex and valuing easements at their rolled-forward historic cost.

4. Capital expenditure

4.1 Introduction

In setting TransGrid's revenue requirement, the Commission must form a view on the prudency of TransGrid'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 TransGrid's proposed capex program for the purpose of establishing a revenue cap and for creating the appropriate economic drivers for investment. Under the NEC, 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 TransGrid'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 TransGrid 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 NEC requirements relevant to the inclusion of capital expenditure in a transmission network's asset base (section 4.2);
- summarises the Commission's draft decision concerning the inclusion of TransGrid's projected capex into the present regulatory period as well as the information considered by the Commission in arriving at that conclusion. This includes:
  - TransGrid's original valuation proposal;
  - the views of interested parties;
  - a summary of the major findings of the Worley International Ltd (Worley) and Ewbank Preece reviews (section 4.3);
- outlines the issues which arose from the Commission's draft decision (section 4.4);
- sets out the Commission's revised considerations (section 4.5); and
- summarise the Commission's conclusions in this regard (section 4.6).

4.2 NEC requirement

The Commission's task in assessing TransGrid's capex is specified in the NEC. In particular, Part B of Chapter 6 of the NEC 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 TransGrid to meet its present and future service requirements; and
- in particular, the adequacy, efficiency and appropriateness of the capital expenditure planned by TransGrid (and EnergyAustralia) in relation to augmentation of supply to the Sydney CBD and inner suburbs.

To this end the Commission engaged Ewbank Preece to review the capex program. The basis for this review was a recent report on TransGrid's capex proposals by Worley which was prepared for IPART as part of its Section 12A review. The results of both the Worley and Ewbank Preece reviews are summarised below.

4.3 Draft decision

4.3.1 TransGrid's original proposal

The following summary is based on TransGrid's submissions to IPART and the Commission on both its regulated revenue and on an Issues Paper published by the Commission in 1998 as a forerunner to the draft *Regulatory Principles*.

Criteria for including capex in the asset base

TransGrid submitted that appropriate regulation of capex should provide the correct incentives for investment in new transmission:

> Typically investment is lumpy, does not follow aggregate system usage growth in a predictable manner, and is a major cost impost on the transmission owner. Appropriate investment is essential to ensuring ongoing supply reliability to the community at large and access by customers to the most competitive electricity source in a transparent and consistent manner.

TransGrid argued that, if it is based on good industry practice and is the most economic option, then new and replacement capex should be included in the asset base, especially where it meets the stringent acceptance criteria set out in the NEC. These criteria include comprehensive public consultation on major investment decisions, such as changes to interconnector capacity, and requirements to consult with market participants.

> The hurdle rate used in the supporting economic justifications should be the regulated weighted average cost of capital (WACC). This assumes that either the regulated WACC is high or regulatory certainty is provided regarding the ongoing revenue streams associated with the capital expenditure.

TransGrid stated that the criteria for including and retaining new capex in the regulated asset base should be clear and transparent.[38]

> Clearly, the greater the risk of subsequent removal of the asset from the regulated asset base the higher the return on capital and the higher the return of capital that should be allowed. It is preferable that capex that is efficient, and is required at the time it is commissioned, be included fully in the calculation of MAR over the asset's life.

Timing for recognition of capex in the asset base

TransGrid argued the size of transmission investments and the need to receive a fair rate of return means capex investment should be recognised in the asset base and revenues immediately it begins to deliver benefits to the public:

> To do otherwise creates incentives to delay the commissioning of essential infrastructure and to game the regulator by delaying projects until the end of a reset period. It considered it to be quite unreasonable to deny transmission owners returns on efficient investments worth sometimes in excess of $100 million for up to five years. Accordingly, justifiable capital expenditure ought to be recognised in the asset base from its in-service date, including interest capitalised during construction.

It suggested that capex be rolled in to the asset base on the basis of forward estimates of cost and commissioning dates determined just prior to each regulatory reset, combined with glide paths over a number of periods to smooth price shocks and accommodate extraordinary costs.

Proposed capex program

In the course of this review TransGrid revised and updated its proposed capex program. TransGrid's initial submission (September 1998) was based on its *1997-2002 Network Management Plan*. This was revised as per its *1998-2003 Network Management Plan* in December 1998. In March 1999 TransGrid advised the Commission of further revisions to its capex projections.

On behalf of IPART, and as part of the current inquiry, Worley International reviewed TransGrid's 1997-2002 plan. The capex program assessed by Worley amounted to roughly $610 million for augmentation projects through to 2003/04 and $150 million for renewals to 2007/08, a total of $760 million. The Ewbank Preece review of the Worley report arrives at a revised figure of $772 million.

Overall Worley found the proposed expenditure to be efficient and essential to meet the requirements of the NEC. For the works proposed to reinforce supplies to the Sydney CBD area Worley noted the importance of meeting the program deadlines. The report is further described in Section 4.4, below.

TransGrid argued that additional revenue will be required to accommodate this capital works program while achieving the NEC requirement of a fair and efficient return on investment:

> Modelling provided to IPART and the ACCC indicated that an X factor on revenue of at least 2 per cent per annum would be required. It should also be noted that:

---

[38] TransGrid argues such criteria should also set out the basis for determining return on capital, return of capital, and associated operation and maintenance cost recovery going forward.

- this modelling assumes significant operating and maintenance efficiency gains that are all passed through to the customers without a glide path; and
- there would be no real average increase in transmission charges because of natural load growth of about 2 per cent.

In this context TransGrid endorsed the Commission's issues paper:

> Consistent with the gas code, the Commission's initial preference is that forecast capital expenditure may be included in the determination of revenues from the time the new asset is expected in service, provided it satisfies certain criteria (for example, it is efficient and has system wide benefits). At the beginning of the next regulatory period, the asset base should be adjusted to reflect differences between the actual and forecast investment.

The following table provides a brief overview of TransGrid's capex proposal for the five year regulatory period, based on its submissions, the Worley report and TransGrid's *1997-2002 Network Management Plan*.

Table 4.1: TransGrid's proposed capital expenditure

Project	Brief Description	Approx cost ($m)	Timing
Sydney CBD upgrade	Reinforce capacity to avoid cable overloading	130	1999/00-2000/01
Yass-Wagga 330 kV expansion	Relieve transmission constraints which impact on Victorian import capability	79	1999-2000
Armidale/ Lismore reinforcement	Enhance capacity to relieve voltage control constraints (330 kV line deferred)	120	2004?
Queensland Interconnector	Install 1000MW export/500MW import connection with Queensland grid	112	1999-2000
South Australian Interconnector	Interconnection with South Australian grid	51	Deferred
Smaller projects	24 augmentation projects	127	1999/00-2003/04
Renewals	Repair / replacement of assets	83	1999/00-2003/04
Total		**702**	

Note that, of the 29 augmentation projects, five make up approximately 80 per cent of the projected capex cost. Of the smaller projects, around $50 million is accounted for by the proposed transfer of the Snowy assets to TransGrid while a number of the other projects provide additional support to the major projects, particularly the Sydney CBD, Wagga and Armidale-Lismore reinforcement programs.

A number of these estimates have been revised upwards significantly in TransGrid's *1998-2003 Network Management Plan*. In particular, TransGrid increased its estimates of required renewal capex to $238 million while smaller projects capex rose from $127.4 million to $194 million. This would increase TransGrid's proposed capital expenditure program over five years to some $946 million in real terms (on an existing asset base of just under $2,000 million).

TransGrid submitted a further revised estimate of its capital needs during the regulatory period on 30 March 1999. At the June pre-decision conference, TransGrid indicated that these latest revisions were in response to the earlier consultants' reviews of their capex program.

4.3.2 Submissions by interested parties

There were not many submissions that commented on the regulation of capex prior to the Commission's release of its draft decision.

NSW Treasury stated that if appropriate investment guidelines have been met, capital expenditure should be included in the regulatory asset base from their date of service, including interest capitalised during construction.

It also considered that involvement by the economic regulator in the initial evaluation and approval of investment decisions should:

- reduce regulatory risk and improve public confidence in the appropriateness of investment decisions;
- ensure that the public interest is properly considered; and
- minimise the need for a regulator to subsequently strand an investment and thus improve overall economic outcomes.

EnergyAustralia supported the Commission's initial preference for forecast capital expenditure to be taken into account in the determination of revenue from the time the new asset comes into service:

> Given the significance of the expected capital expenditure by TransGrid during the next regulatory period, it is important that capital expenditure programs are subject to careful review and are consistent with those proposed by the distributors.

EnergyAustralia considered that the revaluation of network assets at the time of each regulatory review is desirable, in order to impose a market-like discipline on network service providers to plan and design their networks prudently. It argued that, provided an appropriate set of optimisation rules is agreed in advance and applied consistently, this would optimise out any assets no longer adequately utilised and reinstate assets that may have been devalued in earlier reviews.

Powerlink cautioned that, due to estimation errors, it would not be appropriate to lock in the capital works program such that the transmission network carried the risk. This could lead to rewards or penalties for outcomes beyond the network's control and lead to uneconomic behaviours:

> A preferred approach is to agree on a reasonable capital works program for revenue determination with a contract providing for annual cap adjustment so that:
>
> - if the capex is increased/advanced, the revenue is correspondingly incremented;
> - if the capex is decreased/delayed, the revenue is correspondingly decremented.
>
> The [transmission network] should be then allowed to optimise outcomes within these constraints. Such an arrangement will provide [transmission businesses] with strong incentives to develop creative cost effective solutions which will in turn drive asset valuations down.

4.3.3 Consultants' reports

As mentioned above, IPART engaged Worley to review the reasonableness of TransGrid's capex forecasts, assess past investment and the current condition of the network and analyse the reasonableness and adequacy of forecast capital expenditure. The study also considered the adequacy of past and proposed maintenance and the impact on reliability and quality of supply. The report was completed in October 1998.

In early 1999, the Commission employed Ewbank Preece as consultants to review the results of the Worley study. Ewbank Preece addressed the following issues:

- the methodology for determining the adequacy of the transmission system;
- their findings in relation to security and reliability;
- the effectiveness of the TransGrid asset management systems;
- the effectiveness of capital works assessment criteria;
- the costing of capital works plan; and
- the appropriateness of the proposed capital works plan.

In addition, SKM was asked to review capital investment made by TransGrid during the previous IPART determination — that matter is considered in Chapter 3, above. Copies of the Worley and Ewbank Preece reports are available from the Commission and IPART.

The Worley review

The Worley report was completed late in 1998 and thus does not assess developments in TransGrid's capex proposals since that time. Worley concluded that:

- TransGrid had a mature asset management regime in line with international best practice. Its capex information was generally of high quality;
- several radial parts of the 330 kV and 220 kV transmission network meet NEC requirements but did not, at the time, meet acceptable minimum security standards. Some areas of the network were susceptible to developments by TransGrid's customers and some areas were being operated at or close to their limits;
- five out of 29 TransGrid projects make up 80 per cent of the total projected capital expenditures for augmentation;
- the Sydney inner city network should be designed to meet N-2 security requirements for selected contingencies at a minimum because, although the risk of failure may be low, the consequences are potentially very high. As at late 1998, the combined network only marginally met N-1 security requirements;
- further, final resolution of the Sydney inner city supply situation was overdue. TransGrid and EnergyAustralia have since established a joint planning process to review the need and the options for augmentation of the transmission network supplying the Sydney CBD and inner suburbs. Two interim projects for the Sydney CBD supply were not included in EnergyAustralia's capital expenditure projections;
- the proposal and costs for the reinforcement of the Wagga Area supply, the Armidale-Lismore reinforcement and the proposed Queensland Interconnector were

appropriate. Worley considered that work should commence on securing easements for a suitable route for the Armidale-Lismore project in advance of requirements;

- detailed costings for the South Australia interconnection were not requested for review since the project was at the time, not yet approved and the subject of much discussion especially in relation to its evaluation criteria; and
- TransGrid's asset management strategies and expenditure projections for asset renewals were considered appropriate. Worley noted that the majority of transmission line renewals were expensed rather than capitalised.

The Ewbank Preece review

Of the 29 augmentation projects identified, Ewbank Preece concentrated their analysis and audit on the five major projects which each exceeded five per cent of the total expenditure and which accounted for the bulk of projected capex. Ewbank Preece also assessed a sample of five projects from TransGrid's remaining augmentation projects.

The following summarises Ewbank Preece's findings from its analyses of both the Worley review and the draft of the NERA review requested by TransGrid and EnergyAustralia as part of their joint process for assessing the most efficient way of addressing the Sydney augmentation problem. Ewbank Preece concluded that:

- TransGrid asset management systems were effective but the actual costs of asset management may not be declining as the costs associated with operational projects are included in opex. TransGrid's approach to condition monitoring was innovative and pro-active and is likely to extend asset lives;
- Worley did not comment on probabilistic analysis of the system security proposals, load forecasting methods or results or TransGrid's consideration of non-build options. Project selection criteria were not apparent from the Worley report and specification and procurement procedures were not discussed;
- the costs of equipment used by TransGrid in budgeting appear reasonable, except for cables, which the consultant thought may have been low, although the approach used by TransGrid to obtain budget estimates was sound;
- generally, the elements of the Sydney CBD project (e.g. reliability criteria, load forecasting, transformer costs and fuel costs) compared well with international practice. For example, Ewbank Preece commented that, although there is no universally accepted reliability criteria for supplying CBD areas, an N-2 criterion is generally used and was consistent with general international practice. Based on its international database (primarily European), Ewbank Preece considered that TransGrid's cable and switchgear costs may be low while their shunt reactor costs may be high;
- alternative generation options (cogeneration) were considered but Ewbank Preece shares concerns that the projects could not be established in time nor reliably supply the necessary level of support. While comprehensive, the review of demand side options was limited to the CBD but Ewbank Preece believed that local generation and cogeneration options might have greater potential than was considered. The overall benefits of augmenting the CBD and surrounding suburbs would accrue primarily to that area with any system-wide benefits being small;

- the Queensland interconnector project and its costs ($112.46 million) were appropriate, subject to a satisfactory return being indicated by the London Economics economic analysis conducted at the time the matter was originally considered (but which Ewbank Preece was unable to see);
- the Worley report indicates that the costs ($120 million) and timing of the Armidale-Lismore area reinforcement project seemed appropriate. However, Ewbank Preece stated that this project cannot be demonstrated to be an economic proposition until a detailed evaluation is completed;
- the Worley report states that the Wagga area reinforcement proposal and costs ($79 million) were appropriate. However, Ewbank Preece was unable to conclude that the expenditure was appropriate as:
  - it was not known whether a 330 kV line was needed as this was dependent on deciding the level of export requirement which had yet to be finalised; and
  - the project's viability as an economic evaluation had not yet been completed.
- the South Australia interconnection project and its costs ($51.23 million) were appropriate, although the status of the project was unclear given the uncertainty surrounding the relevant regulatory test at the time;
- based on a review of a representative sample of the minor projects, Ewbank Preece concluded that the minor projects and their anticipated were appropriate; and
- expensing (rather than capitalising) of asset renewals could be justified so long as the change over level from capital to maintenance expenditure is reasonable. TransGrid correctly capitalised projects that involved complete rebuilding of lines. The regulator should ensure consumers are not disadvantaged by this practice.

4.3.4 Commission considerations

In the draft decision, the Commission noted that the NEC makes a clear distinction between network planning and the determination of the revenue cap. On the one hand, NEMMCO and the IRPC have, under the NEC, responsibility for coordinating the centralised planning of major investments which may have impacts over the interconnected transmission system in the NEM. The remaining network planning responsibilities lie with the networks themselves.

On the other hand, the Commission's role as economic regulator of the transmission networks is to create the appropriate economic drivers for investment and for the efficient use of existing infrastructure. However, the Commission recognises that a key issue in attempting to create such an environment is that TransGrid and the other networks have an incentive to exclude competitive alternatives when performing their network planning functions. Similarly, forward estimates of capital expenditure are often subject to greater uncertainty than estimates of operations and maintenance expenditures. Consequently, the Commission is also wary of encouraging overestimates of forward capital expenditure which, if not undertaken, the regulated business may try to claim as efficiency gains in the future.

Given the existing arrangements in the NEC, it is unclear what will be the most optimal arrangement in the longer term. Options currently open to the Commission are to rely on *ex post* assessments of the value of a network's assets or previous period's capital

expenditure. However, a number of the networks and others have been critical of these approaches as they might create an uncertain environment for new investment.

The Commission is well aware of the adverse impact that regulatory uncertainty may have on the operation of the networks. Nevertheless, given the existing NEC arrangements, the Commission believes that its ability to optimise asset values, or undertake *ex-post* capex reviews, is a key lever in driving investment decisions that are:

- competitively neutral with respect to competitive alternatives such as generation and demand side alternatives; and
- efficient in both their underlying costs and in their timing.

The Commission would be concerned if network planning processes were conducted in such a way that only a network augmentation option could be considered in response to a concern over the reliability and adequacy of the existing network.

At the time of the draft decision, the Commission noted that it was considering developing a number of principles to manage the regulatory uncertainty associated with new investment. For example:

- that the processes leading up to the network investment fully explore all options and which give sufficient detail and opportunity for other contestable options to be identified in a timely manner;
- that the processes provide an adequate and competitively neutral opportunity for other contestable options to contract with the network (or other participants) in lieu of network investment;
- that construction of the network is undertaken on a contestable basis;
- that network prices are used to signal the need for additional capacity with a view to encouraging efficient utilisation of existing capacity from the demand side; and
- if the network expansion has been made on the basis of a negotiated connection agreement, rather than on the basis of the NEC requirements, then the connection agreement should also specify how the two parties have agreed to finance the new investment.

However, in the current circumstances of setting TransGrid's revenue cap, the Commission stated that it must be confident that the planned network investments are prudent. This should not be interpreted as a Commission view on the efficiency of an investment. For instance, the Commission is currently faced with making a decision on TransGrid's revenue cap, but the majority of the projects included in its proposed capex program have not yet satisfied the network planning requirements of Chapter 5 of the NEC.

Consequently, the Commission's assessment of the prudency of TransGrid's proposed capex program is conducted for the purpose of establishing a revenue cap which is commensurate with its cash flow needs. Indeed, it is likely that TransGrid will undertake some additional projects which are not currently included in its capex program. It is also quite possible that not all the projects proposed by TransGrid will be undertaken — for some projects the need may no longer exist while for others a more efficient alternative may arise. In the latter case, where TransGrid implements a

lower cost project, the savings could be partly retained by the network as an 'efficiency dividend' with the remainder shared with network users at the next review period.

With these principles in mind, the following sections summarise the Commission's considerations on TransGrid's sizeable capex program in the context of its draft revenue cap decision.

Sydney CBD

TransGrid provided the Commission with its analysis of the CBD project and this, and other material, has been independently reviewed by both Worley and Ewbank Preece. On the basis of the information presented to the Commission, it appeared that a N-2 reliability criterion for selected contingencies for the Sydney CBD and a capacity expansion to meet this criterion was prudent. The Commission noted that in assessing potential options, TransGrid and EnergyAustralia had commenced a public review process and an assessment which attempted to take into account the outcome of the Commission's review of the assessment criterion for new interconnectors and network augmentations.

On this basis, the Commission was prepared to include into the determination of revenue cap an allowance of $137 million for TransGrid's projected costs of augmenting their transmission network to the Sydney CBD. The estimate of $137 million was based on the network construction costs for TransGrid included in the draft NERA assessment study. For the purposes of determining a draft revenue stream, the $137 million was included into TransGrid's rate base in the 2003/04 financial year, the year the augmentation project is expected to be commissioned.

The effect of this decision was to provide TransGrid with a revenue stream in line with the projected expenditure on this project. If TransGrid implemented an option of similar performance characteristics as that proposed, but can do so at a lower cost, then the Commission proposed that TransGrid will be able to retain some proportion of the difference as a 'productivity dividend' for the duration of this regulatory period.

Conversely, the Commission noted Ewbank Preece's concerns regarding some of the project's budget projections which it believed were below benchmark costs in Europe. As the revenue cap determination is made on the basis of the budget forecasts, the impact of any cost over-runs on this project would be borne by TransGrid and not TransGrid's customers.

The Commission also noted the considerable concerns of a number of parties which have questioned the merits of a network option over alternative options such as either demand side programs or additional generating capacity in the Sydney basin. Given the Commission's limited role in the network planning process and that TransGrid's and EnergyAustralia's assessment processes have yet to be completed, the Commission did not have a view on what is the most efficient way to address the supply reliability concerns to the Sydney CBD. However, it stated that is clear from the NEC that this is a matter which TransGrid needed to address jointly with EnergyAustralia.

As indicated above, the Commission will review the efficiency of TransGrid's capital expenditure on the implemented CBD project at the next revenue cap determination and will do so according with the *Regulatory Principles*. In undertaking such a review, it is likely that the Commission will take into account the extent to which TransGrid has

undertaken the project on a contestable basis (e.g. competitive tendering), whether network prices could have been used to signal the need for additional capacity and the extent to which the cost of meeting the N-2 criterion is borne by the beneficiaries of the project. At the time of the Commission's draft decision, it was not apparent that these issues were addressed.

Wagga

The TransGrid network management plan indicates that the Wagga augmentation is a pragmatic possibility.

In its review for IPART, Worley considered that this project is required to relieve transmission constraints in the NSW system (caused by the lack of reactive support at Wagga) which impact on the Victorian import capability. There is a possibility of 132 kV system voltage collapse (causing loss of supply), should higher power transfers to Victoria be undertaken following the planned 300MW upgrade of the Victorian interconnector. At times the loading on all four of the Wagga circuits could constrain the NSW south west system operation. Additional capacity will be required through this corridor, particularly if the South Australian interconnection into Buronga proceeds. Worley concluded that:

> The construction of a 330 kV Yass - Wagga circuit is the logical option and associated with this the Yass 330 kV switchyard would need to be uprated to a higher fault capability. This uprating is likely to be required anyway if/when the Yass 330/132 transformers are replaced with higher capacity units. Worley believe that the proposal for the 330 kV transmission line between Yass and Wagga and the project costs for the transmission line and substation work at Yass is appropriate.

Ewbank Preece noted that the Worley assessment but commented that:

> in order to be satisfied that the expenditure of $79 million for the reinforcement project is justified it is necessary to be sure that the project is required. Once the export requirement potentials are decided, a study should be carried out, perhaps similar to that for the Queensland interconnector, in order to justify the expenditure. We cannot confirm that this expenditure is appropriate at this stage.

The Commission concurred with the assessment by Ewbank Preece that, although there may be sound reasons for augmenting the Wagga region, it is not yet apparent that this project has passed the test for new network augmentations in Chapter 5 of the NEC. While this project would be an intra-regional augmentation, it is similar to an interconnector as the main purpose will be to increase electricity flows from Victoria into NSW. Passing this test would be a clear requirement for the assets to be included into, and retained in, TransGrid's asset base.

This project also seemed to raise some of the same issues that arose with the QNI. For example, in the case of QNI, many electricity users in NSW claimed that they would be required to fund QNI, through higher TUoS charges, but that the main beneficiaries would be the NSW generators who would have access to the higher pool prices in Queensland. While the Commission acknowledged that this is an allocative issue (ie. it is one of who pays for the augmentation rather than whether the project generates net public benefits), it is nevertheless an important one for electricity consumers as well as for generators. In this context, the Commission noted that NECA was progressing work on the allocation of new investment costs as part of its review of transmission and distribution prices.

On balance, the Commission decided to include the $79 million for the Wagga augmentation into TransGrid's asset base commencing from the financial year 2003/04 (the final year of this regulatory period) but notes that an economic justification for the project would form an important part of the Commission's reexamination at the next regulatory reset of the actual expenditure that takes place.

Armidale - Lismore

In undertaking their independent reviews of this project:

- Worley observed that the ability of the transmission network north of Armidale to supply Lismore and the Far North coast was limited and that a forced outage on the main transmission line would lead to automatic load shedding (due to voltage constraints on the remaining network) with loss of supply over a wide area;
- Worley noted that all of the possible options, including no capital investment, were considered and tested in a comprehensive economic analysis and risk assessment;
- Worley considered that the project evaluation work carried out by TransGrid is of a high quality, a view supported by the Ewbank Preece review;
- Worley noted that delays in the project would bring increasing risk of significant economic and social impact on the region for a contingency event on the 330kV line from Armidale; and
- both consultants considered that the evaluation, cost and timing of the project had been demonstrated to be appropriate.

The independent reviews of this project appeared to acknowledge the merit of the augmentation. However, the project forms part of TransGrid's longer term investment program. Given its anticipated commissioning date, the Commission considered that the Armidale-Lismore augmentation would not be eligible to be included in TransGrid's asset base until after the end of this regulatory period. Consequently, the Commission concluded that it was not required to make a decision on providing an allowance for this project within the 1999/00 to 2003/04 regulatory period.

The Commission stated that it would make a decision on this matter at TransGrid's next regulatory review based on the information available at that time.

Queensland interconnector (QNI)

In its December 1997 determination on the NEC, the Commission made the following decision regarding the New South Wales derogation to deem the proposed QNI interconnector as a regulated asset:

> The Commission considers that there are public benefits arising from the development of QNI. These benefits include competition benefits arising from an increased efficiency in the use of reserve plant; a possible reduction in the degree of market power on New South Wales generators; greater customer choice and efficiency benefits arising from an integrated approach to ancillary services in the NEM.
>
> Further to these general benefits, the derogation to have QNI deemed a regulated interconnector will have benefits in the form of providing the proponents with certainty regarding the cost recovery methodology that will apply to the assets (although not certainty regarding income stream), and benefits of avoiding transaction costs associated with any duplication of processes.

However, the Commission went on to state that:

> The Commission has not based its decision upon the economic merits or otherwise of QNI or alternatives to QNI. It has noted both the London Economics report and the proponents submission regarding the benefits arising from QNI and has also noted the deficiencies in both those documents as put forward by interested parties. Whether or not QNI is an efficient investment will be a matter which the Commission will revisit when the time comes to optimise the asset bases of TransGrid and PowerLink. The Commission notes that it is a real possibility that the asset bases of the transmission companies could be substantially devalued as part of the optimisation process if QNI proves not to be an efficient interconnector.

Worley undertook a detailed review of the project cost estimates for QNI and concluded these cost estimates were appropriate. Similarly, Ewbank Preece considered the Worley conclusion and the London Economics report and agreed that the project and its capital costs were appropriate.

The arrangements to deem QNI as a regulated interconnector remain in place and the Commission concluded that the NEC would not seem to provide the Commission with an option to optimise the capital expenditure at the time of the draft decision. Also, other than the two independent assessments of this project and the initial London Economics study, the Commission was not been provided with any evidence which would cause it make a decision to exclude TransGrid's capital expenditure on QNI from TransGrid's asset base. A related issue dealt with in Chapter 3 of this report is the re-optimisation upwards by $70 million of some of TransGrid's existing assets which would be utilised to transfer electricity across the QNI.

On this basis, the Commission decided to include the $112.46 million for the QNI into TransGrid's asset base commencing from the financial year 2001/02.

South Australian/New South Wales interconnector (SANI)

SANI was intended to add another 250MW import capacity to the South Australian market. It was to be jointly owned by TransGrid and the Electricity Trust of South Australia and was due to be completed by 2000.

In June 1998 NEMMCO found the application for the SANI project to be deemed as a regulated interconnector was not justified under the NEC based on the current customer benefits test. This halted development of the interconnector. Following the earlier NEMMCO decision, a new generator at Pelican Point will add to South Australia's generating capacity anticipated to be 160 MW by November 2000 increasing to 487 MW by April 2001. At the time of the draft decision, the Commission noted that NEMMCO was assessing a new application for a regulated interconnector between South Australia and New South Wales.

In light of these factors, the Commission decided to exclude the proposed expenditure of $51.23 million for SANI from the capex budget for TransGrid's regulated revenue for this regulatory period.

Smaller augmentation projects

The smaller augmentation projects make up around 20 per cent of TransGrid's projected capital expenditure and, of these, around $50 million is accounted for by the transfer of the transmission assets located in the Snowy region to TransGrid.

Worley commented that 'little information was supplied' on the smaller augmentation projects with the result that it did not review them. Worley noted that 'these projects did correlate with the [capex] requirements of the distributors' networks'.

The Commission asked Ewbank Preece to carry out a sample review of five selected projects for detailed review and comment and to confirm their overall appropriateness. The five projects selected (based on TransGrid's *Network Management Plan 1998-2003*) were:

- Inverell-Moree 132 kV line ($7.18m);
- Coffs Harbour-Kempsey line ($20.85m);
- System reactive plant ($27.9m);
- Waratah West substation augmentation ($10.5m); and
- SCADA equipment ($10.25m).

Ewbank Preece viewed the economic valuations for the first two projects and for two components of the third project together with a project summary for the Waratah West substation and the process for replacing the SCADA system. Based on its reviews of these projects, Ewbank Preece concluded that these smaller augmentation projects, together with their anticipated costs, are appropriate.

In relation to the transfer of the Snowy transmission assets to TransGrid, the Commission noted that:

- the joint owners of the Snowy assets, that is the Commonwealth, New South Wales and Victoria Governments, had yet to finalise the transfer of the transmission assets to TransGrid;
- even though the NSW Treasury has commissioned a review of the Snowy assets, the Commission had not had the opportunity to assess the value of these assets; and
- the Snowy transmission assets are contained in their own region with no users, so the states would have to agree to a cross border flow of TUoS charges before the Snowy assets could earn a regulated income (over and above any derived from the settlements surplus).

The Commission believed that until these three issues were resolved, it would be premature to include into TransGrid's asset base an amount for the acquisition of the Snowy transmission assets. In addition, the expected time of commissioning of the Tamworth-Gunnedah 132 kV transmission line places its expenditure outside the current regulatory period.

The Commission decided to include $143 million for the smaller augmentation projects into TransGrid's asset base, with the timing consistent with the year of commissioning documented in TransGrid's network management plan.

Renewals and replacement

At around a third of its proposed capital expenditure, TransGrid plans to spend $238 million of capital on asset renewals.

In assessing the 1998-2002 expenditure plans, Worley commented that:

> We have reviewed TransGrid's Asset Management Strategy documents which detail the renewal strategies for substation assets. In our opinion the strategies were considered appropriate and the expenditure projections generally agreed with these strategies. Asset replacement costs were reviewed and found to be appropriate.
>
> Where possible we also checked expenditure projections against the renewal strategies and the asset quantities given in the asset management plan. This also indicated to us that asset replacements costs used by TransGrid were reasonable. TransGrid advised that the majority of transmission line renewals are expensed rather than capitalised. A nominal amount has been included.

Ewbank Preece reached the same conclusions as those in the Worley report on TransGrid's asset management systems which they believed were effective as they are delivering improving system performance at decreasing cost. However, Ewbank Preece provided the caveat that the capital costs of renewals projects may not be falling as they could be expensed and included in overall operating and maintenance costs. While Ewbank Preece commented that TransGrid's categorisation of expenditure into expenses or capital expenditure was in line with the approach agreed to by the UK Inland Revenue, they suggested that this practice be further explored in the Australian context.

Some comment in this regard was provided by PB Power in its review of TransGrid's planned opex program (see Chapter 5, below). However, the Commission did not have time to exhaustively examine the appropriate treatment of expenses and capital expenditure in this current assessment. Accordingly, it stated that this would be carried out as part of the Commission's work on developing the regulatory regime for transmission networks in its *Regulatory Principles*.

On the basis of the independent reviews of TransGrid's asset management systems, the Commission decided to include the sum projected for renewals and replacement expenditure into TransGrid's asset base, with the timing consistent with TransGrid's projections. While not all of this expenditure was subjected to detailed assessments by the consultants, they were approving of TransGrid's asset management strategies. However this does raise the issue that in future reviews, all information should be presented early in the assessment process and that revisions, if any, should only be of a minor nature or if factual errors are identified.

4.3.5 Draft decision

TransGrid revised its initial capex program on two occasions; first, in December 1998 and then at the end of March 1999. Despite TransGrid's request that the Commission consider the March revisions, the Commission based its draft decision on the December 1998 revisions; that is, on the basis of TransGrid's *1998-2003 Network Management Plan*. This was because Ewbank Preece had largely completed its review of TransGrid's capex program by the time it was advised of the March revisions. A review of the March revisions would have further delayed the release of the draft decision.

In summary, the Commission decided to accept the initial prudency of including in the 1999/00 to 2003/04 draft revenue cap:

- $137 million for the Sydney CBD augmentation;
- $112.46 million for the Queensland-New South Wales interconnector;

- $79 million for the Wagga augmentation;
- $235 million for renewal and replacement expenditure (including a deduction of $3m for telecommunications assets which TransGrid agreed related to planned unregulated revenues); and
- $143 million for the smaller augmentation projects.

Given their projected timing and stated uncertainty, the Commission decided not to include capital expenditure amounts for the Armidale-Lismore, South Australia-New South Wales interconnector, Tamworth-Gunnedah 132 kV line and the Snowy transmission assets.

Further, while the Commission noted that the amount of expenditure allocated for inclusion in 1999/00 amounts to $50.75m, it reasoned that this expenditure took place during the 1998/99 financial year. As the Commission indicated its intention to accept the asset base valuation as at 1 July 1999 provided to it by IPART, it therefore determined that the expenditure must have been included in the IPART figure. Accordingly, the amount of capital expenditure for the first year of the new regulatory period, on the basis adopted by the Commission for timing the inclusion, became zero.

The Commission used the projects, their costs and timing, as documented in Table 4.2 for the purposes of calculating TransGrid's draft revenue cap for the 1999/00 to 2003/04 regulatory period.

Table 4.2: Draft TransGrid capital expenditure, 1999/00 to 2003/04 ($ million)

Year	99/00*	00/01	01/02	02/03	03/04	Total
Total	**50.75**	**76.69**	**188.67**	**79.48**	**311.25**	**706.84**

* The expenditure allowed in 1999/00 was reduced to zero as discussed above.

4.4 Issues arising from the draft decision

Several general issues were raised in submissions made by interested parties in response to the Commission's draft decision.

The ACA stated that the Commission was being pre-emptive in allowing the majority of TransGrid's proposed investments into its regulated asset base. It submitted that this was an area where, under the NEC, networks needed to properly consider alternatives to augmentation such as demand side management and local generation. Automatic inclusion in the network's rate base removes any incentive to negotiate a lower cost solution with proponents of such alternative solutions. The ACA submitted that future major transmission augmentation projects that could be avoided by alternative solutions should not be included in the rate base until such time as they are committed.

As part of its response to the Victorian Office of the Regulator-General's *Cost of Capital Consultation Paper*, Texas Utilities Australia believed that the role of the regulator should be confined to *ex ante* reviews of proposed capital expenditure. That is, it saw no role for the regulator in the imposed stranding of assets.

NorthPower considered that the draft decision failed to remove uncertainty over whether the capex which passed the initial prudency test would in fact be recognised in future reviews.

Western Power emphasised the uncertainty of capex projections, particularly where those projections depended upon world markets for equipment and that, accordingly, the Commission needed to clarify how inter-regulatory period capex would be accommodated within the regulatory framework in order to ensure efficient investment decisions. It also questioned how large amounts of unexpected capex would be dealt with under the regulatory regime.

TransGrid stated that the Commission should have regard to the further revised capex projections provided by the network in March 1999 as they were developed in response to concerns raised in the Worley report, a report which the Commission took into account in making its draft decision.

TransGrid also made a number of submissions in relation to a number of the particular capex projects considered in the draft determination.

Sydney CBD

TransGrid expressed concern in relation to the Commission's comment that the network would bear the cost of any overruns in relation to the amount given provisional approval for the Sydney CBD augmentation project. TransGrid submitted that this should not be interpreted to mean that it would be unable to recoup the cost of the actual expenditure should that actual amount satisfy any *ex post* expenditure test at the next regulatory reset.

Also in respect of the Sydney CBD augmentation, the BCA stated that the proposed allowance had not been completely justified and that the project should therefore fail the prudency test.

Snowy transmission assets

TransGrid submitted that the Commission should include the acquisition costs of the Snowy region transmission assets identified as one of the smaller augmentation projects in the capex projections.

The network claimed that an agreement to purchase those assets has been reached between its three owners (NSW, Victoria and the Commonwealth) and that, although a transfer price has not been settled, TransGrid expects that the price will reflect an ODRC valuation of the assets. It submitted that any uncertainty over the sale price could be addressed either through:

- making a provisional allowance in the current revenue cap subject to an adjustment for the actual cost at the next regulatory reset; or

- without assigning a specific figure, determining that TransGrid is entitled to include the amount actually paid in the year in which the funds are expended.

TransGrid expressed surprise at the Commission's statement that it had not had the opportunity by the time of the draft decision to assess the value of the Snowy

transmission assets. It submitted that the Commission had an obligation to assess a revenue cap in relation to non-contestable transmission services provided by assets located in NSW (and the ACT) and that this included those located within the Snowy region.

In its draft decision, the Commission commented that the Snowy transmission assets are located in their own region with no users so that the States would need to agree to a cross-border flow of TUoS charges before the Snowy assets could earn a regulated income. In response to this, while accepting that Clause 6.7.3. of the NEC prevents inter-State transmission networks from recovering charges from each other prior to 1 January 2001, TransGrid submitted that:

- this did not prevent those networks recovering revenues from customers other than transmission networks in more than one region;
- the restriction would not apply once TransGrid had acquired the Snowy assets as it would be the network for both sets of transmission assets; and
- once the NEC Chapter 9 derogations requiring Victoria and Queensland to each be considered as single regions for pricing purposes expire, there is no obvious reason why regional boundaries under the NEC would bear any relationship to State boundaries.

Armidale-Lismore

In relation to the Commission draft decision not to include the provisional cost of the Armidale-Lismore augmentation project in the current period's regulated asset base, TransGrid submitted that there was a pressing need to commence evaluation of the most cost-effective solution to meeting security problems in that region. It claimed that, if the evaluation process resulted in TransGrid's preferred option of a second 330 kV being approved, then construction would commence forthwith and the line would be commissioned within the current regulatory control period.

SANI

TransGrid believes that it has been placed in very difficult circumstances in relation to the SANI proposal. In its July 1999 submission, TransGrid claimed the (then) existing "net benefit to *Customers*" test for the approval of interconnectors set out in Clause 5.6.5 of the NEC, although previously authorised by the Commission, has proven unworkable but has yet to be amended.

Thus, TransGrid has not been able to have NEMMCO, the NEC-body which administers the test, determine whether TransGrid's SANI proposal is justified or not and, without that justification, the Commission was unprepared to approve the capex as part of the current regulatory cap. This was despite the fact the Ewbank Preece had concluded that SANI and its costs were appropriate.

The network submits that there is nothing in the NEC which would prevent the Commission from including the allowance in the capex for the current regulatory period since the allowance could be later deleted, altered or adjusted for if NEMMCO subsequently determined that SANI was or was not justified. It claimed that this would

be appropriate in that it would ensure that TransGrid would not be required to bear the cost of the project until the commencement of the next regulatory review.

TransGrid was also concerned that the process which was put in place to determine the new test to be administered by NEMMCO involved the Commission expressing its view as to the content of the new test, in effect making a policy statement which appears to run counter to the Commission's prior acceptance of the test as part of the NEC and its nominated role under the *Trade Practices Act 1974*.

TransGrid added that the preliminary view expressed by the Commission that NEMMCO should not approve new interconnectors more than one year prior to date when action is required to be taken by the network would make it virtually impossible to have that capex approved as part of the Commission's own revenue determination process every five years.

Finally, both TransGrid and EnergyAustralia submitted that:

- if capital projects which meet the Commission's initial prudency test are not 'rolled in' to the network's regulated asset base until those projects are commissioned, then it is appropriate to include an allowance at that time for interest during construction during the period when the assets are under construction but not earning revenues — TransGrid stated that the relevant rate would be its average interest rate on outstanding borrowings, currently at approximately 11 per cent; and

- the Commission should also include into the asset base in 1999/00 the amounts identified as representing works in progress (WIP) as at 1 December 1998 by the asset valuation consultants used for the review. It was submitted that the Commission had no basis for assuming that those amounts had been included in the IPART business valuation as at 1 July 1999.

4.5 Commission considerations

In the Commission's view, the general issues raised by the ACA, Texas Utilities Australia, NorthPower and Western Power reflect the difficulties involved in ensuring that the regulatory regime to be administered by the Commission provides an appropriate balance between ensuring revenue certainty for network owners and the most efficient levels of capital expenditure.

As mentioned in Section 4.4.4 above, the Commission is well aware that the use of an *ex ante* prudency check followed at the end of the five year period by an *ex post* adjustment for actual expenditure may have an adverse impact on the certainty that network owners require to continue to invest in their businesses, particularly when networks are not always in a position to make their own assessment of their optimum capex needs that far out. It is also true that the five year period may not guarantee that alternative supply options are assessed in their most advantageous light.

However, shortening the regulatory period would invite more intrusive, more frequent and more expensive regulatory intervention in the affairs of participants. It is for this reason that the five year minimum period was established under the NEC as providing a realistic and relatively light-handed way of providing the balance discussed above.

Parallel with this is the Commission's view that its *ex ante* and *ex post* assessments will include consideration of whether the network planning requirements set out in Chapter 5 of the NEC have been followed. The Commission considers that by complying with the NEC's network planning requirements, a network will lower (but not necessarily guarantee the removal of) any risk that a project initially approved by the Commission for inclusion in the regulated asset base will be included in future reviews. The Chapter 5 planning requirements and the Commission's views in this regard are designed to reflect the situation which would apply in a competitive market and this matter is further discussed in Chapter 5 of the draft *Regulatory Principles*.

In response to Western Power's query as to how inter-period capex is to be accommodated in the context of the regulatory regime applicable to this decision, the Commission points out that capex is rolled in to the regulatory asset base as at the date of commissioning. Thus, as has been noted in Section 4.4.4 above, the Commission does not propose to determine at present whether the Armidale-Lismore project scheduled to be commissioned in the next regulatory period should be accepted into the asset base until the start of that period.

As discussed in the draft *Regulatory Principles*, expenditure which a network wishes to undertake prior to that approval can be carried forward outside the regulated base at the rate of return pending the decision as to the merits of including the project from the commissioning date.

TransGrid submitted that the Commission should, in making its revenue cap decision, have regard to the further revised capex projections provided by the network in March 1999. In this regard, the Commission:

- considers that any difficulty aligning the network's capex planning cycle and the regulatory review cycle is another instance of the more general issue relating to timing discussed above;

- remains of the view that as the information was provided at the very end of the independent assessment of such expenditure it was too late for inclusion into the decision process in order to allow the Commission to assess the appropriateness of, and give interested parties the opportunity to comment on, the revisions; and

- notes that, while the length of time between the draft decision and this final decision was longer than anticipated, any possibility that there may have been an adequate opportunity to engage a further consultancy and public consultation process on this aspect of the inquiry did not present itself during that time.

This matter is also discussed in relation to several of the larger augmentation proposals addressed below.

Sydney CBD

In its submission TransGrid requested the Commission to clarify its position on cost over-runs for capital expenditure. The Commission's view is that at each regulatory re-set the Commission will assess the prudency of proposed capital expenditure. The efficiency of that expenditure will be rigorously assessed through the NEC's network planning processes based on the regulatory test criterion. To ensure consistency

between the network planning processes and revenue regulation, the Commission will roll into the asset base the costs of those projects that had met the regulatory test criterion in the previous regulatory period. The Commission will roll into the asset base those costs that were identified in the regulatory test assessment but not any cost over-runs incurred during construction.

While agreeing with the BCA that the augmentation option has not been completely justified, the Commission rejects its claim that the project should therefore fail the prudency test and so be excluded from contributing to the current revenue cap from the date it is expected to be commissioned. Again, this relates to the regulatory period dictated by the NEC. While it may serve to a network's advantage to ensure that its preferred option has met the approval process set out in Chapter 5 of the NEC, it is not strictly essential to passing the Commission's prudency test. However, by failing to do so the network runs a larger risk that the actual expenditure undertaken will be optimised out of the regulated asset base at the next reset.

The Commission also notes here that NERA's final report regarding the most appropriate option to meet the Sydney CBD supply issue has not been completed at the time of writing. In the absence of that further information, the Commission will provisionally include the $137m amount indicated in the draft decision plus interest during construction and adjustments for inflation since the time that decision was made.

Snowy transmission assets

Despite TransGrid's submission that a clear agreement has been reached to transfer ownership of the Snowy transmission assets to the network, the Commission remains unconvinced that the agreement provides enough certainty such that it should include any allowance for the purchase cost of those assets in the present revenue cap. As TransGrid admits, no price has been set and the Commission understands that no agreement has been reached on a proposed transfer date. The Commission's view has been formed based on discussions with the assets' present owners.

Accordingly, the Commission is not prepared to make any allowance in the present cap for this, at-present, thoroughly executory arrangement. It would be inappropriate to make customers pay for assets whose value and timing for inclusion in the cap remain uncertain.

Indeed, the Commission has, at the request of the Snowy Mountains Council, commenced a review of the value of the assets on the understanding that the purpose for doing so was to generate a revenue stream for the assets as it was intended that they will remain under the present ownership for the immediate future.

Armidale-Lismore

The need TransGrid refers to in its submission relates to its ability to ensure continued supply to the far north coast of NSW through gas turbines located at Koolkhan and owned by Pacific Power in the event of an outage of TransGrid's own 330 kV line. TransGrid indicates that the urgency stems from Pacific Power's indication that, without a substantial increase in compensation for that network support, it planned to release the turbines from that service.

Again, this issue relates to the ability of the network to adequately foresee the potential need for network development. The Commission notes that TransGrid was aware that the existing arrangements were to expire on 1 February 2000 and yet provided:

- no indication at the outset of this inquiry that any problem was anticipated in renewing that network support[39]; or
- no evidence in its latest submission supporting its contention that the matter had suddenly become a problem.

This is not to say that the Commission, in making its revenue cap decision, is not prepared to take account of the need for expenditure that was reasonably unforeseeable at the time a network provides its original capex proposal. However, if it is to do so in the absence of adequate time to allow comments to be made by its consultants and other interested parties, the Commission must be satisfied that the change in circumstances was not one which properly could have been anticipated. Without sufficient evidence, the Commission cannot be so satisfied in the present case. Accordingly, the Commission is not prepared to advance the inclusion of the proposed Armidale-Lismore project expenditure in the regulated asset base for the current regulatory period.

SANI

At the time of the draft decision the Commission argued that TransGrid's plans for constructing a regulated interconnector between South Australia and New South Wales were highly uncertain. Consequently, the Commission considered that proposed capital expenditure on that project should not be taken into consideration in setting TransGrid's revenue cap. The Commission's reasoning was that:

- NEMMCO and the IRPC had previously assessed, and rejected, TransGrid's request that the interconnector be a regulated interconnector; and
- since the earlier NEMMCO determination, decisions have been made which will bring on-line in South Australia additional generating capacity in the near future.

Since the draft decision some additional uncertainty has been added as Transenergie has proposed constructing an unregulated interconnector between SA and NSW.

TransGrid argued that it would be disadvantaged in two main ways by the Commission's approach as outlined in the draft decision. First, TransGrid argued that the original rejection of their proposal for a regulated interconnector was based on a deficient assessment criterion.

It may well be the case that the earlier assessment criterion has proved to be deficient and, in accordance with subsequent NEC changes, the Commission has redrafted a

---

[39] In its *1998-2003 Network Management Plan*, while noting that the relevant part of the network currently did not meet the required N-1 service standard and that the turbines were relied upon for support, TransGrid's assessment of future capex in this regard consisted of a static Var compensator being installed in 1999 and further reinforcement being necessary "about 2004". As noted above, these actions were generally considered appropriate by Worley and Ewbank Preece.

regulatory test to addresses those deficiencies. Nevertheless, the Commission does not believe that this factor will significantly reduce the uncertainties surrounding the likelihood that TransGrid will receive the necessary regulatory approvals to construct a regulated interconnector between SA and NSW.

Second, TransGrid argued that in the event that it were to construct a regulated interconnector, then the Commission's approach would deprive TransGrid with the capacity to earn revenue on that expenditure until the next regulatory period.

Equally, however, the Commission believes that New South Wales customers would be disadvantaged if the interconnector was not constructed and the Commission had included TransGrid's proposed capital expenditure on that project into its revenue cap decision. The Commission believes that while it could rectify the temporary disadvantage suffered by TransGrid at the next regulatory re-set, it would be more difficult to rectify the disadvantage suffered by electricity consumers whose pattern of electricity consumption, and therefore liability for TUoS, changes overtime.

Consequently, given the uncertainties that TransGrid will get the necessary regulatory approvals to construct a regulated interconnector and the balance of the disadvantages associated with the Commission's decision on this matter, the Commission has not included this project into its calculation for TransGrid's revenue cap.

4.6 Conclusion

On the basis of its considerations in relation to the matters discussed above, the Commission proposes to accept the initial prudency of including in TransGrid's revenue cap for the period between 1999/00 and 2003/04:

- $163 million for the Sydney CBD augmentation;
- $202 million for the Queensland-New South Wales interconnector;
- $93 million for the Wagga augmentation;
- $258 million for renewal and replacement expenditure (including a deduction of $3m for telecommunication assets relating to planned unregulated revenues); and
- $165 million for the smaller augmentation projects.

The amounts noted are those referred to earlier expressed in nominal terms based on the projected inflation rate and including an allowance for interest during construction. The projects and associated allowances will be subject to full review at the next regulatory reset.

Given their projected timing and stated uncertainty, the Commission confirms its draft decision not to include capital expenditure amounts for the Armidale-Lismore, South Australia-New South Wales interconnector, Tamworth-Gunnedah 132 kV line and the Snowy transmission assets.

As noted in Chapter 3, above, the Commission has valued TransGrid's opening asset base as at 1 July 1999 using ODRC principles. This means that it is no longer required

to assume that capex projected for 1998/99 was included in the opening asset figure meaning that the allowed amount of capex for 98/99 can be rolled-in as commissioned.

The Commission has used the projects, their costs and timing, as documented in Table 4.3 for the purposes of calculating TransGrid's draft revenue cap for the 1999/00 to 2003/04 regulatory period.

Table 4.3: TransGrid capital expenditure, 1999/00 to 2003/04 ($ million)

Project	99/00	00/01	01/02	02/03	03/04	Total
Balranald 275/66kV substn.			6.07			6.07
Canberra substation			4.42			4.42
Circuit breakers and current transformers	6.14	5.46	3.72	5.61	5.79	26.71
Easements	5.70	6.95	5.63	7.40	3.87	29.55
Information systems equip.	4.79	3.19	2.96	2.89	2.92	16.75
Inverell-Moree 132kV line		7.72				7.72
Kempsey-Coffs Harbour 132kV line					26.53	26.53
Kemps Creek-Sydney S. 330kV line					12.95	12.95
Koolkhan 132/66kV substn.				2.84		2.84
Liddell-Muswellbrook line				9.12		9.12
Lismore supply complex		13.03				13.03
Metering	0.37	0.05	0.04	0.05	0.05	0.56
Misc. plant and office equip.	2.34	1.54	1.11	0.96	0.99	6.93
Misc. substns	7.00	7.89	7.25	10.44	7.51	40.09
Misc. transmission lines	0.21	0.21	0.39	0.13	0.13	1.07
Motor vehicles/mobile plant	5.49	6.23	7.18	6.04	5.93	30.87
Nambucca 132/66kV substn.			5.09			5.09
Network service projects	0.48	0.37	0.81	0.89	0.92	3.47
Orange substn.			4.41			4.41
Power station switchyards	0.37	0.25	0.11	0.12	0.12	0.97
Queanbeyan substn.			2.32			2.32
Queensland interconnector*			201.86			201.86
Reinforce South West					13.16	13.16
Reinforce Sydney CBD					163.47	163.47
Reinforce Wagga area					92.88	92.88
Reinforce Western area					30.08	30.08
SCADA replacement	3.79	4.96	0.72	0.74	0.76	10.97
System reactive plant	6.12	3.85	3.75	17.07		30.78
TAMIS system	3.84	0.70				4.53
Tamworth 330/132kV substn.				6.83		6.83
Telecommunications	4.15	12.83	28.13	7.40	2.35	54.85
Tomago substn.	1.82					1.82
Tuggerah substn.		6.85				6.85
Waratah West substn.				12.02		12.02
Total	**52.61**	**82.08**	**285.95**	**90.53**	**370.42**	**881.59**

* The sum for QNI includes the value of the reoptimised 500kV transmission lines in 2001/02.

5. Operating and maintenance expenditure

5.1 Introduction

In setting TransGrid's revenue requirement, the Commission must assess the network's capacity to achieve realistic efficiency gains in its proposed operating and maintenance expenditure (opex) with regard to future demand and service quality. As noted by IPART, opex provides the cash flow to meet the ongoing requirements of the business:

> Operating and maintenance … costs are often considered the 'cash outlay' costs of an infrastructure business. Recovery of these costs does not provide any return to the infrastructure owner, as they are paid out in the form of salaries, ongoing operating and maintenance costs, emergency service costs, etc. These costs allow the business to provide and maintain service.

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 the use by TransGrid of benchmarking, based on domestic or 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 TransGrid has struck an appropriate balance between opex and capital expenditure. Finally, efficient opex is a key source of the overall productivity gains that the Commission will consider in determining the incentive outcomes for TransGrid's revenue cap.

The remainder of this chapter:

- sets out the requirements of the NEC (section 5.2);
- 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:
  - TransGrid's opex proposal for the regulatory period;
  - submissions by other interested parties;
  - the findings of PB Power, the consultant appointed by the Commission to review TransGrid's projected opex (section 5.3); and
- outlines the issues which arose from the Commission's draft decision (section 5.4); and
- sets out the Commission's revised considerations and conclusion (section 5.5).

5.2 NEC requirement

The Commission's task in assessing TransGrid's opex is specified in the NEC. In particular, Part B of Chapter 6 of the NEC 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.

Prior to IPART's 1996 determination, TransGrid conducted an efficiency review which recommended that controllable costs (such as labour, overheads and maintenance) be reduced by 25 per cent by June 1998. TransGrid advised IPART that productivity improvements of about eight per cent per annum could be achieved evenly over those three years. This was a key factor in IPART's decision to adjust TransGrid's total transmission revenue by CPI minus three per cent over the regulatory period.

In its 1998 issues paper, IPART reaffirmed the importance to the utility owner of recovering operating and maintenance costs. However, IPART commented that it is important that the utility not incur excessive or unnecessary costs in providing services:

> It is in the interests of all concerned that the regulator and interested parties be able to examine the level of current and forecast operating costs, and be able to compare those costs with other similar entities, both in Australia and overseas. The Tribunal notes that it is important for network companies to be explicit in stating the classification and level of their operating and maintenance costs. This is essential to allow meaningful comparisons with other similar service providers. The Tribunal asks that TransGrid and the [distribution businesses] provide relevant system design and performance characteristics, customer and load information, and other information which will allow for meaningful comparisons.

5.3 Draft decision

5.3.1 TransGrid's original proposal

The following summary of TransGrid's original proposal is based on its various submissions to the Commission and IPART from late 1998 to early 1999.

Opex targets

TransGrid stated in its 1997/98 annual report that it had met the target required of it by IPART to reduce its controllable opex by 25 per cent. This was confirmed by PB Power in its consultancy report (see below).

In relation to opex targets beyond the 1997/98 financial year, TransGrid stated in its September 1998 submission that:

> total operating expenditure for TransGrid during 1997/98 was $101.7 million. TransGrid's Corporate Plan targets a real reduction of 4 per cent per annum reduction in controllable costs for the next three years. This is considered appropriate given the very significant reductions over the current determination period and the maintenance effort associated with minimising uneconomic replacement of aging assets. Additional maintenance effort will begin to emerge as a result of new system additions over the period of the next determination.

However, TransGrid added that the four per cent per annum targets were provisional only and that an efficiency review was planned by NSW Treasury as part of TransGrid's corporatisation process undertaken in late 1998. Accordingly, it was possible that the findings of the review would lead to some adjustment to the targets.

TransGrid subsequently indicated that it had set a revised total target of 12 per cent savings for the three years commencing on 1 July 1998. Information provided by PB Power describes that target as comprising:

- the bulk of the reduction in controllable operating costs occurring during 1998/99 including a $5.2m reduction resulting from the capitalisation of indirect labour costs; and
- further real savings of two per cent in TransGrid's network group cost and four per cent for its other business units for each of the years 1999/00 and 2000/01.

Preliminary studies carried out by TransGrid had considered extending the targets through the remaining three years of the regulatory period but those targets have yet to be formalised in its business plan. Consequently, no targets for those years were provided to the Commission.

The tradeoff between opex and capex

TransGrid emphasised in its submissions that there is an important tradeoff between opex and capital expenditure (capex) and that transmission businesses with old assets typically have higher operation and maintenance costs than transmission businesses with new assets. As equipment ages, maintenance costs tend to increase.

However, it is unusual for replacement capex to be economically justifiable on the basis of consequent savings in opex alone. Accordingly, opex requirements need to be considered in the context of overall business efficiency. As it has an average equipment age of some 25 years, TransGrid states that it would 'actually be economic for operating and maintenance costs to increase over time'.

Conversely, where overall opex exceeds the value of capital investment, then asset replacement becomes optimal:

> The economic life of an asset is generally thought of as the shortest of its legal, physical, technical or commercial lives. Applying this to TransGrid's material assets it is the commercial lives which are the most important consideration. This principle suggests that when the present value of the operating and maintenance costs (incorporating energy losses and service and reliability standards (ie. probability risk of not meeting service standards)) exceeds the cost of replacement capital expenditure it is more effective to replace than continue to maintain the existing system. This represents the asset's effective economic life.

TransGrid also added that the appropriate accounting treatment for recording opex items is an issue that warrants closer evaluation:

> While audited accounting practices provide a degree of uniformity different interpretations of whether certain expenditures are capital or operating in nature do occur. It is acknowledged that the principles used in a given regulated entity need to be transparent and consistently applied over time.

Benchmarking

TransGrid agreed that the opex allowance should be based a benchmarked level of efficient service but prefers a standard of good industry practice. TransGrid claims there are very strong arguments for providing opex levels matched to reasonable levels of relative cost performance rather than best practice performance:

> Under incentive regulation the allowance opex should be determined on the basis of good industry practice, not world's best practice. Benchmarking opex is very useful for improving specific

management practices. Examples include optimising the frequency of line inspections or improving plant condition monitoring techniques.

In its 1997/98 annual report, TransGrid stated that it had participated for several years in two international benchmarking studies. These were the International Transmission Operations and Maintenance Study (ITOMS) and the National Grid Company (UK) International Comparison of Transmission Performance. Referring to the first of these in its submissions to the Commission, TransGrid noted that:

> when compared to other companies on the basis of international benchmarking TransGrid's operating and maintenance costs are in the lowest quartile. Composite measures of service performance on the other hand, place TransGrid in the best performance quartile. That is, TransGrid compares more than favourably on the basis of cost and service with other transmission companies.

However, while recognising that the regulator needs to have sufficient information to arrive at an informed judgement on opex, TransGrid warned that benchmarking for such purposes is fraught with difficulty and has had very limited success in relation to transmission businesses overseas. This is due to the fundamental and diverse differences between transmission networks and the consequential difficulties in normalising comparative performance indicators.

Accordingly, when requested to provide detailed information concerning the ITOMS study, TransGrid was only prepared to provide the Commission and IPART with a briefing on the executive summary, stating that:

- confidentiality considerations prevented more complete disclosure; and
- the study was designed as a management tool only and thus had limited relevance to the regulators' inquiries.

TransGrid indicated that it was developing proposals to address the appropriate criteria for benchmarking opex and that a suite of whole of system indicators covering cost and performance may be able to be developed to assist regulators. It also claimed that:

> regulated entities should be able to keep a share of the efficiency gains over more than one regulatory reset period. This is essential if investment is to occur in efficiency improvement and parallels the competitive market where better than average performers keep gains until other companies 'catch up'.

5.3.2 Submissions by interested parties

The following material is mostly drawn from submissions on the Commission's *Regulatory Principles* issues paper. While, with one exception, they are not specifically focussed on TransGrid's revenue or performance, the issues they raise regarding opex are germane to the Commission's consideration of this aspect of TransGrid's operations.

Other Australian transmission networks (GPU PowerNet; Powerlink; Transend, Western Power) commented on the treatment of opex in their submissions to the Commission's *Regulatory Principles* issues paper. GPU PowerNet also provided comments in response to the Commission's release of PB Power's consultancy report. These comments shared TransGrid's concerns regarding the assessment of opex for regulatory purposes, namely:

- the difficulty in interpreting and comparing benchmarked data from different networks due to differences in asset ages and design, operational characteristics, financial conditions, load density and demography, and geography;
- the distinction between maintenance costs (which vary with operation of the network) and other controllable, usually fixed, overhead costs;
- the need for the regulator to understand the interdependence of capex, opex, efficiency improvement factors and optimised assets in the overall context of network service, not in isolation; and
- the need to establish meaningful indicators (such as opex costs per MWh, opex costs per line kilometre and opex costs per asset base dollar) while taking account of the inherent deficiencies in such measures.

In its submission to IPART, NSW Treasury supported the recovery of a benchmarked level of efficient costs in the revenue cap, rather than the network's actual or projected operating costs. Treasury also commented that efficiency reviews should recognise differences in operating environment, accounting policies, service standards, levels of capital expenditure and the design and age of networks. Therefore, individual efficiency targets should be required for each network rather than broader industry benchmarks.

Given the importance of opex benchmarks to the revenue cap incentive mechanism, Treasury urged that the regulator consult with the networks with regard to the benchmarking methodology adopted and resultant operating cost targets:

> Where possible, attempts should be made to reconcile material differences between the [networks] own expectations for efficiency savings relative to those required by the regulator in order to ensure that the regulator's required efficiency savings are achievable.

Ergon Energy commented generally on the method of accounting for the allocation of expenditure between capital and maintenance (ie. expense) accounts:

> This is because the potential effect of manipulating expenditure in the MAR is significant. For example, the replacement of a tower could be considered maintenance expenditure and therefore, under the MAR formula, part of opex, thus allowing for complete recovery of the cost of the work in the relevant year and causing an increase in revenue (ie. prices to consumers). A strict definition of maintenance expenditure could ensure recognition of this expense as capital in nature and therefore require it to be treated as an increase in the [written down value] asset cost base…. Therefore an unintentional bias exists in the formula which encourages [transmission entities] to recognise network expenditure as operational (ie. maintenance) rather than capital in nature. This allows the MAR to be maximised and the generation of higher profits from regulated network assets.

BHP emphasised that, as they are the only controllable cost of the network, operating expenses are the only cost worthy of benchmarking. In addition, the regulator should focus only on opex in using CPI-X to encourage innovation and productivity. BHP stated the incentive factor should relate to a set of dynamics, including the right of the network to earn more than the WACC for above benchmark performance. Transparency was also an important issue:

> The ACCC should require that the [networks] disclose their own opex costs — past and forecast, as well as benchmark data with other [networks] in Australia and elsewhere. The outputs should also be benchmarked in terms of service levels, reliability, network outages and perhaps periods of congestion.

The Business Council of Australia (BCA) supported the benchmarking of opex with financial and non-financial indicators. BCA also raised a concern that maintenance programs (funded by opex) could extend the service life of assets indefinitely, while the network also charge consumers for depreciation on the same asset:

> Similarly when replacement prices are used to value the asset base, the consumer is then being asked to pay for the original asset, pay for its maintenance and pay for its replacement — a triple dipping!

The Energy Users Group (EUG) also supported benchmarking of opex costs against local and international experience, the results of which should be then reflected in efficiency targets. Setting the opex allowance too high will create inefficiency while setting it too low may undermine asset lives, service quality and reliability. EUG also raised concerns regarding the ability of regulated utilities to roll compliance costs into their opex base, whereas end-users 'are left to participate on a comparative shoe-string and balance in the regulatory process is seriously compromised'.

5.3.3 The PB Power review

The following summarises PB Power's approach to examining TransGrid's proposed opex costs and its principal findings in relation to the appropriateness, efficiency and effectiveness of TransGrid's opex strategy. In particular, PB Power reported on the following matters:

- assessing whether TransGrid:
  - had asset management policies and procedures in place which ensured that only efficient opex takes place;
  - appropriately classified expenditure as either opex or capex; and
  - properly allocated common costs between its regulated and unregulated businesses;
- the network's past opex performance;
- analysis of TransGrid's future opex plans and targets and the scope for further efficiency gains beyond those targets; and
- TransGrid's performance against benchmarks as a guide to efficiency targets.

TransGrid's opex practices and outcomes

PB Power concluded that the following TransGrid operating practices and/or outcomes were generally appropriate:

- asset management strategies (including the development and implementation of a comprehensive 30 year management plan and the recent implementation of new business and financial systems);
- the development and review of maintenance standards which TransGrid tested through benchmark studies against world's best practice; and
- the approach to expensing or capitalising projects using a minimum threshold of $500 for capitalisation and a test for capitalisation based on the effect of the project on overall network design and type of plant.

Broadly speaking, similar conclusions were reached by Ewbank Preece in its report on capital expenditure.

In relation to the question of the allocation of common costs, PB Power noted that:

- at the time the review was conducted, TransGrid earned a relatively small proportion (some two per cent) of its total revenues through unregulated work but planned to grow the value of that work in the future. At the time of the review, the unregulated revenues were principally derived from engineering consultancy and labour hire ($6m in 1997/98) plus a small amount from leasing telecommunications bandwidth (less than $1m in 1997/98);
- TransGrid's policies for allocating common costs were generally appropriate given the materiality of the unregulated revenue — normally by way of a burden rate on labour for the engineering consultancy and labour hire business which includes most indirect labour costs, depreciation and insurance but no allowance for financing or corporate overheads (neither of which TransGrid considered to be material at present). Given the small levels of telecommunications revenue and the fact that such revenue is essentially capital-derived, expenses other than depreciation were not allocated directly to this source; and
- while depreciation was allocated to unregulated revenues, the level at the time of the review was so small that the effect of excluding the relevant assets from the regulated asset base would have been immaterial.

These comments generally correspond with the analysis of TransGrid's regulated and unregulated assets contained in SKM's asset base report.

Financial performance

As noted above, PB Power confirmed that TransGrid had achieved a 25.14 per cent reduction in controllable costs since 1995/96 and that it planned to reduce controllable costs by 12 per cent over the next three years. These future targets used 1997/98 as the base year and the bulk of those savings were planned to occur in the period prior to the commencement of the Commission's revenue cap on 1 July 1999.

A large portion of the savings for 1998/99 was planned to come from $5.2m capitalisation of overheads. TransGrid in the past had only capitalised direct labour cost and had not made any allowance for other associated costs such as overheads, supervision etc. PB Power considers the revised approach to be appropriate and noted that TransGrid had confirmed this direction with independent advice.

In terms of opex targets and projects for the upcoming regulatory period, PB Power concluded that TransGrid is well placed to make the planned efficiencies. It found that:

- the proposed savings of 12 per cent in transmission operations over the three years from 1997/98 should be more than achievable — total opex should reduce from $119m in 1997/98 to $99.8m (real) in 2000/01 (ie. $19.2m over the three years);
- no further savings were planned for 2001/02-03/04 — expenditure variations noted by TransGrid for those years reflect TransGrid's assumptions regarding the need to increase insurance costs but note that this increase did not include any allowance for potential liabilities under the *Trade Practices Act 1974* for damage to customer equipment arising from power system surges; and
- any cost savings in the three remaining years of the revenue cap period may be less easy to achieve due to TransGrid's increasing asset base, the rising cost of insurance, restrictive employment conditions and the relatively unknown costs of

complying with NEM requirements. The costs for public consultation in relation to supplying future loads was also considered by TransGrid to be significant, although this would largely be expected to be capex, not opex. Any extra costs should also be partly offset by savings in IPART monitoring and the discontinuation of pre-corporatisation reporting requirements.

PB Power also noted that TransGrid's planning cycle presently differs from the five-year regulatory cycle and considered it would be normal prudent business management to align the two when the opportunity becomes available.

Benchmarking results

As mentioned above, TransGrid has participated for several years in both the International Transmission Operations and Maintenance Study (ITOMS) and the National Grid Council (UK) benchmarking study.

PB Power noted that the intention of the ITOMS study was to identify performance improvement opportunities at an asset management level covering only about $30m of TransGrid's opex and not for the business as a whole.

It also stated that, while the UK study collected a range of information about companies around the world, the results of the study needed to be treated with caution. For example, the basis on which the participating transmission networks valued their assets (ODV, DAC or otherwise) would be likely to have a major impact on the relative performance of the networks as depicted in the results of the study.

PB Power stressed that any consideration of future opex against historic performance, on the basis of benchmarking, would be complicated by the difficulties in making accurate inter-utility comparisons. In order to allow comparisons to be made on a more level playing field basis, PB Power was of the view that, in the first instance, only Australasian networks should be only considered as the nature of their business arrangements are better known. However, even when considering such networks, there were a number that are dissimilar to TransGrid so that results generated by their inclusion needed to be treated with caution.

PB Power concluded from its own benchmarking analysis using available data on comparable Australasian networks that:

- TransGrid's overall trend for opex costs per MWh transported was appropriate;
- the trend for opex costs per asset value (about four per cent) was satisfactory from 1998/99 onwards after being on the high side for 1995/96 and 1996/97 — a target of 3.5 per cent seems appropriate for this measure but, to achieve it, TransGrid's opex would have needed to decrease by $5m from the target level predicted for 2003/04;
- the trend for opex costs per circuit kilometre decreased significantly from 1997/98, compared to increases in similar costs for Powerlink and Transpower. PB Power stated that 'a slight reduction in TransGrid's long term opex costs per circuit kilometre [was] considered appropriate'; and
- these performance measures indicate that a further one to two per cent efficiency savings per annum should be achievable in the last three years of the regulatory period.

Conclusions

PB Power concluded that the efficiency targets set by TransGrid were achievable with the possibility that further ongoing savings could be made during the last three years of the revenue cap period. However, TransGrid's ability to meet its own projected targets and the further savings suggested by PB Power's analysis depended on a range of internal and external factors including:

- Federal and State government taxation policies (for example, the GST) and possible privatisation;
- TransGrid's existing employment conditions, which limited the scope for redundancies;
- TransGrid's proposed capex program, some of which depended on future developments. For example, actual capex may differ from the planned capex budget and there may be surplus resources in opex due to a drop-off in capex projects;
- windfall gains that might accrue from lower maintenance costs due to good weather, reduced material costs or the sale of further 132 kV lines to NSW distributors;
- unexpected changes to asset performance arising from failures that may not have been anticipated in the 30-year asset management plans e.g. an increased failure rate in current transformers;
- changes to market rules and other compliance cost factors; and
- liabilities for damages to customer equipment arising from power system surges.

5.3.4 Commission considerations and draft decision

As the result of the analysis provided by PB Power, the Commission accepted the opex efficiency gains proposed by TransGrid for the first two years of the revenue cap period. It also agreed with the consultant that there appears to be scope for TransGrid to make further gains during the years 2001/02, 2002/03 and 2003/04 — for this purpose, the Commission adopted a target of 75 per cent of the $5m per annum figure in 2003/04 dollars suggested by PB Power ie. $3.75m in 2003/04 dollars. The target for the additional efficiencies adopted makes an allowance for the uncertainties identified by PB Power as being inherent in the benchmarking analysis undertaken.

On the basis of these savings, TransGrid's total real regulated controllable opex should reduce by approximately seven and one half per cent from the base year of 1998/99 (this excludes the reductions planned by TransGrid to be made in 1998/99). This translates to an average saving of just over 1.5 per cent per annum which is slightly less than the range of efficiency gains indicated by a preliminary total factor productivity (TFP) analysis conducted by the Commission in-house.[40]

The Commission noted TransGrid's concern that the cost figures which were analysed by PB Power (and thus the efficiency gains recommended by the consultant) did not include allowances for the extra expenses that may be required for additional insurance

[40] That study suggested that productivity gains in the region of between two and three per cent per annum may be achievable.

resulting from potential liability for power surges or for the additional costs of compliance under the NEM. However, the Commission stated that it was in no better position than TransGrid in this regard — it cannot include amounts for those potential expenses where they cannot be estimated by the network itself. Further, the Commission was of the view that the efficiency gains determined above are, in all the circumstances, moderate. If, during the revenue cap period, TransGrid considered that the lack of available figures for such expenses has resulted in an under allocation of the MAR, the Commission noted that the network should be able to raise this for consideration at the next regulatory reset.

The Commission also noted TransGrid's intention to develop its unregulated businesses in the near term. TransGrid has also indicated that, as the large planned capex program and limited labour resources are likely to restrict the opportunities for growth in engineering consulting and labour hire, any extra revenues are likely to be in other areas such as telecommunications (it was noted in Chapter 3 that some $3m of the capital expenditure plan related specifically to such activities).

As indicated by PB Power, TransGrid's allocation of common costs to unregulated income was considered appropriate given their very low level of materiality (less than two per cent of total 1997/98 income). However, the Commission fully expected that, as these sources of income grew, TransGrid would adopt more specific policies to ensure that the appropriate expenses (including indirect labour, depreciation, interest and corporate overhead) are matched against those revenues. The Commission noted its intention to develop guidelines for such purposes in the *Regulatory Principles* and expected them to be applied by TransGrid and included as part of the annual financial information required to be provided to the Commission under the NEC.

5.4 Issues arising from the draft decision

In response to the Commission's draft decision, TransGrid considered that the cost reduction targets were acceptable.

A number of the networks and academics submitted that service standards mandated by the Commission as part of a revenue cap decision may have an impact on a network's costs. More generally, they claimed that there is an as-yet unresolved uncertainty in the Commission's discretion to set the levels of service by which a network's performance will be measured as part of the regulatory regime. It was submitted that this uncertainty was one facet of a general asymmetric risk faced by the networks which merited appropriate compensation.

5.5 Commission considerations and conclusion

The Commission agrees that there may be a relationship between opex and the particular service standards selected for use in a particular revenue cap decision. It considers that evidence of any need to adjust costs upwards to meet higher levels of service standards would need to be properly demonstrated before those increases could be incorporated into a network's opex allowance. As noted in Chapter 2 above, the Commission notes that TransGrid has not suggested that this will be the case for the

standards of service proposed in this decision. The matter of service standards is further discussed in Chapter 8, below.

However, the Commission considers that the material, efficient and reasonable insurance cost arising from an increase in TransGrid's third party liability position may be claimable as a 'pass through' charge during the period of the current revenue cap. The Commission notes that, at the next regulatory reset and beyond, it will examine the reasonableness and efficiency of the cost as it would any other.

Otherwise, in terms of the operating expenditure to be allowed for the purposes of the present regulatory cap, the Commission concludes that the allowance made in its draft decision remains appropriate.

6. Total revenue

The previous chapters discussed each of the major elements of the Commission's building block approach to setting TransGrid'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 TransGrid's revenue cap for the period 1 July 1999 to 30 June 2004.

6.1 NEC requirement

As explained in Chapter 1, the NEC 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 TransGrid will calculate the resulting network prices in accordance with a recent NSW derogation and Chapter 6, part C of the NEC.

The NEC outlines the general principles and objectives for the transmission revenue regulatory regime to be applied by the Commission. The NEC also grants the Commission the 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*, the draft of which was released in May 1999.

6.2 The accrual building block approach

As explained in Chapter 1, the Commission's decision on TransGrid's MAR relies on the accrual building block approach, while having regard to financial indicators. The basic building block approach calculates the MAR as the sum of the return on capital, the return of capital and opex (non-capital expenditure).

Interested parties were overwhelmingly supportive of use of the building block approach. For example, TransGrid submitted:

> TransGrid strongly supports this approach (the building block method) for determining maximum allowable revenue because:
>
> - it is consistent with the intent of COAG as embodied in the Code;
> - correct economic signals to users result…[41]

EnergyAustralia stated that it:

> welcomes the Commission's decision to use the accrual building block approach for the determination of transmission revenues. This should assist in providing rational and repeatable regulatory outcomes.[42]

---

[41] TransGrid, 'Submission to the ACCC on the Statement of Regulatory Intent, issues paper', August 1998, p. i.

As noted in Chapter 1, the Commission has chosen to recast its decision in terms of a post-tax nominal framework. Two additional elements, GST and the possibility of an increase in third party insurance premiums as the result of a widened potential customer liability, have been incorporated to reflect the business environment that TransGrid will face in the future. The revised building block formula thus becomes:

MAR = return on capital + return of capital + opex + tax + insurance + GST

= (WACC * WDV) + D + opex + tax + insurance + GST

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;
insurance = possible increased third party liability insurance cost; and
GST = net impact of Goods and Services Tax on the business.

The expected tax and insurance terms have been discussed in Chapters 2 and 5 respectively. The GST term is explained below.

6.3 TransGrid's proposal

During the regulatory regime administered by IPART, TransGrid's regulated revenue had been about $350 million per annum. Regulated revenue reported for the 1998/99 financial year amounted to $339 million.

At the outset of this review, TransGrid argued that its regulated revenue cap for the new regulatory period should be $351 million for the first year indexed annually by 4.5 per cent. The indexation comprised an inflation rate of 2.5 per cent and an X factor of plus 2 per cent to reflect a planned growth in capital expenditure. TransGrid indicated that this revenue path would:

- result in negligible changes to average real transmission charges;
- generate an average pre-tax real rate of return on regulated assets of about 8.5 per cent;
- enable the acquisition of the Snowy transmission assets; and
- ensure that major new capital expenditure is undertaken to reduce energy charges to customers and ensure continuing reliability of the transmission system.

In its submission in relation to the Commission's draft decision, TransGrid revised a number of the components of this revenue cap leading to a revised revenue proposal that trends from $357.94 million in 1999/00 to $455.45 million in 2003/04. The revised figures do not include any adjustment for the impact of the GST nor the additional revenues which TransGrid claimed were required to compensate the network for asymmetric risks.

---

[42] EnergyAustralia, 'Submission to the ACCC on Regulation of NSW Transmission Revenues, issues paper', January 1999, p. 1.

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 TransGrid, the Commission has modelled TransGrid'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 TransGrid's asset base is that the closing value of the asset base from year to year is constructed by taking the opening value, converting it to a nominal figure by adding in an inflation adjustment, adding in any capital expenditure and subtracting disposals and depreciation for the year. The closing value for one year's asset base becomes the opening value for the following year's asset base. Under the post-tax nominal framework, this methodology is modified slightly to account for two regulatory issues which will be discussed in the Depreciation section below.

The NEC indicates that in assessing asset values, the Commission should use a deprival value methodology. Moreover, recent NSW derogations specify that the Commission can set the opening asset value in line with the NEC principles which specify that this should be the deprival value or below.

Consistent with these principles, NSW Treasury engaged a consultant to undertake an ODRC valuation of TransGrid's assets and the Commission engaged SKM to undertake a review of this valuation. The NSW Treasury valuation estimated that TransGrid's assets were worth $2 064 million as at 1 December 1998. The SKM review broadly supported the NSW Treasury valuation, and estimated that TransGrid's assets were worth $2 103 million. The SKM review included relevant non-network assets, while the Treasury valuation did not, and this accounts for much of the difference between the two estimates.

The Commission has set the opening value of TransGrid's assets at $1 935 million. This figure is based on the ODRC value adjusted downwards on the basis that:

- consistent with ODRC principles, the re-optimised QNI assets will not be recognised at the start of the period but upon the commissioning of the interconnector; and

- easements have entered the opening asset base valued at their historic purchase cost rolled forward at the inflation rate to 1 July 1999. In the absence of complete historic cost records, a 1996 ODRC value has been used as a proxy. The 1996 value represents the best available information regarding the historic cost of acquiring those assets.

In terms of modelling the movement in TransGrid's asset value over the regulatory period, the Commission has, for the purposes of this decision, indexed this opening

asset value by 3.15 per cent per annum, which is consistent with the inflationary expectations used in deriving the WACC.

6.4.2 Capital expenditure

TransGrid has plans for an extensive capital expenditure program ($946 million in 1998/99 dollars) over the coming regulatory period. To gain a better understanding of the prudency of the proposed investments, the Commission and IPART engaged two consultants to provide an independent assessment of TransGrid's capital expenditure program. These assessments covered both specific projects as well as TransGrid's asset management systems.

On the basis of its assessments of these reviews, the Commission will include, in nominal terms, $881 million of capital expenditure in the calculation of TransGrid's revenue cap. This figure includes interest during construction as this decision only recognises the capital expenditure once the project is commissioned. The capital expenditure program and interest during construction allowed for in the revenue cap calculations is comprised of approximately:

- $163 million for the Sydney CBD augmentation;
- $202 million for the Queensland-New South Wales interconnector;
- $93 million for the Wagga augmentation;
- $258 million for renewal and replacement expenditure; and
- $165 million for the smaller augmentation projects.

Given their projected timing and current uncertainty, the Commission has decided not to include into capital expenditure amounts for the Armidale-Lismore augmentation, South Australia-New South Wales interconnector, Tamworth-Gunnedah 132 kV line and the Snowy transmission assets.

6.4.3 Depreciation

For the purposes of modelling the movements of asset values over the life of the regulatory period and for determining the return of capital, the Commission calculated depreciation using the straight line method. The Commission notes that TransGrid, in its initial submission to this review, considered the straight line method to be 'administratively easy, transparent and appears to be used in regulated industries in the majority of countries including the UK'.

Draft decision

In the draft decision, the Commission derived TransGrid's straight-line depreciation figures using the initial asset value provided by IPART rolled forward. IPART's initial asset value was an economic valuation, not separated into values by asset class. Therefore, to calculate depreciation, the Commission applied the average remaining life of approximately 25 years suggested by the asset valuations undertaken by GHD and SKM to the opening asset base figure.

That figure excluded imputed values for TransGrid's non-depreciable assets; that is, easements and freehold land. The imputed value of those assets was established by taking the proportions comprised by those assets in the SKM ODRC valuation and

applying them to the opening asset base figure. This methodology resulted in a proposed schedule of depreciation which increased from $59.8 million in 1999/00 to $59.6 million, $63.3 million, $67.0 million and $73.1 million in each of the following years of the regulatory period.

At the time of the draft decision, the Commission accepted that this imputation method represented an approximation only and that, in principle, using the proportions found in an ODRC valuation would not necessarily be perfectly consistent with an asset base established using an economic valuation method. However, in the circumstances, the Commission considered that, on balance, a greater disadvantage would accrue to customers by allowing the network to have the windfall benefit of revenues representing a return of capital on assets which do not depreciate in value.

Submissions by interested parties

NSW Treasury claimed that, because the Commission was required to make those assumptions in its calculation of depreciation, the draft decision led to an inappropriate outcome. For instance, the NSW Treasury stated that:

> TransGrid's current depreciation is around $77.5 million per annum. IPART's [business] valuation suggests a reduction of 10.6% against TransGrid's current book value of assets. The draft decision, however, reflects a reduction of 22.8% in the annual depreciation charge.

In a similar vein, TransGrid argued that the Commission's draft assessment of the depreciation allowance was arbitrary and that the Commission should provide an allowance equivalent to $77.5 million on the existing asset base. On the basis of its analysis, Powerlink submitted that TransGrid's depreciation allowance should be in the order of $71.8 million.

Commission considerations

Since the draft decision, NSW has submitted derogations which allow the Commission to set the opening asset values for TransGrid. As discussed in Chapter 3, the Commission has largely accepted the ODRC valuation of TransGrid's assets. As this valuation includes a breakdown of values by asset and asset class, the Commission has been able to calculate depreciation using the straight line methodology based the remaining life per asset class. The Commission believes this approach addresses TransGrid's and NSW Treasury's concerns. The revised depreciation allowance trends from $81.36m in 1999/00 to $87.03m, $93.94m, $106.52m and $113.41m in each of the following years of the regulatory period. The numbers are higher than those proposed by TransGrid as the Commission has included interest during construction an the effects of inflation in rolling-forward the capital base.

It should be noted that the calculation of TransGrid's rolled-forward asset base set out in Table 6.1 below involves a different set of depreciation numbers than those just noted. The depreciation numbers set out in the Table net together the straight line depreciation charge set out above with the inflation allowed on the asset base in each year. The combined figure thus summarises the net change in the value of the asset base from period to period (in this sense, it can be referred to as "economic depreciation").

This approach has been adopted because it also provides a relatively straightforward way to treat two issues discussed in Chapter 2 above within the context of the post-tax nominal framework. Those two issues are:

- the normalisation of tax payable estimates over the life cycle of the assets — that is, adjusting the allowance for expected taxes contained in the post-tax nominal MAR to remove the 'S-bend' phenomenon. This is ensure that future network customers do not pay a disproportionately higher charge for the same portfolio of assets as the result of the higher tax payments that will need to be made at that time; and

- the removal of the (relatively small) windfall benefit to the network's owners that would result from the early allowance for taxes provided for by the normalisation — that is, by moving the allowance for taxes forward to solve the 'S-bend' problem, the networks gain higher revenues initially which they will otherwise earn a return on. The economic depreciation allowance has been used as a tool to ensure that this windfall return is removed.

Both of these framework issues, and the way in which the economic depreciation concept enables them to be conveniently dealt with under the post-tax nominal regulatory framework, are discussed in detail in Attachment B[43]. What is important to understand in terms of the Commission's asset base roll-forward is that the depreciation allowance incorporates both the straight line depreciation and inflation components noted above.

6.4.4 Weighted average cost of capital

In determining TransGrid's revenue cap, the Commission must have regard to TransGrid's weighted average cost of capital. 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 TransGrid 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 WACC of 8.30 per cent to TransGrid. The 8.30 per cent post-tax nominal WACC equates to a post tax nominal

---

[43] As noted in Chapter 2, there is a third issue. This occurs where, as in the present case, the regulator has moved from using a pre-tax real framework and an assumption that taxes payable will equal those assessed at the statutory tax rate to a post-tax framework based on the regulated entity's effective tax rate. In such a situation, the issue is whether the revenue stream determined under the new framework should be adjusted for the possibly overgenerous allowances for tax provided under the previous framework.

While the Commission considers that the making of such an adjustment is appropriate in principle, it has not done so in the present case. This arises from difficulties in quantifying the tax allowances made in IPART's 1996 TransGrid revenue cap determination which was based on cash-flow modelling.

return on equity of approximately 13.85 per cent. The Commission believes these figures are slightly towards the higher end of a feasible range.

In arriving at those figures, the Commission has adopted:

- a nominal risk free interest rate of 6.81 per cent, reflecting the short term average yield on ten year Commonwealth Government bonds;

- a real risk free rate of 3.55 per cent based on the short term average yield on ten year capital indexed bonds;

- an expected inflation rate of 3.15 per cent derived from the difference between the two yields;

- a debt margin of 1.0 per cent above the nominal risk free interest rate leading to a nominal pre-tax cost of debt of 7.81 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.

The Commission has examined the risks faced by TransGrid and the equity betas of similar businesses in arriving at an asset beta of between 0.35 and 0.50. This range is derived principally from the average equity beta for the infrastructure and utilities industry group listed on the Australian Stock Exchange. Using a gearing assumption of 60 per cent and a debt beta within a feasible range of between 0.00 and 0.06, this converts to a possible range for the equity beta of between 0.78 and 1.25. Taking the midpoint of this range returns an equity beta for TransGrid of just above one.

As discussed in Chapter 2, the Commission has made a slight upward allowance to the post-tax nominal return on equity and post-tax nominal WACC figures derived from those parameters in order to account for any perception of risk attributable to the relative newness of the Commission's regulatory framework. This is consistent with the position taken by the Commission in its Victorian Gas Access Arrangements decision made in 1998.

In order to place this decision within the context of the earlier draft decision, the 13.85 per cent post-tax nominal return on equity figure assessed by the Commission converts to an equivalent pre-tax real WACC of 7.35 per cent which is slightly higher than the 7.25 per cent set out in the draft decision reached in May 1999. The main reason for the change is that, since that time, financial conditions have altered resulting in an upwards movement in real interest rates. In addition, as noted above, the Commission has made an adjustment in the cost of capital reflecting the risk of the relative 'newness' of the regulatory regime.

It is, however, important to note that, in pre-tax real terms, the 7.35 per cent WACC assessed by the Commission is lower than the pre-tax real figure of 8.3 per cent and range of 7.6 to 8.9 per cent submitted by TransGrid and NSW Treasury respectively in their post-draft submissions. It also lies towards the lower end of the 7 to 8 per cent feasible range assessed by IPART in its December 1999 determination. The principal reasons for these differences are that the Commission has factored into to its modelling

the lower company tax rate foreshadowed in the Ralph business taxation review and has also been able to determine an effective tax rate for TransGrid.

The effect of recent movements in financial markets is compounded when comparing the assessed cost of capital in nominal terms. Thus, the Commission's nominal post tax return on equity of 13.85 per cent lies above the 10.8 per cent originally proposed by TransGrid and the 13.35 per cent suggested by the network in its submission on the Commission's draft decision. The Commission's figure also lies above the range of 11.7 to 13.2 per cent proposed by NSW Treasury in its post-draft submission. The comparisons largely reflect the fact that those submissions were made at times when both real and nominal interest rates were materially lower than they are at present.

For the same reasons, the Commission's 8.3 per cent post tax nominal WACC lies above the 7 per cent suggested by TransGrid and range of 6.3 to 7.1 per cent submitted by NSW Treasury in their submission on the draft decision. It is also why the nominal post tax return on equity figure and post-tax nominal WACC determined by the Commission sit slightly above the ranges of between 11 and 12 per cent and 6.6 and 7.5 per cent assessed by IPART in its December 1999 determination.

The figures lie below the 15.61 per cent post tax nominal return on equity but above the 7.59 per cent post tax nominal WACC figures assessed in the Commission's recent final Adelaide airports multi-user integrated terminal access decision. The difference in this case is mainly attributable to the higher risk considered to be associated with the airport infrastructure proposal combined with the lower risk free interest rates and inflation rate used in the earlier decision.

6.4.5 Asset base roll-forward

Based on the above components, the Commission has modelled TransGrid'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 (10.2 per cent) consistent with the post-tax WACC determined from the cost of capital parameters. This is done to ensure that the estimated tax payable building block component from year to year is accurate[44].

[44] The nominal vanilla WACC formula (WACCvan = Re[E/V] + Rd[D/V]) differs from the post-tax nominal WACC formula (WACCptn = Re{[1-Te]/[1-Te(1-g)]}[E/V] + Rd[1-T]/[D/V]). Both generate the correct post tax nominal return on equity. However, the latter incorporates the long-term effective tax rate appropriate for the portfolio of assets under consideration which will not ensure the correct tax payable estimates derived from the WACC parameters for each year. To overcome this problem while still ensuring the correct return on equity, the nominal vanilla WACC formula must be used — a further explanation of this issue is set out in Attachment B.

Table 6.1: TransGrid's return on capital, 1999/00 to 2003/04 ($ million)

	1999/00	2000/01	2001/02	2002/03	2003/04
Opening asset base	1,934.54	1,961.01	2,011.95	2,260.87	2,309.44
Capital expenditure	52.61	82.08	285.95	90.53	370.42
Economic depreciation*	(26.14)	(31.14)	(37.03)	(41.96)	(47.12)
Closing asset base	1,961.01	2,011.95	2,260.87	2,309.44	2,632.74
Return on capital	197.72	200.42	205.63	231.07	236.03

* Economic depreciation nets the straight line depreciation charge, the inflation allowance and adjusts for the normalisation of estimated taxes payable and the gain from prepayments issues noted above.

6.4.6 Operating and maintenance expenses

TransGrid indicated to the Commission that it has set itself the target of achieving a 12 per cent saving in operating expenses over the three years from 1 July 1998. The Commission's consultant, PB Power, believed that these efficiency targets are achievable and that further on-going savings could be made during the last three years of the revenue cap period.

On the basis of this advice, the Commission has included its revenue cap decision provision for a real saving in TransGrid's controllable regulated operating expenses of just over seven and one half per cent over the regulatory period. This equates to a saving of approximately 1.5 per cent per annum.

An issue which emerged from the review of operating expenses is the treatment of unregulated income and expenses. While TransGrid's unregulated businesses may presently be immaterial, this is unlikely to be the case in the future. Consequently, the Commission expects that TransGrid will implement guidelines to be developed as part of the Commission's *Regulatory Principles* process which will clearly identify and account for unregulated incomes and expenses, including the appropriate allocation of any costs common to both regulated and unregulated activities.

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 TransGrid as being in a positive tax paying position during the regulatory period. As noted in Chapter 2, the Commission has estimated those tax liabilities using the outcomes foreshadowed in the Ralph business taxation review. These involve a reduction from the previously applicable 36 per cent company tax rate and the removal of accelerated depreciation allowances (although the latter is grandfathered for those assets which TransGrid had in service prior to September 1999 as per the Ralph review outcomes).

It should be noted that the Commission's assessment of taxes payable are based on the 60 per cent gearing level assumed in the WACC parameters, not TransGrid's current (lower) gearing level. Further, the tax estimates relate only to the network's regulated activities. Comparisons with the network's historic tax expenses are therefore difficult

to make. The Commission's estimated taxes payable trend from $8.95m in the first year of the regulatory period to $15.31m in 2003/04.

6.5 Total revenue

6.5.1 Total revenue and CPI-X smoothing

Draft decision

Based on the various elements of the Commission's building block approach, the Commission's draft decision proposed an unadjusted revenue allowance that increased from $204.99 in 1999/00 to $308.04 million, $311.12 million, $314.24 million and $317.38 million in the subsequent years of the regulatory period (Table 6.2). Those figures incorporate revenue smoothing designed to limit the potential for price shocks (see below).

Table 6.2: Draft TransGrid MAR, 1999/00 to 2003/04 ($ million)

	1999/00	2000/01	2001/02	2002/03	2003/04
Return on capital	131.83	135.42	146.93	150.48	170.46
Return of capital	59.80	59.58	63.29	67.01	73.10
Operating expenses	99.52	98.72	97.82	99.83	101.98
Unadjusted revenue allowance	291.15	293.72	308.04	317.32	345.54
Smoothed MAR	**304.99**	**308.04**	**311.12**	**314.24**	**317.38**

In arriving at its draft decision, the Commission noted that its proposed revenue cap was around 18.5 per cent lower than that initially requested by TransGrid.

Final decision

Based on the Commission's assessment of both the financial parameters operating in the Australian economy at this time as well as TransGrid's expenditure program, the Commission has determined a maximum annual revenue for TransGrid which grows in nominal terms from $329.63 million in 1999/2000 to $393.12 million in 2003/04.

As required by the NEC, the revenue cap determined by the Commission has been constructed using a CPI-X efficiency regime. That is, TransGrid will be able to roll forward the opening revenue figure of $329.63m adjusted from year to year for changes in the Consumer Prices Index (CPI) plus an X factor of about -1.3 per cent per annum. That is, the MAR will increase by CPI *plus* 1.3 per cent in each year of the regulatory period.

This overall rate of increase (negative X) largely reflects TransGrid's sizeable planned capex program which outweighs the operating expense savings identified as achievable during the period. The rate determined ensures that the network will be able to receive the real value of the MAR assessed by the Commission over the regulatory period. Note that the CPI figure used during one or more years of that period may need be adjusted for the impact of the GST (see below).

Table 6.3: Final TransGrid MAR, 1999/00 to 2003/04 ($ million)

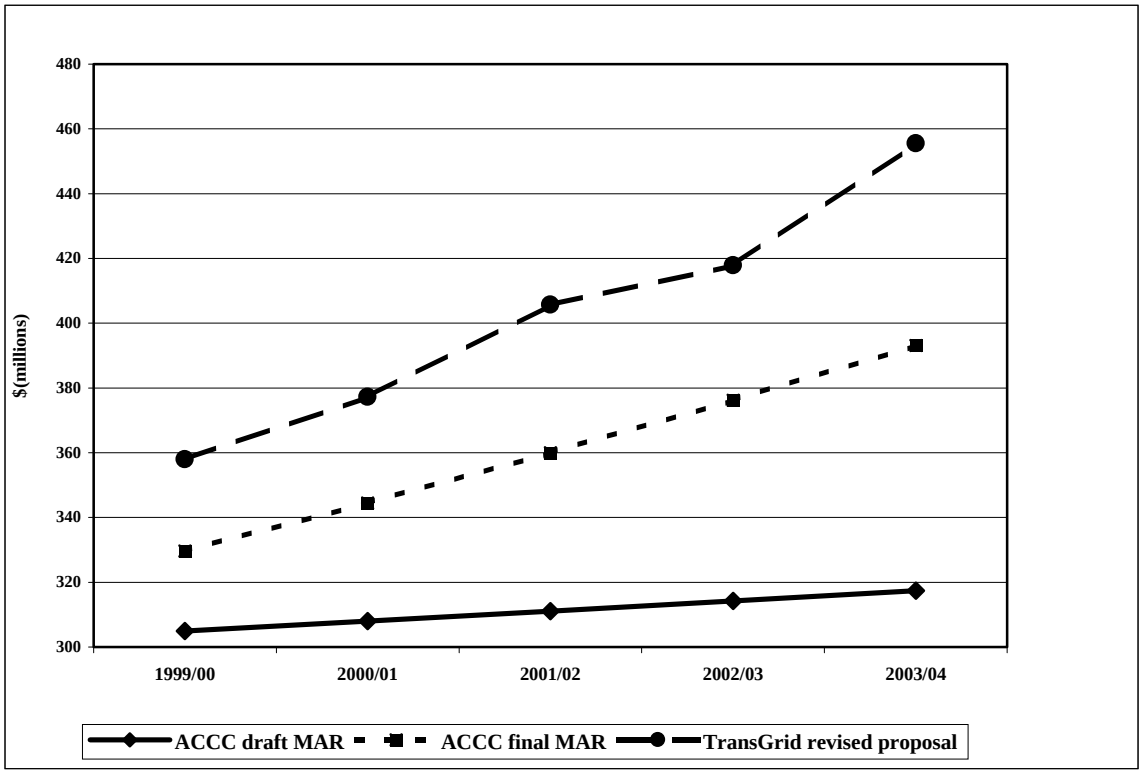
	1999/00	2000/01	2001/02	2002/03	2003/04
Return on capital	197.72	200.42	205.63	231.07	236.03
Return of capital	26.14	31.14	37.03	41.96	47.12
Operating expenses	101.30	102.93	104.57	106.25	107.95
Estimated taxes payable	8.95	9.75	10.04	13.33	15.31
Less value of franking credits	(4.47)	(4.88)	(5.02)	(6.67)	(7.66)
Unadjusted revenue allowance	329.63	339.36	352.25	385.94	398.76
CPI-X smoothed MAR	**329.63**	**344.47**	**359.98**	**376.19**	**393.12**

The Commission's final revenue figures differ from the draft figures for a number of reasons, including:

- a higher value for the opening asset base;
- the inclusion of interest during construction in the capex assessed as prudent;
- a higher straight line depreciation allowance as a result;
- the use of an effective tax rate rather than the statutory rate;
- a higher post-tax nominal return on equity (which in turn reflects revised cost of capital parameters as set out in Chapter 2); and
- the final figures being determined using CPI-X smoothing whereas the draft figures use a different form of revenue smoothing (see below).

On the basis of an 8.3 per cent pre-tax real WACC and a 2.5 per cent inflation rate, TransGrid requested a revised revenue allowance increasing from $357.94 million in 1999/00 to $377.20 million, $405.66 million, $417.80 million and $455.45 million in the subsequent years of the regulatory period. As noted above, this revenue proposal was submitted as being exclusive of GST effects and compensation which TransGrid claimed was necessary in order to offset asymmetric risks.

Figure 6.1: Comparison of maximum annual revenue for TransGrid, 1999/00 to 2003/04 ($ million)



The Commission's final revenue cap decision provides a revenue stream around 10 per cent lower than the revised figures proposed by TransGrid (see Figure 6.1). The difference between the Commission's final MAR and TransGrid's revised figures is mainly the result of:

- a lower opening asset base due to easements being valued at their rolled-forward historic cost rather than at ODRC and recognising the reoptimisation of the 500 kV QNI assets at the time those assets are expected to be commissioned;
- excluding several projects from TransGrid's extensive capital expenditure program;
- use of different expected inflation assumptions in rolling forward the asset base;
- use of different cost of capital parameters in arriving at the post-tax nominal return on equity (see Chapter 2); and
- use of the CPI-X incentive mechanism.

6.5.2 Additional revenue smoothing

Draft decision

As discussed, the Commission's draft decision was not presented in the CPI-X format. When arriving at the unsmoothed draft numbers, the Commission observed that this revenue allowance would result in a sizeable initial fall in TransGrid's revenue which would be reversed in the following years. This movement in revenues over the period was attributed to TransGrid's extensive network investment and augmentation program which brings large new assets on-line in the latter half of the regulatory period.

In order to limit price shocks, the Commission proposed a draft revenue cap that was smoothed with an upward trend to take account of the lumpy investment being commissioned at the latter end of the regulatory period. The question at hand is whether a similar form of additional revenue smoothing beyond the CPI-X adjustment now incorporated in the final revenue cap numbers is appropriate.

Issues arising from the draft decision

In commenting on the revenue smoothing contained in the Commission's draft decision, the Energy Users Group (EUG) submitted that, as customers tend to place a high discount on future benefits, they would prefer benefits now rather than later. On this basis, they did not support an additional smoothing process that withheld savings in order to prevent a price shock.

TransGrid submitted that not only was the Commission's proposed additional smoothing approach:

> … not supported by end use customers, … it would appear to also expose customers to a higher likelihood of step changes in transmission prices when the revenue cap is reviewed. This is because the path of the "smoothed" revenue results in a revenue cap (and hence prices) substantially below their unsmoothed level.

NSW Treasury was also concerned that the Commission's proposed approach would lead to a price shock at the first regulatory reset. For instance, NSW Treasury argued that:

> the draft decision proposes a 'smoothed' 2003/04 revenue allowance of $317.4M for TransGrid compared to an 'unadjusted' building block revenue requirement of $345.5M. This revenue shortfall will need to be captured in the following regulatory period in addition to any other increases in the underlying revenue requirements. NSW Treasury estimates that TransGrid will require a P_O revenue increase of approximately 11% in 2004/05.

However, in contrast to the views of the EUG and TransGrid, NSW Treasury proposed that the unadjusted revenues should be smoothed. NSW Treasury argued that while additional smoothing might result in a revenue surplus or shortfall over the regulatory period, this would be acceptable as revenues would still be consistent with the Commission's feasible range for the WACC and price volatility would be reduced.

On the basis of an ODRC asset value and an 8 per cent pre-tax real WACC, NSW Treasury requested a smoothed MAR increasing from $348 million in 1999/00 to $360 million, $373 million, $386 million and $400 million in the subsequent years of the regulatory period. NSW Treasury argued that under its proposal:

> revenue increases in nominal terms by 3.6% each year over the regulatory period. After allowing for growth and inflation, average transmission prices reduce in real terms by 1% annually, or 5% cumulatively over the regulatory period. This is a very reasonable outcome … As TransGrid will achieve its unadjusted MAR in Year 5, customers will not be exposed to the same risk of price shocks at the next regulatory reset relative to what is currently proposed in the ACCC's draft decision.

Commission considerations

The smoothing approach proposed by the Commission in the draft decision was designed to avoid revenue shocks resulting from:

- the downward pressure on revenues at the initial stages of the regulatory period as a result of the Commission's reset of a number of the regulatory parameters; and

- the upwards pressure on revenue at the end of the regulatory period largely as a result of TransGrid's capital expenditure program.

However, the Commission accepts that smoothing the revenue stream during the period in this way may lead to the likelihood of a larger revenue shock at the next regulatory reset. The Commission has therefore decided not to smooth TransGrid's revenue cap in this final decision beyond the CPI-X smoothing already noted at 6.5.1 above.

6.5.3 GST and insurance

The Federal Government's recently introduced GST will take effect from 1 July 2000. The introduction of the tax and the associated removal of wholesale sales tax (WST) and other imposts is almost certain to have a net effect on both the costs faced by the electricity networks and on the economy as a whole.

The Commission proposes to take the former into account by adjusting the MAR for the 2000/01 financial year for the one off net impact of the GST on the regulated services provided by TransGrid. That is, the MAR for that year will also include a pass-through item which nets off the cost reductions anticipated as the result of the removal of the WST and other savings against the network's GST liability.

The impact of the new taxation arrangements is also expected to have some transitional impact on economy-wide inflation levels. Under the regulatory framework used by the Commission, TransGrid's asset base and revenue stream will increase from year to year by the CPI (the revenue stream will also be adjusted by the X factor discussed above). However, the immediate impact of the GST will have been taken into account in the revenue pass-through term set out above. Thus, it is likely that allowing the network to recover that impact and have its asset base and revenue stream increased by the CPI inclusive of GST effects will result in TransGrid over-recovering revenues during the transitional phase. Any over-recovery would also carry forward into future revenues through the CPI-X mechanism.

In order to account for this issue, the Commission at present considers it appropriate to index TransGrid's asset base and revenues by a CPI factor exclusive of GST effects as they apply to electricity networks during the transitional period. The exact quantification of the adjustment in the inflation factor as it will be applied to TransGrid's those calculations and the appropriate length of the transitional period has yet to be determined.

The Commission proposes to make that assessment in cooperation with TransGrid, EnergyAustralia and the parallel efforts of State regulators with the intention of arriving at an appropriate CPI adjustment factor for the 2000/01 revenue cap by the end of April 2000. The Commission welcomes the fact that TransGrid has already indicated its willingness to assist the regulators in this regard.

Finally, as noted in Chapters 2 and 5, the Commission considers that it may be appropriate to treat any material, efficient and reasonable increases in TransGrid's third party liability insurance costs as pass through charges for the purposes of the proposed

revenue cap. That is, any such dollar amounts from year to year will be recoverable as a revenue item in addition to the CPI-X smoothed allowance set out above.

6.6 Conclusion

Subject to resolution of the GST issue noted above, the Commission has determined a revenue cap for TransGrid that trends from approximately $330 million in 1999/00 to $393 million in 2003/04.

7. Financial indicators

7.1 Introduction

Clause 6.2.4(c) of the NEC provides that in setting the revenue cap to apply to TransGrid, the Commission must have regard to relevant financial indicators.

Accordingly, the Commission has sought to examine the impact of its decisions on TransGrid's ongoing ability to manage its financial position. This approach is consistent with that adopted by the Commission in its assessment of the Victorian Gas Access Arrangements and with other recent regulatory decisions.

Financial indicator analysis is relevant in the current context as investors, financiers and credit rating agencies examine financial performance indicators as part of their assessment of a firm's credit worthiness. Firms with lower ratings are less likely to gain access to funds in debt and equity markets.

In its 1998 *Regulatory Principles* issues paper, the Commission mooted the possibility of using multi-financial indicators as an alternative means of determining the maximum allowable revenues to be applied to a regulated network. The Commission notes that interested parties expressed little support for using multi financial indicators as a basis for setting the revenue cap.

Nevertheless, many submissions addressed the issue of using financial indicators as a form of sanity or reasonableness check against the results of the building block approach[45]. Transmission networks in particular were concerned that the Commission should not use financial indicator analysis to justify 'tweaking' the results but, rather, that any deficiencies revealed by the financial indicator analysis should lead to a reexamination of the elements of the proposed revenue stream. For example, TransGrid stated:

> The ACCC has stated its preliminary view to 'adopt an accrual building block approach to determining NSP's MAR, while having regard to other financial indicators'. TransGrid supports this position in principle. …it is suggested that no *automatic* adjustments be made to the building block numbers using the multi-financial indicators - that is no 'tweaking' to the asset base or the rate of return should be done just to remove an *implied* 'excess' cash position based on the indicators.

NSW Treasury submitted:

> Financial indicators may provide a reasonable sanity check, however comparisons may be clouded by capital structure, service standards and accounting policies adopted by individual NSPs.

EnergyAustralia's submission in response to the Commission's draft revenue cap decision called for caution in utilising financial indicators as a major component of a regulatory regime stating:

---

[45] For example, TransGrid, NSW Treasury, GPU PowerNet, Powerlink, Transend and Western Power.

> EnergyAustralia would caution against the use of financial indicators for anything more than high levels comparisons. Managing the financial indicators is the role of a business's management and not the role of the regulator.[46]

The Commission agrees that, given:

- the broad support for the accrual building block approach noted earlier in this decision; and
- the dangers associated with placing too much emphasis on financial indicators derived from the regulatory model, elements of which are not strictly comparable with the way in which traditional financial statements are derived,

the appropriate role for financial indicator analysis should be confined to providing a reasonableness check against the MAR determined under the building block methodology.

7.2 Financial indicator analysis

To assess the implications of the total revenue assessed for TransGrid, the Commission has used both qualitative and quantitative indicators, the former broadly described as the business profile and the latter as the financial profile. These two aspects are intertwined. For example, a firm with a strong business profile but a weak financial profile may achieve the same credit rating as a business with a weak business profile but strong financial profile.

Business profile

A range of issues impact on the assessment of a firm's business profile. These include the nature of the markets in which the firm operates, the firm's competitiveness, cost management systems and quality of key personnel. It is not the Commission's function to comment on these factors directly.

However, the Commission is in a position to comment on one important issue that has a major impact on the regulated entity's business profile, namely the nature of the regulatory framework itself. The Commission considers that the revenue protection afforded to regulated electricity transmission networks, particularly under a revenue cap methodology, ensures that those firms are able to maintain a relatively strong business profile.

The regulatory framework in the Australian electricity market is still in an evolutionary stage, which may lead to a degree of uncertainty. However, as noted in Chapter 2 above, the Commission has taken this risk into account in setting TransGrid's revenue stream for the current regulatory period. As the regulatory framework becomes settled, that risk is expected to diminish.

---

[46] EnergyAustralia, Submission to the Australian Competition and Consumer Commission, 11 June 1999, p. 6.

Financial profile

Notwithstanding the importance of the business profile, quantitative financial ratios also provide useful tools for analysing the impact of regulatory decisions on the firm. As noted above, the process of calculating those ratios is complicated by differences between principles underlying the Commission's regulatory financial model and those used as the basis for construction of standard financial statements. However, the Commission considers that, for the purposes of high-level assessment, a reasonable basis for estimation is possible.

The Commission has used a typical range of financial ratios. The indicators used include measures of TransGrid's:

- ability to cover operating costs;
- profitability;
- ability to service and repay debt;
- ability to finance new expenditure from operations; and
- gearing.

Credit rating

To generate an indicative overall credit rating from the business profile and financial ratios, the Commission has applied the classifications normally used by Standard and Poor's. Those ratings, and the way they are normally interpreted, are as follows.

Table 7.1 Standard and Poor's key indicators

Utility business profile	Funds flow interest cover (times)				Funds flow net debt payback (years)				Internal financing ratio (per cent)			
	AAA	AA	A	BBB	AAA	AA	A	BBB	AAA	AA	A	BBB
Excellent	4.00	3.25	2.75	1.50	4.0	6.0	9.0	12.0	100	70	60	40
Above ave.	4.25	3.50	3.00	2.00	3.5	5.0	7.0	9.0	100	80	70	50
Average	5.00	4.00	3.25	2.50	3.0	4.0	5.5	7.0	100	100	90	55
Below ave.	X	4.25	3.50	3.00	X	4.0	5.5	7.0	X	100	100	75
Vulnerable	X	X	4.00	3.50	X	X	4.0	6.0	X	X	100+	90

AAA Highest rating - extremely strong capacity to meet financial commitments.

AA Very strong capacity to meet financial commitments.

A Strong capacity to meet financial commitments but somewhat susceptible to adverse economic conditions and changes in circumstances.

BBB Adequate capacity to meet financial commitments but more susceptible to adverse economic conditions.

Ratings in the BB, B, CCC, CC and C categories are regarded as having significant speculative business, financial and economic conditions.

7.3 Commission's assessment and conclusion

TransGrid has maintained a stand alone credit rating in the region of AA from 1995 to 1998[47]. NSW Treasury has adopted a minimum target of an A rating for its government trading enterprises. In its submission on the Commission's draft decision, TransGrid provided in confidence a set of indicators which it used to judge the impact of the revenue stream proposed by the Commission. TransGrid claimed that the results of that analysis supported the contention that the draft numbers may have been low.

The Commission has calculated a set of financial indicators for TransGrid for the regulatory period. This has been done by taking the maximum allowable revenues determined in this final decision and incorporating those values and their associated costs into a set of financial statements. The assessed indicators are set out in Table 7.2.

[47] Standard and Poor's, 'TransGrid' April 1998, p. 1.

Table 7.2 TransGrid financial indicators

Indicator[48]	99/00	00/01	01/02	02/03	03/04
EBIT to revenues (%)	46	46	45	45	44
EBITD to revenues (%)	68	69	70	70	73
EBIT to funds employed (%)	8.76	9.03	8.22	8.27	7.47
EBIT to regulated assets (%)	8.19	8.33	7.60	7.64	6.93
Dividend payout ratio (%)	85	85	85	85	85
Funds flow interest cover (times)	3.69	4.00	4.24	3.60	3.84
S & P assessment	AA	AAA (AA)	AAA (AA)	AA	AA
Funds flow net debt pay back (years)	5.30	4.80	5.41	5.27	6.23
S & P assessment	AA (A)	AA	AA (A)	AA (A)	A
Internal financing ratio (%)	180	121	37	131	34
S & P assessment	AAA	AAA	BB (<BB)	AAA	<BB
Pre-tax interest cover (times)	3.48	3.67	3.76	3.28	3.40
Gearing (%)	41	41	45	43	48

Note: Financial indicators formulae:

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

In interpreting the results of the calculations, the Commission considers that TransGrid has a business profile lying between excellent and above average given the likely stability of its earnings and lack of competitors for the services provided.

The resulting likely credit rating is not uniform across the Standard and Poor's indicators. In particular, while the internal financing ratio is extremely strong in three of the five years of the regulatory period, it is low in the years 2001/02 and 2003/04. This reflects TransGrid's very large and 'lumpy' planned capex program, a program which will increase the network's regulated asset base by over one-third during the next five years (see Chapter 4). In such circumstances, it is reasonable to expect that cash from operations would, in particular years, be insufficient to wholly fund the size of the planned expenditure and that additional debt and/or equity would need to be sourced.

[48] Where two Standard and Poor's credit ratings appear in a cell in the table, the second represents the rating that would be generated using the 'above average' business profile where this would differ from that suggested by the 'excellent' profile.

The funds flow interest cover and funds flow net debt payback assessments indicate that TransGrid has a strong capacity to manage any such increases and this is supported by the fact that the network's actual gearing ratio remains below the industry benchmark considered appropriate (see Chapter 2).

It should also be noted that the internal financing ratios in years 2001/02 and 2003/04 reflects the way in which the regulatory model rolls capital expenditure into the regulated asset base. The actual movement in the internal financing ratios will be less dramatic than that indicated above as the financing surpluses in 2000/01 and 2002/03 will in fact absorb the capex planned to takes place in those years, thus improving the ratios for the years 2001/02 and 2003/04. Assessed on this basis, the internal financing rating would move from AAA in 1999/00 to BBB in 2000/01, AA in 2001/02, BBB in 2002/03 and A in 2003/04.

On balance the analysis suggests that, under the Commission's MAR, TransGrid is likely to have an overall credit rating that trends from AA to A over the duration of the regulatory period. As noted above, this mainly reflects the very large capex program that the network plans to undertake during that time. Based on its analysis, the Commission considers that the trend, when assessed against the background of TransGrid's strong business profile, indicates that the final revenue stream set out above will not adversely compromise the ongoing financial viability of the network.

The above conclusion is based on TransGrid's actual capital structure which is relatively conservatively geared at present. The level of gearing is a matter for the network's owner. The Commission has also calculated the indicators associated with the 60 per cent gearing assumed in the cost of capital parameters referred to in Chapter 2 above and is satisfied that an overall A credit rating would be the most likely result.

8. Service standards

8.1 Introduction

It is important for the Commission to determine TransGrid's revenue cap in the context of a set of defined service standards (sometimes called a service charter) as revenue cap 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 NEC requires the Commission to take into account the standards (mainly quality of supply standards) as specified and any standards as determined between the transmission network service provider 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 Commission maintains its concern, first expressed in its NEM Access Code draft determination of 29 August 1997 that, given the 'uneven' bargaining positions of customers versus transmission network service providers (and, possibly unequal bargaining positions of smaller customers relative to larger ones) the negotiation of connection agreements may not provide network customers with sufficient protection from a network service provider that may pay insufficient attention to meeting the benchmark level of service.

Recognising this concern, the Commission's draft decision stated that the NEC must be altered to provide the transmission regulator with the powers:

- to request that a transmission network service provider submit a service charter which fully specifies the service standards which will be met for the duration of a revenue cap period;
- to acquire the necessary information to monitor compliance with a transmission network's service charter; and
- to revoke or revise a transmission network's revenue cap during a regulatory control period for any breaches of its service charter.

In coming to this view, the Commission was of the opinion that a service charter could serve several purposes. First, they would provide the basis upon which connection agreements would be negotiated. Service standards covering the entire transmission network would provide additional protection to customers, even if the customer had a connection agreement covering the service standards required on the radial line from his generator, plant or distribution system to the meshed portion of the transmission network. Lastly, they would form the basis on which the regulated revenue cap would be set thereby avoiding incentives for networks to reduce service standards within a rate period.

However, in response to the Commission's draft report, NECA expressed an alternative view that a service charter may not be the most appropriate mechanism to monitor the quality of service under revenue cap regulation. Consequently, NECA undertook, as part of its review of network prices, to re-examine the issue of maintaining consistency between a regulator's revenue cap determination and a network's service standards. The Commission accepted NECA's undertaking as part of its final decision on the access code dated 16 September 1998.

The proposed NEC changes resulting from the NECA review published in July 1999 would require the transmission networks to publish and adhere to the service standards imposed on them by the regulatory regime administered by the Commission. The NEC changes also provide for the development of a regime to allow for the negotiation of, and payment for, higher levels of service.

In order to establish a set of service standards that will apply to TransGrid over the regulatory period, the Commission has documented the NEC requirements, sought additional information from TransGrid on the service standards it proposes be adopted for its network, sought input from interested parties and engaged a consultant (SKM) to provide expert advice on service standards for TransGrid. The remainder of this chapter details each of these steps.

8.2 NEC 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 NEC states that in setting a revenue cap, the Commission must have regard to:

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

Clause 5.2.3(b) and schedule 5.1 of the NEC 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 NEC states:

> A Network Service Provider must:
>
> (1) 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

(2) 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 NEC 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 per cent, 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* (per cent) — 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, e.g. those caused by bark, animals, birds etc. The faulted line is automatically disconnected, then automatically reconnected after a preset time delay.

8.3 NECA's review

In its final report issued in July 1999, NECA recognised that, in a number of quality of supply areas (*eg* voltage fluctuations, harmonic voltages and frequency) the NEC already sets out clear standards. However, NECA recommended that reliability service standards should be set for tariffed services from 1 July 2001 and that the networks should propose service standards, to be determined by the regulator, as part of the regulatory review process.

NECA also recommended that the networks be required to publish consistent annual statistics on operational performance (reliability) based on a combination of the published performance measures of OFFER (the UK electricity regulator), ORG, IPART and the suggestions of its own working group. NECA also concluded that the NEC needs to include a negotiation framework to establish the rights and obligations of transmission networks and customers in negotiating the terms and conditions of service.

8.4 TransGrid's proposal

In response to a Commission request for TransGrid to document their service standards, TransGrid proposed the use of two high level measures to monitor the service level provided on their system:

- **system minutes** — megawatt hours (MWhs) not supplied divided by MW peak demand (multiplied by 60 to convert to system minutes); and
- **circuit availability** — actual circuit hours available for all transmission circuits divided by the total possible circuit hours available.

8.5 Submissions by interested parties

The Commission requested comments on TransGrid's proposed service standards from all of its customers as well as from other transmission network service providers.

TransGrid's customers (including ACTEW, Advance Energy, Energy Australia, and Tomago Aluminium) generally supported the service standards proposed by their transmission network service provider. ACTEW and Energy Australia suggested that service standards should also include measures of quality of supply in addition to reliability indicators. ACTEW and Advance Energy wanted to include indicators describing the unavailability of supply due to transmission constraints. Advance Energy also commented that an indicator on the performance of interconnectors would be desirable.

Tomago Aluminium said that what was important to it was not total system indicators, but indicators of TransGrid's performance in relation to that company, such as the number and duration of constraints that impacted on Tomago as well as the amount of energy not supplied to the company as a result of system outages.

Transmission network service providers were not as supportive of the process as were TransGrid's customers. For example, Transend wrote that:

> the level of service that can be provided without undue cost is a matter for transmission entities to manage in conjunction with customers in accordance with good electricity industry practice and the provisions of the [NEC]. Transmission businesses should be able to adopt standards, procedures and practices (inputs) most appropriate to achieve desired outcomes. Power systems are an integrated package of customer service level expectations, generator market access requirements and transmission system capabilities. As market requirements for service varies so should and will the performance of the transmission systems.

Western Power noted that it should be up to the transmission network service provider to determine the best approach to rectify reliability problems on their network and added:

> The proper role of a regulator should be to audit compliance and achievement of the desired outcomes. There is no clear role for a regulator in fixing standards, procedures and practices.

With respect to TransGrid's proposed standards, ElectraNet SA wrote that the performance measures proposed by TransGrid are well accepted measures that provide a very high level analysis, but do not contain sufficient detail to be useful for specific analysis. GPU PowerNet notes that it can be difficult in practice to determine whether or not service levels have fallen below the benchmark level. Service standards may differ at different points along a network and, therefore, it is necessary to allow for the transmission network service provider to explain its performance with respect to performance that appears to be below the benchmark level. The service standards that apply to GPU PowerNet are set out in Box 8.1.

Box 8.1: GPU PowerNet's service standards

Aside from ElectraNet SA, the only other Australian transmission network service provider with an explicit set of service standards presently set by a regulator is GPU PowerNet – which has the following service standards, set by the Victorian Power Exchange (now VENCorp) and incorporated into the network's System Code:

1. Sustained (greater than 1 minute) forced outage rate for all transmission lines (nominal voltage 220kV to 500kV) is to be:
   (a) less than 1.0 incidents per annum per 100 circuit km for failure of primary or secondary equipment or transmission company operating error if there is less than 24 hours prior warning given; and
   (b) less than 0.5 incidents per annum per 100 circuit km for outages due to lightning and storms (excluding items covered by (a) above).
2. Mean duration of forced outages for all transmission lines (220 kV to 500 kV) is to be less than 10 hours.
3. Successful autoreclose is to be achieved in greater than 75 per cent of transient faults on transmission lines.
4. Sustained (greater than 1 minute) forced outage rate for all transformers is to be less than 0.3 incidents per annum for failure of primary or secondary equipment or transmission company operating error if there is less than 24 hours prior warning given.
5. Mean duration of forced outages for all transformers to be less than 10 hours.
6. Availability of equipment forming part of the transmission Network (including both forced and planned outages but excluding construction related outages):
   - Circuits > 99.5 per cent
   - Transformers > 99.7 per cent
   - Static VAR compensators > 99.0 per cent
   - Synchronous compensators > 91.0 per cent
   - Capacitor banks > 99.3 per cent
   - Protection systems > 99.8 per cent
7. Percentage of incorrect protection system responses < 1 per cent

8.6 The SKM review

The Commission's consultant, SKM, prepared a report on TransGrid's service standards. SKM recommended that the Commission approve the two standards proposed by TransGrid but, in addition, also recommended further study be undertaken in order to develop a number of additional standards necessary to providing a comprehensive package of performance indicators for use in a quality of service monitoring program. In making its recommendations, SKM had access to all the submissions made to the Commission prior to 16 February 1998, and had regard to the information in these submissions in making those recommendations.

Table 8.1 below shows the two indicators proposed by TransGrid (system minutes and network circuit availability) along with the three additional performance indicators recommended by SKM.

Table 8.1: SKM's Recommended service standards for TransGrid

Type	Entire Network	Individual Points of Connection	Status
Network Reliability	System minutes (minutes)	N/A	Proposed by TransGrid
Availability	Network circuit availability (per cent)	N/A	Proposed by TransGrid
Connection point performance	Average supply point interruption frequency Average supply point interruption duration Average restoration time	Number of interruptions – planned – unplanned Total duration of interruptions (min) – planned – unplanned	Proposed by SKM
Market Performance	Number of constraint events □ <100 MW □ 100-250 MW □ >250 MW Extra generation to overcome constraints (MWh) Cost of extra energy to overcome restraints ($)	Interconnector availability	Details to be researched and developed
Quality of Supply	N/A	Number of sustained under/over voltage excursions Number of excessive transient voltage excursions	Measurability to be formalised

8.7 Issues arising from the draft decision

Responses from interested parties were generally supportive of referencing the networks' revenue caps to a set level of service. TransGrid, however, raised concerns that the Commission's proposal would create a situation of 'triple jeopardy' if it fails to meet the required level of service. That is, TransGrid argued that it would be concurrently exposed to potential financial penalties for under-performance from:

- customers exercising their legal rights under connection agreements;
- civil actions instituted due to inadequate performance vis a vis the standards set out under the NEC and National Electricity Law; and
- the regulator through a reduction of allowable revenues due to the failure to meet the service standards imposed by the regulator.

TransGrid also submitted that the Commission may not have the authority to establish and enforce a set of service standards. It argued that the Commission should merely be examining the existing service standards rather than establishing such standards itself.

GPU PowerNet, TransGrid and EnergyAustralia also raised issues in relation to asymmetric risks associated with service standards. They argued that over-performance needs to be rewarded just as under-performance is penalised. This matter is dealt with in Chapter 2, above.

GPU PowerNet and EnergyAustralia raised concerns that the service standards for TransGrid may not be applicable for their own, or other, networks. EnergyAustralia also raised concerns relating to the additional burden of complying with multiple sets of service standards that may be required of integrated transmission and distribution networks.

GPU PowerNet commented that although the service standard indicators may be universally applicable, the precise performance will probably differ between networks due to factors beyond the reasonable control of the network. These factors include the age of the network and the network configuration. Therefore, GPU PowerNet argued that these factors should be considered when establishing the service standards to apply to each individual network.

8.8 Commission considerations and conclusion

TransGrid, and the other transmission networks in the NEM, have an obligation to operate their networks within the framework set out in the NEC. Those networks also have an obligation under the NEC to fully describe the quality of service provided under connection agreements. The Commission considers that, as the regulator of such organisations, it has an obligation to ensure that they set out a complete set of service standards (including benchmark levels of performance) which they believe should be used to monitor the quality of the services that they will provide.

At this point in time, it is the Commission's view that, to date, there has not been a comprehensive set of service standards put in place by TransGrid that would permit the Commission to determine whether or not service quality is being maintained. Accordingly, as part of this inquiry, the Commission asked TransGrid to define a comprehensive set service standards that can be used to monitor its performance over the next five years.

However, it is apparent to the Commission that TransGrid has not been able to sufficiently describe the nature of the service standards and benchmark levels of performance to which it should be bound during the next regulatory period. While defining service standards and defining benchmarks levels of service is not an easy task, the Commission believes that some progress has been made.

As part of the draft decision, the Commission proposed the following as the service standards for TransGrid:

- the two service standards proposed by TransGrid with the benchmark levels as determined by SKM:

  - network reliability – 0.5 to 2.0 system minutes per annum (with a rolling three year average of less than 1.3); and
  - network availability - 99.0 to 99.2 per cent; and
- the other service standards developed by SKM with respect to connection point performance and quality of supply (subject to the precise indicators being established). The Commission notes that, when determining benchmark levels of performance at individual connection or supply points, there will be a need to balance the appropriate level of service standards to support the level of the revenue cap determined against the cost to the network of providing additional reliability.

As noted above, TransGrid raised concerns that the Commission did not have the authority to establish a set of service standards. The Commission considers that, while it does not have the function of enforcing the maintenance of service standards to ensure compliance with licensing conditions, it does have an obligation under the NEC to ensure that the maximum revenues allowed reflect a determined service level.

However, it is less clear whether TransGrid have indicated what it believes those service standards should be.

Despite this, the Commission notes that, since the draft decision, the NSW Ministry of Energy and Utilities (MoEU) has begun gathering information relating to network performance against the reliability and availability service standards included in the Commission's draft decision. The Commission understands that the MoEU will release a Network Management Report shortly which will consider TransGrid's performance against those standards.

This is understood to be part of a process to consolidate the service standard requirements placed upon the NSW electricity networks. The MoEU released a discussion paper in May last year which outlined its concerns over the current regimes. In addition to the current licensing and technical standards, the MoEU discussed the benefits of incorporating the service standards relevant to economic regulation.

The MoEU noted that it had commenced a consultation process with IPART in relation to the service standards that it sees as being relevant to its regulatory regime. Moreover, the MoEU included the service standards proposed by TransGrid as part of the Commission's revenue cap inquiry into its discussion paper. The Commission understands that the MoEU intends to require all the NSW electricity networks to comply with the benchmarked service levels and reporting requirements established as the result of that process as part of the State's licensing arrangements.

The Commission will consider the administrative efficiencies of relying on the reports published by the Ministry as the appropriate means of satisfying the Commission's own service standards levels and reporting requirements applicable to TransGrid for the purposes of tis revenue cap decision. In order to facilitate its considerations in this regard, the Commission intends to liaise with the MoEU, IPART and other interested parties to ensure that the suite and levels of service standards for applicable are appropriate for the regulatory regime.

This process will be undertaken as part of the Commission's development of its *Regulatory Principles* which will also include consideration of the NEC changes proposed as the result of the NECA Transmission and Distribution Pricing Review.

Due to the incomplete nature of the Commission's work in relation to service standards and the changes currently taking place in NSW, the Commission notes that it will, at the next regulatory reset, consider adjusting TransGrid's revenue cap to reflect any non-performance during the current period against the level of service standards presently contained in the NEC as well as the service standards proposed by the network during this inquiry at the performance levels assessed by SKM. TransGrid will be required to provide the Commission with information suitable to make such an assessment as part of its annual regulatory reporting requirements.

Beyond the next reset, the Commission intends to benchmark TransGrid's performance against the suite of indicators being developed at present. The Commission also intends to further consider the need for, and scope of, any penalty (and/or bonus) regime that should apply to non-performance against those standards. In this respect, the Commission also plans to examine the experiences associated with the performance regime included in the recent South Australian Electricity Pricing Order.

Finally, the Commission notes that, once the suite of indicators being developed as part of the *Regulatory Principles* have been finalised, it will include those service standards in revenue caps finalised beyond that point in time. That is, the Commission will assess the performance of the relevant NEM-participating transmission networks against both the existing and those new service standards from then onwards.

Accordingly, the Commission strongly suggests that the networks begin to gather and compile the data necessary to ensure that at least five years of performance information can be made available for each of the standards referred to in this decision as well as those contemplated for inclusion as part of the *Regulatory Principles* process.

9. EnergyAustralia parallel transmission network services revenue cap

9.1 Introduction and NEC requirement

Part of the process of structural reform of the NSW electricity industry undertaken during the last decade involved the creation of TransGrid and the six distribution businesses as separate entities. Network assets were divided between the new businesses on both an asset class and geographical basis. The result of this process is that each of the NSW distribution businesses own some sub-transmission wires with ratings between 66 kV and 220 kV.

The NEC defines these assets as forming part of the transmission network but also provides that those assets which do not operate in parallel with (provide support to) the main transmission system may be deemed to be assets which form part of the distribution network[49]. The rationale for this is to assist in the matching of regulation to the actual services provided by the network.

In accordance with clause 6.2.1(d) the Commission and IPART agreed that the distribution businesses will be able to deem their non-parallel transmission assets as being subject to regulation by IPART under Parts D and E of Chapter 6 of the NEC. This agreement was for the regulatory period of 1 July 1999 to 30 June 2004. As noted above, the revenue streams applicable to those assets during that period was determined by IPART in December 1999.

Another class of sub-transmission assets are those parallel transmission assets with ratings between 66 kV and 220 kV that provide support to the main transmission system. EnergyAustralia notified the Commission that it owns such assets which are, therefore subject to regulation under Parts B and C of Chapter 6 of the NEC.

As noted previously, NECA, on behalf of the NSW Minister for Energy, submitted a derogation to the Commission on 24 June 1999 that proposed a modification to the Commission's revenue relation role within NSW between 1 July 1999 and 31 January 2000. The derogation stipulated that the Commission's revenue determination in respect of in NSW will take effect from 1 February 2000, not 1 July 1999.

---

49 The NEC defines a transmission system to be: 'A transmission network together with the connection assets associated with the transmission network, which is connected to another transmission or distribution system'. A transmission network is defined as a network within any participating jurisdiction operating at nominal voltages of 220 kV and above plus:

(a) any part of a network operating at nominal voltages between 66 kV and 220 kV that operates in parallel to and provides support to the higher voltage transmission network; or

(b) any part of a network operating at nominal voltages between 66 kV and 220kV that does not operate in parallel to and provide support to the higher voltage transmission network but is deemed by the Regulator to be part of the transmission network.

The Commission granted an interim authorisation to the derogation on 30 June 1999. As a result, the previous IPART revenue determination has been extended and will apply until 31 January 2000, over which time the Commission will be responsible for administering that determination. At the end of this period the Commission's revenue cap decision will take effect and will be administered by the Commission from 1 February 2000.

9.2 Related decisions and consultancies

Many of the issues relevant to the assessment of the parameters used to determine the MAR for EnergyAustralia's parallel transmission assets have already been discussed in earlier chapters relating to TransGrid's revenue cap. Accordingly, the remainder of this chapter focuses on considerations particular to EnergyAustralia. It also sets out the Commission's assessment of the building block and other elements of the determined maximum revenue stream .

Further, EnergyAustralia is primarily a provider of distribution network services. In respect of that function it is regulated by IPART. The Commission's responsibility for regulation of EnergyAustralia's parallel transmission assets raises the prospect of regulatory overlap, inconsistent treatment and possibly an increased cost of regulation. In order to minimise the effect of such issues, the Commission has, where relevant, chosen to rely upon the consultancy reports prepared for IPART as part of its July 1999 Report to the NSW Premier and December 1999 final distribution network revenue and pricing determination. Copies of those reports should be available from IPART's website.

9.3 Commission's assessment of building block components and service standards

Consistent with the final TransGrid revenue cap decision, the Commission has used the accrual building block approach in setting the maximum revenues that EnergyAustralia may earn during the regulatory period.

9.3.1 Opening asset base

EnergyAustralia's original proposal

EnergyAustralia submitted to the Commission a list of its assets that provided parallel transmission network services[50]. These included both dedicated transmission assets and assets shared between distribution and transmission services. The asset values were determined by applying the ODRC methodology and utilising the unit rates and optimisation factors used by GHD in its review of the asset bases of the NSW distribution networks. Common assets were valued by apportioning the total ODRC of those assets between the different functions on a utilisation basis.

[50] EnergyAustralia, 22 April 1999, 'Transmission assets and costs' V2d.

The opening asset base proposed by EnergyAustralia based was $864 million. This comprised $384.6 million for transmission and supporting non-system assets and $480.3 million for easements.

Commission's draft decision

In its draft decision the Commission accepted the opening asset base valuation of $345.41 million provided by the IPART Secretariat in accordance with clause 6.2.3(d)(4)(iii) of the NEC. [51]

Issues arising from the draft decision

The submissions on the Commission's draft decision in relation to the opening asset base question fell into two broad groups.

The networks that responded (TransGrid, EnergyAustralia, PowerLink, NorthPower, Western Power and GPU PowerNet) considered that:

- the Commission's use of the business valuation provided by IPART was inconsistent with the asset-based accrual building block approach used in other parts of the decision; and
- that the assets should be valued using the ODRC method — NorthPower stated that doing so would ensure that sunk assets were valued on the same basis as future capital expenditure; and
- easements were an essential part of the network's assets and it was also therefore appropriate to value them on an ODRC basis — particularly where, as TransGrid submitted, the Commission had indicated its intention to do so in the draft *Regulatory Principles* document released shortly after the draft of this decision.

In relation to the first point, EnergyAustralia criticised the IPART valuation for its "lack of consistency, transparency and for being extremely subjective"[52]. The network considered that the asset value proposed by IPART for EnergyAustralia was inconsistent with the ODRC methodology adopted by PowerNet Victoria and was also inconsistent with the valuation provided for TransGrid's transmission assets, potentially leading to 'rail gauge' issues that would impact on pricing, asset management and investment. This was said to be particularly the pertinent in relation to the valuation of easements in urban areas.

TransGrid submitted that the Commission should not adopt IPART's business valuation for the reasons that:

- to adopt the IPART valuation would be inconsistent with the overriding objectives for the transmission regulatory regime set out in Clause 6.2.2 of the NEC. For example, Clause 6.2.2.(b)(2) requires the Commission to "provide a sustainable

[51] It should be noted that following the Commission's draft decision IPART revised its recommendation to $420.33 million.

[52] EnergyAustralia, 11 June 1999, 'Submission to Australian Competition and Consumer Commission'

commercial revenue stream which includes a fair and reasonable rate of return… on efficient investment"; and

- even if the Commission's adoption of IPART's valuation was consistent with those objectives, the valuation is not one which satisfies the requirements set out in Clause 6.2.3(d)(4)(iii). That is, it is not "a value of TransGrid's assets in existence and generally in service as at 1 July 1999 and… does not appear to be the regulatory asset base established in New South Wales".

The networks and NSW Treasury supported the use of ODRC on the basis that it provides a transparent, readily understandable and repeatable valuation process. NorthPower added that the use of ODRC ensured that the risk of asset optimisation was left to the networks and not to more subjective forward-looking business valuation methods.

The second group of responses (ACA, BCA, Energy Markets Reform Forum and PIAC) commented that the use of the ODRC valuation method would be inappropriate, particularly in relation to easements. The BCA submitted that, in relation to easements, the Commission should adopt the approach used in the United States. That is, easements should initially be valued at cost and the benefits of any subsequent revaluation should be shared between networks and customers.

NSW Treasury submitted that the exclusion of sales tax and interest during construction would support its contention that the ODRC valuation determined by GHD was conservative.

IPART's determination

In its December 1999 distribution networks pricing determination, IPART adopted asset values for those networks that were largely consistent with an ODRC valuation. This was not the case with respect to the regulatory values to be attributed to easements as IPART considered that doing so would lead to an unacceptable price shock to network customers. In this respect, IPART was of the view that there was no economic benefit in valuing easements at their market value. In its determination IPART did not separately identify the value of assets attributable to the transmission network.

Commission considerations and conclusion

As noted, after the Commission's draft decision was released, NECA sought on behalf of the NSW Government authorisation of a derogation which would give the Commission responsibility for determining the opening asset value to be applied to EnergyAustralia's parallel transmission assets. That valuation was to be subject to the principles contained in the NEC. The Commission granted interim authorisation to that derogation on 15 December 1999.

In arriving at a valuation for EnergyAustralia's network assets as at 1 July 1999, the Commission has adopted the ODRC principles used in relation to the valuation of TransGrid's assets. The reasons for the Commission's use of that methodology are set out in Chapter 3, above. The Commission has determined the ODRC value of those assets as at 1 July 1999 to be $384.9 million. This amount is based upon material submitted by EnergyAustralia, which was derived from the GHD valuation conducted in February 1999.

As noted by IPART, there are significant issues associated with the proper valuation to be accorded to easements in the regulatory context. A discussion of these issues is set out in Chapter 3, above where it was noted that the Commission is currently considering the most appropriate methodology to be applied over the longer term as part of the *Regulatory Principles*. The Commission has already indicated a preference for the valuation of easements to be on a basis consistent with the principles used to value network assets including the recognition of the need to transition between revaluations occurring over time using depreciation allowances. However, the Commission has yet to finalise those views.

For the purposes of the present decision, the Commission has applied the same approach used to establish the opening value of TransGrid's easements. That is, the Commission has determined the opening value for EnergyAustralia's easements using their indexed historic costs. The Commission considers that this methodology provides an acceptable balance between its obligations under the NEC to ensure that network owners earn a reasonable return on their investments and the desirability that customers should not face an immediate price shock.

The historic cost used is based on the transfer values recorded at the time EnergyAustralia was formed as a new entity in 1989. That amount was $56.4 million and has been indexed to 1 July 1999 at the inflation rate resulting in an opening value for the network's easements of approximately $72.5 million.

Therefore, the total regulatory opening asset value assessed by the Commission for the purposes of this final decision is $457.4 million.

9.3.2 Capital expenditure

EnergyAustralia's original proposal

EnergyAustralia indicated that it planned to spend $80 million on capital works projects over the regulatory period. This estimate consisted of $33.6 million renewals expenditure for mains and substations and augmentation expenditure of $46.4 million reflecting anticipated load growth. The latter primarily consisted of four major projects. The forecast augmentation costs by project are set out in Table 9.1 below.

Table 9.1: Forecast augmentation capex ($ million)

	1999/00	2000/01	2001/02	2002/03	2003/04	Total
Feeder 910 & 911	3	7	0	0	0	**10**
Tuggerah to Munmorah feeder	3.5	0	0	0	0	**3.5**
Ourimbah to Gosford feeder	0.2	0.3	4.5	2	0	**7**
Sydney Central connections	0	0	5	15	5	**25**
Other augmentation	0.2	0.2	0.1	0.2	0.2	**0.9**
Total	**6.9**	**7.5**	**9.6**	**17.2**	**5.2**	**46.4**

As part of its inquiry into the revenue caps to be applied to the NSW distribution businesses, IPART engaged Worley International (Worley) to review EnergyAustralia's planned capital expenditure programs. Worley accepted that that program was, as a whole reasonable and appropriate. The Worley report is available from IPART's website.

Commission's draft decision

The Commission, noting the conclusion reached by Worleys, accepted that the capex program outlined by EnergyAustralia was prudent in the circumstances. In doing so, the Commission made it clear that this meant that it was satisfied that the amounts submitted were being given provisional approval for inclusion in the draft regulatory asset base and that the actual amounts spent by EnergyAustralia on those projects would be subject to *ex-post* reasonableness review at the next regulatory reset. This approach was consistent with that adopted in relation to TransGrid's planned capex program.

The Commission also noted that the value of the assets would be rolled-in to the regulatory asset base at the expected date of commissioning, rather than as at their planned construction date. This was consistent with the Commission's role as a service regulator.

Issues arising from the draft decision

In its submission on the Commission's draft decision, EnergyAustralia argued that the Commission should either recognise new assets in the regulated base as they were constructed or, if those assets were instead to be recognised by reference to their expected commissioning date, include the network's appropriate costs of financing the construction in the revenue stream allowed. This view was supported by TransGrid amongst others.

A number of other issues were raised by interested parties in relation to the Commission's proposed treatment of new capital expenditure. Those issues were generally raised in the context of TransGrid's planned capex program. Accordingly, the discussion of the Commission's consideration of those issues is set out in Chapter 4, above.

IPART's determination

In its December 1999 revenue and pricing determination, IPART noted the recommendations contained in the Worley report and was satisfied that it was appropriate to include the projections in EnergyAustralia's rolled-forward asset base for the regulatory period.

Commission considerations and conclusion

After taking into account the submissions referred to above, the Commission remains of the view that is appropriate to accept the initial prudency of the forecast capital expenditure amounts included in EnergyAustralia's submission as approved in the Worley report. Those projects will be rolled into the network's regulatory asset base as at their anticipated commissioning date.

As it has done in relation to TransGrid, the Commission also accepts that it is appropriate to include interest during construction on those amounts at the WACC rate of return. This is consistent with the Commission's views set out in the draft *Regulatory Principles*.

The Commission wishes to emphasise that, in assessing the initial prudency of the planned capex, it is not approving the capital expenditure *per se*. Actual expenditure incurred will be subject to an *ex-post* reasonable assessment and the Commission may be prepared to optimise the regulatory value of the new assets may occur if the expenditure fails that test.

Further, in making both the *ex-ante* and *ex-post* assessments, the Commission will have regard to whether the network planning requirements set out in Chapter 5 of the NEC were followed as a guide for assessing whether the proposed expenditures are the most efficient and reasonable given available (competitive) options.

The capital expenditure that the Commission has included in the determination of EnergyAustralia's revenue cap is set out in Table 9.2. The amounts noted are expressed in nominal terms and include an allowance for interest during construction assessed at the WACC rate of return.

Table 9.2: EnergyAustralia capital expenditure, 1999/00 to 2003/04 ($ million)

Year	Base cost	Interest during construction	**Total**
1999/00	3.30	0.12	**3.42**
2000/01	8.60	0.34	**8.94**
2001/02	18.30	0.79	**19.09**
2002/03	9.30	0.34	**9.64**
2003/04	14.90	0.71	**15.61**
Total	**54.40**	**2.30**	**56.70**

Note: The columns may not add to the totals due to rounding.

9.3.3 Return on capital

EnergyAustralia's original proposal and the Commission's draft decision

In its original submissions to the Commission, EnergyAustralia did not specifically address the issue of rate of return on capital. The network addressed this issue in it submission in response to the Commission's draft decision and is noted below.

In the draft decision, the Commission assessed the rate of return to be applied to EnergyAustralia's regulated asset base in order to generate an appropriate return on capital building block as 7.25 per cent expressed in pre-tax real terms. This was the same rate assessed with respect to TransGrid's regulated business. The reasons for that decision, including the determination of the relevant cost of capital parameters, are set out in Chapter 2.

Issues arising from the draft decision

A large number of issues were raised in submissions by interested parties regarding the WACC assessed by the Commission in the draft decision. Those issues may be broadly categorised as concerning the values to be attributed to specific elements of the cost of capital and those concerning the issue of appropriate compensation for perceived asymmetric risks. A comprehensive discussion of those matters and the Commission's related conclusions are set out in Chapter 2.

In relation to the asymmetric risk issue, EnergyAustralia submitted that a regulated electricity network faced a number of different elements of asymmetric risk and that the appropriate forms of compensation for each differed. For example:

- major insurable risks should be accounted for in the cash flows or via an adjustment to the WACC;
- accelerated depreciation was more appropriate for specific instances of asset stranding; and
- generic asset value writedowns and the risk due to regulatory uncertainty should be accounted for via an adjustment to the WACC

The network provided an assessment of the size of the adjustment considered appropriate in relation to the risk of asset stranding occurring to its distribution assets located in the Sydney CBD. The example suggested a WACC adjustment of between minus one and plus two per cent. EnergyAustralia's submission, and those made by other interested parties on this issue, are discussed in Chapter 2.

IPART's determination

In its December 1999 determination, IPART concluded that a pre-tax real WACC in the range of between 7 and 8 per cent was an appropriate rate of return for the NSW distribution businesses. For the purposes of that determination, IPART assessed the revenue streams using a 7.5 per cent pre-tax real WACC.

Commission considerations and conclusion

The approach used by the Commission in determining EnergyAustralia's WACC is consistent with that used for TransGrid. In particular the Commission has opted to benchmark the WACC for EnergyAustralia's transmission assets against other transmission network service providers rather than relying on the particular features of EnergyAustralia which flow from its (mainly) distribution operations. This is designed to ensure competitive neutrality between the transmission network investment decisions of EnergyAustralia and those made by TransGrid.

Accordingly, the Commission has determined that, like TransGrid, the appropriate return on capital to be applied to EnergyAustralia's parallel transmission assets is a post-tax nominal return on equity of 13.85 per cent. When this is converted to a post-tax WACC there is a marginal difference between EnergyAustralia and TransGrid due to the tax position of the EnergyAustralia assets. In particular the tax shield afforded to EnergyAustralia from depreciation is proportionally less than that for TransGrid due to the higher proportion of non-depreciable assets in the asset base. This results in a slightly lower post-tax nominal WACC of 8.1 per cent and a slightly higher pre-tax real equivalent WACC of approximately 7.5 per cent. The parameters utilised by the Commission for both TransGrid and EnergyAustralia are outlined in Chapter 2.

Unlike TransGrid EnergyAustralia did not express a view as to an appropriate rate of return for its transmission assets, rather EnergyAustralia quarantined its comments to the derivation of the parameters, and the appropriate treatment of the different permutations of business risks.

The Commission views this return on capital to be towards the higher end of the feasible range. This reflects an adjustment made by the Commission which takes into account any risk associated with the relative newness of the regulatory regime.

9.3.4 Operating and maintenance expenses

EnergyAustralia proposal

EnergyAustralia provided the Commission with its transmission operating expenses for the 1998/99 current financial year and forecasts for the subsequent ten years. These forecasts generally reflected the load growth anticipated during the period, expected increases in some cost drivers and anticipated efficiency gains of 1.2 per cent per annum.

Where an allocation between transmission and distribution operating expenses was required, EnergyAustralia attributed costs on a causal basis. Where a causal relationship was not readily identifiable, EnergyAustralia determined the transmission activity's share of the expense by apportioning the costs on a related asset valuation basis.

Benchmarking of operating expenses

As discussed in Chapter 5, the Commission considers that allowances for opex should be based on good industry practice. As transmission networks improve their efficiency, their operating costs benchmarks will also improve, enabling the benefits of those gains to be passed onto the consumers. Further, the use of good industry practice as the basis for comparing operating costs ensures that the regulated businesses are provided with an incentive to improve their performance in order to generate profits above that indicated by the WACC-based revenue stream.

Several interested parties who made submissions to the Commission in relation to its *Regulatory Principles* issues paper supported the view of using benchmarked costs, including the EUG, Ergon Energy and TransGrid.

As was the case with TransGrid, EnergyAustralia has recently participated in two operating expense benchmarking studies. Copies of both the studies described below appear on IPART's website.

The first study was undertaken by the UMS group and involved the participation of many Australian and international businesses, including EnergyAustralia and the other NSW distributors. The study was designed to provide strategic management information for cost savings and provide advice on potential cost saving measures and/or plans for increasing service levels. The voluntary nature of this study relied on confidentially arrangements regarding the publication of the resulting analysis, which has meant there are limitations on the usefulness of this study for regulatory purposes. The Commission cannot set actual efficiency targets for an individual regulated business by relying on this information alone.

However, while the report masked individual company performances, it did indicate relative performance in relation to the average operating expenses of the NSW distribution networks. Thus, the relative position of the business, when combined with its known historical operating costs, can be used to provide a sanity check for the opex forecasts proposed by the distributor for the regulatory period.

The UMS study noted that, in order for the NSW distributors as a group to match the average best performing companies involved in the study, they would have to achieve an average 12 per cent cost savings. Some participants noted that there were limitations to the study in their submissions to IPART as part of its recently concluded inquiry into the revenue caps and prices to be determined for those businesses.

The second benchmarking study was undertaken by London Economics, as consultants to IPART during its current inquiry. The study was significantly different to that undertaken by the UMS Group in that it concentrated primarily on Data Envelopment Analysis (DEA) to ascertain potential efficiency targets. This technique compared the performance of the distributors against the frontier, or most efficient, companies in the database.

The results of this study showed that there existed significant scope for EnergyAustralia to make efficiency savings on operating expenses. This was true for the raw efficiency score for the overall technical efficiency (potential gains of up 41 per cent against the frontier) as well as most of the sensitivity analyses conducted. London Economics concluded by suggesting that the range of potential efficiency gains lay between nine and 42 per cent.

The NSW distribution networks raised a number of concerns about the conclusions reached by the London Economics report in their submissions to IPART as part of its inquiry into revenues and prices. The concerns ranged from perceived failure to address some basic fundamental issues of efficiency to a concern over precise utilisation of the findings.

The Commission's draft decision

In its draft decision, the Commission noted that the two studies referred to had not attempted to separate the costs or potential efficiency gains attributable to EnergyAustralia's transmission and distribution businesses. In making its own preliminary assessment of the scope for savings in regard to the former, the

Commission took into consideration the 1.2 per cent per annum target identified by the network and any further potential for savings not explicitly identified in the financial information provided.

The Commission concluded that an overall real savings target of 12.95 per cent was appropriate for EnergyAustralia's transmission operating and maintenance expenses during the regulatory period. The Commission was satisfied that that level of savings was broadly consistent with the potential suggested by the UMS study.

The Commission noted that its assessment would be subject to revision once the results of IPART's further investigations had been made available.

Issues arising from the draft decision

Submissions prepared in response to the Commission's draft decision did not raise any significant issues in relation to the proposed operating and maintenance expenditure allowances in EnergyAustralia's revenue cap.

IPART considerations

In the December 1999 determination, IPART set EnergyAustralia a cumulative real operating and maintenance expense efficiency target of ten per cent over the regulatory period for the business as a whole. This target was subject to making an allowance for increases in those expenses as the result of expected growth during the period. That allowance in EnergyAustralia's case was determined to be one half of the anticipated ten per cent growth allowance for the regulatory period. Accordingly, IPART determined that the net overall real opex reductions required of EnergyAustralia was five per cent in total or one per cent per annum.

Commission considerations and conclusion

In its draft decision the Commission foreshadowed its intention to review its assessment of the operating and maintenance expenditure and anticipated efficiency gains once IPART had made its decision on these issues for EnergyAustralia's distribution business.

In this regard, the Commission has sought to achieve, where appropriate, consistency with IPART to minimise any side effects that may result from the application of dual efficiency targets to a single business by the two regulators.

The Commission is also conscious of the need to minimise any risk of 'regulator shopping' occurring, an issue that has received much comment from stakeholders in the past. For example, the application of separate targets may provide the regulated entity with an incentive to move the attribution of cost items between its transmission and distribution operations. This would serve to undermine the customer benefits designed to be achieved by incentive-based regulation and would perpetuate uneconomic practices.

In addition to these considerations, the Commission also notes that it is only as the result of the commencement of separate transmission regulation that EnergyAustralia has faced a need to disaggregate its operating expenses. Thus, verification of historic cost information in relation to the firm's transmission operations has proven difficult.

In light of these issues, the Commission has chosen to apply the anticipated efficiency gains as assessed by IPART in its December 1999 determination. In reaching this conclusion, the Commission considers that the efficiency gains identified in distribution would be similarly appropriate for EnergyAustralia's transmission services due to the integrated nature of the two businesses.

Accordingly, the Commission has made an allowance in the revenue stream applicable to EnergyAustralia's transmission operations consistent with the network being able to achieve real reductions in operating and maintenance expenditures of one per cent per annum over the course of the regulatory period.

9.3.5 Service standards

Background and the Commission's draft conclusion

The issue of service standards is largely dealt with in relation to TransGrid in Chapter 8, above.

Briefly, as part the inquiry leading to the Commission's draft TransGrid determination, TransGrid was asked to supply information regarding the service standard levels that it considered should apply to the transmission services which it planned to provide during the regulatory period under consideration. The Commission then contracted SKM to review TransGrid's submission and to suggest additional standards as appropriate.

In its draft decision, the Commission proposed to adopt for both TransGrid and EnergyAustralia the two standards proposed by TransGrid at the performance levels recommended by SKM. These were:

- network reliability – 0.5 to 2.0 system minutes per annum (with a rolling three year average of less than 1.3); and
- network availability - 99.0 to 99.2 per cent.

The Commission indicated its intention to explore a number of other standards recommended by SKM as potentially being appropriate to the delivery of the regulated service. Further, it signalled that it would have regard in the final decision to the service standards being considered at the time by the NSW Minister for Energy and Utilities (MoEU) for inclusion as part of the NSW electricity networks' licensing conditions.

Issues arising from the draft decision

Responses from interested parties were generally supportive of referencing the networks' revenue caps to a set level of service although, as noted in Chapter 8, TransGrid raised concerns over the Commission's ability to mandate service standards in the revenue regulation context and the potential for 'triple jeopardy' arising in relation to any under-performance by the network.

GPU PowerNet and EnergyAustralia raised concerns that the service standards for TransGrid may not be applicable for their own, or other, networks. EnergyAustralia also submitted that complying with multiple sets of service standards for integrated transmission and distribution networks may represent a real burden on the network.

GPU PowerNet commented that although the service standard indicators may be universally applicable, the precise performance will probably differ between networks due to factors beyond the reasonable control of the network. These factors include the age of the network and the network configuration, and therefore GPU PowerNet argued that these factors should be considered when establishing the service standards to apply to each individual network.

Other submissions were made in relation to service standards and these are set out in Chapter 8.

Commission considerations and conclusion

As discussed in relation to TransGrid, the Commission considers that a comprehensive resolution of the service standards issue in the regulatory context has yet to be reached. The Commission intends to continue to explore that issue as part of the *Regulatory Principles* and, in doing so, will work with the MoEU, IPART and other regulators to ensure that an appropriately balanced suite of indicators will be finalised prior to the next regulatory reset. That framework may incorporate a penalty or bonus regime for under- or overperformance.

The Commission notes that the MoEU has recently indicated its intention to assess, as a minimum, the performance of the NSW electricity networks against the two standards and performance levels adopted in the Commission's draft decision.

The Commission is satisfied that, in the circumstances, it is appropriate to rely on the service standards established in the draft determination for the purpose of assessing EnergyAustralia's performance in relation to the revenue stream allowed during the current regulatory period. Examination of that performance will take place at the next regulatory reset and will be based on information supplied by the network to the Commission each financial year as part of its regulatory reporting requirements. Beyond the next reset, the Commission intends to benchmark EnergyAustralia's performance against the suite of indicators being developed at present.

Further discussion of the Commission's conclusions in relation to the service standards which will be applicable to both EnergyAustralia and TransGrid is set out in Chapter 8.

9.4 Total revenue

9.4.1 Depreciation

As previously noted, the opening asset base provided to the Commission by the IPART Secretariat for the draft decision was a business valuation for EnergyAustralia. As such, that valuation was not separated into values by asset class. Accordingly, for the purposes of calculating the depreciation allowance, the Commission made approximations of the values associated with specific assets, or classes of assets, as the case may be.

The results of this approach were criticised by EnergyAustralia in its post-draft decision submission in that it believed that the appropriate depreciation allowance was well in excess of that calculated by the Commission. This claimed underestimation of the depreciation allowance was considered largely to be the product of the assumptions that

the Commission was required to make regarding the inclusion of easements in the opening asset valuation.

As a result of the derogation discussed above in relation to asset valuation, the asset values associated with the different classes are now explicitly known, and therefore the skewing impact of the implicit average remaining life that was suggested to have resulted due to easements is no longer an issue.

However, even though the Commission is no in a position to determine a more appropriate allowance in respect of the depreciation profile associated with EnergyAustralia's transmission assets, the depreciation allowance has not significantly increased due to the Commission's adoption of an economic depreciation approach for the purposes of this final decision. This approach combines the normal accounting depreciation allowance with the value of the inflation adjustment required to maintain the real value of the regulated asset base over the regulatory period and is further discussed in Chapters 2 and 6, above.

Table 9.3 illustrates the economic depreciation charges that the Commission has used in deriving the revenue cap for EnergyAustralia.

Table 9.3: Depreciation allowance for EnergyAustralia

Year	$ million
1999/00	8.51
2000/01	9.50
2001/02	10.61
2002/03	11.53
2003/04	10.32
Total	50.47

9.4.2 CPI – X regime and revenue smoothing

As discussed in relation to TransGrid, the Commission has adopted the use of a CPI-X efficiency regime in determining the revenue stream to apply to EnergyAustralia's transmission assets. The Commission has utilised an overall smoothing 'X' of 1.43; that is, the revenues associated with those assets will increase by CPI but decline from year to year by a factor of 1.43 per cent. The resulting revenue stream incorporates the impact of the anticipated operating and maintenance cost efficiency gains of 5 per cent for the regulatory period as discussed above. The final revenue outcomes are subject to the impact of the GST as discussed in Chapter 6, above.

Consistent with its approach in relation to TransGrid, the Commission has also chosen not to apply any further revenue smoothing beyond that already incorporated in the CPI-X regime.

Finally, it is important to note that, in its December 1999 determination, IPART determined a revenue path for the whole of EnergyAustralia, including its transmission services and that the revenue path for the network's distribution services is the net of

the total revenue assessed less the amount which the Commission has determined for transmission services in this decision. The implication is that revenue cap for EnergyAustralia's transmission network will not impact upon its total revenues and therefore that further smoothing by the Commission in relation to the maximum allowable revenues that it has determined would not be appropriate.

9.4.3 Total revenues

The final revenue cap determined by the Commission for EnergyAustralia's parallel transmission assets for the regulatory period is shown in Table 9.4 below.

Table 9.4: MAR for EnergyAustralia's parallel transmission assets, 1999/00 to 2003/04 ($ million)

	1999/00	2000/01	2001/02	2002/03	2003/04
Return on capital	46.70	46.19	46.13	47.00	46.81
Return of capital	8.51	9.50	10.61	11.53	10.32
Operating expenses	16.45	16.71	16.98	17.25	17.53
Estimated taxes payable	2.88	2.94	2.84	3.20	8.04
Less value of franking credits	(1.44)	(1.47)	(1.42)	(1.60)	(4.02)
Unadjusted revenue allowance	73.10	73.87	75.14	77.38	78.68
CPI-X smoothed MAR	**73.10**	**74.33**	**75.57**	**76.83**	**78.12**

As noted above, the revenues in Table 9.4 do not include any impact associated with the introduction of the GST. The way in which that impact will be incorporated into the assessed MAR is set out in Chapter 6.

Attachment A – Submissions

Submissions received in response to the Regulation of NSW Transmission Revenues Issues Paper, the draft decision and also in response to the pre-decision conference.

Submission Author/s	Submission Date	Submission Title
Australian Cogeneration Association	14/7/99	Preliminary Submission: ACCC Assessment of TransGrid's Revenue Cap
Business Council of Australia	26/6/99	NSW and ACT Transmission Networks Revenue Cap
Energy Markets Reform Forum	10/6/99	NSW and ACT Transmission Networks Revenue Cap
EnergyAustralia[1]	11/1/99	Regulation of NSW Transmission Revenues
EnergyAustralia[2]	11/6/99	Submission to Australian Competition and Consumer Commission
EnergyAustralia[3]	2/7/99	EnergyAustralia Supplementary Submission – NSW and ACT Transmission Revenue Caps
G A Swan	23/5/99	NSW & ACT Networks Revenue Cap – Draft Decision. Comments
GPU PowerNet	2/7/99	Response to ACCC Draft Decision
NorthPower	26/6/99	NSW and ACT Transmission Networks Revenue Cap – Draft Decision
NSW Treasury	12/7/99	ACCC Draft Decision on NSW and ACT Transmission Revenue Cap – NSW Treasury Submission

NSW Treasury, NSW Electricity Reform Taskforce	3/9/98	NSW Treasury Response to the ACCC Statement of Regulatory Intent for the Regulation of Transmission Revenues
Powerlink Queensland	11/6/99	NSW and ACT Transmission Networks Revenue Cap – Draft Decision
Public Interest Advocacy Centre	11/6/99	NSW and ACT Transmission Networks Revenue Cap- Draft Decision
South Australian Treasury	5/7/99	Draft Decision NSW and ACT Transmission Networks Revenue Caps 1999/00 – 2003/04
Stephen Gray, University of Queensland	4/6/99	Response to Consultation Paper No.4: Cost of Capital Financing
Texas Utilities Australia	4/6/99	Response by Texas Utilities Australia Pty Ltd to Consultation Paper No.4: Cost of Capital Financing
TransGrid[1]	6/8/98	Regulation of Transmission Revenues – Submission of Response to May 98 ACCC Issues Paper
TransGrid[2]	Oct 98	Special Reference on Electricity by the Premier of NSW: Submission to the Independent Pricing and Regulatory Tribunal
TransGrid[3]	23/12/98	Regulation of NSW Transmission Revenues Issues Paper December 98
TransGrid[4]	2/7/99	Response to Draft Decision: NSW and ACT Transmission Network Revenue Caps 1999/00 – 2003/04
Western Power	2/7/99	Draft Decision – NSW and ACT Transmission Revenue Cap 1999/00 – 2003/04

Attachment B – Regulatory framework issues

Pre and post-tax investor returns

The National Electricity Code (NEC) requires the Commission to set maximum allowable revenues for non-contestable services so that investors in that infrastructure can expect to receive a commercial return commensurate with the risks involved in the provision of those services. As such, the returns are not intended to include monopoly profits. The more appropriate level of such returns are fairly accurately indicated by arbitrage based models of return such as the capital asset pricing model (CAPM).

An important feature of commercial returns to investors, including those indicated by CAPM, is that they are always expressed in post-tax nominal terms. The logic of this is relatively simple — if two investments involving similar risks provide the owner with the same return before tax but a different net return after tax, an investor will prefer the investment that gives the higher net after tax return. Indeed, if the investments are available as shares listed on the stock exchange the price of the latter will be bid up relative to the other so that the post-tax returns to investors will be equalised.

The discussion that follows serves to emphasise two important points:

In setting regulated revenues, a regulator needs to take account of the taxes likely to be paid by the regulated entity given the financial structure of that entity. This structure is the one that maintains consistency between the regulatory accounts and the assumptions used in the CAPM to derive the appropriate commercial return for the business; and

If there are features of the taxation system which give benefits to shareholders in addition to dividend cash-flow, these also need to be taken into account when assessing the prospective return to shareholders. The value of imputation credits to shareholders is one such benefit that needs to be accounted for in the Australian context.

Implications for pre-tax regulatory frameworks

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*[53], 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

---

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

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. The Ralph Business Taxation review changes have highlighted this uncertainty. During the course of the Victorian Gas decision, a range of financial experts appearing at a forum to discuss WACC issues unanimously agreed that this problem could be avoided. They suggested assessing revenue requirements on a post-tax basis and augmenting the revenues obtained by making reasonable estimates of likely tax liabilities for the regulatory period (of five years) rather than over the lifetime of the assets (which may exceed 50 years). The focus on short-term forecasts significantly reduces uncertainty over likely tax liabilities and whether they are adequately compensated for in the revenues that are expected to be received by the regulated entity.

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. When graphed (see Figure 1(b)), the profile of tax liabilities takes on the appearance of a flattened S shaped curve – hence the title.

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.

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. Hence, as identified in the draft *Regulatory Principles* document, it is the Commission's preferred regulatory approach.

What is the effective tax rate?

The difference between pre-tax and post-tax rates of return is defined by the effective tax rate. It is sensitive to a number of factors which include the corporate tax rate and the range of available tax concessions which 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 (Tc), 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 which are well accustomed with uneven cash flows.

Nevertheless, such deferrals of tax costs can have significant value for a business and its shareholders. As such, they effect the rate of post-tax return earned by the company and its owners. By examining the prospective pre-tax cash flows, it is a straightforward matter to calculate the expected *pre-tax internal rate of return* for those cash flows over the life of the asset. Similarly, an examination of prospective cash flows net of tax reveals the expected *post-tax internal rate of return*. As discussed earlier, it is this expected post-tax rate of return that the regulator seeks to provide to a regulated entity through the regulatory framework.

Clearly such a regulatory framework may be based on the pre-tax rate of return or post-tax rate of return but there is a strict requirement that, if a pre-tax rate is used, it must be fully consistent with the required post tax rate. It is the correct relationship between the two which defines the effective tax rate (Te).

$$R\ (post\text{-}tax) = R\ (pre\text{-}tax) \times (1\text{-}Te)$$

It is important to note that only the business entity actually incurs tax liability. It is also important to distinguish the returns to equity capital from borrowed funding. Hence this formula is only appropriate to the equity term within a weighted average cost of capital (WACC) formula. In the case of the return to equity holders, the focus of the CAPM, the necessary return to equity holders is complicated by the value which needs to be attributed to imputation credits. Thus the relation between the pre-tax return on equity and post-tax return on equity is defined by:

$$ROE\ (post\text{-}tax) = ROE(pre\text{-}tax) \times [(1\text{-}Te) + \gamma.Te]$$

In this formulation γ (gamma) is defined as the rate of utilisation of imputation credits attached to dividends and available to shareholders by virtue of taxes paid by the regulated entity. Their value in the hands of shareholders is equal to $[ROE.\gamma.Te]$[54].

Transitional issue

While the Commission has identified the post-tax cash flow based framework as its preferred regulatory approach, there are a number of access arrangements in place and proposed which rely on a pre-tax framework. In the present case, TransGrid and EnergyAustralia's previous revenue caps were determined by the New South Wales Independent Pricing and Regulatory Tribunal (IPART) using a pre-tax real framework. This creates a potential difficulty in moving to the post-tax framework.

---

[54] Some academic articles refer to the term $(1\text{-}\gamma).Te$ as the effective tax rate; that is, the effective tax rate to shareholder income after taking account of the value of the imputation credits but before removing personal tax.

This relates to that component of revenues determined in the previous pre-tax framework which represents the prepayment of expected future tax liabilities estimated at the time. In principle, such prepayments should not be ignored since they may represent a significant (albeit temporary) return of capital to the regulated entity. Depending on the quantum and circumstances involved, it could be strongly arguable that it would be inequitable to expect users to pay a second time for tax the liabilities of the regulated entity.

The prepayment of tax generated in a pre-tax framework can be readily illustrated by reference to the stylised S-bend diagrams below.

Figure 1(b) shows the average rate of tax payable relative to net economic income available to the regulated entity over time. Usually, the initial average rate of tax is zero because of available tax concessions (particularly the tax debt shield provided by interest on borrowing in combination with accelerated depreciation). But as such concessions are used up the assessed taxable income increases and tax becomes payable. During the later life of the assets, the average tax payable is likely to exceed the corporate tax rate since some economic costs (for example, depreciation) have been anticipated and deducted for tax purposes in previous years.

Figure 1(b) also illustrates the relative magnitude of the corporate tax rate Tc and the effective tax rate Te that is looking forward from a point in time when assets are new. It also shows how the effective tax rate increases based on an assessment looking forward from a time part-way through the assets' lives and from a time in the later part of the assets lives when it can exceed the corporate tax rate Tc[55].

The achieved annual post-tax return on equity is illustrated in Figure 1(c) with the lifetime post-tax return on equity (Re) relevant to the CAPM benchmark shown as a horizontal line. Also shown are estimates of the expected return (on equity as reflected in the regulatory accounts) looking from part-way through the assets' lives and from and again at a later period. The reducing prospective return is a symptom of the S-bend phenomena.

Figure 1(d) indicates the market value of the business relative to its regulatory value. Initially, the ratio is unity since the discounted value of the future revenues net of expenses of the business should equal the initial cost of the assets if a commercial rate of return is expected. The market value subsequently falls away relative to the regulatory asset value since in later periods a portion of the revenues designed to compensate for future tax liabilities have already been received. Hence looking forward, the revenues will be inadequate to provide for tax liabilities as well as providing the expected commercial return on the regulatory asset base from that point on. This deviation of the implicit market value of the business from its regulatory asset value sits uneasily in a regulatory framework and is another aspect of the S-bend problem.

---

[55] Generally, the lifetime effective tax rate will only equate to the corporate tax rate when inflation and the discount rates are both zero. The ratio of total tax paid relative to total economic income is Tc but Te may be much smaller because cash flows available in the earlier years have higher value in net present value terms.

While this aspect of the real-pre-tax framework can be readily appreciated, it is implicit in the regulatory compact that the regulated entity should understand that it receives pre-compensation for future tax liabilities. Thus, it should not seek extra compensation at a later date when it considers its prospective return to be inadequate because of the tax burden. If parties are aware of this, political pressure or lobbying to increase the pre-tax WACC to cater for increased tax liabilities associated with maturity of the assets should not emerge.

Once this is understood, it is a fairly small step to also acknowledge the pre-compensation for future taxes that needs to be taken into account when moving to a post-tax regime. To the extent that there remains an amount of tax prepayment which has not yet been utilised, the compensation for future tax liabilities in the revenues allowed needs to be reduced so that, by the end of the life of the assets, the compensation for tax liabilities allowed has exactly offset (in present value terms) the estimated impost of taxes.

To suggest there are no political difficulties with such a stand is somewhat optimistic. Evidence for this is available from past and present access arrangements proposing a pre-tax framework. In almost every instance where there are mature existing assets, the applicants vigorously argue that the assets should be notionally depreciated for tax purposes. That is, available tax concessions should not be taken into account when assessing what the pre-tax rate of return needs to be to achieve the desired post-tax return. Ignoring these concessions leads to a higher pre-tax WACC estimate.

Such a stance displays a misunderstanding of what the pre-tax WACC actually is, namely a WACC that gives a post-tax return over the life of the asset and needs to be consistent with the effective tax rate over the life of the asset. Of course such a stance is reasonable if the regulated entities have not received pre-compensation for future tax liabilities in earlier revenues. This is essentially an empirical question. However, to the extent that past revenues were based on a cost recovery methodology which included a benchmark rate return on capital, akin to a pre-tax rate of return, there seems little justification for ignoring prepayment for tax now that the regulated entity is entering a formal regulatory framework where a pre-tax framework is being considered. The situation can be resolved in one of two ways.

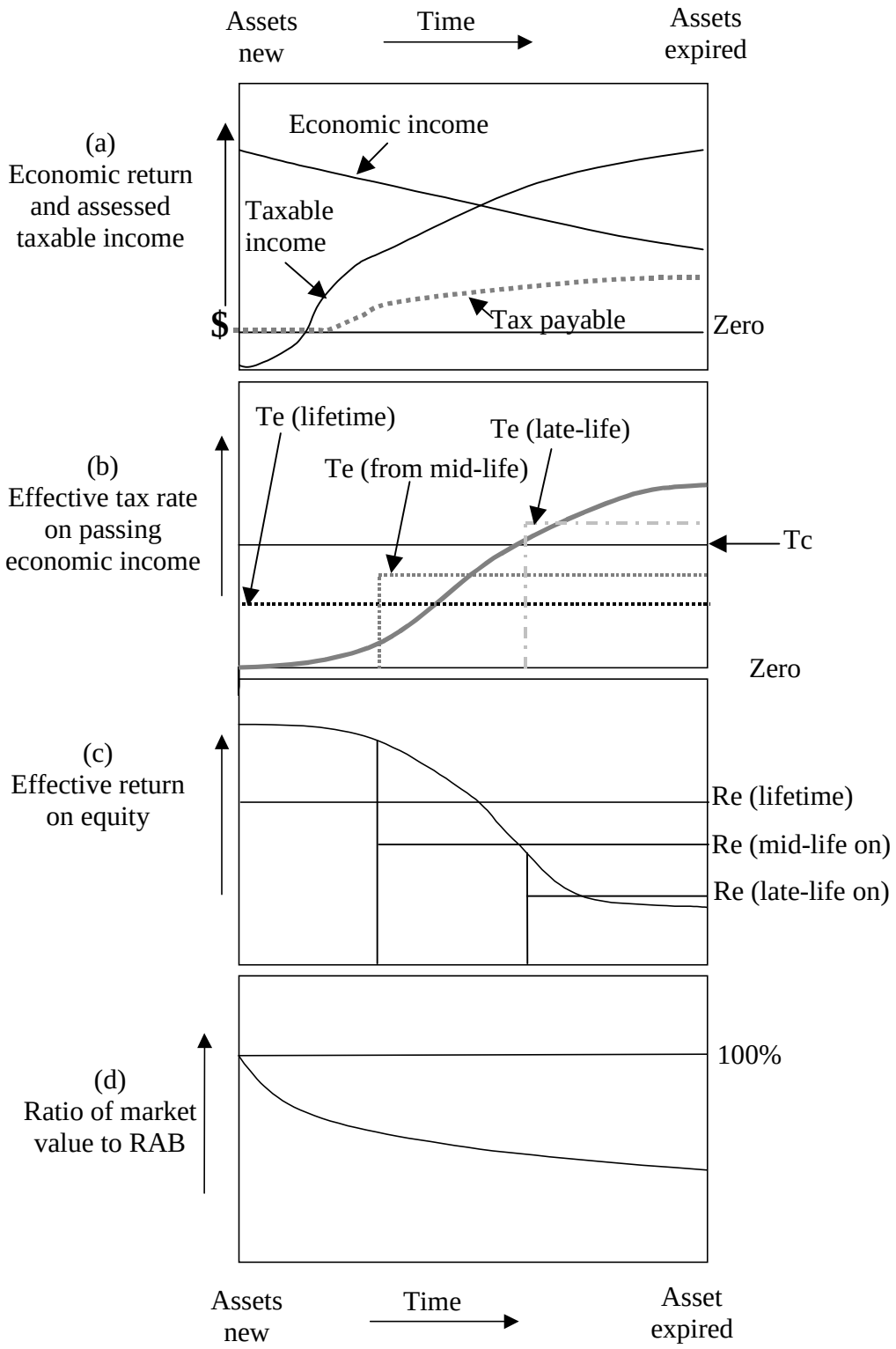
The first is that the earlier prepayments of tax can be assessed and treated as a return of capital (in the same way as a depreciation allowance). This involves a reduction in the initial regulatory asset value by an amount corresponding to the net prepayment of tax liabilities. This change in asset valuation is analogous to the difference in the market value of the business and the regulatory asset value illustrated in Figure 1(d) above. This approach may be used whether the new regulatory framework is going to be post-tax or pre-tax. By recognising the prepayments of tax as a temporary return of capital the slate is wiped clean and the new framework can be adopted without the historical tax baggage. This approach is essentially the well accepted ‘normalisation’ procedure used by US regulators.

The second approach will apply only when the new proposed framework uses a pre-tax rate of return. It involves an assessment of what the pre-tax rate of return would be assuming that the existing assets were all new, that is valued at optimised replacement cost (ORC) and eligible for all existing tax concessions. It is this pre-tax rate of return which delivers the commercial rate of return over the life of the assets. If a pre-tax

WACC is assessed on the basis of the existing tax status of the assets then the regulated entity is being overcompensated and essentially receives a windfall gain equal to the net prepayment of taxes it has already received.

A side benefit of keeping track of prepayments of tax and estimated liabilities is that uncertainty over the future tax regime and other factors impact on actual tax liabilities disappear. This is because the revenue for tax compensation and past and expected tax liabilities can be assessed on a continuing basis so that there is no net over or under compensation over the long term. Acceptance of the approach means that fairly substantial errors in tax forecasts can be accommodated and rectified at a later date. This provides a good reason for adopting the first of the two options described above regardless of the proposed changes to the future regulatory framework.

Figure 1 Stylised summary of the impact of tax liabilities over time under a pre-tax regulatory framework (the S-bend issue)



Prepayments of tax and normalisation

In a net present value (NPV) cash flow modelling approach as used in the TransGrid and EnergyAustralia revenue decisions, the assessment of the prepayment of taxes implicit in the post-tax framework is somewhat more convoluted than in the familiar cost of service model. First of all, revenues are determined on the basis of a CPI-X adjustment rule and a simple comparison with the revenues that would apply under a 'no-tax' scenario (Tc=0) is unhelpful. Instead, it is necessary to examine the impact of the return of capital on the 'economic depreciation' determined as a residual after subtracting operating expenses and return on capital estimates from the allowed base revenues.

The return on capital in period t, is estimated as (w . At) where w is the assessed related pre-tax WACC and At is the value of the regulatory asset base at the start of the period. The pre-tax WACC estimated from the cash-flow modelling includes a premium above the 'no-tax' rate to compensate for the expected tax payments over the life of the assets. This raises the question as to what the 'no-tax' WACC (v), should be. It could be estimated on the same basis as w but setting the corporate tax rate Tc to zero in the calculations. Fortunately, there is a more direct estimate available. In the absence of tax, the pre-tax and post-tax WACC all converge to the vanilla WACC given by:

$$v = Re \cdot E/V + Rd \cdot D/V$$

where all of the parameters have their standard interpretation.

This means that the provision for prepayment of tax can be readily calculated for each year as:

$$\text{Prepayment} = (w\text{-}v) \cdot At$$

To keep track of the net prepayment (over- or under compensation for tax liabilities), it is necessary to subtract from this figure the assessed tax for the same year. The accumulation of these over- or underpayments for tax liabilities over time provides a mechanism to ensure that there is no long term over- or under compensation for tax liabilities due to errors in long term forecasts of inflation or errors in assumptions regarding the tax regime applicable over the longer term.

Unfortunately, a simple accumulation of these amounts does not adequately reflect the value of the pre-payments to the regulated entity. This is because, the amounts effectively reflect a return of capital. To the extent that this is not explicitly modelled in the pre-tax framework, the future revenues are enhanced by an amount equal to the earnings on the accumulation of net pre-payments of tax. This augmented accumulation is the amount that needs to be monitored to provide the correct assessment of the net compensation for tax at any point in time. Table 1 below illustrates the mechanics of estimating the net tax prepayments over the course of the first regulatory period for a hypothetical new set of assets.

Table 1 Example of an assessment of tax prepayments ($m)

Nominal pre-tax WACC	10.227%					
Nominal vanilla WACC	10.090%					
WACC tax premium	0.1370%					
Company tax rate (Tc): 30%						
	1998	*1999*	*2000*	*2001*	*2002*	*2003*
Revenues	0.49	0.99	1.58	2.26	2.86	
Less tax related expenses:						
Tax depreciation	-1.91	-1.92	-1.92	-1.92	-1.92	
Interest paid	-1.12	-1.24	-1.36	-1.47	-1.56	
O&M	-0.72	-0.74	-0.77	-0.79	-0.81	
Taxable income	-3.26	-2.92	-2.47	-1.91	-1.43	
Tax loss carried forward	0.00	-3.26	-6.18	-8.65	-10.56	
Assessable income	-3.26	-6.18	-8.65	-10.56	-11.98	
Tax liability	0.00	0.00	0.00	0.00	0.00	
Regulatory asset value	25.94	28.83	31.54	33.96	35.97	37.61
Prepayment of tax	0.04	0.04	0.04	0.05	0.05	
Cumulative prepayments	0.04	0.08	0.12	0.16	0.21	
Cumulative prepayments incl. WACC	0.04	0.08	0.13	0.19	0.26	
Regulatory asset base (pre-tax)	25.94	28.83	31.54	33.96	35.97	37.61
Regulatory asset base (post-tax)	25.94	28.80	31.46	33.83	35.78	37.35
Difference		0.04	0.08	0.13	0.19	0.26

Note: Numbers may not add up due to rounding.

The calculations summarised in Table 1 show that the value to the regulated entity at the end of the first regulatory period of tax prepayments is $0.26m. In keeping with the earlier discussion, this needs to be accounted for when considering the next regulatory period. Within the context of a continuing pre-tax framework it provides the starting point for further accumulation of net tax prepayments or, more generally, indicates the amount the starting asset base should be reduced before assessing the next arrangement looking forward from that point on regardless of the proposed framework.