DETERMINANTS OF THE REVENUE CAP FOR ELECTRICITY NETWORKS

SUBMISSION TO THE OFFICE OF THE INTERIM UTILITIES COMMISSIONER

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1. INTRODUCTION

Under the 1999 *Electricity Networks (Third Party Access) Code* ("the *Access Code*") the Utilities Commission (UC) is to determine the maximum allowable revenue (MAR) PAWA can receive for access to its electricity networks, and oversee the principles that are applied by PAWA in setting tariffs for network access (i.e. "reference tariffs") and out of balance energy. [1]

The UC is to conduct periodic regulatory reviews that will establish revenue caps for each financial year within regulatory-control periods. The first regulatory-control period extends from 1 April 2000 to 30 June 2003.

The *Access Code*, together with the Office of the Interim Utility Commissioner's (OIUC's) Discussion Paper on *Calculating PAWA's Initial Network Revenue Caps (i.e. "the Discussion Paper")* reflect the *OIUC's* current viewpoint on issues relating to calculation of the revenue cap or "maximum allowable revenue".

This submission presents PAWA's response to the OIUC's current position on methodological issues relating to calculation of the revenue cap, and responds to the OIUC's requests for information relating to PAWA operations.

In forming its viewpoint on methodological issues, PAWA has considered determinations and "principles" papers prepared by regulatory bodies such as the Australian Competition and Consumer Commission (ACCC), the NSW Independent Pricing and Regulatory Tribunal (IPART), and the Office of the Regulator General in Victoria (ORG) and submissions prepared by utilities involved in determinations in the eastern States.

Whilst PAWA acknowledges the relevance of determinations in other States, it does consider that in some respects, operating conditions in the NT differ substantially from operating conditions in other regions. Consequently, it is desirable that these differences be reflected when quantifying the MAR. The theoretical approach adopted in other jurisdictions for calculation of the cost of capital presents a framework for taking account of such differences.

This submission follows the structure of the OIUC *Discussion Paper*[2] (although as the *Discussion Paper* has 2 preliminary sections, Section 2 in this submission relates to Section 3 in the *Discussion Paper*, etc). In Section 2 there is a brief discussion of the building block approach as this represents the overall framework for calculating the revenue cap. All of the subsequent sections in the submission examine issues relating to application of the building-block approach— i.e. timing issues, definition of relevant services, calculating the cost of capital, the asset valuation methodology,

[1] Out of balance energy involves electrical energy compulsorily dispatched by PAWA generation into the power system or absorbed by PAWA generation to meet any mismatch between the transfer of electrical energy into and out of the electricity network from another generator to its customers.

[2] Note that the equation numbers in this submission align with those used in the OIUC's *Discussion Paper*.

calculating depreciation, measuring allowable operating costs and “other issues” such as the appropriate glide path.

2. ROLE OF THE COMMISSIONER IN SETTING REVENUE CAPS

2.1 THE ACCRUAL BUILDING BLOCK APPROACH

OIUC's Proposed Approach

Schedule 6 of the *Access Code* requires that the "accrual building block" approach be applied for the purpose of calculating the maximum allowable revenue or revenue cap for each geographically distinct network.

The building block approach can be expressed as follows —

$$CAP = (CAPITAL * WACC) + DEP + O\&M \quad (1)$$

where:

CAPITAL = the network's capital base.

WACC = the pre-tax weighted average cost of capital.

DEP = the expected depreciation charge for the financial year on the network's assets.

O&M = the expected operations, maintenance and administration expenditure for the financial year by the network business.

PAWA's View

The building block approach is a widely accepted method, and PAWA supports its use because it encapsulates the three main components of investment returns — return on capital, return of capital, and return of operating expenses.

3. SPECIAL REQUIREMENTS FOR THE "INITIAL YEAR"

3.1 THE INITIAL PERIOD

OIUC's Proposed Approach

The revenue cap for the period 1 April to 30 June 2000 ($CAP_{APR\text{-}JUNE}$) needs to be calculated by using an appropriate proportion of an annual revenue cap. The following general formulation is proposed by the OIUC —

$$CAP_{APR\text{-}JUNE} = CAP_{FULL\ YR} * Q * P \qquad (2)$$

where:

$CAP_{FULL\ YR}$ = revenue cap for a full financial year.

Q = apportionment factor.

P = price adjustment factor.

The revenue cap is scheduled to commence on 1 April 2000, and in the OIUC's *Discussion Paper* two alternatives are proposed — either directly estimating the cap for this period or deriving it from the cap to apply for the 2000-2001 period.

If the latter option is taken the OIUC proposes adopting the following formula —

$$CAP_{99\text{-}00} = CAP_{00\text{-}01} * (1 - \Delta PI - \Delta GST) \qquad (3)$$

where:

$CAP_{00\text{-}01}$ = annual revenue cap applying to the 2000-01 financial year, derived by applying information directly relevant to that year to equation (1).

ΔPI = the percentage increase in the an appropriate price index (PI) expected between 1999-00 and 2000-01.

ΔGST = the percentage net increase in PAWA's average network tariffs expected between 1999-00 and 2000-01 purely on account of introduction of the GST from 1 July 2000.

PAWA's View

PAWA considers that the fairest apportionment factor in (2) is the number of days during the quarter. This allocation will provide a reasonable apportionment and is known in advance — use of energy fractions would involve further use of projected data.

PAWA would prefer to derive the cap for the 1 April 2000 to 30 June 2000 period from the estimates established for the 1 July 2000 to 30 June 2001 period, as opposed to direct estimation of the 1999-2000 cap. Focus on the costs for the 2000-2001

period will have more relevance to the revenue cap calculations for the ensuing financial years as they are inclusive of GST and exclusive of wholesales sales tax.

The revenue cap for 2000-2001 will reflect both inflation and GST impacts. However, equation 3 for removing these effects in converting the revenue cap to a 1999-2000 equivalent needs to be modified for three reasons. (It should be noted that the sequence of conversions is firstly to apply equation 3 and then equation 2).

Firstly, deflation by one period should be undertaken by multiplying by $(1+\Delta PI)^{-1}$ as opposed to multiplying by $(1-\Delta PI)$.

Secondly, if an "X" factor is to be applied in rolling the MAR forward, it should also be used in rolling it back.

Thirdly, the GST adjustment could be explicitly accounted for. KPMG has estimated PAWA network's opex costs will be approximately $1.5 million higher during 2000-2001 than 1999-2000 as a result of the introduction of GST and associated tax reforms such as the removal of wholesale sales tax. PAWA is uncertain about the effect of the tax reforms on capex and asset values and hence has not adjusted these values.

Taking account of the above three factors, PAWA would propose to use the following modified version of equation (3) —

$$CAP_{99\text{-}00} = CAP_{00\text{-}01} * (1 + \Delta PI)^{-1} * (1-X)^{-1} - netGST^{pawa} * (1 + \Delta PI)^{-1} \qquad \text{(PAWA3)}$$

where:

$netGST^{pawa}$ = net $ change in PAWA's position resulting from the GST reforms.

X is an amalgam of efficiency and "other" factors (see Section 9).

In respect of equation (2) the OIUC *Discussion Paper* states that the price adjustment factor (P) should be the ratio between April 2000 and June CPI. However, after applying equation (3) the cap will be in 1999-2000 dollars. Therefore, to convert to dollars reflecting prices in the final quarter, P should be set equal to the ratio between the 1999-2000 CPI and the CPI for the final quarter of 1999-2000.

3.2 GEOGRAPHICALLY DISTINCT NETWORKS

OIUC's Proposed Approach

The OIUC has called for comment regarding whether the Darwin and Katherine networks are truly separate, and whether there are any genuinely contestable customers requiring access to the smaller networks (i.e. Alice Springs and Tennant Creek) on 1 April 2000. If not, there would be no need for a revenue cap for these networks.

PAWA's View

While it is true that the Darwin to Katherine lines are inter-connected, mostly these networks utilise separate assets and service geographically distinct customer groups and therefore should be considered as "distinct" networks. However, principles do need to be established for the allocation, between the two networks, of the costs associated with the Darwin to Katherine 132 kV line. This issue is addressed in PAWA's submission to the OIUC on pricing principles.

PAWA therefore agrees that four different networks should be identified — Darwin, Katherine, Alice Springs and Tennant Creek. Contestability is being phased in with customers in tranche 1— i.e. customers using in excess of 4 GWh per annum — contestable after 1 April 2000. Customers in tranche 2 (3-4 GWh per annum) will be contestable after 1 October 2000. Customers in tranche 3 (2-3 GWh per annum) are scheduled to become contestable from 1 April 2001 and customers in tranche 4 (0.75-2 GWh) are scheduled to become contestable from 1 April 2002. A significant number of tranche 1 and tranche 2 customers are connected to the Katherine and Darwin networks, but the Alice Springs and Tennant Creek networks do not have a significant number of customers in these tranches.

Hence PAWA agrees that it is not appropriate to establish a revenue cap for the Alice Springs and Tennant Creek networks for the initial period. In fact, even after tranches 3 and 4 become contestable there is doubt as to whether the emergence of competing generators will be imminent. PAWA therefore considers that while the framework should accommodate the establishment of revenue caps for Alice Springs and Tennant Creek, quantification is not necessary at this stage, and may not be necessary during the first regulatory control period.

3.3 OTHER ISSUES FOR COMMENT

OIUC's request for comment …

The Interim Commissioner has also sought opinions regarding the use of the lower of Westpac's and NAB's latest forecasts of underlying (direct GST effects excluded) CPI inflation as a measure of expected inflation between 1999-00 and 2000-01.

PAWA is comfortable with this approach but would suggest that consideration be given to using the weighted average all groups all capital cities CPI, as published by the ABS (catalogue No. 6401.0) as the measure of inflation. This is the measure of inflation that has been adopted by the ACCC (1999a) for use in the CPI-X component of the regulatory framework.

4. NETWORK SERVICES INCLUDED IN THE CAP

OIUC's Proposed Approach

The Interim Commissioner proposes to limit the services excluded to the following—

- services (including metering, electric lines or electric plant) for the specific benefit of any third party (and requested by the third party) and not made available by PAWA Networks as a normal part of standard services to customers including—
    a) charges for moving mains, services or meters forming part of PAWA's network system to accommodate extension, re-design or re-development of any premises; and
    b) the provision of electric plant for the specific purpose of enabling the provision of standby supplies or sales of electricity;
- the provision of connection equipment to a standard in excess of a standard associated with the "least overall cost, technically acceptable" assets; and
- power system (but not network system) control costs directly associated with the activities of a system controller licensed under the Electricity Reform Bill 1999.

PAWA's View

The OIUC's *Discussion Paper* also requests PAWA's opinion regarding excluded services. PAWA agrees with the above exclusion, but notes that the following services should also be excluded—

1. the provision of metering, or metering data, to a standard in excess of that required for the billing of network tariffs;
2. the provision of streetlighting; and
3. contestable consulting services provided by PAWA's Network Engineering Division.

PAWA considers these items are not part of the core "network service" and therefore the associated costs should not be included in the revenue cap.

5. WEIGHTED AVERAGE COST OF CAPITAL

5.1 FORMULAE

OIUC's Proposed Approach

In accordance with Schedule 8 to the *Access Code*, the real pre-tax weighted-average cost of capital ($WACC_r$) is to be calculated using the following formula:

$$WACC_r = \{(1 + WACC_n)/(1 + \Delta PI)\} - 1 \quad (4)$$

where:

$WACC_n$ = nominal pre-tax weighted-average cost of capital (%).

ΔPI = expected annual inflation rate (%).

As also specified in Schedule 8, the nominal pre-tax weighted-average cost of capital is to be calculated using the following formula:

$$WACC_n = [R_e/(1 - T*(1-G))] * (1 - D/C) + (R_d * D/C)) \quad (5)$$

where:

R_e = the required post-tax rate of return on equity.

T = the effective tax rate.

G = the imputation factor (measuring the value of franking credits).

D/C = the ratio of debt to capital employed.

R_d = the pre-tax cost of debt.

Schedule 8 defines R_e and R_d as follows:

$$R_e = R_f + (\beta_e * ERP) \quad (6)$$

where:

R_f = risk-free rate of return on capital.

β_e = equity beta.

ERP = equity risk premium.

and

$$R_d = R_f + DRP \quad (7)$$

where:

R_f = risk-free rate of return on capital.

DRP = debt risk premium.

Schedule 8 does not propose a specific formulation for β_e, the equity beta term. Of the choices available, it is proposed in the *Discussion Paper* that the following be used:

$$\beta_e = \beta_a * [1 + (1 - T*(1-G)) * D/E] \quad (8)$$

where:

β_a = asset beta;

T = the effective tax rate;

G = the imputation factor; and

D/E = the debt-to-equity ratio, which is equal to the debt-to-capital ratio (D/C) expressed as a ratio of the equity-to-capital ratio (= 1 – D/C).

From the above, the parameters required to determine the WACC are as follows:

economy-wide parameters:

R_f = risk-free rate of return on capital;

ERP = equity risk premium;

ΔPI = expected annual inflation rate;

'specific' parameters:

β_a = asset beta;

D/C = debt-to-capital ratio;

T = effective tax rate;

G = imputation factor; and

DRP = debt risk premium.

Under the *Access Code*, it is the Commission's role to examine each of these values and so determine the value of the WACC parameter.

PAWA's View

PAWA notes the OIUC's intention to use pre-tax real as the WACC. Although this is at odds with the latest post-tax nominal WACC determination by the ACCC relating to the NSW and ACT Transmission Network, PAWA in this submission will follow the direction set by the OIUC.

With regard to the equations put forward by the OIUC, these are the standard equations used to estimate the WACC, and hence PAWA generally supports their use. In its *Discussion Paper*, the OIUC calls for interested parties' opinions regarding the form of the equation for estimating the levered beta.

PAWA notes that equation (8) differs from the formula suggested by the ACCC (1999a) in its Draft Regulatory Principles paper. The ACCC consider that the Monkhouse equation is the most robust as it takes into account dividend imputation. The Monkhouse formula is as follows —

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

where:

β_d = the pre-tax cost of debt

The ACCC does not preclude use of other formulae recognising that the academic debate is likely to continue. However, PAWA agrees with the ACCC, in that if there is to be deviation from the Monkhouse formula, then some rationale should be provided for the deviation.

5.2 RISK FREE RETURN ON CAPITAL

OIUC's proposed approach

The OIUC's *Discussion Paper* identifies two sets of issues that need to be addressed in measuring the risk-free rate of return, namely:

- the choice of the benchmark bond; and
- the method of averaging.

The Interim Commissioner's preference is to use the rate on a 10 year Commonwealth Government bond, because most estimates of the equity risk premium (see below) are based on use of bonds of this maturity and there is little difference between the real-term 5 and 10 year bond rates.

In respect of the method of averaging, the Interim Commissioner's preference is to average the 10 year Commonwealth bond rate over the 30 trading days period prior to the date of the determination, broadly in line with the approach generally followed by regulators elsewhere in Australia.

PAWA's View

The 10 year Commonwealth Government bond rate has been used in most recent decisions to represent the nominal risk free rate, and it is considered that the 10 year bond rate gives a better picture of the true market rate than less liquid bonds such as 15 or 20 year bonds.

However the ACCC (1999a) has indicated that it intends to use a 5 year rate to correspond to a 5 year regulatory review period. The rationale seems to be that the 5 year regulatory review period means that interest rate risk beyond that period will be borne by consumers rather than utilities.

However if the intention is to use a real cost of capital and an indexed capital charge the main interest rate risk (normally due to variable inflation) will in any case be passed on to consumers. In addition most estimates of the market risk premium are based on using 10 year government bonds and the CAPM assumes that the risk free rate and market risk premium will have the same horizon. The ACCC has also noted (1999a), there is little difference between the 5 and 10 year bond rates. For these reasons a 10 year Commonwealth government bond rate is preferred.

In relation to the extent to which the bond rate should be averaged to reduce excessive short-term volatility, it could be argued that in a highly efficient capital market current spot rates should be used as they most closely reflect the market's current view about future returns. However it is reasonable to argue that a single observation may contain the effects of uninformed noise so that some averaging of recent rates is justified.

The ACCC (1999a) endorses taking an average over a 'relatively short period to smooth daily variations'. IPART uses the average rate for a 20 day trading period. In

contrast, EnergyAustralia, (1999) in its submission to IPART expressed some concern that a 20 day averaging period was not long enough and could cause significant price shocks for customers from one regulatory period to the next. However there is considerably less volatility in real rates compared with nominal rates and since charges will be related to real rates with indexing for inflation, an average of the 10 year Commonwealth bond rate over the 30 day trading period prior to the determination is considered reasonable and is supported by PAWA.

However, if the Reserve Bank announces a change in interest rates during the 30-day period a straight average will clearly not be appropriate. In this case, either: 1) the period within the 30 day trading period before the RBA announcement should be disregarded, or 2) rates for the period before the announcement should be adjusted by the size of the change in official rates before the average is taken. PAWA prefers the latter option as it incorporates the rate change, but has a more significant smoothing effect than the first option.

5.3 EQUITY RISK PREMIUM

OIUC's proposed approach

The Interim Commissioner proposes to use a figure of 5.5 per cent, on the basis that this is the median figure typically applied recently by interstate regulators.

PAWA's View

The market risk premium (MRP) is the difference between the expected return on the market portfolio or a proxy for it and the return on a risk free asset both defined over the same holding period.

An extensive review of the empirical estimates of the MRP is provided in IPART (1999d, pp. 206-208). The estimates cited ranged from levels as low as 1 per cent to in excess of 8 per cent. Estimates used in recent pricing decisions, however, fell within a much narrower band — from 5.0 to 6.5. IPART also noted that independent expert's reports have tended to use market risk premia in the range of 5-7 per cent with a median of 6 per cent.

PAWA considers that an estimate at the higher end of the 5-7 per cent range is justified, provided the normal WACC formula (which includes a term to reflect the value of imputation credits) is used to be consistent with long term averages and the observation that dividend imputation *per se* should not affect the required aggregate by PAWA after (all) tax return of investors. An estimate of 6.6 per cent is considered appropriate, which compares with 6.6 per cent as recommended by the National Electricity Code and 6.5 per cent as used in the ACCC/ORG gas transmission decision. It is also consistent with the premium adopted by Merrill Lynch and Fay Richwhite in a recent financial modelling study of PAWA undertaken for the NT Government.

5.4 EXPECTED INFLATION

OIUC's proposed approach

The Interim Commissioner identified two different approaches for estimating expected inflation—

- the difference in yields on nominal and indexed 10 year Commonwealth bonds, being an indicator of the market's assessment of inflation expected over the relevant period. IPART and ACCC derive inflation expectations on this basis; and
- the use of an average of key private and public forecasts.

The Interim Commissioner's preference is to follow the approach taken by IPART and the ACCC, because it would yield an estimate which is likely to be more directly consistent with methods used to estimate the risk-free rate and the equity risk premium.

PAWA's View

The Commonwealth government has issued nominal and CPI-indexed bonds, both of which are traded in the market place. The difference in yields between the bonds is an indicator of the market's assessment of inflation expected over the relevant period. Inflation expectations are not the exact difference in yields, but are estimated using the Fisher Equation (1 + nominal return) = (1 + real return) × (1 + inflation rate).

IPART and ACCC derive inflation expectations from the difference between the nominal and real risk free rates for 10 year Commonwealth bonds. The use of indexed bonds is also consistent with the approach taken by many regulators in the UK (ORG 1999).

Other approaches that could be adopted are to take an average of key private and public forecasts or to use the Reserve Bank policy target of keeping inflation between 2 and 3 per cent.

The main weakness with using indexed bonds is that the market may not be very deep however this is not considered to be a significant problem and PAWA suggests that the approach recommended by IPART and the ACCC be adopted rather than the average of key private and public forecasts.

5.5 PAWA-SPECIFIC OR INDUSTRY-WIDE PARAMETERS

In its *Discussion Paper*, the OIUC has called for comment regarding whether industry wide or PAWA specific β_a, D/C, T, G and DRP parameters should apply.

PAWA's View

There are two general reasons for adopting a PAWA-specific perspective in determining the abovementioned WACC parameters. (These factors are considered in more detail below when considering each of the relevant WACC parameters).

First, competitive neutrality objectives cannot reasonably be achieved in a short time frame and therefore it is not reasonable to immediately apply industry-wide parameters in respect of the debt to equity ratio and the debt risk premium (see discussion below). PAWA will be making every attempt to increase its debt to capital ratio and negotiate better terms for its debt. However, if the WACC is calculated assuming that PAWA is already at best practice in terms of its debt to capital ratio then PAWA will essentially be penalised for factors that are outside its control. In other words, if "optimal" values of D/C and DRP are used to calculate WACC despite these factors creating an unavoidable layer of costs, then, the resulting returns would be less than those required by a "typical" investor, faced with the same constraints. This seems counter to the objectives of price regulation.

Second, investors typically apply both an industry-wide evaluation and "case-specific" evaluation when evaluating potential investments. The industry-wide performance is clearly relevant, but the investor must account for intra-industry variations in non-diversifiable risk. Otherwise, additional risk could be taken on without any offsetting gain in expected returns. If the WACC is estimated without considering PAWA specific factors (such as its cost drivers and the variance in its revenue base), then there is some question as to whether future investment will take place. Again, this would appear to be inconsistent with the objectives of price regulation.

Hence PAWA supports the consideration of PAWA specific factors when determining the appropriate WACC parameters.

5.6 ASSET & EQUITY BETAS

Beta is a measure of the sensitivity of the return on an individual investment to changes in returns for the market as a whole. It measures the systematic risk, that is, the risk that cannot be eliminated by diversification of investments. The market price of this risk is given by the market risk premium.

The asset beta is the beta that would apply if the company were 100 per cent financed by equity, thereby eliminating the effect of leveraging whereas the equity beta takes account of the effect of leveraging. Where there is leverage the asset beta is a weighted average of the equity and debt betas, with the weights reflecting capital structure and tax effects.

OIUC's proposed approach

The OIUC proposes adopting either the asset beta value of 0.43 used by IPART (1999d) or the ACCC (1999b) value of 0.45. Adopting equation (8) and an asset beta of 0.43 gives an equity beta of 0.936.

PAWA's View

One of the key issues in determining the beta, is the variance in demand associated with main revenue sources. Where an electricity utility's revenue streams are significantly dependent on mining and tourism activity — which is the case for PAWA — it is also instructive to consider betas from sectors with similar characteristics. Approximately 10 per cent of PAWA's electricity revenues are from the mining sector and around 5 per cent are from tourism. Hence a total of 15 per cent of revenues are from relatively high variance sectors which moderately increases PAWA's non-diversifiable risk in comparison to other "typical" networks. Table 5.1 contains asset betas for ASX industry groups of interest. The fact that mining and tourism betas are relatively high, suggests that PAWA's asset beta will be high relative to other utilities, due to its direct exposure to the risks borne by these industries.

Furthermore, because PAWA's customer base is quite concentrated — i.e. it has a few large customers upon which it is very dependent — it bears more risk than utilities operating in major cities as their larger customers are often closer located to each other and operate in a broad range of industries. Hence, the structure of PAWA's revenue base exposes it to more non-diversifiable risk than a "typical" electricity network.

The above considerations relate to non-diversifiable risk. A specific risk is PAWA's dependence on revenue from the Australian Defence Force (approximately 10 per cent of electricity revenue) — revenue which could potentially be lost some time in the future because the Commonwealth Government periodically changes its Defence strategic outlook (as espoused in the Defence "White Paper"), and this may lead to the future relocation of Defence bases. PAWA has included the most likely revenue from Defence (i.e. it is assumed that Defence will remain indefinitely) rather than factor in the probability of Defence relocating into PAWA's cash flows. Strictly speaking under CAPM, specific risks of this type should be accounted for in cash flows, however where this is not practical it is appropriate to adjust the return to capital. IPART (1999e, p. 47) have indicated that this approach is conceptually sound—

> "Under the CAPM model these risks [specific risks] should be included in the cash flow rather than the WACC. However, a similar effect can be achieved by adopting the common practice of including a loading on the rate of return."

PAWA does not consider it practical to adjust cash flows to account for the possibility that Defence reduces its presence in the Northern Territory. Instead it would prefer to adjust the asset beta — an approach which, clearly, can be accommodated within the CAPM framework.

TABLE 5.1: BETAS FOR RELEVANT ASX INDUSTRY GROUPS

Entity	Asset beta
Infrastructure & utilities	0.46
Energy	0.69
Diversified industrials	0.71
Diversified resources	0.90
Gold	1.05
Other metals	1.19
Tourism and leisure	0.93
All industrials	0.65

Source: IPART 1998

The infrastructure and utilities asset beta is 0.46 which is much lower than for energy (0.69), diversified resources (0.90) other metals (1.19) and tourism and leisure (0.93). The infrastructure and utilities asset beta of 0.46 is not considered to represent the risk characteristics of PAWA since it is based on entities that are dominated by metropolitan economic activity. As noted PAWA is heavily dependent on mining and tourism in its customer base and these sectors have asset betas of around 1.

Moreover, the above infrastructure and utilities asset beta relates to a broad range of utilities. (See Table 5.3 for more specific examples of asset beta for electricity utilities).

Another important factor that may affect the true value of beta is the extent to which price or revenue cap regulation introduces an important asymmetry (or skewness in the expected distribution of returns). This factor is not reflected in the standard CAPM models, and hence if the beta is based on the standard CAPM model it will under-estimate returns that investors will require.

The basic CAPM model can be extended, however, to explicitly recognise the impact of skewness, based on the assumption that investors have a positive preference for positive skewness (Kraus and Litzenberger 1976), and therefore a negative preference for negative skewness (as is the case when a revenue cap is applied). The form of the CAPM model adjusted to include the impact of skewness reflects the fact that where there is a constraint on upside potential the investor will require a higher rate of return *vis á vis* alternative investments where this constraint does not apply. It is not possible to readily compare the CAPM model with an extension for skewness with the normal CAPM in terms of demonstrating the empirical impact. However Patterson (1995, p.40) who is a well recognised authority on the cost of capital notes that the impact on investors' required returns may be significant — "for public utilities whose future profitability is constrained on the upside by the regulatory process and whose returns may therefore be negatively skewed". Given these considerations it is reasonable to either adjust the beta or allow for a separate explicit adjustment to recognise negative skewness that is likely to be introduced by price or revenue cap regulation.

PAWA considers that as an asymmetry on the rate of return will apply ¾ due to application of the revenue cap ¾ the appropriate adjustment should be made to the

maximum revenue cap either by increasing beta or by making a separate explicit adjustment.

It is difficult to take all of the above into account in an objective way when estimating the beta. However, to assist in this process, it is useful to review recent regulatory decisions and international and domestic benchmarks. Table 5.2 summarises the beta values adopted in recent regulatory decisions.

TABLE 5.2: BETAS ADOPTED IN RECENT ELECTRICITY AND GAS REGULATORY DECISIONS

Entity/Author	Industry	Equity beta	Asset beta	Comment
ACCC/ORG (1998)	Gas transmission	1.20	0.55	Based on consultant's report on overseas gas companies and increased in the final decision to reflect asymmetric risks that were not accounted for elsewhere
IPART (1999d)	Electricity transmission and distribution	0.96	0.43	Based on tribunal's assessment of predictability of returns, utility's negligible insolvency risk and limited exposure to inflation risks and relative insensitivity to changes in the overall economy.
OTTER (1999)	Electricity distribution	0.95		To be consistent with views expressed in recent determinations by ACCC and IPART.
ACCC (1999b)	NSW and ACT electricity transmission	0.93	0.45	Transmission is considered to be relatively low risk
ACCC (1999c)	AGL Central West Pipeline	1.48	0.60	Upper end of range to be consistent with reasoning in ACCC/ORG and recognition of some additional risk relative to the Victorian situation (1998)
IPART (1997)	AGL Gas networks	0.65-0.90		AGL equity beta
IPART (1999b)	Gas distribution	0.96-1.10		

The betas adopted in recent regulatory decisions have also been heavily influenced by observations of betas for US electricity and gas utilities. The ACCC/ORG draft decision relied on a consultant's report on US utilities (subsequently adjusted upwards in the final decision to reflect the regulator's judgement about different risk characteristics) and it is common to use a benchmark asset beta, largely based on US observations, of 0.45.

It is instructive therefore to compare average asset betas in the US with those in the UK. This is done in Table 5.3 which also shows UK average asset betas in 1995 and asset betas for some individual utilities. It is notable that the average asset beta for electricity distribution in the UK is currently estimated to be 0.72 compared with 0.42 in the US. It is also notable that the average asset beta for electricity distribution in the UK in 1995 was 1.62 and that the asset betas for some individual utilities in less

populated centres have been estimated to be well in excess of 1. The ABN-AMRO submission noted that there were greater risks with UK incentive based regulation compared with US rate of return regulation and that the former was more comparable to the Victorian regime. Based on this and other information the ABN-AMRO submission concluded that a reasonable asset beta range for Victorian electricity distribution licences would be 0.55 to 0.75.

TABLE 5.3: US AND UK ELECTRICITY BETAS

Entity	Asset beta
Average of US electricity utilities (1999)	0.42
Average of UK power utilities (1999)	0.72
Average of UK power utilities (1995)	1.62
Scottish power (1999)	1.10
Scottish & Southern energy (1999)	1.22
Northern Electric (1995)	2.94
East Midlands (1995)	4.38
London Electricity (1995)	0.83

Source: ABN-AMRO 1999

Most of the regulatory decisions relate to assets that are considered to be lower risk than the PAWA transmission and distribution assets, due mainly to the high proportion of mining and tourism revenues in PAWA's total revenue. However it is important to recognise that the ACCC (ACCC/ORG 1998 and ACCC 1999b) has conceded that asymmetric risk is relevant although difficult to quantify and has made small upward adjustments to the betas to recognise the risk.

The ACCC/ORG (1998) decision is regarded as an important benchmark decision but there is a danger that other regulators will not recognise that there is scope to adjust certain parameters and particularly the beta parameter to better reflect the particular circumstances of the entity being regulated. For example OTTER (1999 p.93) in its recent report stated that—

> "In response to the Issues Paper the entities stated that they were of the view that there were specific risks associated with the network businesses that justified a higher equity beta. Transend in particular was of the view that its equity beta should be set to take account of a range of risks that could not be provided for through adjustments to the cash-flows. On this basis, Transend argued for an equity beta of at least 1.2. However it was noted by the Regulator that an equity beta of 0.95 would be more consistent with views expressed in recent determinations by ACCC and IPART."

Another component of non-diversifiable risk which may explain some of the variation in betas listed in Table 5.3, is the difference between risk for electricity utilities whose vertically aligned generation sectors *are not* subject to competition and those networks that are either vertically separated or whose generation sectors *are* subject to

competition. The risk of assets being stranded, or under-utilised, is much higher in the latter case, because the risk of generators relocating or closing down and the risk of by-pass are much higher. If assets are to be optimised out of the asset base in such instances, then there must be some addition to the asset beta to accommodate the added associated risk that the network provider must bear.

The theoretical considerations, reasoning in key regulatory decisions and relevant empirical information suggest that the asset beta for PAWA should be well in excess of the recent standard that has been adopted for metropolitan based electricity utilities. In summary, the key conclusions are as follows —

1. The CAPM does not recognise asymmetry of profitability possibilities. That is, unlike operators in non-regulated markets, there is a limit to the "upside" or potential profitability for those investing in regulated monopolies. Therefore an appropriate adjustment is needed to the maximum allowable return to achieve a competitively neutral position relative to a competitive market. There is well established theoretical and empirical evidence to support this proposition.

2. The ACCC/ORG have accepted the conceptual relevance of the asymmetry argument and made some conservative adjustments in key decisions.

3. There is also a risk that the revenue cap will tend to relate to the most likely value of cash flows (i.e. cash flow with the highest probability) rather than the expected value of cash flows (i.e. the sum of the possible cash flows multiplied by their respective probabilities) and if so this would create an additional distortion that would require a compensating adjustment to achieve competitive neutrality.

4. It is well accepted in theory that adjustments need to be made to take account of different non-diversifiable risk characteristics of utilities and in particular to allow for the different circumstances of rural relative to metropolitan-based utilities. The added risks that network providers must bear who do not have vertically aligned monopoly generation sectors *vis á vis* those network providers that do, is another relevant difference that should be accounted for in estimating the beta.

5. Based on key regulatory decisions, the foregoing considerations and the characteristics of PAWA, a minimum asset beta in the range of 0.6 to 0.8 would be conservative.

To take reasonable account of PAWA's relatively large non-diversifiable risk (especially in comparison to larger utilities in the eastern States that predominantly supply urban markets) and the negative asymmetry introduced by regulation PAWA considers an asset beta of at least 0.7 would be appropriate.

5.7 DEBT TO CAPITAL RATIO

OIUC's Proposed Approach

The OIUC propose adopting a debt to capital ratio of 60 per cent which is consistent with the IPART (1999d) and ACCC (1999b) determinations.

PAWA's View

The debt to capital ratio, or capital structure, affects the cost of equity through its impact on the equity beta and the debt margin and in determining the WACC. The normal regulatory practice is to specify a capital structure consistent with efficient financial management and in particular the minimisation of the cost of capital in a similar commercial enterprise. As noted in Section 5.5, there are however some important issues in applying this approach to PAWA because of the obvious difficulties in quickly changing the capital structure and renegotiating the mix and term of debt.

The gearing ratios adopted in recent regulatory decisions are all around 60 per cent debt:capital. This is considered to be on the high side for PAWA given the problems associated with rapidly changing the capital structure. As noted earlier PAWA has higher non-diversifiable risks compared with the utilities in larger urban-based markets. These risks are related to the following factors —

- higher risks associated with dependence on relatively high risk tourism and mining customers;
- higher risks associated with dependence on a relatively small number of large customers;
- higher risks associated with relatively small scale which adversely affects operating leverage for a utility; and
- reticulated gas may lead to network by-pass by major customers.

Given these considerations a gearing ratio of 40 per cent is preferred as a medium term benchmark with the regulator allowing a glide path to that level over the initial regulatory period. At this time PAWA does not have the same flexibility as a private entity would in accessing a wider range of financial institutions as it is required to borrow exclusively through the Northern Territory Treasury Corporation. It is contended that the extent to which PAWA is disadvantaged relative to the private sector should be recognised in determining the capital structure and debt charges. This provides a strong rationale for the suggested glide path.

Given the foregoing considerations the indicative range in the draft determination of 60 per cent is considered to be unreasonable in the initial regulatory period. It would however be reasonable over time if PAWA management had the appropriate flexibility to adjust the capital structure. It is suggested that this should be revisited in the subsequent regulatory period and that the benchmark target should be 40 per cent for the last year of the initial regulatory period with an appropriate glide path over the 3 years.

5.8 EFFECTIVE TAX RATE

OIUC's Proposed Approach

The OIUC proposes to apply the statutory company tax rate. This means that the WACC for the period from 1 April 2000 to 30 June 2000 will be based on the current rate which is 36 per cent. The WACC will be calculated using a statutory rate of 34 per cent for the 2000-2001 financial year, as this rate is due to apply for one year from 1 July 2000. The WACC for the following two financial years will be based on the statutory rate of 30 per cent, which is due to be introduced on 1 July 2001.

PAWA's View

There are two alternatives in the determination of an appropriate tax rate — the statutory rate of 36 per cent (34 per cent from 1 July 2000-30 June 2001, and 30 per cent from 1 July 2001) and an effective tax rate which adjusts for both timing differences and other differences that have a permanent effect. With infrastructure, large tax deductions in the early years of asset life may increase the net present value of tax benefits relative to other investments and reduce the effective tax rate below the statutory rate. Timing differences should be ironed out over time although the benefits may extend over several years. It would also be difficult to determine an appropriate effective tax rate. Recent regulatory decisions have adopted the statutory rate as the effective tax rate (Table 5.4).

As recognised in the ACCC/ORG decision the adoption of the statutory rate and pre-tax WACC formulation means that the post tax return is high in the early years of an investment and lower in the later years. However the ACCC/ORG do not consider this to be a reason to provide compensation in a future regulatory period if the after tax return does decline.

Recognising the foregoing considerations PAWA supports the OIUC's proposal to use the statutory rate. Recognition of the anticipated changes in the effective rate is also supported.

TABLE 5.4: EFFECTIVE TAX RATES

Entity/Author	Industry	Effective Tax Rate (%)
NEC	Electricity	33
IPART (1999d)	Electricity distribution	36
OTTER (1999)	Electricity distribution	36
ACCC/ORG (1998)	Gas transmission	36
ORG (1998b)	Gas distribution	36
IPART (1999b)	Gas distribution	36

It is clear that the intention in setting the above rates is to reflect the statutory rates. Therefore, after the Government reduces the statutory rate, it is expected that there

will be an adjustment made to the effective rates applied in the relevant determinations.

5.9 IMPUTATION FACTOR

Under an imputation system a proportion of the tax paid at the company level effectively represents personal tax paid at the company level. In Australia, the proportion of the company tax paid that can be used as a personal tax credit depends on the marginal tax rate and whether the shareholder is an Australian taxpayer.

A tax imputation credit is created when a company pays a franked dividend out of its Australian based post-tax profits. The value of imputation credits depends on the company's effective tax rate and its dividend payout policy. Low payout ratios defer the benefit of imputation credits and make them less valuable. The value of credits to a particular shareholder depends on whether the shareholder can access and utilise those credits.

OIUC's Proposed Approach

The OICU proposes adopting either the imputation factor used by IPART (1999d) of 0.40 or the imputation factor of 0.50 used by the ACCC (1999b).

PAWA's View

A key issue to resolve with respect to the treatment of dividend imputation is whether the rate of return should be set with respect to competitive neutrality from the shareholder perspective or with respect to average treatment in the market place.

The Northern Territory government is the PAWA shareholder and as such it pays no income tax so that dividend imputation credits cannot be used to reduce income tax. However this effectively means that full imputation applies in practice since the objective of dividend imputation was to eliminate double taxation of dividends (first at the company level and then at the personal level). Since for a government owned company such as PAWA income is only taxed once, full imputation effectively applies. From the shareholder perspective if less than full dividend imputation is allowed (when no personal tax applies) in determination of a rate of return target, the real after tax cost of capital will be effectively raised relative to other investors who also are in the position of being able to fully utilise imputation credits.

This is effectively the argument provided in the Commonwealth-State Steering Committee on National Performance Monitoring report , " An Economic Framework for Assessing the Financial Performance of Government Trading Enterprises", 1996.

However in access pricing determinations regulators have tended to focus on competitive neutrality in terms of a typical commercial enterprise and have adopted imputation factors based on the average values observed in market transactions with judgemental adjustments for such factors as foreign ownership (if relevant) or special tax effects.

In the Victorian gas decision the ACCC noted that it preferred an assumption that the operator was Australian and privately owned. It also noted that such an approach would suggest an estimate of the value of dividend imputation towards the high end of ranges discussed by commentators. However it preferred an estimate of 50 per cent in the Victorian gas decision based on the reasoning that the value of the imputation credits would be reduced in that particular case by accelerated depreciation.

The main consideration with respect to whether a position of average dividend imputation should apply is that such a position would be consistent with that of an average private Australian investor. PAWA suggests this approach should be adopted based on consistency with other regulatory decisions and the objective of focussing on competitive neutrality for a commercial provider. PAWA suggests an imputation factor of 0.5 is reasonable. It is consistent with the ACCC's recommendation, and other key regulatory decisions (Table 5.5) and is the same value as assumed by Merrill Lynch and Fay Richwhite in their 1998 financial modelling of PAWA.

TABLE 5.5: ESTIMATED TAX IMPUTATION (GAMMA) FACTORS

Entity/Author	Industry	Gamma
NEC	Electricity	0.5
IPART (1999d)	Electricity distribution	0.3-0.5
OTTER (1999)	Electricity distribution	0.5
ACCC/ORG (1998)	Gas transmission	0.5
ORG (1998b)	Gas distribution	0.5
IPART (1999b)	Gas distribution	0.3-0.5
Hathaway and Officer (1995)	Generic	0.6
Bruckner et al (1994)	Generic	0.68
Browne and Clarke (1993)	Generic	0.72
Steering Committee on National Performance Monitoring of Government Trading Enterprises (1996)	All Government Trading Enterprises	1.0

5.10 DEBT RISK PREMIUM

The WACC requires estimates of the cost of equity and the cost of debt. In determining the cost of debt for regulatory purposes there is a need to calculate a benchmark premium over the risk free rate that reflects market conditions and best practice financial management for the entity.

OIUC's proposed approach

The OIUC proposes adopting the debt risk premium used by IPART (1999e) and ACCC (1999a) of 1 per cent.

PAWA's View

Appropriate premiums can be calculated based on observations of market

transactions. However as noted by ORG (1999) care should be taken in using observations of market transactions in Australia because the market is not very deep.

The following are examples of regulators' and regulated utilities views about the appropriate debt margin —

- IPART (1999d) considers that debt margins in the range 60 – 100 points above the 10 year bond rate are not unreasonable for electricity utilities, and that this assumes a credit rating in the range of A to BBB-. IPART concluded that an appropriate margin for electricity utilities is 1 per cent.
- the final ORG/ACCC Victorian gas access decision set the debt margin at 1.2 per cent. This was based on an A- credit rating and 60 per cent gearing. It represented an increase in 40 basis points from the draft decision as borrowing costs had risen due to "growing uncertainties in global financial markets".
- The ACCC (1999c) draft decision for the Central West Gas Pipeline for AGL Pipelines concluded that 100 basis points was reasonable. It noted that this was consistent with recent market transactions for Envestra, Boral and AGL.
- In its submission to ORG, ABN-AMRO (1999) argued for a premium of between 1.3 and 1.6 per cent consisting of 0.4 – 0.5 per cent to adjust the Commonwealth Government "risk free" rate to a credit based benchmark; 0.10% - 0.15% pa to reflect bank return on capital and corporate credit risk in providing fixed rate debt through interest rate swaps; and 0.80% – 0.90% pa to reflect the credit cost of lending to an electricity utility and the annualised cost of the upfront fees payable to raise such funding.

It is important to note that both absolute rates and 'spreads' change over time according to economic conditions, and that conditions such as the Asia crisis could increase the cost of debt finance, while strong economic conditions could reduce it.

Another way to determine an appropriate debt margin would be by reference to average actual borrowing costs and implicit debt guarantee fees. PAWA has a portfolio of loans that have an average interest rate which is in excess of current market rates.

The loans were taken out by the Northern Territory Government, and on-lent to PAWA, for infrastructure development during the late 1980s. The loans are generally fixed-interest, fixed-period loan and were incurred during a period when interest rates were generally very high. PAWA has inherited this financing structure and is constrained in its capacity to re-finance existing loans at favourable rates

By establishing a WACC based on a cost of debt which is substantially lower than PAWA's cost of debt the regulator would effectively be jeopardising PAWA's financial viability and sustainability. This is because the premium PAWA pays on the pre-existing loans represents a substantial proportion of its costs, which it would not be able to recover. Over time it is anticipated that interest costs will be brought more into line with current market rates. Therefore, as PAWA increases it debt to equity ratio, it will lower the average interest rate that it pays on debt.

Recognising the existing constraints on management's ability to change the capital structure and to renegotiate debt *PAWA proposes use of the a phasing of the WACC*

over the initial 3 year regulatory period and part of the subsequent regulatory period. A recent precedent in this regard has been set by OTTER (1999) which allowed a phasing of the WACC over 3 years for both the Tasmanian Hydro-Electric Corporation, Transend Networks Pty Ltd and the distributor Aurora Energy Pty Ltd. The real pre-tax WACCs were set at 8.2 and 8.5 per cent for the respective organisations in 2000 adjusting to 7.5 per cent each by 2002. Slower adjustment was allowed for Aurora reflecting greater restrictions on its ability to restructure its debt. It is notable however that Transend had no long term debt and a net debt to equity ratio of only 8 per cent at the time of the determination but phasing was still allowed.

5.11 SUMMARY OF WACC AND CAPM PARAMETERS

On the basis of the above discussion, the WACC and CAPM parameters PAWA is proposing are as shown in Table 5.6.

TABLE 5.6: INDICATIVE ESTIMATES OF PAWA'S PREFFERED RATE OF RETURN FOR NETWORK ASSETS

	Year 1	Year 2	Year 3	OIUC Discussion Paper
Nominal risk free rate	7.3	7.3	7.3	6.84[a]
Inflation	3.16	3.16	3.16	3.16
Cost of debt				7.9
Market risk premium	6.6	6.6	6.6	5.5
Gearing D:E				60:40
Dividend imputation, γ	0.5	0.5	0.5	0.4
Tax rate	.34	.30	.30	.36
Asset Beta	0.7	0.7	0.7	0.43
Equity Beta[b]	0.95	1.02	1.10	0.94
CAPM nominal equity return	13.56	14.04	14.54	12.49
Post tax nominal WACC	9.61	9.77[c]	9.48	7.27
Post tax real WACC	6.25	6.40[c]	6.13	3.99
Pre tax nominal WACC	14.56	13.95	13.54	11.02
Pre-tax real WACC	11.05	10.46	10.06	7.62

a) It should be noted that the OIUC's *Discussion Paper* was released prior to the Reserve Bank of Australia's 2 February 2000 announcement of a 50 point increase in the Commonwealth Government bond rate. This explains the difference between PAWA's nominal risk free rate and the OIUC's. In conducting the WACC calculations it is assumed that the OIUC will take account of this increase. Therefore the "OIUC WACC" estimates reported above are higher than those reported in the OIUC's *Discussion Paper*.

b) Equity beta is derived from equation (8).

c) Note that the debt to equity ratio enters the WACC equations both as the weighting factor, and through the equity beta equation. As the D:E ratio increases there are opposing effects, which explains why the WACC in the second year can be higher than the WACC in the first year.

6. MEASURING THE CAPITAL BASE

Unlike assets in competitive markets, it is not possible to derive a regulated monopoly's asset values on the basis of how much investors would be prepared to pay, simply because the value of assets from the investors' perspective is dependent on the regulated revenue cap. Hence academics, regulators and regulated utilities have given some consideration to the issue of asset valuation.

The OIUC has sought comment on the valuation of PAWA's monopoly network assets.

6.1 DIVISION OF ASSETS BETWEEN GEOGRAPHIC ZONES

For the purpose of determining the revenue cap applying to the regulated networks, PAWA has determined that the regulated networks will consist of the assets used to supply the following areas —

Darwin: Inner Darwin: CBD, Northern suburbs, East Arm, Palmerston,
Outer Darwin: generally Litchfield shire and beyond including Howard Springs, Humpty Doo, Arnhem Highway, Berry Springs, Darwin River, Acacia, Batchelor, Adelaide River.

Katherine: Inner Katherine: Katherine town, Nitmuluk Gorge, Tindal, Venn.
Outer Katherine: Mataranka, Larrimah, Pine Creek, Cosmo Howley.

Tennant Ck: Inner: Tennant Creek town,
Outer: Warrego, Nobles Nob, any area south greater than 10km south of town.

Alice Springs: Inner: Alice Springs,
Outer: Any area greater than 25km from town centre.

It should be noted the inclusion of the Pine Creek network in the Katherine has been done for pragmatic reasons. The *Access Code* gives no indication as to whether the Pine Creek area is or should be included in the access regime. The inclusion by PAWA of these assets in the regulated Katherine network removes any doubt. The area is a prospective mining province and PAWA has transmission assets servicing two mines at present as well as several franchise customers. If these mines cease operation there will be an increase in average network charges applicable to supply to the remaining customers. Similarly, an increase in mining activity, serviced by the PAWA assets, would effectively reduce average charges.

6.2 FORMULA

OIUC's proposed approach

The formula for calculating the capital base forwarded by the Interim Utilities Commissioner is as follows —

$$CAPITAL = [WC + (ODV - CAPCON) + 0.5*(CAPEX - DECOM)*(1 + \Delta PI)^{-1/2}] \quad (9)$$

where:

WC = the funds ('working capital') required to finance the network's operations ($M).

ODV = the depreciated optimised deprival value of the network's fixed assets at the beginning of the financial year ($M).

CAPCON= the capital contributions received net of any amount amortised, to the extent that the resultant assets constructed have increased the gross ODV ($M).

CAPEX = the capital funds that are expected to be expended in the financial year in connection with the creation or upgrade of network fixed assets ($M).

DECOM = the ODV of those network assets expected to be decommissioned in the financial year before the end of their economic life ($M).

ΔPI = the forecast change in an appropriate price index for the financial year (%).

PAWA's View

In essence PAWA supports adoption of equation (9) for the calculation of the capital base, although as discussed below it does question the use of ODV. Moreover, in this Section, PAWA presents its views relating to the calculation of the other components of equation (9), and forwards information to the OIUC in relation to its approach to forecasting CAPEX and DECOM.

6.3 WORKING CAPITAL

While most capital is tied up in a network's fixed assets, recognition is required of the funds held to finance the day-to-day operations of the network business.

OIUC's proposed approach

The Interim Commissioner proposes to measure the working capital employed in a particular network by estimating the average monthly difference between current liabilities and current assets in the previous financial year for PAWA as a whole and

then allocating that amount in proportion to the network's relative share of PAWA's total operating costs.

PAWA's View

PAWA agrees with the OIUC's proposed approach for calculating working capital. However, for the next regulatory review it is likely that network costs will be more directly identifiable, and therefore it will be possible to calculate the direct working capital requirement for PAWA networks, as opposed to allocating working capital according to network's share of PAWA's total operating costs.

6.4 VALUATION OPTIONS

The three main options for valuing assets are: depreciated asset cost (DAC); depreciated optimised replacement cost (DORC); and optimised deprival value (ODV). DAC is simply the initial cost of the asset adjusted for economic depreciation. DORC, however, takes account of the fact that in competitive markets investors' valuation of assets do not include sub-optimal prior investments, and if the intent is to mimic asset values that would apply in competitive markets these assets should be "optimised" out of the asset base. Consequently DORC is generally considered a more meaningful measure than DAC. The process for estimating DORC is as follows —

1. Optimise out excessive investment.
2. Value the existing assets at modern equivalent value.
3. Adjust the assets to take account of remaining useful lives (e.g. by adjusting for accumulated depreciation if reasonable).

Finally, ODV is defined as the minimum of the following two values: (1) the depreciated optimised replacement cost value; and (2) the maximum of the net present value of expected cash flows from the assets continued use and the net realisable value of disposing of the asset.

OIUC's proposed approach

In the *Discussion Paper* the Interim Commissioner proposes using ODV.

PAWA's View

Under the deprival value approach there is a need to value the future economic benefits that the entity would be deprived of. However these cannot be valued unless one knows the value of the cash flow which in turn depends on the allowed rate of return and the asset base. But the latter depends on the discounted value of the cash flow — hence there is a circularity problem associated with using ODV.

There is however, no need to apply ODV and hence the circularity problem should be avoided. This is because DORC values are the best approximations of asset values that would apply in competitive markets.

It is pertinent to list the reasons why the ACCC (1999a, pp. 39-40) in its *Draft Regulatory Principles* paper supported the use of DORC —

- It is consistent with the outcome in a competitive or contestable market since it is a valuation methodology that is consistent with the price charged by an efficient new entrant into an industry and so is consistent with the price that would prevail in the industry in long run equilibrium.
- Revenue streams consistent with a DORC valuation will minimise the likelihood of significant shocks to tariffs as the replacement of assets becomes necessary.
- Any value in excess of DORC is likely to imply pricing of services that will expose the service provider to being bypassed.

The ACCC (1999a, p.41) also noted that DORC was advocated by —

- Victorian Department of Treasury and Finance Submission 5 August 1998.
- NSW Treasury Submission 3 September 1998.
- South Australian Department of Treasury and Finance Submission 30 July 1998.
- EnergyAustralia Submission 31 July 1998.
- Powerlink Submission 30 July 1998.

Furthermore, key precedents where DORC has been accepted as the valuation methodology are —

- Primary valuation methodology recommended by ACCC in their *Draft Regulatory Principles* paper with respect to maximum asset values for electricity transmission revenues (1999a).
- Initial regulatory asset valuation of electricity distribution network service providers and gas distribution and transmission network service providers by the Office of the Regulator General in Victoria with adjustments to maintain a greater degree of relativity between the prices paid by urban and rural customers than would otherwise be the case (1994).
- ACCC final decision on access arrangements for natural gas pipelines in Victoria (1998).
- IPART decision on asset valuation for the Hunter Rail network for the purposes of setting a revenue cap (1999c).
- New South Wales Treasury policy guidelines for valuation of electricity network assets (1995).
- IPART proposed values of New South Wales electricity distributors (except easements and Australian Inland Energy) (1999d).

The ACCC interpretation is that for assets that will remain in use DORC is consistent with the use of ODV. There will be a difference between the DORC value and ODV of other assets. However, it should be remembered that the value of assets no longer in use will be reflected by their optimisation out of the asset base under DORC.

In summary, PAWA's preferred approach is to apply DORC, as —

(1) it is consistent with asset values in competitive markets;

(2) the main alternative — ODV — cannot be applied due to circularity problems and is not a meaningful measure in any market where price is regulated; and

(3) the use of DORC has been endorsed in a number of recent determinations.

PAWA Views in Relation to the Optimisation Factor

The optimised factor accounts for overdesign, overcapacity, and redundant assets including an adjustment for stranded assets or partially stranded assets. Determination of the optimisation factor is somewhat subjective because where large economies of scale are present it is optimal to develop assets that, at the time of development, have excess capacity to accommodate future demand growth.

Generally speaking, in a market which is experiencing the growth rates evident in the NT, it is rare that assets become redundant, although their purpose may change. For example, express feeders between zone substations may become additional distribution circuits from the zone substations they previously linked.

Nonetheless, PAWA has a few assets that are redundant. These will be excluded from the asset base prior to a general optimisation. An example is the 66kV transmission line from McMinns Zone Substation to Point Z in the Darwin system. This line has recently been taken out of service following the construction of a new transmission link. Its value will be excluded from the asset base.

PAWA also considers that careful examination is required in determining whether an asset should be defined as "stranded". On first inspection, an argument could be made in favour of optimising out the Cox Peninsula cables from the asset base, as the replacement value is $4.3 million, but the net present value of sales only amounts to $0.5 million. However, PAWA has an obligation to maintain services to this area, and therefore the asset cannot be economically replaced, nor can it be taken out of service. Moreover, given PAWA has an obligation to provide the asset, it should be able to retain the asset in the asset base and achieve a rate of return from it.

PAWA policy is for asset revaluation to be undertaken every three years and the optimisation factors will need to be re-assessed as part of these periodic revaluations.

Top Down or Asset Class Approach to Optimisation

The ACCC (1999a) in its *Draft Regulatory Principles* paper recommends a top down approach which considers infrastructure from a system wide perspective i.e. customer base and services provided are to be considered in a very broad fashion. If this approach is to be taken based on the above assessment PAWA considers that a high optimisation factor should be applied. This is based on a realisation that demand

growth has been strong and will continue to be strong — there was a high growth rate of around 10 per cent in the 1970s and currently the growth rate is around 5 per cent. Any excess capacity that is present in the system is therefore justified on the basis that, given the anticipated demand growth, it would be uneconomic to add small increments to capacity.

In contrast to the broad view of the optimisation factor, the NSW Treasury *Policy Guidelines for Valuation of Network Assets* paper applied optimisation to a number of different asset classes. Similarly, PAWA intends evaluating the optimisation factors for specific asset classes and has commenced working on this task. Calculation of the optimisation factor based on the broad view is unlikely to differ significantly in this instance, but it is potentially less precise.

Risk implications

Where a DORC methodology is applied and full economic depreciation implied by that methodology was not recovered in the capital charge due to application of the optimisation factor, then PAWA will bear any technological risk or regulatory risk of stranded assets. It may be considered that the assumption of such risk is a normal feature of a competitive market. However an important feature of competitive markets that will be absent from the regulated regime is unlimited upside potential that provides an offset to technological risk or other risks that reduce the economic value of the asset. If assets are to be regularly revalued using DORC, it is clearly the case that a retrospective adjustment to depreciation (through the "K" factor described in Section 9) is appropriate whenever the asset base is optimised down.

Brownfields or greenfields valuation

The concept of a brownfields valuation refers to a situation where the optimisation is undertaken on an incremental (brownfields) basis that recognises other basic and complementary infrastructure is in place. In contrast a greenfields valuation is not constrained by the existence of other infrastructure. The brownfields assumption is considered to be more realistic and more practical and is considered more likely to reflect the costs of a new entrant. It also accords with the observation that incremental optimisation is generally a more important feature of the commercial market than the ability to design and implement an entirely new asset network. However it is recognised that there may be situations where a greenfields assumption is more appropriate.

PAWA valuations are generally provided on the basis of brownfields valuation. The ACCC supports this position in its *Draft Regulatory Principles* paper.

PAWA's View in Relation to Land and Easements

The normal DORC methodology would assign values to land and easements reflective of their market value. There would normally be no physical depreciation but there could be economic depreciation or appreciation reflecting a rise in real asset values. It is considered important that the market real estate value of the optimised proportion of easements owned by PAWA be represented in the asset base. This is because —

- Land used in any venture in competitive market must receive a return that reflects its saleable value. Therefore if the regulated asset base (RAB) is to reflect the hypothetical market value that would apply then DORC must be used;
- If the full opportunity cost of land and easements is not reflected in the RAB then this could lead to allocative inefficiency.

Allocative inefficiency occurs when resources are not directed to their most valued use, and this will only occur if full asset values are represented on the utility's RAB. As recognized by the ACCC (1999a, p. 46) in its *Draft Regulatory Principles* paper if easements are correctly valued then the choice between easements and underground cabling will be made in such a way that the social cost is minimised —

> "Inclusion of the easement value within the RAB provides the incentive for the transmission network service provider (TNSP) to acquire easement rights to expand the network as required. If the value in the alternative use of the easement (its social cost) exceeds the cost of alternatives such as underground cabling — the TNSP has an incentive to realise its market value and adopt the lower cost alternative since the DORC basis for the RAB means that it will only reflect the lower cost alternative.
> The Commission is attracted to this approach and proposes to adopt it as the basis for the treatment in the guidelines on DORC valuation which the Commission will develop."

In contrast to the ACCC's recommended use of DORC for valuing easements, IPART (1999b) valued those easements in existence before the regulatory period at historical cost, and commented that "to include a market value for existing easements in the initial capital base would be of no economic benefit." PAWA however, does consider there is an economic benefit, because DORC valuation clearly promotes allocative efficiency.

IPART (1999e) also stated that

> "Electricity easements generally apply in perpetuity. Gradual growth in load, and the difficulty and expense of negotiating a new easement means that they are rarely replaced."

The opportunity cost of assets, however, must be reflected in the asset base regardless of their longevity if the objective of asset valuation is to promote efficient allocation of resources. Longevity is reflected in the depreciation rate, and is not relevant in the discussion of asset valuation method *per se*. IPART's argument for valuing easements at historical cost is therefore counter to the "efficient resource use" rationale for applying DORC.

In summary, PAWA can see no reason why land and easements should be evaluated differently from other assets and therefore considers they should be represented using the market real estate value of their optimised proportion.

6.5 ROLLING THE ASSET BASE FORWARD

The OIUC *Discussion Paper* calls for comments relating to rolling the asset base forward (i.e. use of equation (9)). PAWA supports use of equation (9), but does have some views regarding the measurement and forecasting of the components of equation (9) — i.e. capital contribution, capital expenditure and the decommissioning of assets.

PAWA's views re: Capital contributions

Under Section 79 of the *Access Code*, if augmentation of the connection equipment or the network system assets is not commercially viable without a capital contribution from the user, the access applicant must make a capital contribution towards the augmentation. To the extent that contributed assets have been paid for elsewhere they should either be excluded from the asset base or if included an adjustment should be made to the allowable rate of return that would have an equivalent effect. It is simpler to exclude contributed assets from the asset base for regulatory price or revenue-capping purposes.

The three types of contributed assets include —

- Gifted assets. The extensions to the network that developers are required to carry out before a development is approved make up the majority of gifted assets. Once the development is complete the assets are handed over to PAWA, and it is responsible for continuing operation, maintenance, repair and replacement of the assets.
- Recoverable works. Most recoverable works are associated with new subdivisions, and are very similar to gifted assets, and hence while they are called "Recoverable" works, they are really capital contributions. Recoverable works include the testing and commissioning of the gifted assets. Occasionally, there is a genuine recoverable work, such as the recent relocation of a kilometre of 66 kV lines.
- CAPCONs relate to the contribution made by larger developers or customers for the augmentation to the network's capacity triggered by the additional load. In contrast to gifted assets and recoverable works, the developer is not paying for a specific asset.

Some capital contributions in the "gifted assets" and "CAPCONs" categories are paid into the distribution system extension policy account (DSEP). An issue that PAWA has identified is that under the Section 79 of the *Access Code* DSEP payments are not to be included as capital contributions. However, in terms of the approach taken in other determinations the DSEP payments should clearly be included. The *Access Code* also states that only capital contributions from network users with a formal access-agreement should be included. Again, it would appear that in other determinations capital contributions from other network customers are also included.

There are no records of capital contributions for the period before 1 July 1998, and therefore PAWA considers that it is appropriate to include in the asset base all assets owned by PAWA at this time. However, assets contributed after 1 July 1998 are not to be included in the asset base. The Northern Territory Auditor General has accepted that PAWA has no records prior to July 1998 that identify gifted assets or capital

contributions. Since that date PAWA has identified gifted assets in its asset register.

There are three reasons why capital contributions made before 1 July 1998 should be included in the regulated asset base —

1) the allocation of assets to capital contributions before this period would be largely arbitrary given that no records of capital contributions exist;

2) it is generally recognised that a "line in the sand" must be drawn to initiate the new regulatory era. This has meant that in most determinations, capital contributions made before a specified date (usually quite recent) have been included in the asset base. If the IUC wishes to diverge from the general practice in this respect, then in order to have a similar overall impact (in terms of encouraging re-investment), there would need to be an offsetting effect elsewhere within the "building blocks"; and

3) initial exclusion of too many assets from the base could lead to large price volatility when assets need to be replaced.

Capital Contributions Data are available for the period from 31 January 1999 to 1 February 2000. Capital contributions in the "gifted assets" category for the period between 1 July 1998 and 31 January 1999 are included in the SKM valuation and will be adjusted to give effect to the principles outlined in the OIUC's *Discussion Paper.* The 31 January 1999 to 1 February 2000 actual data are projected to 30 June 2000. Subsequent forecasts of capital contributions are based on inflated values of current annual values. This assumes that growth is to remain constant, which is a reasonable assumption given the stable population growth rate in Katherine and Darwin in recent periods.

PAWA's views re: capital expenditure (CAPEX)

Capex is divided into the following categories —

- Growth. Projects which facilitate expansion of the network to provide for new or additional business.
- Replacement. Projects which replace components of existing infrastructure, in order to maintain current service levels, capacity or original purpose. Capex forecast for replacement is based on the economic life of existing assets.
- Improved service levels. Projects aimed at improving service levels (eg, environmental, response times, outage frequency, etc). For example, remote control system automation is being introduced in some areas as it improves reliability by decreasing restoration time.
- Efficiency. Projects aimed at improving the productivity of the business through work practices or procedures leading to overall reductions in capital or operating costs and/or improving net revenue, eg telemetry to reduce site visits and so save operating costs. Another example is the instalment of larger conductors to reduce the loss in power during transmission.

- Risk/safety. Projects aimed at mitigating business, public or employee risks. For example, the movement of poles away from black spots on roads, and the raising of line heights in areas subject to flood.

Maintenance that relates to offsetting the effect of depreciation is not included as capex as this has been factored into the MAR calculations through depreciation and maintenance projections. Including an adjustment to the RAB would therefore amount to double counting of these costs.

In terms of magnitude, capital works is divided into "minor works" which is for capex of individual item value of less the $150,000 and capital works which is for capex in excess of $150,000. Capital works for periods after the next financial year are referred to as forward works.

The forward planning process looks at the effect of load growth on the system in two ways — ability to supply the load at an acceptable quality, and ability to cope with single contingency failures. The second is a risk management strategy to ensure that, in the event of a relatively common event, large numbers of customers are not left without supply for extended periods.

Where load forecasts predict that a part of the network will fail to meet one of these criteria at some time over the ensuing five years, a study of alternative solutions is carried out. These studies take into account initial and NPV costs over the life of the asset, including utilisation, losses, and O&M costs of the alternatives. The end result of this is the inclusion of the lower NPV option in the Forward Works Program (FWP).

Some smoothing of the capex budget is conducted within the overall PAWA context, however, the degree of smoothing is limited by: constraints on the availability of resources; the need to generally fit work in during the dry season in the Top End; and the need to ensure key developments occur in a timely fashion.

For the purposes of rolling the asset base forward to 30 June 1999 from the last valuation (31 January 1999), the actual capex expenditure for the 31 January 1999 to February 2000 period has been projected for the remaining 4 months of the current financial year. For the purpose of establishing the level of capex for each of the three years during the regulatory period, the actual capex for the 31 January 1999 to February 2000 period has been inflated by the CPI and by the real growth rate in capex over past years.

It is PAWA's understanding that at the end of each financial year within the regulatory period an adjustment is to be made to the revenue cap for the subsequent financial year for the difference between actual and forecast capex and decommissioning of assets. This is the approach recommended by the ACCC (1999a) in its Draft Principles paper. Without this adjustment it would not be prudent of PAWA to make conservative estimates of its CAPEX program as it would need to give more weight to the high side of demand expectations in forming the forecast.

There has been no adjustment made to the capex forecasts on the basis of the GST impact due to high degrees of uncertainty regarding the impact of the GST on the size of the capex program.

PAWA's Views re: Decommissioning of Assets

PAWA will comply with the request that it provide the OIUC with details of assets to be decommissioned.

7. MEASURING THE ANNUAL DEPRECIATION CHARGE

OIUC's proposed approach

The depreciation expense needs to reflect depreciation of the initial asset base as well as the depreciation of CAPEX assets. An adjustment is also required so that depreciation of decommissioned assets is only included for the proportion of the year they remained in use. All of these factors are reflected in the OIUC's *Discussion Paper* in the depreciation formula (formula 12) —

$$DEP = DCUR + 0.5*[(DNEW-DDEC)] \quad (12)$$

where:

DCUR = depreciation charge for the year based on the assets in service at the start of the year, and this equals the initial asset base (IAB) divided by the weighted average remaining economic life of the initial asset base;

DNEW = depreciation on new assets added during the financial year, and this equals the CAPEX divided by the weighted average remaining economic life of CAPEX assets;

DDEC = the adjustment to depreciation for assets decommissioned during the financial year equals DECOM divided by the weighted average remaining economic life of DECOM assets.

The OIUC has sought comment on the use of straight line method for calculating annual depreciation; and the basing of depreciation on the ODV of depreciable assets.

PAWA's Views

Straight-line depreciation is generally recognised as a pragmatic approximation of the true depreciation pattern of assets, and has been generally accepted for use in determinations of revenue caps. PAWA supports the use of straight-line depreciation, where the life of the asset is taken as the economic life and depreciation is applied to DORC valuations of assets. Use of straight-line depreciation based on the economic life of assets is espoused in the OIUC's *Discussion Paper* and in the *Access Code*. The only difference between PAWA's preferred depreciation function and the depreciation function recommended by the OIUC is that assets are valued using DORC rather than ODV.

An issue that has been discussed by the ACCC, IPART, and EnergyAustralia is that straight-line depreciation can lead to excessive lumpiness in charges. After a new asset is brought on line, the depreciation charge will be much higher than in the preceding periods when depreciation related to a lower value asset. "Competition" depreciation is a technique that can be used to smooth the depreciation profile, however it is yet to be applied in Australian determinations simply because more research is required into its appropriateness and effectiveness in smoothing prices. Moreover, to the extent that the commissioning of new assets is staggered, there may not be excessive jumps in rates resulting from use of straight-line depreciation. On balance, PAWA currently supports the use of straight-line depreciation but will

monitor the results of further research into the potential merits of adopting competition depreciation.

Effects of Technology and Optimisation on Depreciation

The optimisation of the asset base should reflect technology changes. Technology changes occurring during the regulatory control period that were not factored into optimisation factors at the previous review may need to be factored into the depreciation rate. However PAWA does not consider that this adjustment is needed because, as pointed out by the ACCC (1999a), the technology of network assets is not fast moving and therefore within regulatory control period adjustments are not usually considered necessary.

As mentioned in Section 6.4, it is necessary to allow for a retrospective adjustment to depreciation where assets are optimised down by the regulator. This can be accommodated through the K factor discussed in Section 9.

8. MEASURING ALLOWABLE OPERATING COSTS

OIUC's proposed approach

The Interim Commissioner proposes to use the efficiencies assessed as available in the Northern Territory context by the Government's 1998 strategic review of the Power and Water Authority and as revealed in the savings target set by the Government. In effect, the operating cost savings element of the $30 million financial target approved by the Government in November 1998 amounts to a reduction of around 18% in PAWA's operating cost structure as it stood in 1997-98. This target was based on the maximum savings available under continuing government ownership, and related to the whole of PAWA.

The Interim Commissioner also proposes to allow the phasing-in of such efficiencies equally over a three year period concluding in 2001-02.

PAWA is required to provide estimates of OM&A for the financial year in the context of a three-year series, and in a form which shows the breakdown between major components, including:

- direct expenditures (staffing, systems, maintenance, etc); and
- administrative overheads.

In providing the required information, PAWA will also need to document the following:

- the efficiency assumptions factored into the OM&A estimates provided, against the improvements targeted for PAWA by the Government;
- the methodology and assumptions underlying the apportionment of administrative overheads across the various lines of business including the network business;
- the method used to estimate the GST payments included in the OM&A figures; and
- the treatment of the Darwin-Katherine transmission line (DKTL) costs, and the basis of any apportionment of those costs between Darwin and Katherine network users.

The Interim Utilities Commissioner has also called for comment on the use of a 'glide path' approach to efficiency adjustment in PAWA Networks, based upon the cost savings target set by the Government and a three-year phasing-in period. This issue is discussed in Section 9.

PAWA's View

For the purpose of calculating operating costs for each of the 4 networks, it is appropriate to identify the following cost categories—

- OM&A (including repairs and maintenance). This category includes labour, materials, contracts, plant, and general oversight activities. Common costs are allocated firstly between regulated and non-regulated activities, and then between each of the 4 regions.
- System control. This function is carried out in respect of power networks system controller activities, water and sewerage. The common costs within system control will be attributed to each of the different functions including those outside the revenue cap (i.e. water and sewerage system control, and generation dispatch). Total costs of system control that are attributed to networks will equal the direct system control costs plus the allocated costs, both associated only with network related activities.
- Headquarters costs. These are all indirect costs that should firstly be allocated between water, sewerage, electricity generation, electricity retail, electricity networks, system control and rural services (Aboriginal Communities). Second, the amount allocated to networks must be allocated between capex and OM&A (including repairs). Third there must be an allocation between regulated and non-regulated activities. Finally, there must be an allocation to each of the 4 regions.

Operations, maintenance and administration (OM&A) costs will be inclusive of GST and exclusive of other WST, for the period after 1 July 2000. Adjustments to the revenue cap for its application for the remaining quarter of 1999-2000 are contained in Section 3, and these include adjustments to remove the net effect of GST.

In relation to the Government requirement for a $30 million reduction in operating expenses, it is noted that the requirement is for a business improvement being a combination of expense reduction and revenue improvement (for services previously not charged for or previously insufficiently charged for). It is not clear, however, as to the extent of network's share of this reduction, as the operating expenses also relate to generation, retail, water, sewerage and rural services.

The additional revenue was targeted to come from PAWA activities across the board, and the Authority does not expect that networks will be able to provide a large proportion of the saving because —

- efficiency gains in the area of repairs and maintenance are mainly being realised in terms of increased network performance and therefore less end use disruption rather than cost reductions. These efficiency gains are factored into OM&A and capex estimates for 2000-01 for regulated functions. There has been a moderately successful redundancy program available to all staff on a voluntary basis and the associated cost reduction is already factored into OM&A budgets; and
- networks are characterised by a high percentage of fixed costs in total network costs and through the revenue capping process some of these costs will not be evident in PAWA's depreciated, optimised asset base.

As a part of the preparation for nominating OM&A values to the OIUC, PAWA has examined every aspect of its network operations. As a result of this rigorous investigation, many significant costs, previously regarded as part of normal network

costs, will be excluded from the network OM&A costs. The largest single example of these is streetlight repairs and maintenance.

PAWA anticipates retaining its R&M budget at its current level in real terms. While R&M expenditure is not expected to fall, there is a clear expectation that network output and reliability will improve. The average outage duration of 330 minutes per annum is significantly higher than the Australian average of 180 minutes.

It is recognised, however, that care should be taken in applying reliability benchmarks developed from the eastern states to the NT case. To take this a little further, the following is a list of reasons why the cost of meeting any reliability target is likely to be higher per kilometre of network than it is elsewhere —

- lightning intensity in Darwin, as advised by the Bureau of Meteorology, is the highest in Australia, averaging an isokeraunic level of 141, and a ground flash density of 2.5. These figures are typically five times the level experienced in NSW and Victoria. These levels result in large numbers of lightning strikes on the system, causing numerous interruptions and much damage;
- steel poles are required because of termites, particularly *Mastotermes Darwiniensis*, making timber poles untenable. These conductive poles have poorer performance than timber under lightning conditions, resulting in a higher incidence of insulator damage and interruptions. In addition to their inherent performance in an electrical network, steel poles are typically 3 times the price of timber or concrete poles in the eastern States;
- underground cables must be installed with termite protection, adding about 30 per cent to the cost of cable, and a similar amount to cable pits;
- cyclonic conditions require poles and wires to be stronger near the coast in the NT than would suffice in other States;
- high tree growth rates increase the amount of trimming required, and again lead to a higher level of customer interruptions;
- poor earthing due to soil types prevalent in many areas of the NT requires the use of an earth wire run with all major lines, and higher substation earthing costs than are experienced in southern states;
- consistently high levels of UV, temperature and humidity accelerate deterioration of the network;
- generally, materials are more expensive because they need to be transported a greater distance;
- large birds and bats which are a feature of the NT, impose a need to install more expensive insulators, and cause frequent interruptions, contributing to what may appear to be excessive outage rates compared with southern state equivalent networks; and
- live line work can only be carried out during the dry season rather than all year round, increasing network costs due to the uneven demand for labour, and the need for emergency repairs during the wet season which then have to be re-done when the weather allows.

Combined with higher labour costs, the high material prices mean that unit prices for overhead lines are approximately 2.5 times unit prices in the eastern States, while underground lines are typically 1.4 times.

PAWA's methodology for factoring in efficiency gains

Any efficiency gains that are available in network costs are inherent in the base year estimate of 2000-01. Some activities which have previously been a part of PAWA's traditional network costs are being excluded from the OM&A value. Growth in the network usage will improve price outcomes over time and will be factored into prices. The CPI–X framework will drive the network business to identify further efficiencies and productivity improvements.

PAWA's methodology for apportioning administration costs

This category of administration costs does not include the headquarter costs described earlier, but relates to the administration costs associated with each network business unit.

Administration and common services costs are apportioned, in the same manner as headquarter costs. i.e first across activity, then between capex, OM&A, then between regulated and non-regulated network activities, and finally across the four main locations. Examples of this include—

- meter services administration— a part of general administration of the network businesses, which is identified by estimating the time spent by personnel on this task and allocating on that basis. A portion of general office expense is apportioned on the basis of the number of staff involved as a proportion of total staff employed at the site; and
- communications — a common service to networks. Test services, system control, and administration are apportioned, where specific activities cannot be identified, on a rational basis such as number (and individual cost of usage) of phones.

The method used to estimate the GST payments included in the OM&A figures

The net dollar change in PAWA's position resulting from the GST reforms (including the removal of wholesale sales tax) have been factored into the OPEX budget. Economy-wide effects of the GST and related tax reforms, however, have not been incorporated (i.e. if the GST has a positive impact on economic growth, then this could increase demand, operating expenditure and capex). These effects if they eventuate within the regulatory control period will be captured through the K term described in Section 9.

PAWA's proposed treatment of the Darwin-Katherine transmission line (DKTL) costs, and the basis of any apportionment of those costs between Darwin and Katherine network users

In developing its pricing proposal for the DKTL line costs, PAWA has considered that whatever process is used, it should be capable of being translated to a "regulated"

environment should the line ever be "declared" or otherwise become a regulated network. Additionally, the principles adopted need to recognise the purpose the line meets.

PAWA has contracted with the owners of the line for the reservation of capacity to deliver power to Katherine, Manton, Pine Creek, and the Channel Island Power Station. The costs of this contract will be met by PAWA networks and recovered by charges levied against users on an apportionment basis which follows user pays principles. The apportionment of DKTL costs will follow the simple rule of users pay in proportion to their use. The questions to be addressed after establishing that principle are: (1) what basis for determining apportionment is appropriate; and (2) what methodology should be adopted for spreading the costs over the ultimate users i.e. customers.

(1) The Basis of Apportionment.

The choices for apportionment include contractual reservation of capacity and/or usage (kWh delivered). PAWA's preference is on contractual reservation. Other generators may wish to reserve or use some capacity of the line to deliver their power. The sum of all these capacity figures would become the denominator when apportioning the annual cost of the line, currently ($5+ million), over the usage by each party.

Another methodology which is also logical is to use the energy (kWh) delivered by each party relative to the total energy delivered as the proportioning factor. Whilst PAWA does not believe this fully reflects the contractual arrangements between it and the owner of the line, it does provide an easily identifiable set of references — i.e. meter readings — to make it work.

A combination of either of these methodologies may be appropriate in the circumstances. PAWA has not approached the owner of the line with these possibilities at this stage and is prepared to negotiate a reasonable outcome on the basis of the principles outlined here.

(2) The Process for Spreading the Costs over the Ultimate Users.

With respect to another generator using the line to deliver power to customers, the proportion of DKTL costs that it (the generator) bears will be recovered in the sale price to its retailer. This recognises both the location of the generator relative to the location of the customers and the facility the line provides in provision of stand-by and out-of-balance power.

9. OTHER ISSUES

9.1 THE APPROPRIATE GLIDE PATH

A general conceptual issue that needs to be clarified relates to the interpretation of the "X" factor in the commonly adopted "CPI-X" glide path term. IPART (1999e) stated that —

> "The CPI-X component does not represent the impact of inflation and efficiency gains. The CPI-X factor is used to achieve the desired revenue path, resulting in end-year revenues consistent with the building block approach/pricing and financial analysis/glide path outcomes. The building block components are indexed and the efficiency gains are built into the operating and maintenance expenditure."

Similarly, the ACCC (1999a, p. 88) stated that —

> "the X factor takes into account both the potential efficiency gains of the regulated network but also enables revenue smoothing to be undertaken. The effect of smoothing and efficiency are therefore combined in the X component of the CPI-X formula. This aggregate X factor represents an amalgam of what is happening with a broad range of cost elements averaged over the regulatory period, while smoothing the revenue path within the regulatory period."

PAWA therefore would not support X being referred to as just an efficiency factor, and instead it should be stressed that, as pointed out by the ACCC, that it represents an amalgam of what is happening with a broad range of cost elements.

In PAWA's view, the CPI-X term should: reflect the glide paths that have been directly accounted for; allow for some uncertainty; provide for a degree of benefit sharing; and it should also allow for some extension of the glide path between regulatory control periods.

PAWA has *directly* applied glide paths to the debt risk premium and debt to equity ratio WACC parameters, and to the opex estimates. If these factors are acceptable to the Interim Commissioner, then they should be reflected in the CPI-X term.

In other determinations it has generally been recognised that benefit sharing is important not only from an incentive perspective but also from a risk management perspective, as highlighted by the ACCC (1999a, p. 94) —

> "It should be noted that under CPI-X the TNSP is provided with the incentive to pursue operating and maintenance efficiencies, since any under-performance would result in correspondingly low achieved returns overall. However, the regulator, would not normally seek to be over-zealous in setting the operating and maintenance forecasts (in line with aggressive assumptions on potential productivity savings) as this may be viewed as introducing unnecessary

> regulatory risk which would need to be compensated for through a higher regulatory rate of return."

It is also the case that the glide path should transcend regulatory control periods, as noted by the ACCC (1999a, p. 94) —

> "The more significant issue is whether the single period incentive will achieve the desired improvement in efficiency or whether a glide path adjustment for operating and maintenance expenditures is necessary. If the only benefits the TNSP is to receive from productivity gains are those within a particular regulatory period, there may be an incentive to defer potential improvements (and not disclose them to the regulator) until the start of the next regulatory period. Of course such gaming produces an economically inefficient outcome, although the benefit for the firm may be maximised. Glide pathing will significantly reduce the magnitude of this perverse incentive and whether the single period incentive is adequate or not may become a secondary consideration."

While PAWA would not support the suppression of information about efficiency gains or deliberately delay the implementation of efficiency gains, it does consider that the glide path should extend over two regulatory control periods as: a) this facilitates benefit sharing without causing excessive price volatility; and b) WACC parameters used in other determinations implicitly account for benefit sharing structured in this way. If PAWA was not able to realise a similar benefit then its WACC should be increased commensurately.

9.2 FIXED OR HYBRID REVENUE CAP

A fixed revenue cap can impose risks on the utility as —

- components of the WACC, particularly inflation during the regulatory period could change;
- demand growth could be greater than anticipated; and
- there could be an increase in cost elements outside of the network providers' control.

If PAWA were required to bear these risks, then it would clearly be necessary to adjust the WACC accordingly.

Rather than adjust the WACC, PAWA would prefer some measure to be included in the cap to accommodate these contingencies. Use of a hybrid formula for revenue cap which includes a fixed component and a variable component that accounts for demand growth and changes in principal cost drivers is not considered necessary. However, inclusion of a K term (i.e. $MAR_t = MAR_{t-1}*(1+CPI)(1-X) +K$) in the revenue cap formula would reduce the risk for the network. This term would account for all of the above contingencies. To avoid large changes in the price from year to year, PAWA considers that it would be appropriate, where the K term comes into effect, to spread the discrepancy over two to three years.

Provision should be made in the *Access Code* for PAWA to make a submission on the K term, at the end of each financial year.

When the K term is invoked it will be necessary to backward solve for the glide path. In other words, to determine the cap for the years after the K term comes into effect, it will be necessary to re-calculate the glide path from the initial year of the regulatory control period, assuming the K factor affected costs in all of the financial years within the regulatory control period.

9.3 THE COST OF SELF INSURANCE

IPART made provision for inclusion of a pass through coefficient, that accounts for the liability associated with guaranteeing the quality of supply and guaranteeing supply *per se*. This provision represents the equivalent fair value insurance, that is an implicit cost for PAWA as it self insures (in fact it is essentially not possible to insure against this type of risk).

A typical investor would account for the implicit insurance cost when assessing an investment opportunity. Hence, as it is a real cost to be borne by PAWA, PAWA considers that an insurance "equivalent" should be added to the revenue cap.

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