

**2001 QCA DISTRIBUTION PRICE REVIEW
WACC ISSUES**



ERGON Energy Corporation Limited

**Supplementary Submission
to the Queensland Competition Authority**

WACC Determination

September 2000

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WACC ISSUES

Ergon Energy submits this supplementary paper on WACC determination in response to issues/concerns arising from the recent Electricity Reform Unit review of applicable WACC. Appendix A of the determination is attached as an Appendix to this document.

This recent decision has resulted in a decrease the real pre tax WACC from 7.49% to 6.81%.

Ergon Energy has raised concerns with ERU about the derivation of the WACC and wishes to bring these issues to the attention of the QCA for consideration during the current revenue review process.

This supplementary paper should be read in conjunction with our submission to QCA in February this year in response to the Issues Papers titled: *Electricity Distribution: Asset Valuation, Depreciation and Rate of Return*.

1 Overview

Ergon Energy has a number of concerns with the WACC of 6.81% calculated in the ERU Determination. Ergon Energy believes that their WACC is above 7.8% as per independent advice we have received from Macquarie Bank. It is also noted that the 6.81% is significantly lower than the recent ORG decision of 7.1% - 7.5%.

The major areas of concern with the ERU determination are dividend imputation, equity beta, debt margin, and tax rate. In addition Ergon Energy wishes to make some further comments about Pre vs Post Tax WACCs and nominal vs real WACCs.

2. Issues

The proposed case for each matter raised in the current WACC submission is set out below.

2.1 Dividend Imputation

The ERU, in its determination of June 2000, applied a gamma factor of 1.0 on the basis of the actual ownership/shareholding arrangements of Ergon and Energex as Government corporations.

The approach adopted by ERU in this case of applying a gamma value based on the ownership arrangements of the subject company rather than benchmark arrangements is however inconsistent with –

- the approaches applied by jurisdictional regulators under the NEC;
- the provisions of the NEC; and

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- the basis to other parameter values in WACC calculations by jurisdictional regulators.

The following are examples of recent regulatory decisions in relation to gamma values for relevant Australian utility companies. These values have been determined independently from the actual ownership arrangements of the subject companies –

Gamma values in recent Australian regulatory decisions	
Decision	Gamma Value
ORG Final Decision on Victorian Gas Distribution (October 1998)	0.50
ACCC Final Decision on Victorian Gas Transmission (October 1998)	0.50
IPART Great Southern Network Final Decision (March 1999)	0.30-0.50
IPART Albury Gas Company Final Decision (December 1999)	0.30-0.50
IPART NSW Electricity Distribution Final Decision (December 1999)	0.30-0.50
ACCC NSW and ACT Transmission (TransGrid) Final Decision (January 2000)	0.50
ACCC Draft Snowy Decision (June 2000)	0.50
ORG Draft Distribution Service providers (May 2000)	0.50
ACCC Central West Pipeline Final Decision (June 2000)	0.50

The application of a gamma value based on a benchmark commercial enterprise is consistent with the principle of competitive neutrality and with the requirements of the NEC. In this regard the NEC provides that in determining the form and mechanism of economic regulation to apply to prescribed distribution services, the a jurisdictional regulator is to have regard to –

“The Distribution Network Owner’s weighted average cost of capital applicable to the relevant network services, having regard to the risk adjusted cash flow rate of return required by investors in commercial enterprises facing similar business risks to those faced by the Distribution Network Owner in the provision of that network service,”¹

The other parameters of the WACC calculation are based on a similar benchmark commercial market assumption – in particular, the application of the CAPM is based on the assumption that there are traded shares in the subject company.

The application of benchmark, rather than actual ownership arrangements, is consistent with the underlying objectives and principles of the NEC, which provide for the establishment of an incentive-based regulatory regime (ie where companies are encouraged to exceed the benchmark assumptions). In this regard, the following objectives and principles are noted –

- the objectives set out in section 6.10.2 which provide for –

¹ section 6.10.5(d)(5) of the NEC.

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“an incentive-based regulatory regime which:

- (1) provides an equitable allocation between *Distribution Network Users* and *Distribution Network Owners* of efficiency gains reasonably expected by the *Jurisdictional Regulators* to be achievable by the *Distribution Network Owners*;
 - (2) provides for, on a prospective basis, a sustainable commercial revenue stream which includes a fair and reasonable rate of return to *Distribution Network Owners* on efficient investment, given efficient operating and maintenance practices of the *Distribution Network Owners*;”²
- the principles set out in section 6.10.3 under which prices are to be regulated –
–
“The regulatory regime to be administered by the *Jurisdictional Regulator* must be consistent with the objectives outlined in clause 6.10.2 and must also have regard to the need to:
 - (1) provide *Distribution Network Owners* with incentives and reasonable opportunities to increase efficiency;”³

The ORG’s Draft Decision on the 2001 Electricity Distribution Price Review provides an example of a jurisdictional regulator adopting a benchmark approach in accordance with the above to determine a regulated company’s capital structure and financing arrangements in order to calculate the company’s WACC value. In this regard the ORG provides the following comment in its Draft Decision –

“The Office considers that, to the extent an assumption about the ownership structure of the industry is required, then *benchmark* assumptions rather than the *actual* ownership structures of the relevant distributors, should be employed. The use of a *benchmark* assumption about the identity of the equity participants in the distributors will ensure that the distributors have the incentive to implement efficient financing arrangements and retain the benefits from outperforming financing assumptions, but also protect customers from inefficient financing decisions. The use of benchmarks is consistent with the requirements of the Tariff Order to provide the distributors with incentives to operate efficiently, and with its objective in the Electricity Industry Act to protect the interests of customers with respect to electricity prices.”⁴

The regulatory approaches, which have tended toward a gamma value of 0.5 for gas and electricity network assets are supported by key empirical studies on imputation⁵.

² section 6.10.2(b) of the NEC.

³ section 6.10.3(e) of the NEC.

⁴ page 188, Draft Decision on the 2001 Electricity Distribution Price Review, ORG, 20 May 2000.

⁵ eg. Hathaway and Officer, 1999 r/e Melbourne Business School study.

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In view of the appropriateness of adopting a benchmark approach under the NEC and based on the recent regulatory determinations and empirical studies, it is appropriate to apply a gamma value of 0.5 to Ergon.

2.2 Equity Beta

Ergon faces higher systematic risks than typically faced by Australian electricity distributors given Ergon's high level of dependency on rural areas and on primary production generally (relative to the lesser dependency on those factors within the Australian equities market overall). The higher systematic risks translates to a higher asset beta than the typical asset betas for distribution companies in other states.

In our analysis of this issue, we have used the simple form of WACC calculation based on the CAPM methodology and 100% equity financing and adopted the levering approach embodied in the following formulae⁶ –

$$R_d = R_f + B_d (R_m - R_f) \quad B_d = (R_d - R_f) / (R_m - R_f)$$

$$B_a = B_e * (E/V) + B_d * (D/V)$$

Asset betas in recent Australian regulatory decisions⁷			
Regulatory decision	Form of regulation	Adopted Asset Beta/Range	Adjusted Adopted Asset Beta/Range
ORG Final Decision on Victorian Gas Distribution (October 1998)	Price cap	0.45-0.60 (adopted 0.55)	0.50-0.65 (adopted 0.60)
ACCC Final Decision on Victorian Gas Transmission (October 1998)	Price cap	0.45-0.60 (adopted 0.55)	0.50-0.65 (adopted 0.60)
IPART Great Southern Network Final Decision (March 1999)	Price cap	0.40-0.50	0.49-0.56
IPART Albury Gas Company Final Decision (December 1999)	Price cap	0.40-0.50	0.45-0.57
IPART NSW Electricity Distribution Final Decision (December 1999)	Revenue Cap	0.35-0.50	0.39-0.56
ACCC NSW and ACT Transmission (TransGrid) Final Decision (January 2000)	Revenue Cap	0.35-0.50	0.41-0.59
ACCC Draft Snowy Decision (June 2000)	Revenue Cap	0.34-0.50 (adopted 0.42)	-
ORG Draft Distribution Service providers (May 2000)	Price Cap	-	0.50

⁶ the approach and formulae are the same as applied by the ORG in its Draft Decision on the 2001 Electricity Distribution Price Review, ORG, 20 May 2000. Refer page 161.

⁷ Key elements of this table is also from the ORG's Draft Decision of 20 May 2000 (refer page 162 of the Draft Decision). The column at the far right shows asset beta amounts consistent with the methodology set out above

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We consider that Ergon's higher systematic risk than for the average for distribution companies in Australia as generally presented in the table above translates to an asset beta for Ergon of 0.55. Given this, based on the procedure for levering asset betas consistent with the methodology above and applying –

- a debt/asset value of 50%;
- a debt margin of 1.2% (discussed in 3.3 below); and
- a MRP of 6.6% (as per the ERU determination),

Ergon's equity beta is calculated to be 0.92.

2.3 Debt margin

The debt margin for distribution companies under recent regulatory decisions have been as follows –

Debt margins used in recent Australian regulatory decisions		
Regulatory decision	Assumed margin over the risk free rate	Assumed financing structure (debt/assets)
ORG Final Decision on Victorian Gas Distribution (October 1998)	1.2%	0.6
ACCC Final Decision on Victorian Gas Transmission (October 1998)	1.2%	0.6
IPART Great Southern Network Final Decision (March 1999)	1.2%	0.6
IPART Albury Gas Company Final Decision (December 1999)	0.9 – 1.1%	0.6
IPART NSW Electricity Distribution Final Decision (December 1999)	0.8 – 1.0%	0.6
ACCC NSW and ACT Transmission (TransGrid) Final Decision (January 2000)	1.0%	0.6
ORG Draft Distribution Service providers (May 2000)	1.2%	0.6

It would be unreasonable to present that Ergon (having higher systematic risk than a distributor which, on average, have less reliance on rural areas and primary production) should have a lower debt margin on risk free rate than those other distributors. On this basis, Ergon's debt margin should be at the upper end of the scale of the recent regulatory decisions ie 1.2%.

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2.4 Tax Rate

The statutory rate of 36% as used in the ERU decision should be replaced with 34% for the year 2001 and 30% for following years in order to conform with Government announced changes to corporate tax rates.

2.5 Pre vs Post Tax

Recent final and draft decisions by the ACCC and the ORG have moved away from the exclusive use of a pre-tax analysis to a post-tax analysis for determining the total annual aggregate revenue. While there are a number theoretical arguments why a post-tax analysis is preferred, distribution and transmission network service providers have concerns that this route leads to micro management of the business by the regulator, and will erode the few remaining incentives which are supposed to distinguish an incentive based regulatory framework from a cost of service framework with all its documented inefficiencies and regulatory overhead. Fundamentally, any erosion of the incentive arrangements envisioned by the NEC should not be supported. Currently, we understand the QCA have a view that a post-tax approach should be used.

Where a post-tax analysis occurs, the regulator must become intimately involved with the financial and tax management issues faced by the regulated entity. This would include the cost of borrowed debt funds, the effective tax arrangements of the entity (rather than statutory or industry average tax rates), and the capital structure of the entity. This could in turn lead to the regulators getting more intimately involved with the finance of the businesses including the dividend policy, the ownership and entity structure and the manner in which the entity utilises any franking credits it derives in the course of business. These latter issues should not be the purview of the regulator, and are issues which are best managed by the Executive and Board of the regulated entity.

In contrast, a pre-tax analysis, leaves the incentive for the regulated entity to seek efficient financial and tax management techniques to improve shareholder value, on a risk adjusted basis, as judged by the financial markets. This in itself provides further incentives for efficient financial operation leading to increased shareholder value and lower costs which can eventually be shared with customers through lower prices.

In addition, were a post-tax approach adopted, a simple change of ownership could lead to the need to adjust revenues and hence prices (either up or down) due to the fundamentally different tax treatment that could exist between the different entities. Thus customers would be subject to price shocks purely as a result of the ownership structure and tax arrangements of the regulated business. This outcome is a nonsense for a regulated network business. The ACCC in particular appear to have acknowledged the issue, but have to date failed to address how a move away from

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the use of industry average to company specific WACC input tax values will benefit the customer in the longer term.

Therefore, Ergon believes that a pre-tax analysis of cash flows is the most appropriate methodology to adopt, for regulated revenue path setting in Queensland. Moreover, the analysis should continue to adopt an industry average approach to the tax treatment rather than a company specific, effective tax rate analysis. This is particularly relevant for a Government owned business, which has to be seen to be operating on a competitively neutral basis within the NEM under the Council of Australian Governments agreements regarding GBEs.

2.6 *Real vs Nominal*

The building block approach can be performed by either applying a real rate of return on an inflated asset base, or a nominal rate of return on a real (or fixed) asset base⁸. An analysis using a real rate of return on an inflated asset base method is preferred. The reasons relate to the stability of asset base value, the incorporation of economically efficient pricing signals to consumers and the avoidance of price (and revenue) shocks at subsequent reset periods as a consequence of the differential asset valuations at a future point in time when replacement of the assets occurs. The prime reasons why a real analysis is preferred include:

- a better retention of the economic value of the physical capital, which remains constant in real terms while providing services of comparable standard; and
- a better matching of the asset base treatment with a comparable economic depreciation technique, such that economic depreciation remains constant in real terms.

So while the return on assets using either methodology is essentially the same, the nominal method does not provide an economically efficient return of capital. While a straight line depreciation in nominal terms might at first appear intrinsically equitable, this conclusion cannot be maintained when the spending power of money is factored in. Essentially the depreciation rapidly falls below the 'true' value of the current cost of the service potential being consumed. This leads to inefficient pricing signals over time, which in turn distorts the consumption signals seen by consumers and hence the associated allocative efficiency of this consumption. It also leads to reduced incentives for economically efficient investment.

In contrast, a constant depreciation in real terms (ie. a rising depreciation in nominal terms) better matches the reality of reducing an inflated asset base to a value representative of its current service potential. Thus economic depreciation of an

⁸ The latter method was suggested by the ACCC in its 'Statement of Regulatory Principles' discussion paper for transmission pricing regulation in May 1999. Interestingly the ACCC has subsequently used a variant on the SORP method for the NSW and ACT electricity transmission networks (ie: TransGrid and Energy Australia), the Central West gas transmission pipeline, the draft Snowy electricity transmission network, and the draft Moomba to Adelaide gas transmission pipeline. These variants retain a CCA asset base analysis, and use a normalised tax approach which depreciates the regulatory asset base faster than in the CCA approach.

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inflated asset base ensures a better basis for pricing signals over time, and a significant reduction in the potential for price (or revenue) shocks.

It must be emphasised that in an attempt to get around the WACC formula conversion arguments⁹ which originally arose with the Victorian gas transmission pipeline decisions in 1998, the ACCC has preferred a nominal analysis. But as it improves its disclosure of the method it is using, it has become evident, that the methodology used with electricity transmission companies appears to continue to use a current cost accounting (CCA) or inflated asset base approach, with a nominal classical WACC, which double counts inflation. The ACCC method then applies a return in inflated asset base, a straight line depreciation (theoretically better as described above), subtracts a CPI uplift cash flow to remove the double counting of inflation (appears flawed), and then normalises tax by allocating the “S curve” excessive revenues above actual tax paid to additional asset value depreciation. Thus the ACCC has not removed the “S curve” effect from the cash flow stream of the business, but forces the asset value to reduce faster and approach the market value of the business in the future. The business is still not able to access additional regulated revenues in the future when the tax shield is lost.

The ACCC treat gas pipelines slightly differently, and the CWP decision indicates that the ‘economic depreciation’ includes straight line depreciation, tax normalisation, revenue shortfall uplift in the earlier years of the pipeline’s life, and an uplift associated with the use of an NPV solution technique to ensure the asset value is depreciated to zero over the life of the pipeline.

The ACCC approach is thus not static, and is evolving. It has intimated in its TransGrid decision, that it will also move in the future to including accelerated depreciation profiles within the ‘economic depreciation’ term to handle the asset stranding risk issues, rather than applying a WACC uplift to compensate for the higher risk of a reduced regulatory asset base.

On the other hand the ORG, has used a tax ‘flow through’ methodology in its draft Distribution Businesses decision of May 2000. In this method is best categorised as a ‘post-tax real’ analysis, rather than a ‘post-tax nominal’ method. In essence the tax is treated as a smoothed effective tax rate in the cash flow series.

At present it is unclear which approach is better from a financial theory point of view, or which method will provide financial viability and regulatory certainty into the future. However, it is evident that significant input from the regulated business to the regulator in making its decision over a methodology should be allowed, and that the QCA must provide full disclosure of its methodology to the industry. Neither the ACCC or the ORG have fully disclosed their methodology to the respective business

⁹ If the nominal to real conversion is done before the post-tax to pre-tax conversion different WACC outcomes are obtained. A move to having the tax treated in the cash flows rather than the WACC formula, means that this argument does not arise, and the only cost of capital elements which are required to be estimated are the nominal return to equity, the nominal cost of debt and the ‘plain vanilla’ or classical WACC without tax or imputation adjustments. All these are less contentious to derive.

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regulated, nor to the broader industry, and as a result the regulatory uncertainty has begun to increase the debt premium required by the debt financiers who supply funds to these network businesses. This can only be to the detriment to the customers in the longer term.

Electricity Reform Unit's Approach to Determining the Required Rate of Return for the Regulated Revenues of Ergon and Energex

1. General Approach

The definition of WACC¹⁰ used by ERU is:

$$r = r_e \left(\frac{E}{V} \right) + r_d \left(\frac{D}{V} \right)$$

where: r is the after-tax weighted average cost of capital (WACC);
 r_e is the required return on equity;
 r_d is the required return on debt;
 E is the market value of equity;
 D is the market value of debt; and
 V is the market value of the assets ($D + E$).

This WACC is applied to the following cash flow definition:

$$CF = X_o - T(X_o - X_D)(1 - \gamma)$$

where: CF is after corporate tax cash flow;
 X_o is pre-tax operating cashflow;
 X_D is interest payments to debt holders;
 T is the effective corporate tax rate; and
 γ is the proportion of tax collected from the company that will be rebated against personal income tax.

The WACC is the opportunity cost of capital invested in a firm and therefore represents the required (target) rate of return on assets by an investor or shareholder as well as the discount rate for application to future cash flows.

Estimating the required return on equity (r_e)

The Capital Asset Pricing Model (CAPM) is used to estimate the required return (or cost) on equity. The return on equity (r_e) can be found by the formula:

$$r_e = r_f + b_e(r_m - r_f)$$

....where r_f is the risk-free rate, r_m is the expected return on the market, and b_e is the entity's market risk. The excess of equity returns over the risk free rate ($r_m - r_f$) is termed the market risk premium (MRP).

¹⁰ Detailed technical discussions of the underlying assumptions for the use of WACC and CAPM is available in 'An Economic Framework for Assessing the Performance of Government Trading Enterprises'

Risk-free rate (r_f)

The choice of risk-free rate used in the WACC must be consistent with the risk-free rate used in the estimation of the MRP. In Australia the estimates of the MRP are generally benchmarked on the 10-year government bond rate. ERU has also adopted this approach.

Therefore the 10-year Commonwealth Government bond rate is used as a proxy for the risk-free rate.

Market risk premium

There have been several studies using long data series designed to empirically estimate the MRP, which is assumed to be reasonably stable over the medium term. These estimates range from 6.0 per cent to 8.0 per cent.

Hathaway (1995) performed a study of the Australian equity market risk premium and equity risk premium set on world capital markets. He concluded that the appropriate figure was between 6% and 7%, with the most likely estimate being 6.6%. US estimates of the MRP (based on bonds of similar duration to those used for the Australian study) are around 7%, reasonably consistent with the Australian results.

ERU is aware of empirical evidence indicating the MRP has reduced in recent years, however, ERU considers this evidence is not yet as compelling as the work undertaken by Hathaway.

Therefore 6.6% is the value used for the market risk premium.

Beta (b)

Beta is the extent to which returns on individual stocks are correlated to returns on the market. For example, if a stock has a beta of 1.5, and the market goes up by 10% then the stock price will increase by approximately 15%. Similarly, if the market falls by a given percentage, the stock will fall by 1.5 times the market change.

The beta for a listed firm is estimated by using a simple linear regression of historical accumulated stock returns on historical accumulated market returns in the corresponding time period. This method is straightforward to implement, but there are a number of statistical and practical issues to consider.

Only firms listed on a stock exchange have observable betas. For entities with no traded equity base (eg Government Trading Enterprises (GTE) and non-listed companies), it is necessary to form a judgement on the appropriate beta. However, the resulting increase in subjectivity does not alter the fact that the cost of capital represents the rate of return required by the shareholder.

In developing betas it is important to ensure that only factors which impact on the opportunity cost of capital are incorporated in the beta. In this regard, the only form of risk investors can expect to be compensated for is the risk they *have* to bear. This form of risk is known as *market, non-diversifiable* or *unavoidable risk*. Market risk affects the returns on all investments in the market portfolio to some degree. The affect of other risk factors (*unique risk*) will be captured in the cash flows.

Unique or diversifiable risk affects only a specific industry and perhaps related sectors of the economy. Examples would include the risk of legal liability arising from a faulty product or, in many cases, changes in industry-specific regulation.

Unique risk does not affect the cost of capital. This is because investors can, by diversifying, reduce unique risk without reducing the returns from an individual investment.

QERU undertook a risk assessment to determine the underlying asset risk of the entities in developing equity betas for each entity and has drawn on a number of sources in this process including the use of benchmark betas sourced from the Australian Graduate School of Management and Bloomberg Financial Services among others. This approach is still relevant.

Dividend Imputation and Valuation

Corporate valuation is calculated after company tax, but before personal tax. Hence, the overall effect of dividend imputation is to increase the cash flow shareholders can access.

An Australian citizen on a marginal tax rate above the company rate can fully utilise the tax credits available under the system of dividend imputation. In this situation, and if timing impacts are eliminated, he or she is completely compensated for company tax. In which case the company tax becomes a prepayment of the shareholder's personal tax liability.

Not all investors can fully utilise imputation credits. In developing cost of capital targets or undertaking a valuation it is necessary to estimate the proportion of corporate tax that can be deducted from the personal tax liability of the company's shareholders. As there are often insufficient empirical data available to estimate confidently the extent of utilised credits for individual enterprises, there is a widespread practice of using market averages. However, this is a second-best solution in many cases. For reasons which are explained in Section 3, it is not appropriate to use simple market averages for dividend imputation when estimating a GTE's cost of capital under continued Government ownership.

In determining the imputation assumption to apply to the public sector the main issue is that when dividends are distributed to the shareholder they are worth their face value. That is, there is no further tax liability attached which would diminish the dividend stream. This is the same situation faced by a private sector investor who can claim all the credits (that is, full imputation).

In determining the WACC for Energex and Ergon as an asset of the Queensland Government an imputation rate of 100% (full imputation) is applicable.

If a market valuation was being undertaken for the purpose of privatising the entities, which is not the case at this stage, the value attached to the imputation credits by shareholders (and therefore the dividend imputation assumption to be used in the valuation) would be determined by estimating the prospective shareholder's ability to access the imputation credits.

Cost of Debt

In estimating the cost of capital for the purposes of regulating revenues, the cost of debt needs to reflect the current market rate for debt for an entity that is efficiently financed. In this regard, the actual cost of debt that Ergon and Energex face is not relevant.

Under current Government ownership, debt levels and regulatory structure Ergon and Energex would obtain a higher debt rating than they would as stand alone entities due to an implicit Government guarantee. That is, the cost of debt for the entities would be higher without the implicit guarantee. To obtain an appropriate cost of debt for estimating the cost of capital, an estimated stand alone cost of debt needs to be obtained.

However, as noted above in the discussion of the required return on equity and gearing, ERU is satisfied the market risk of the assets has not changed materially. Therefore while in reality the cost of debt and levels of debt may have changed for each entity, the re-weighting within the WACC of both the levels and costs associated with debt and equity result in no change to the WACC.

Given this outcome, ERU has used the gearing and costs of debt and equity estimated by QERU in July 1997 as the basis for recalculating the WACC.

In addition as a reality check, ERU has modelled a number of ratios expected to be obtained under alternative operating scenarios and compared these to Standard and Poor's benchmarks (Attachment E lists these ratios and other ratios included in the valuation model for performance monitoring purposes).

The ratios generated in this way will be used to estimate an expected rating and corresponding expected cost of debt through a debt rating model.

2. COST OF CAPITAL ESTIMATES

WACC CALCULATION	Distribution Corporations
Nominal Risk Free Rate (R_f) (i)	6.31%
Real Risk Free rate i (real) = $[i - r / 1 + r]$	3.72%
Market Risk Premium (MRP)	6.60%
Equity Beta (β_e)	0.80
Required Return on Equity (R_e)	11.59%
Real R_e	9.00%
nominal LT Bank base rate (R_f)	6.31%
LT margin ('A-' rated)	0.72%
nominal LT interest rate (L_i)	7.03%
real LT interest rate	4.63%
LT debt (L_d)	500.00
Nominal ST base rate (180 days bill swap rate)	5.38%
ST margin	0.43%
Nominal ST interest rate (S_i)	5.81%
Real ST interest rate	4.15%
ST debt (S_d)	
Total debt (D)	500.00
Nominal Return on Debt (R_d)	7.03%
Real R_d	4.63%
Total assets (V)	1000.00
Total equity (E)	500.00
Debt/total value	0.50
Dividend imputation	100.00%
Inflation (r) (based on estimates of expectations)	2.50%
Tax rate	36.00%
Debt/TMV	50.00%
Nominal Post Tax Weighted Ave. Cost of Capital ($WACC_1$): $R_e(E/V) + R_d(D/V)$	9.31%
Real post tax WACC	6.81%

Note:

1. R_f is the yield on the 10 year Commonwealth Bond as at 15 June 2000
2. The equity beta has been developed by QERU.
3. Source: Deutsche Morgan Grenfell.
4. Source: Deutsche Morgan Grenfell.
5. Illustrative only in order to produce the desired target ratio of debt to equity for the calculation of the WACC.
6. Illustrative only in order to produce the desired target ratio of debt to equity for the calculation of the WACC.

3. THE FULL IMPUTATION ASSUMPTION

The issues which need to be considered when determining a working dividend imputation assumption for GTEs are outlined below:

- **The Government as shareholder**

Governments have moved to ensure that GTEs face similar pressures to firms operating in competitive markets and do not have an advantage because of their Government ownership. The observed behaviour of firms and the imputation uptake within the market is substantially determined by investors' decisions. With this in mind, Governments should, for the purposes of determining a GTE's cost of capital, seek to ensure competitive neutrality at the shareholder level in the investment decision process. In other words, they should seek to act as individual shareholders do. This will encourage behaviour at the GTE level consistent with private sector practice.

Although they are also taxing agents, when determining cost of capital targets for GTEs it is paramount that governments view themselves primarily as shareholders. Thus, the focus should be on the fact that dividends distributed by GTEs are free of any further tax liability and not that the tax or tax equivalent is paid to the government.

- **Market Valuations of Imputation Credits**

The value of imputation credits is determined by the shareholder's tax status and taxable income. Timing effects aside, those on high marginal tax rates will fully value the credits, while those on lower levels may only partially value them. Tax exempt investors (eg. Universities) and foreign companies cannot generally access credits.

As investors of differing tax status set the price for imputation credits, the observed value of such credits reflects the average level of imputation. Recent research indicates that on average around 70 per cent of imputation credits are utilised by shareholders, with different companies and industry sectors having different rates. For example, the banking sector has an uptake of imputation credits by investors of around 90 per cent, close to the full value when timing effects are considered.

Shareholders value returns on a post-tax basis, and will seek to maximise their earnings by choosing investments which provide the best after-tax returns. Investors will place a different value on the dividends, and therefore on the firm itself, depending on the level of imputation applicable.

- **Franking credits for GTEs**

If the value placed on imputation credits by the shareholder is known, then it should be used in setting the correct cost of capital for an enterprise. Market averages should only be used if more accurate shareholder or industry sector information is not available.

The use of a zero assumption for imputation is sometimes argued for GTEs and is based on the proposition that Governments don't pay tax. This argument is superficial at best and ignores that when dividends are received by Governments they face no further tax liability and therefore fully value the dividends. Where imputation is not fully effective shareholder will not fully value the dividends. That is, in the case of the Government the use of a zero imputation assumption implies that when a GTE distributes a dividend to its shareholder (the Government) there is a further personal tax liability on behalf of the Government. This is clearly not the case. Owner Governments are able to fully value the dividends they receive from their GTEs and require no further return to compensation for a personal tax liability.

The use of a zero imputation assumption for the calculation of a GTE's cost of capital would produce unnecessarily high pre-tax costs of capital, prices for services and lower values for a GTE where the cost of capital is used as the discount rate in a DCF valuation.

High-yielding, fully franked industrial stocks would appear to be suitable benchmarks for determining the appropriate level of imputation for GTEs. Listed trading banks demonstrate these characteristics. Research undertaken by Hathaway and Officer (1996) indicates that banks have an imputation credit take up rate of more than 90 per cent. For practical purposes this is essentially full imputation, with much of the difference accounted for by timing effects.

In addition, it could be assumed that GTE imputation credits, if available, would be valued highly by the market, and that the appropriate level of imputation would be in excess of 90 per cent. The impact on the cost of capital of assuming full, as opposed to 90 per cent, imputation is not material, particularly if cost of capital is rounded. A shift away from full imputation means a divergence between pre- and post-tax targets. While the cost of capital can be calculated on this basis, it would introduce an unwarranted complication to the approach for no real increased accuracy given the subjectivity of some of the inputs to the calculation.

This assumption does not imply that public and private sector assets with the same level of risk have different values. The assumption is independent of ownership and, regardless of the status of the shareholder, recognises that shareholders value dividends according to whether further liabilities attaches to the dividends when distributed.

Summary

Despite the fact that Governments do not pay tax on the dividends paid by their GTEs, the tax environment for GTEs replicates one in which dividend imputation is fully effective. That this, when dividends are distributed by GTEs, there is no tax liability attached to them. The fact that the GTE's shareholder is also the taxing agent does not change this relationship.

Using a significantly lower level of imputation would increase the cost of capital. This would have implications for a range of management decisions, including investment and pricing decisions.

