APPENDIX A

The Weighted Average Cost of Capital

(WACC)

for the

TUBRIDGI PIPELINE SYSTEM
(WA PL16 & PL19)

The Weighted Average Cost of Capital (WACC) for the Tubridgi Pipeline System

1. INTRODUCTION AND SUMMARY

This document provides a description of the methodology used to derive a real, pre-tax Weighted Average Cost of Capital (WACC) for the Tubridgi Parties in respect of the Tubridgi Pipeline System. The Tubridgi Pipeline System comprises two separate pipelines, the Griffin Pipeline and the Tubridgi Pipeline, which transport gas from the Tubridgi Gas Plant 25 kilometres south of Onslow, to Compressor Station No. 2 on the Dampier to Bunbury Natural Gas Pipeline (DBNGP). This WACC has been assessed as at 19 October 1999.

The Tubridgi Parties believe that the real, pre-tax WACC for the Tubridgi Pipeline System is 8.75%. As discussed below, the WACC range takes into account:

- a risk-free rate calculated with reference to 10-year Commonwealth nominal bond yields; and
- two alternative approaches to converting a post-tax nominal WACC into a pre-tax real WACC.

To date, three sets of Access Arrangements have reached 'Final Decision' stage in Australia. These are decisions by the ACCC and ORG in respect of the Victorian Gas transmission and distribution systems and by IPART in respect of the Wagga Wagga Gas distribution system. The general WACC methodology adopted by the Tubridgi Parties for the Tubridgi Pipeline System is consistent with that used these decisions.

The WACC for the Tubridgi Pipeline System has been calculated in accordance with the requirements of sections 8.30 and 8.31 of the National Third Party Access Code for Natural Gas Pipeline Systems ('the Code). These sections require:

> *8.30 The Rate of Return used in determining a Reference Tariff should provide a return which is commensurate with the prevailing conditions in the market for funds and the risk involved in delivering the Reference Service (as reflected in the terms and conditions on which the Reference Service is offered and any other risk associated with delivering the Reference Service).*
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> *8.31 By way of example, the Rate of Return may be set on the basis of a weighted average of the return applicable to each source of funds (equity, debt and any other relevant source of funds). Such returns may be determined on the basis of a well accepted financial model, such as the Capital Asset Pricing Model. In general, the weighted average of the return on funds should be calculated by reference to a financing structure that reflects standard industry structures for a going concern and best practice. However, other approaches may be adopted where the Relevant Regulator is satisfied that to do so would be consistent with the objectives contained in section 8.1.*

The Tubridgi Parties have used the Capital Asset Pricing Model to determine the cost of equity component of the WACC for the Tubridgi Pipeline System.

2. THE WACC FORMULA AND PARAMETERS

Mathematically, the WACC formula is expressed as follows.

$$\text{WACC (nominal, post-tax)} = R_e \bullet \frac{E}{V} \bullet \frac{1-t_c}{(1-t_c(1-\gamma))} + R_d \bullet \frac{D}{V} \bullet (1-t_c)$$

A summary of the WACC parameters, and the value adopted by the Tubridgi Parties for those parameters is as follows:

Parameter	Explanation	Value Adopted
R_e	Post-tax return on equity (before imputation adjustments) calculated using the CAPM as follows: $R_e = R_f + b_e(R_m - R_f)$	14.17%
E	Assumed level of equity.	40%
V	Sum of assumed debt level plus assumed equity level.	100%
t_c	Effective tax rate.	36%
γ	Value of imputation credits. γ = 1 when all franking credits can be used and γ = 0 when none can be used.	0.3
R_d	Cost of debt (R_f + debt risk margin).	
	- Debt margin	1.2%
D	Assumed level of debt.	60%
R_f	The expected return from holding a riskless security. Nominal risk-free rate of return estimated using 10 year Commonwealth bonds.	6.37%
R_m-R_f	The market risk premium, measured as the difference between expected holdings from a market portfolio and the risk free rate.	6%
β_e	The equity beta (β_e) measures the operational risk associated with the business relative to the market as a whole, for a given financial risk based on the gearing level.	1.3
β_a	The asset beta ($\beta_{a)}$ measures the operational risk associated with the business, relative to the market as a whole, assuming 100% equity finance. In conjunction with the debt beta (β_e) the asset beta is transformed to an equity beta using various levering and de-levering formula.	0.6

3. DERIVATION OF THE WACC PARAMETERS

3.1.Return on Equity, R_e

The return on equity relates to the rate of return required to attract and maintain equity in the business.

Consistent with recent regulatory decisions, the nominal, post-tax rate of return on equity has been estimated using the CAPM model, with its derivation being as follows:

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

3.1.1 Risk Free Rate of Return, R_f

In determining the risk free rate consideration has been given to prevailing market rates for nominal 10-year bonds (using 10-year Commonwealth bonds). This is consistent with the approach adopted by the ACCC, ORG and IPART in the decisions cited above. It is also consistent with the measurement of the market risk premium which is discussed below.

To take account of potential volatility in interest rates and the practical difficulty of taking a spot measurement, bond yields were considered over a two-month period to 19 October 1999. In this period, (nominal) 10-year Commonwealth bond yields (7.5% coupon, maturity September 2009) ranged from a low of 6.12% to a high of 6.68%. An average nominal rate of 6.37% on Commonwealth bond yields was observed.

3.1.2. Market Risk Premium, $R_m - R_f$

The market risk premium is a measure of the risk associated with holding a market portfolio of investments. The premium measures the difference between the expected return from holding such investments and the risk free rate.

The premium in the WACC calculation has been determined using a measure of the actual average excess returns from holding shares compared to 10-year Commonwealth bond yields. The Tubridgi Parties have adopted an expected risk premium of 6.0% and note that this is the level adopted by the ACCC, ORG and IPART in decisions cited above.

3.1.3. Equity Beta, β_e

The equity beta measures the risk associated with holding an individual security relative to the market as a whole. Three types of risk are generally associated with a regulated business. They are:

- systematic (beta) risk;
- company-specific (unique/diversifiable) risk; and
- regulatory risk.

Systematic (beta) risk relates the systematic risk of a business to the risk of the market as a whole. It incorporates market wide factors such as the country's sovereign risk, legal, taxation and foreign affairs environment.

Company-specific risk relates to the size and nature of the geographic region in which the business operates, the demand and load growth risks (eg. energy substitutability, price elasticities), customer profiles etc.

Regulatory risk relates to regulatory uncertainty with respect to matters such as changes in policy and regulatory frameworks.

A given risk may not be neatly categorised into one of these three categories (ie. in reality, some company-specific risks have a level of market correlation – a beta effect). The compensation for these risks can either be represented by an additional cash flow (such as a probability weighted cash flow in the operating and maintenance line) or an increase in the WACC.

In considering whether to include company-specific and regulatory risks in the cost of capital, the ACCC, ORG and IPART noted the difficulty with including some of these risks in the cash flows. The ORG stated:

> *Corporate finance theory indicates that investors require compensation through the cost of capital for systematic risk only. However, a number of submissions pointed to the established practice of including some allowance in the cost of capital for non-systematic or diversifiable risks (such as regulatory risk and the risk of major infrastructure dislocations) which cannot be readily quantified and included in the cash flows, as theory would require.*[1]

The starting point in the risk analysis is usually to estimate an asset beta (β_a) which considers the operational risk associated with the business (and assumes 100% equity finance). The UK's Monopoly and Mergers Commission (MMC) has estimated an asset beta range of 0.45 to 0.6 for UK utilities subject to price cap regulation.

The ACCC started with an asset beta of 0.45 and then added 0.1, or approximately 20%, for company-specific and regulatory risks, taking the asset beta to 0.55 for the Victorian Transmission system. However, the Tubridgi Pipeline System has greater non-diversifiable risk than the Victorian Transmission system, for reasons including:

- uncertainty regarding Gas developments and hence use of the Tubridgi Pipeline System in the medium term;
- the level of uncertainty regarding short-term gas flows;
- the low number of existing Users on the Tubridgi Pipeline System and the nature of the industries by those Users; and
- the risks associated with the untested Regulatory regime in Western Australia;

[1] ORG Final Decision on Victorian Gas Distribution Businesses, October 1998 (para 4.3.4 (c)).

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- The Tubridgi Parties have chosen to deal with risk (a) by accelerating depreciation during the initial Access Arrangement Period. This is discussed in the Access Arrangement Information for the Tubridgi Pipeline System. Risks (b) to (d) have been reflected in the asset beta and the Tubridgi Parties believe that an expected value this parameter of 0.6 is appropriate for the Tubridgi Pipeline System.

3.1.3.1.Debt Beta, b_d

The debt beta represents the sensitivity of the Tubridgi Parties' debt (risk premium) to the overall debt market. It is used to de-lever and re-lever the asset beta to the gearing level assumed for the business. The debt beta is not directly observable in the market place and is estimated by the following formula:

$$\beta_d = \frac{R_d - R_f - bank\ costs}{R_m - R_f} = \frac{company\ \ debt\ premium\ - bank\ costs}{market\ \ risk\ premium}$$

As outlined below the expected debt premium of the Tubridgi Parties is estimated at 1.2%. As outlined above an expected market risk premium of 6% has been adopted. The Tubridgi Parties have used an estimate of 50 basis points to represent bank costs, which is consistent with the ACCC's estimate in its decision on the Victorian gas transmission assets. On this basis, the Tubridgi Parties have determined an expected value of the debt beta to be 0.12.

3.1.3.2.Conclusion on Equity Beta

Using an expected asset beta of 0.6 translates to an expected equity beta of 1.3 using the debt beta of 0.12 and the various de-levering formulae adopted by the ACCC, ORG and IPART. The Tubridgi parties note that this compares with the ACCC and ORG equity beta assessment for the Victorian gas businesses of 1.20 and the equity beta for the market as a whole of 1.61, at a 60% gearing level.

3.2.Debt and Equity Levels

The level of debt (D) compared to equity (E), provides the necessary weightings for the construction of the final WACC.

The Tubridgi Parties have adopted a debt to equity ratio of 60:40 on the basis that this is a reasonable assumption regarding the long-term average gearing level. This gearing level has been used and accepted by the ACCC, ORG and IPART in the decisions cited above.

3.3.Effective Tax Rate, t_c

Since the WACC is based upon long run estimates of key parameters it is appropriate to use a long run effective tax rate. The Tubridgi Parties have adopted the statutory taxation rate of 36%, consistent with the ORG, IPART and ACCC decisions cited above. The Tubridgi Parties are of the view that adopting effective tax rates that are lower than the statutory tax rate would require the Regulator to consider the structure of the company in question, a role far beyond that

appropriate to the Regulator or that envisaged by the Code. It is up to the company itself to manage its own tax affairs.

3.4.Value of Imputation Credits, g

The limits of the value of γ are:

- γ = 1: when all franking credits are able to be used (ie. when the credits are distributed only to Australian resident entities and are distributed immediately); and
- γ = 0: when franking credits are unable to be used (ie. when they are not distributed or sold to any Australian resident entities).

The Tubridgi Parties have adopted an expected value of γ of 0.3. This is consistent with the range of values used in recent regulatory decisions in the gas industry and avoids double counting the value of imputation associated with adopting both a higher γ and a lower market risk premium.

3.5.Cost of Debt, R_d

The nominal, pre-tax cost of debt is estimated by adding an appropriate debt risk premium to the risk free rate, determined earlier as 6.37%. This risk premium has been estimated by the ACCC and ORG as being between 100 and 120 basis points with an expected value of 120 basis points. The Tubridgi Parties have adopted an expected value of 120 basis points as the premium, leading to a nominal, pre-tax cost of debt of 7.57%.

4. CALCULATION OF THE WACC

In generating a value for the real, pre-tax, WACC, the Tubridgi Parties have adopted the methodology described below. Again, the methodologies used are generally consistent with those adopted by the ACCC, ORG and IPART in the decisions cited above.

4.1.Conversion of Nominal Post-Tax WACC to Real Pre-Tax WACC

There are two approaches to dealing with the conversion of a nominal post-tax WACC into a real, pre-tax WACC. One is to gross up the nominal post-tax WACC to a nominal pre-tax WACC by applying the estimated tax rate (36%) and then de-escalating this nominal pre-tax WACC using an estimated inflation rate. The second approach (also known as the Macquarie method) reverses this sequence.

Mathematically, approach one is:

$$WACC_{\text{nominal, pre-tax}} = R_e \bullet \frac{E}{V} \bullet \frac{1}{(1-t_c(1-g))} + R_d \bullet \frac{D}{V}$$

$$WACC_{\text{real, pre-tax}} = \frac{(1+WACC_{\text{nominal, pre-tax}})}{(1+i_{\text{inflation}})} - 1$$

Mathematically, approach two results in a much more complex formula, in the order of:

$$WACC_{\text{real,pre-tax}} = [\frac{(1+WACC_{\text{nominal,pre-tax}})}{(1+i_{\text{inflation}})} - \frac{t_c \bullet i_{\text{inflation}}}{(1-t_c)\bullet(1+i_{\text{inflation}})}] - 1$$

The Tubridgi Parties have taken the average of the two conversion formulae in arriving at a real pre-tax WACC range, as described below.

4.2.The WACC range

The Tubridgi Parties have identified a range of plausible estimates for the WACC of 8.01% to 9.38%. This range takes into account both approaches to converting a post-tax nominal WACC into a pre-tax real WACC.

Cost of Capital	De-levering Approach 1	De-levering Approach 2	Midpoint of de-levering approaches
WACC (real, pre-tax)	9.38%	8.01%	8.70%

The midpoint of the WACC range is 8.70%.

4.3.The WACC estimate

The Tubridgi Parties have selected a point estimate of WACC of 8.75%. This represents an increase of 0.05% over the midpoint of the WACC range. This adjustment is consistent with the degree of accuracy expressed in the decisions cited above.