SUBMISSION 55: Rate of Return

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1. EXECUTIVE SUMMARY

REQUIREMENTS OF THE NGL AND THE NGR

1.1.   Rule 87 of the NGR comprises two parts. The first and paramount part (Rule 87(1)) requires a rate of return on capital used in the setting of a regulated tariff to be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services. This is the end, or outcome, that must be achieved.

1.2.   Rule 87(2) dictates relates to the means or tools that are to be used to arrive at the end or outcome in arriving at a rate of return that satisfies Rule 87(1). It requires that in setting a rate of return on capital, certain matters are to be assumed (paragraph (a)), and (paragraph (b)) that a well accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well accepted financial model, such as the Capital Asset Pricing Model, is to be used.

1.3.   For the purposes of Rule 87(2), a weighted average of the cost of equity and the cost of debt – a weighted average cost of capital (WACC) – is an example of a well accepted approach. The cost of equity can be estimated using the Capital Asset Pricing Model (CAPM), which is a well accepted financial model.

1.4.   However, the calculations derived from the Rule 87(2) do not, and cannot have been intended to, arrive at a rate of return that, without adjustment, satisfies Rule 87(1), because inherently they simplify the complexity of financial markets and, in doing so, do not and cannot take account of all the conditions necessary to arrive at a result that satisfies Rule 87(1). Thus, a WACC calculated in accordance with Rule 87(2) must be adjusted to produce an outcome which can be taken to be the rate of return required by Rule 87(1).

DRAFT DECISION

1.5.   Having ascertained what it considered to be the appropriate parameter values for the CAPM, and for the calculation of a real pre-tax WACC, the ERA made that calculation, and identified the result – a real-pre-tax WACC of 7.16% – as the rate of return required by Rule 87 of the NGR.

1.6.   In so making its determination of the rate of return, the ERA did not take into account the specific requirements of Rule 87(1) of the NGR, nor did it undertake the analysis required for it to make a proper determination as to whether or not its conclusion on the rate of return satisfies those requirements. In addition, it failed to consider all of the requirements of the NGL relevant to a determination of the rate of return.

RATE OF RETURN DETERMINATION

1.7.   A rate of return which is commensurate with the prevailing conditions in the market for funds, and with the risks involved in providing reference services, is not observable as such in financial markets. It must there fore be a construct of parameters, models and estimates.

1.8.   In order to give direction to the process of the construction of a rate of return, Rule 87(2) requires the application of a well accepted approach. The well accepted approach which DBP has proposed is the calculation of a real pre-tax WACC. This requires estimates of the cost of equity and the cost of debt.

1.9. To ascertain whether the real pre-tax WACC which has been calculated is the rate of return required by Rule 87(1), these parameters, estimates and models must be assessed to see whether they are, of themselves, capable of being used in a way which can deliver a result which satisfies Rule 87(1).

Cost of equity

1.10. DBP has proposed an estimation of the cost of equity using the CAPM with an estimate of the market risk premium of 6.5% and an estimate of the equity beta of 0.8 (at a gearing level of 60 per cent debt to total assets). This produces an estimate of the cost of equity of 10.91%.

1.11. Because DBP's shares are not traded, the cost of equity in this case is not directly observable. Thus, to assess whether the estimate of the cost of equity made using the CAPM complies with Rule 87(1), DBP has compared that estimate with:

(a) estimates of the cost of equity made, for DBP, by economics consultants NERA, using other asset pricing models (Black's Capital Asset Pricing Model, the Fama-French three factor model, and a zero-beta version of the Fama-French three factor model); and

(b) estimates, made by Strategic Finance Group, of the cost of equity derived from equity analysts' reports on equity returns expected by investors in six energy infrastructure businesses which are seen by investors as being comparable to DBP in the sense that an investment in any of them would be regarded as an alternative to an investment in DBP.

1.12. The estimates of the cost of equity from equity analysts' reports on equity returns expected by investors, and those made using other asset pricing models, all indicate that the cost of equity exceeds 11.7%, and could be as high as 14.5%.

Cost of debt

1.13. DBP has proposed the following financial model for estimation of the cost of debt: the cost of debt is the sum of the nominal risk free rate of return and a debt risk premium. This model is well accepted by financial market practitioners and by regulators, but it is, nevertheless, a model and simplifies the complexity of financial markets. In doing so, it cannot take account of all the conditions necessary to arrive at a result which satisfies Rule 87(1).

1.14. DBP's estimate of the cost of debt was 9.95%. Capital markets advisors AMP Capital Investors estimated the cost of debt to be 9.52%.

CONCLUSIONS

1.15. The measures of the cost of equity which NERA derived from other asset pricing models, and which Strategic Finance Group derived from the reports of equity analysts, all indicate that an estimate of the cost of equity obtained using the CAPM is not commensurate with prevailing conditions in the market for funds and risks involved In providing reference services.

1.16. The measure of the cost of debt determined by AMP Capital Investors indicates an estimate of the cost of debt, obtained as the sum of the nominal risk free rate of return and a debt risk premium, which is not commensurate with prevailing conditions in the market for funds and risks involved in providing reference services. It establishes that

the real pre-tax WACC calculated by the ERA under Rule 87(2) fails to satisfy Rule 87(1).

1.17. Rule 87(1) requires, DBP has, therefore, that adjusted adjustments be made to the estimate of the cost of equity, and the estimate of the cost of debt, so that these estimates are commensurate with prevailing conditions in the market for funds and risks involved in providing reference services. DBP has calculated that the adjusted estimate of the cost of equity is 12.5%; %, and the adjusted estimate of the cost of debt is 9.52%. These adjusted estimates yield a pre-tax real WACC of 10.03%. That real pre-tax WACC satisfies the requirements of Rule 87(1). It is, therefore, the rate of return required by Rule 87.

2. INTRODUCTION

2.1. On 14 March 2011, the Economic Regulation Authority (**ERA**) made its draft decision (**Draft Decision**) in relation to the full access arrangement proposal filed by DBNGP (WA) Transmission Pty Ltd (**DBP**) on 1 April 2010 (**Original AA Proposal**).

2.2. The Draft Decision indicates that the ERA:

    (a)   is not prepared to approve the Original AA Proposal; and

    (b)   requires 109 amendments to the Original AA Proposal in order to make the access arrangement proposal acceptable to the ERA.

2.3. The Draft Decision also fixes a period for amendment of the Original AA Proposal (**revision period)**, which revision period expires on 18 April 2011.

2.4. On 18 April 2011, DBP submitted the following documents pursuant to Rule 60 of the NGR, which make up the amended access arrangement proposal (**Amended AA Proposal**):

    (a)   Amended Proposed Revised Access Arrangement; and

    (b)   Amended Proposed Revised Access Arrangement Information.

2.5. Rule 59(5)(c)(iii) of the NGR requires the ERA to allow at least 20 business days from the end of the revision period for submissions to be made (in relation to both the Draft Decision and the Amended AA Proposal). The ERA has advised that interested parties are able to make submissions on the ERA's Draft Decision up until 4:00pm (WST) Friday 20 May 2011.

2.6. While DBP has submitted to the ERA that the Amended AA Proposal contains the information that the NGA (which includes the WA National Gas Access Law text (**NGL**) and the National Gas Rules (**NGR**) requires to be included in order to enable it to be approved by the Economic Regulation Authority (**ERA**), on 18 April 2011, DBP also submitted that DBP will also be filing the following supporting submissions that explain and substantiate the amendments and additions in the Amended AA Proposal that have been made to address various matters raised in the Draft Decision:

    (a)   Submission (48) Revised Amended Access Arrangement Proposal (this was filed on 18 April 2011)

    (b)   Submission (49) Response to Specific Amendments

    (c)   Submission (50) Reference Service

    (d)   Submission (51) Terms & Conditions

    (e)   Submission (52) Opening Capital Base

    (f)   Submission (53) Capital Expenditure

    (g)   Submission (54) Operating Expenditure

    (h)   Submission (55) Rate of Return (being this Submission)

    (i)   Submission (56) Other Tariff Matters

    (j)   Submission (57) Non Tariff Matters

2.7. In this Submission, DBP:

   (a)   responds to a number of matters relating to the issue of reference services that were raised in paragraphs 325 to 759 of the Draft Decision; and

   (b)   substantiates its amendments and additions made in the elements of the Amended AA Proposal relating to its case for rate of return.

3.   RATE OF RETURN

Access arrangement revisions proposal and Draft Decision

3.1.   DBP's proposed revisions included a proposal for determination of the rate of return, required by Rule 87 of the NGR, to be used in determining the total revenue and revised reference tariffs for the Dampier to Bunbury Natural Gas Pipeline. DBP proposed a real pre-tax rate of return of 10.76%.

3.2.   On 14 March 2011, the ERA issued its Draft Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline (**Draft Decision**).

3.3.   In accordance with the requirements of Rule 59 of the NGR, the Draft Decision indicated that the ERA was not prepared to accept the proposed revisions, and set out the nature of the amendments required in order to make the revisions proposal acceptable to the regulator.

3.4.   Required Amendment 7 of the Draft Decision required:

In relation to Rate of Return, Table 67 of the proposed revised access arrangement should be amended to reflect the values of CAPM and WACC parameters in Table 45 of this Draft Decision.[1]

3.5.   For the purposes of the Draft Decision the ERA adopted, and required DBP to use, a real pre-tax rate of return of 7.16% (Draft Decision, Required Amendment 8, paragraph 759).

3.6.   Specific elements of the ERA's rate of return determination in the Draft Decision are examined in Attachment 1. From the conclusions of this examination, and from its own further considerations, including consideration of the way in which Rule 87 is to be applied, DBP has concluded that an access arrangement revisions proposal incorporating Required Amendments 7 and 8 would not comply with the requirements of the NGL and the NGR. The reasons for this, and the reasons for an amendment which complies with the requirements of the NGL and the NGR, and which addresses the matters raised in the Draft Decision in relation to rate of return, are set out in this Submission.

3.7.   To address the matters raised in the Draft Decision in relation to the rate of return, and given that conditions in the market for funds presently prevailing are different from those which were prevailing at the time of submission of the Original AA Proposal in April 2010, DBP has amended the rate of return to 10.03% (real, pre-tax), and has amended all other parts of the Original AA Proposal which require change as consequence of that amendment.

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[1]   Draft Decision, paragraph 758. DBP presumes that the reference to "Table 67 of the proposed revised access arrangement" should be a reference to Table 20 of the proposed revised Access Arrangement Information

4.   REQUIREMENTS OF THE NGL AND THE NGR

Objective of the regulatory regime

4.1.   Under section 28(1) of the NGL, the ERA must, in assessing revisions to an applicable access arrangement and in making a decision in respect of those revisions, assess and make its decision (including exercising a discretion) in a manner that will or is likely to contribute to the achievement of the national gas objective.

4.2.   The national gas objective is set out in section 23 of the NGL:

The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.

4.3.   All provisions of an access arrangement must be consistent with the national gas objective (NGR, Rule 100). However, by reason of the particular stance taken by Western Australia in relation to the implementation of the NGL and the NGR, and the physically discrete nature of the State's gas market, in determining whether this requirement is complied with, the natural gas services referred to, and the consumers referred to, are services and consumers in Western Australia.

4.4.   That there is a need to take into account circumstances specific to Western Australia is reinforced by the second reading speeches of Ministers in both houses of the WA Parliament when the Bill to enact the National *Gas Access (WA) Act* was tabled. In both speeches, the Government's intention to ensure that the Act was able to accommodate the State's unique characteristics was expressly stated.

Rate of return

4.5.   Rule 87 of the NGR governs determination of the rate of return.

4.6.   The objective to be achieved through determination of the rate of return is stated in section 24(5) of the NGL:

A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates.

4.7.   Achievement of this objective is conditioned by the requirement of section 7 of Part 2 of Schedule 2 of the National *Gas (WA) Act* to interpret a provision of the NGL so as to best achieve the national gas objective:

In the interpretation of a provision of this Law, the interpretation that will best achieve the purpose or object of this Law is to be preferred to any other interpretation.

4.8.   Section 24(5) does not prescribe that a reference tariff should allow for the required return through the use, in tariff calculation, of a single specific method or financial model. Such an interpretation would be contrary to section 7 of Part 2 of Schedule 2 to the *National Gas (WA) Act.*

4.9.   In conformity with section 24(5) of the *National Gas (WA) Act*, Rule 87(1) of the NGR provides that the rate of return on capital is to be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.

4.10.   Rule 87(2) provides the method for determining the rate of return. Rule 87(2) requires:

In determining a rate of return on capital:

(a)   it will be assumed that the service provider:

   (i)   meets benchmark levels of efficiency; and

   (ii)   uses a financing structure that meets benchmark standards as to gearing and other financial parameters for a going concern and reflects in other respects best practice; and

(b)   a well accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well accepted financial model, such as the Capital Asset Pricing Model, is to be used.

4.11.   Rule 87(1) sets out the criteria – commensurability with prevailing conditions in the market for funds, and commensurability with the risks involved in providing reference services – for determining the rate of return. Rule 87(2) requires that, in determining a rate of return which satisfies these criteria, the primary tools to be used are a well accepted approach and a well accepted financial model.

4.12.   The acceptance, without modification, of the mathematical output from the use of a well accepted approach and a well accepted financial model may not produce a result which satisfies the criteria of Rule 87(1). There are a number of reasons why this is the case and, because of this, the modification of that mathematical output by the exercise of judgment is likely to be necessary to reach a result which complies with Rule 87(1).

4.13.   The reasons why the mathematical output from the use of a well accepted approach and a well accepted financial model may not produce a result which satisfies the criteria of Rule 87(1) are as follows.

4.14.   First, in requiring use of a well accepted approach, such as a weighted average cost of capital (**WACC**), Rule 87(2) recognises that the rate of return is not directly observable, and must therefore be determined from factors which are, themselves, observable. However, a WACC, or indeed any other result which might be obtained from a process of determination using a well accepted approach, is conceptually distinct from the rate of return required by Rule 87. As the Australian Competition Tribunal has noted:

. . . the use of the WACC formula is only a means to an end, which is to estimate the required rate of return for an investment with certain characteristics of riskiness and debt.[2]

4.15.   The result obtained by applying a well accepted approach cannot produce the rate of return required by Rule 87, allowing the possibility that such a result does not satisfy the criteria of Rule 87(1).

4.16.   The second reason why the application of Rule 87(2) may not produce a result which satisfies the criteria of Rule 87(1) is that, in accordance with Rule 87(2), the rate of return is to be "determined" and not "calculated". Judgments are to be made in a process of determination, and Rule 87(2) is predicated upon a process of determination, which involves judgments about the factors to be taken into account when using a well accepted approach and a well accepted financial model.

4.17.   Rule 87(2) requires use of a well accepted approach which incorporates the cost of equity and the cost of debt. Use of a weighted average of the cost of equity and the cost of debt – a WACC – is an example of such an approach. The nominal post-tax approach

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[2]   *Application by Telstra Corporation Limited ABN 33 051 775 556* [2010] ACompT 1, paragraph 422.

of the Australian Energy Regulator, which does not use a WACC, is another well accepted approach which incorporates the cost of equity and the cost of debt. Judgments must be made in choosing a well accepted approach.

4.18. Rule 87(2) requires use of a well accepted financial model. The Capital Asset Pricing Model (CAPM), which is used to determine the cost of equity is an example of such a model.[3] The dividend growth model, which is widely used to assess the cost of equity in North American regulatory practice, is another well accepted financial model. Judgments must be made in choosing a well accepted financial model.

4.19. Rule 87(2) requires assumptions that the service provider meets benchmark levels of efficiency, and uses a financing structure that meets benchmark standards as to gearing. Benchmarking cannot occur in the abstract, and requires consideration of many factors including the reliability of gas suppliers, the locations of pipeline assets, the ways in which those assets are operated and maintained, the state of capital markets, and the creditworthiness of counterparties. In respect of a financing structure, Rule 87(2) further requires that best practice be taken into account. Practice is responsive to conditions and context: what is best practice in one context may not be best practice in another. The requirements to use benchmark levels of efficiency, to use a financing structure which reflects best practice, and to use benchmark standards as to gearing and other financial parameters, call for judgment and therefore admit a range of possible outcomes. For example, a benchmark standard as to gearing of 60% debt is often used in applying Rule 87(2), but financial theory and a review of business practice both indicate that other values might be assumed.

4.20. Different judgments about the factors to be taken into account when using a well accepted approach and a well accepted financial model can be expected to lead to different results. This again allows the possibility that any particular result obtained by applying a well accepted approach does not satisfy the criteria of Rule 87(1).

4.21. The third reason why the application of Rule 87(2) may produce a result which does not satisfy the criteria of Rule 87(1) is that there is no financial model, well accepted or not, which, when used with a well accepted approach which in all other respects satisfies those criteria, necessarily produces a result which satisfies the criteria of Rule 87(1).

4.22. Any specific financial model is the simplification of a complex reality and necessarily involves approximation, allowing the possibility that any particular result obtained by using a well accepted financial model does not satisfy the criteria of Rule 87(1).

4.23. To the extent that the use of a well accepted approach and a well accepted financial model do not produce a result which satisfies the criteria of Rule 87(1), the results from applying that approach and that model must be adjusted in the processes of determining the rate of return required by Rule 87.

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[3] The term "Capital Asset Pricing Model" is not defined in the NGL or in the NGR. The literature of financial economics reports many capital asset pricing models but, in that literature, the phrase "the Capital Asset Pricing Model" is usually reserved for the capital asset pricing model proposed, during the 1960s, by William Sharpe, John Lintner, Jan Mossin and others, and initially reported in the following published papers: William F. Sharpe (1964), "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk", Journal of Finance, 19(3): 425-442; John Lintner (1965), "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets", Review of Economics and Statistics, 47(1): 13-47; and Jan Mossin (1966), "Equilibrium in a Capital Asset Market", Econometrica, 34(4), 768-683.

5. DRAFT DECISION AND REQUIRED AMENDMENTS 7 AND 8

5.1. In paragraphs 756 to 759 of the Draft Decision, the ERA concluded on the rate of return.

5.2. Paragraph 756 stated:

Based upon the above assessment of each of the CAPM parameters, the point estimates that the Authority considers may reasonably be applied to the parameters of the CAPM in estimating the rate of return for DBP are as shown in Table 45 below.

5.3. Table 45 of the Draft Decision set out the ERA's preferred values of parameters which are to be used in a WACC calculation of the type which was endorsed by the regulator in paragraphs 359 to 361. Nominal and real post-tax and pre-tax WACCs, calculated using the parameters in Table 45, were set out in Table 46 of the Draft Decision. Table 46 reported a real pre-tax WACC of 7.16%.

5.4. In paragraph 757 of the Draft Decision the ERA stated that it did not approve DBP's proposal in relation to the rate of return.

5.5. Paragraph 758 of the Draft Decision set out Required Amendment 7, and Required Amendment 8 was set out in paragraph 759.

5.6. Having ascertained what it considered to be appropriate parameter values for the CAPM, and for calculation of a real pre-tax WACC, the ERA made that calculation, reported the result in Table 46, and, in paragraphs 758 and 759, identified this real pre-tax WACC as being the required rate of return.

5.7. In determining that, in relation to the rate of return, DBP should amend its access arrangement revisions proposal to reflect the CAPM and WACC parameters in Table 45 of the Draft Decision, and should adopt a real pre-tax value of 7.16%, the ERA focused solely on the calculation of a WACC as might be carried out in accordance with Rule 87(2). The ERA did not take into account the specific requirements of Rule 87 of the NGR and, in particular, did not take into account the criteria of Rule 87(1). More generally, the ERA failed to consider all of the requirements of the NGL as these pertain to the rate of return.

5.8. In fact, the ERA seems to have formed the view that Rule 87(1) was not to be taken into account in determining the rate of return. Paragraph 348 of the Draft Decision states:

The Authority does not agree with DBP's proposal that the rate of return on capital is required to be commensurate with prevailing conditions in the market for funds and that the relevant market is the international capital market, given the scale of the operations of the business.

5.9. The requirements of the NGL and the NGR, as these pertain to the rate of return, were set out in DBP's *Submission 8: Rate of Return*, which was provided to the ERA on 14 April 2010.

5.10. An access arrangement revisions proposal incorporating Required Amendments 7 and 8 of the Draft Decision would not comply or be consistent with the requirements of the NGL and the NGR.

5.11. To address the matters raised in the Draft Decision in relation to the rate of return, and to take into account the fact that the conditions presently prevailing in the market for funds are different from those which were prevailing at the time DBP submitted its Original AA Proposal in April 2010, DBP has amended the Original AA Proposal by amending the

rate of return to 10.03% (real, pre-tax), and amending all other parts of the Original AA Proposal which require change as a consequence of that amendment. DBP's reasons for this amendment to the rate of return are set out in the following sections of this Submission.

6. APPLYING THE METHOD OF RULE 87(2)

6.1. To amend the rate of return of the Original AA Proposal, DBP has determined a real pre-tax WACC in accordance with the requirements of Rule 87(2). Use of a real pre-tax WACC is, as stated in Rule 87(2), a well accepted approach which incorporates the cost of equity and the cost of debt. The real pre-tax WACC has been calculated in two steps, in the way described in paragraphs 6.2 and 6.3 below.

6.2. First, a nominal pre-tax WACC has been calculated using the formula:

$$\text{WACC}_{\text{nominal pre-tax}} = E(r_e) \times E/V \times 1/[1 - T_c \times (1 - \gamma)] + E(r_d) \times D/V,$$

where:

(a) $E(r_e)$ is the nominal post-tax expected rate of return on equity (the cost of equity);

(b) E/V is the proportion of equity in the total financing (which comprises equity and debt);

(c) T_c is the tax rate;

(d) γ (gamma) is the value of franking credits created (as a proportion of their face value);

(e) $E(r_d)$ is the nominal pre-tax expected rate of return on debt (the cost of debt); and

(f) D/V is the proportion of debt in the total financing ($D/V = 1 - E/V$).

6.3. In the second step, the real pre-tax WACC was obtained by removing expected inflation, π^e, from the nominal pre-tax WACC:

$$\text{WACC}_{\text{real pre-tax}} = (1 + \text{WACC}_{\text{nominal pre-tax}})/(1 + \pi^e) - 1.$$

6.4. DBP had calculated a real pre-tax WACC in this way in its Original AA Proposal. In paragraph 360 of the Draft Decision, the ERA stated:

The Authority notes that DBP's proposed method of ascertaining a rate of return using a real pre-tax WACC is appropriate and this proposal is also consistent with the Authority's preference.

Cost of equity

6.5. For the purpose of calculating a real pre-tax WACC in accordance with the requirements of Rule 87(2), DBP has used the CAPM to estimate the cost of equity. The CAPM is, as stated in Rule 87(2), a well accepted financial model.

6.6. Required Amendment 7 of the Draft Decision required use of the CAPM for estimation of the cost of equity.

6.7. The CAPM estimates the expected rate of return on equity (the cost of equity to a service provider) as the sum of a risk free rate of return and a premium for risk:

$$E(r_e) = r_{rf} + [E(r_m) - r_{rf}] \times \beta,$$

where:

(a) $E(r_e)$ is the nominal post-tax expected rate of return on equity (the cost of equity);

(b) r_{rf} is the nominal risk free rate of return;

(c) $E(r_m) - r_{rf}$ is the market risk premium; and

(d)   β is the equity beta.

6.8.   For the purpose of estimating the cost of equity using the CAPM, DBP has estimated the nominal risk free rate of return as the average of the daily yields, reported by the Reserve Bank of Australia, on Australian Government bonds with terms to maturity of 10 years. This average, 5.71%, has been calculated using yields reported for the period of 20 trading days ending 28 February 2011.

6.9.   The ERA used Reserve Bank bond yield data for the period of 20 trading days ending 28 February 2011 to determine the nominal risk free rate of return shown in Table 45 of the Draft Decision. However, the yield data which the ERA used were for Australian Government bonds with terms to maturity of 5 years. This difference in approach is discussed in section 6 of Attachment 1.

6.10.   For the purpose of estimating the cost of equity using the CAPM, DBP has used, on the basis of advice it has received from Value Advisor Associates, an estimate of 6.5% for the market risk premium. Value Advisor Associates' report for DBP is attached to this Submission as Attachment 2.

6.11.   Required Amendment 7 of the Draft Decision required use of an estimate of 6.0% for the market risk premium for reasons which the ERA set out in paragraphs 730 to 754 of the Draft Decision. DBP's reasons for not using this estimate are set out in section 8 of Attachment 1.

6.12.   For the purpose of estimating the cost of equity using the CAPM, DBP has used an estimate of the equity beta of 0.8.

6.13.   Required Amendment 7, which requires use of the WACC parameters in Table 45 of the Draft Decision, requires use of an equity beta of 0.8.

6.14.   Using the CAPM, and using the estimate of 5.71% for the nominal risk free rate of return, the estimate of the market risk premium of 6.5%, and the estimate of the equity beta of 0.8, DBP has estimated the cost of equity for the purposes of Rule 87(2) to be 10.91%.

6.15.   The estimation of the cost of equity using the CAPM is summarised in Table 1.

Table 1
Estimation of the cost of equity using the CAPM

Parameter		Estimate
Nominal risk free rate of return	r_{rf}	5.71%
Market risk premium	$E(r_m) - r_{rf}$	6.5%
Equity beta	β	0.8
Cost of equity	$E(r_e) = r_{rf} + [E(r_m) - r_{rf}] \times \beta$	10.91%

Cost of debt

6.16.   For the purpose of calculating a real pre-tax WACC in accordance with the requirements of Rule 87(2), DBP has estimated the cost of debt to be 9.95%.

6.17.   This estimate of the cost of debt was made using the method used by the Australian Energy Regulator (**AER**) in its Final Decision on the revenue proposals of the Victorian

electricity distribution network service providers.[4] The AER estimated the cost of debt as the sum of:

(a)   the nominal risk free rate of return; and

(b)   a debt risk premium.

6.18.   The AER estimated the debt risk premium as a weighted average of:

(a)   the premium for BBB bonds with terms to maturity of 10 years obtained from a fair yield curve constructed as the sum of:

- the yields on BBB bonds with terms to maturity of 7 years, obtained from the Bloomberg service, plus

- the differences between the yields, reported by the Bloomberg service, on AAA bonds with terms to maturity of 10 years and the yields on AAA bonds with terms to maturity of 7 years; and

(b)   the premium on a recent bond issue by APT with credit rating BBB and maturing in approximately 10 years.

6.19.   In the AER's Final Decision on the Victorian electricity distribution network service provider revenue proposals, these two premiums were weighted 75% and 25% respectively.

6.20.   Using data from the Bloomberg service for the period of 20 trading days ending 22 June 2010 for the differences between the yields on AAA bonds with terms to maturity of 10 years and the yields on AAA bonds with terms to maturity of 7 years, and for the period of 20 trading days ending 28 February 2011 for the yields on BBB bonds with terms to maturity of 7 years, the debt risk premium is 4.24%.

6.21.   Adding the nominal risk free rate of (5.71%; see paragraph 6.8 above) to the debt risk premium (4.24%) yields an estimate of the cost of debt of 9.95%.

6.22.   Required Amendment 7 required the estimation of the cost of debt as the sum of the nominal risk free rate of return and a debt risk premium. The estimate of the debt risk premium which was required was 3.124%. DBP's reasons for not adopting this estimate are explained in section 4 of Attachment 1.

Gearing

6.23.   For the purpose of calculating a real pre-tax WACC in accordance with the requirements of Rule 87(2), DBP has used an estimate of 60% for gearing.

6.24.   Required Amendment 7, which requires use of the WACC parameters in Table 45 of the Draft Decision, requires use of an estimate for gearing of 60%.

Tax rate

6.25.   For the purpose of calculating a real pre-tax WACC in accordance with the requirements of Rule 87(2), DBP has used an estimate of 30.0% for the corporate tax rate.

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[4]   Australian Energy Regulator, Victorian electricity distribution network service providers: Distribution determination 2011–2015, October 2010.

6.26. Required Amendment 7, which requires use of the WACC parameters in Table 45 of the Draft Decision, requires use of an estimate of 30.0% for the corporate tax rate.

Value of imputation credits (gamma)

6.27. For the purpose of calculating a real pre-tax WACC in accordance with the requirements of Rule 87(2), DBP has used an estimate of gamma of 0.

6.28. This estimate of gamma is based on advice which DBP has received from Strategic Finance Group (**SFG**). SFG's report (on the value of imputation credits) for DBP is attached to this Submission as Attachment 3.

6.29. The ERA used an estimate of 0.53 for gamma to determine the nominal pre-tax WACC shown in Table 46 of the Draft Decision. The reasons why zero, and not 0.53, is the better estimate of gamma are presented in section 5 of Attachment 1.

Expected inflation

6.30. For the purpose of calculating a real pre-tax WACC in accordance with the requirements of Rule 87(2), DBP has used an estimate of expected inflation of 2.57%.

6.31. DBP has estimated expected inflation using a geometric mean of inflation forecasts made by the Reserve Bank of Australia and published in the Bank's February 2011 *Statement on Monetary Policy*. The geometric mean has been calculated for the period of 10 years from 31 December 2010.

6.32. The Reserve Bank of Australia forecasts which have been used are:

   (a) 2.75% for the year to December 2011;

   (b) 2.75% for the year to December 2012;

   (c) 3.0% for the year to June 2013; and

   (d) 2.5% (the midpoint of the Reserve Bank target range for inflation) for each year from June 2013.

6.33. The ERA used an estimate of 2.65% for expected inflation to determine the real pre-tax WACC shown in Table 46 of the Draft Decision. This estimate was the geometric mean of Reserve Bank of Australia forecasts for a period of 5 years. The reasons why 2.57%, and not 2.65%, is the better estimate of gamma are presented in section 7 of Attachment 1.

Real pre-tax weighted average cost of capital

6.34. DBP's real pre-tax WACC, calculated in accordance with the requirements of Rule 87(2), is 9.39%.

   The estimates which DBP has used for the parameters of this calculation are summarised in

6.35. Table 2.

Table 2
WACC parameter estimates and real pre-tax WACC

Parameter		Estimate
Cost of equity	$E(r_e) = r_{rf} + [E(r_m) - r_{rf}] \times \beta$	10.91%
Cost of debt	$E(r_d)$	9.95%
Gearing	D/V	60.0%
Tax rate	T_c	30.0%
Gamma	γ	0
Expected inflation	π^e	2.57%
Nominal pre-tax WACC	$WACC_{nominal\ pre\text{-}tax} = E(r_e) \times (1/(1 - T_c \times (1 - \gamma) \times E/V + E(r_d) \times D/V$	12.20%
Real pre-tax WACC	$WACC_{real\ pre\text{-}tax} = (1 + WACC_{nominal\ pre\text{-}tax})/(1 + \pi^e) - 1$	9.39%

7.   APPLYING THE CRITERIA OF RULE 87(1)

7.1.   Rule 87(1) requires:

The rate of return on capital is to be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.

7.2.   As noted in paragraph 4.13 above, a WACC is conceptually distinct from a rate of return. Before a WACC calculated in accordance with the requirements of Rule 87(2) can be taken to be the rate of return required by Rule 87 of the NGR, it must be shown to satisfy the criteria of Rule 87(1). It must be shown to be commensurate with prevailing conditions in the market for funds, and with the risks involved in providing reference services. If the WACC calculated in accordance with the requirements of Rule 87(2) does not satisfy the criteria of Rule 87(1), it must be adjusted to produce an outcome which does satisfy those criteria.

7.3.   However, there is little guidance in the NGR on the how the two criteria of Rule 87(1) – commensurability with prevailing conditions in the market for funds, and commensurability with the risks involved in providing reference services – are to be applied.

7.4.   "Commensurate" does not imply an exact relationship, or equality. Rather, it means "corresponding in size or degree".

7.5.   Reference to the "market for funds" would seem to be a reference to financial markets – the markets in which financial assets are traded. These markets include stock markets, in which ordinary shares, or equities, are traded, and the markets in which government and corporate bonds, and other debt securities, are traded. They also include foreign exchange markets – the markets in which currencies are traded. The NGR does not limit the "market for funds" to financial markets within Australia. To do so would impose an artificial and unnecessary limitation on the assessment of whether a particular rate was the rate of return required by Rule 87. This issue is further examined in section 2 of Attachment 1.

7.6.   Rule 87(1) requires, then, that the rate of return correspond in size or degree with prevailing conditions in financial markets. Prevailing conditions are the current conditions in those markets; they are the conditions in those markets now, rather than the conditions at some earlier time.

7.7.   Reference to the "risks involved in providing reference services" is quite specific. As noted in paragraph 4.6 above, the objective to be achieved through the setting of the rate of return is stated in section 24(5) of the NGL. The rate of return should be set so that a reference tariff calculated using that rate allows a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates. The risks involved in providing reference services to which Rule 87(1) refers are not, then, only the macroeconomic risks to which all businesses are exposed. In assessing whether a particular rate is the rate of return required by Rule 87, consideration must be given to whether the rate is commensurate with the risks involved in provision of the reference services using the pipeline system for which reference tariffs are to be determined, and for which a rate of return is required.

7.8.   The application of Rule 87(2) is a process which combines a number of parameters in one or more financial models. When numerical values for the parameters – estimates – are used in this process, it yields, as a result, a numerical value of WACC. That result

cannot itself be assessed against the criteria of Rule 87(1). A rate of return is not observable in financial markets. It is a complex composite of parameters, models and estimates. To ascertain whether the result – the numerical value of WACC produced by applying Rule 87(2) – is the rate of return required by Rule 87:

(a) the parameters and models must be assessed for whether they are, of themselves, capable of being applied in a way which can deliver a result which, is commensurate with prevailing conditions in the market for funds and with the risks involved in providing reference services;

(b) the estimates used in the calculation must be assessed for:

- whether they have been arrived at on reasonable bases, and represent the best estimates possible in the circumstances (in accordance with Rule 74 of the NGR); and

- whether they are commensurate with prevailing conditions in the market for funds and with the risks involved in providing reference services; and

(c) the intermediate results obtained when those estimates are combined using the financial models of the WACC calculation must be assessed for whether they are commensurate with prevailing conditions in the market for funds and with the risks involved in providing reference services.

The WACC calculation and Rule 87(1)

7.9. As noted in paragraphs 6.2 and 6.3 above, the real pre-tax WACC of 9.39% is calculated in two steps. First, a nominal pre-tax WACC is calculated. This nominal pre-tax WACC is 12.20%. In the second step, the real pre-tax WACC is obtained by removing expected inflation, estimated to be 2.57%, from the nominal pre-tax WACC.

7.10. The nominal pre-tax WACC (12.20%) is a weighted average of:

(a) the estimate of the nominal post-tax cost of equity obtained using the CAPM (10.91%), adjusted for the value attributable to imputation credits (via the parameters gamma and the tax rate); and

(b) the estimate of the nominal pre-tax cost of debt (9.95%).

7.11. The weight applied to the estimate of the nominal post-tax cost of equity in the calculation of the nominal pre-tax WACC is one minus the estimate of gearing. The weight applied to the estimate of the nominal pre-tax cost of debt in the calculation of the nominal pre-tax WACC is the estimate of gearing.

7.12. The numerical value of WACC (9.39% real, pre-tax) obtained from a calculation made in accordance with Rule 87(2), will be the rate of return required by Rule 87 if the following are commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services:

(a) the estimate of expected inflation of 2.57%;

(b) the estimate of gearing of 60%;

(c) the estimate of the tax rate of 30%;

(d) the estimate of gamma of zero;

(e)   the estimate of the nominal post-tax cost of equity of 10.91% obtained using the CAPM; and

(f)   the estimate of the cost of debt of 9.95%.

Expected inflation

7.13.   The estimate of expected inflation of 2.57% used in calculating the real pre-tax WACC of 9.39% is an estimate made using forecasts published by the Reserve Bank of Australia in February 2011, and which were based on economic conditions early in 2011. It is, at the date of this response, an estimate commensurate with prevailing conditions in the market for funds.

7.14.   The estimate of expected inflation used in calculating the WACC is an estimate of the expected change in the level of prices in Western Australia during the next access arrangement period. Change in those prices may influence the risks involved in providing reference services, but the estimate of expected inflation is not meaningfully assessed for commensurability with those risks.

Gearing

7.15.   The assumption of a financing structure comprising equity and debt, and the estimate of gearing of 60.0%, meet the requirements for a financing structure that meets benchmark standards as to gearing and other financial parameters for a going concern and reflects in other respects best practice. The assumptions about financing structure, and the estimate of gearing, were extensively reviewed by the Australian Energy Regulator (**AER**) for its May 2009 determination on WACC parameters to be used in the setting of access prices for regulated electricity networks. After examining the gearings of network service providers in both the electricity and gas sectors, the AER determined that an estimate of gearing of 60% was the appropriate benchmark.

7.16.   An estimate of gearing of 60% has been advanced in most access arrangement revisions proposals submitted for regulator approval since May 2009. Only Envestra has proposed a lower estimate (of 55.0%, for its Queensland and South Australian gas distribution systems). Envestra's proposals were based on:

(a)   a range for gearing of 40.0% to 80.0% obtained from a Standard and Poor's report, published in 2001, which examined 75 utilities in countries around the world; and

(b)   a New Zealand regulatory decision which allowed a lower gearing for gas distribution.

7.17.   The national regulator formed the view that the Standard and Poor data on which Envestra sought to rely were dated and of limited relevance to Australian conditions. The New Zealand decision also took into account specific local factors. An estimate of 60% remained appropriate.

7.18.   DBP's estimate of gearing of 60% is, therefore, an estimate commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.

Tax rate

7.19.   The estimate of the tax rate (30.0%) used in calculating the real pre-tax WACC of 9.39% is the current company tax rate applied by the Australian Taxation Office. It is, at the

7.19   date of this response, an estimate commensurate with prevailing conditions in the market for funds.

7.20.   The estimate of the tax rate used in calculating the WACC is an estimate of the rate at which the income earned by Australian resident corporations is taxed. The rate at which the income earned by Australian resident corporations is taxed is set, from time to time, by the Australian Government. Changes in the tax rate may influence the risks involved in providing reference services, but the estimate of the tax rate is not meaningfully assessed for commensurability with those risks.

Gamma

7.21.   The estimate of gamma used in calculating the real pre-tax WACC of 9.39% was zero.

7.22.   As noted in paragraph 6.28 above, this estimate of gamma is based on advice which DBP has received from SFG.

7.23.   Gamma (γ) is the product of two factors, the franking credits distribution rate (F), and the value of distributed credits (θ):

$\gamma = F \times \theta$.

7.24.   The distribution rate, F, is, in turn, the ratio of:

(a)   the amount of franking credits distributed to shareholders during a specified period; and

(b)   the total amount of franking credits created during that period.

7.25.   The estimation of F, in the context of the setting of regulated access prices, has been the subject of considerable debate. That debate, which was noted in the advice DBP received from SFG, has recently been settled in proceedings before the Australian Competition Tribunal. In December 2010, in paragraph 4 of its reasons for decision in *Application by Energex Limited (Distribution Ratio (Gamma)) (No 3)* [2010] ACompT 9, the Tribunal concluded:

In light of these submissions and the material before the Tribunal, the Tribunal concludes that the distribution ratio is 0.7 for the calculation of gamma.

7.26.   In its reasons for decision in *Energex Limited*, the Australian Competition Tribunal also reviewed the use of tax statistics and dividend drop-off studies in the estimation of the valuation of distributed credits (θ). The Tribunal determined that tax statistics cannot be used to estimate θ but provide an upper bound on possible estimates. Furthermore, the Tribunal directed the AER to commission new dividend drop-off studies for the estimation of θ, and has now accepted an estimate of 0.35 made, for the AER, by SFG.[5]

7.27.   An estimate of θ of 0.35 does not exceed the upper bound determined from tax statistics. An estimate of gamma is, therefore, 0.25 = (0.7 x 0.35).

7.28.   An estimate of θ of 0.35 was, however, conditional on an estimate of 0.85 for the value of cash dividends. If the value of cash dividends were set at 1.00, which is the assumption made when applying the CAPM using a market risk premium which has

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5   See Attachment 3.

been adjusted for the value of imputation credits, then the corresponding value of θ must be zero.[6]

7.29. SFG has advised that, when estimates are made of the cost of capital for purposes other than setting regulated access prices, the dominant practice among corporate finance practitioners is to make no adjustment for the value of imputation credits, which is consistent with those practitioners using an estimate of zero for gamma.

7.30. An estimate of zero for gamma is, in these circumstances, commensurate with prevailing conditions in the market for funds.

7.31. Gamma is a measure of the value equity investors attribute to franking credits (as a proportion of their face value). The data from which gamma is estimated are data for the equity market as a whole. They are not data pertaining specifically to investments in gas pipeline systems, and the estimate of gamma is not meaningfully assessed for commensurability with risks involved in providing reference services.

Cost of equity

7.32. The estimate of the nominal post-tax cost of equity of 10.91% used in calculating the real pre-tax WACC of 9.39% is an intermediate result obtained by applying the CAPM with an estimate of the nominal risk free rate of return of 5.71%, an estimate of the market risk premium of 6.5%, and an estimate of the equity beta of 0.8.

7.33. The estimate of nominal risk free rate of return was calculated from yields on Australian Government bonds reported, by the Reserve Bank of Australia, for the period of 20 trading days ending on 28 February 2011. It is, at the date of this response, an estimate commensurate with prevailing conditions in the market for funds.

7.34. The estimate of the nominal risk free rate has been made using data for Australian Government bonds traded in financial markets. It is not meaningfully assessed for commensurability with risks involved in providing reference services.

7.35. For the purpose of applying Rule 87(2) in establishing the rate of return used in the Original AA Proposal, DBP estimated the market risk premium to be 6.5%. Recognizing that the effects of the Global Financial Crisis were still being transmitted through the economy at the time this estimate was prepared (early 2010), DBP sought, from Value Advisor Associates, a view on the market risk premium which should be applied in April 2011. Value Advisor Associates reported that, when the data for 2010 were included in the calculation, the long term average of the realised market risk premium (after adjustment for the value of franking credits) was between 6% and 7%.

7.36. Value Advisor Associates concluded the data continue to support its view that the market risk premium is around 7%, and that 6.5% is a better estimate than the estimate of 6% which has been proposed by others. A higher, rather than a lower, estimate of the premium was appropriate because financial markets have not returned to "normal" conditions following the Global Financial Crisis. This was evident from the current high levels of debt risk premiums, and the recent narrowing of the difference between equity and debt risk premiums. Assuming that the narrowing of the risk premium difference is not indicative of a structural change in financial markets (which cannot be ascertained so

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[6]   See Attachment 1, section 5, and Attachment 3, paragraph 118.

soon after the crisis), and applying Grundy's lower bound for the equity premium to the debt risk premium of the Draft Decision, the equity premium should exceed 8.5%.[7]

7.37. DBP's estimate of the market risk premium of 6.5% remains commensurate with prevailing conditions in the market for funds. It is not meaningfully assessed for commensurability with risks involved in providing reference services.

7.38. The estimates of the nominal risk free rate of return and the market risk premium which DBP has used are commensurate with prevailing conditions in the market for funds (and are not meaningfully assessed for commensurability with the risks involved in providing reference services). Whether the intermediate result obtained using these estimates, the estimate of the nominal post-tax cost of equity of 10.91%, is commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services is, then, a question of whether an estimate of the cost of equity obtained using CAPM is commensurate with prevailing conditions in the market for funds and with the risks involved in providing reference services.

CAPM

7.39. The CAPM is derived from a model of choice in which investors choose, at a point in time, portfolios of assets which yield returns one period later. The following assumptions are made for the derivation:

(a) quantities of the assets are fixed, and the assets are perfectly divisible and perfectly liquid (marketable);

(b) the market in which the assets are traded is perfectly competitive: investors take the market prices of the assets as given;

(c) there are no restrictions on the short selling of assets, no transaction costs are incurred when assets are traded, and there are no taxes;

(d) one of the assets available in the market is a risk free asset: investors can borrow and lend, in unlimited amounts, at the rate of return on this risk free asset (the risk free rate of rate of return) which is fixed and determined outside the model;

(e) the return on a portfolio of assets is not known with certainty at the time the portfolio is chosen, but all investors know the true joint probability distribution of returns at the end of the period (the assumption of homogeneous expectations); and

(f) investors maximise the expected utility of end-of-period wealth by choosing among alternative portfolios which can be ranked in terms of expected portfolio return and risk, with risk measured as the variance, or standard deviation, of portfolio return.

7.40. These assumptions imply, among other things, that all investors hold the same portfolio of assets. This portfolio, the market portfolio, comprises every asset held in a proportion which is the ratio of the total market value of the asset to the market value of all assets.

7.41. The premium for risk in the CAPM is the product of the market risk premium and the asset's beta. The market risk premium is the difference between the expected rate of

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[7]   Bruce D Grundy, *The Calculation of the Cost of Capital: A Report for Envestra*, Attachment 9-1.2 to Envestra Queensland Access Arrangement Information, dated 10 October 2010, and available at
http://www.aer.gov.au/content/index.phtml/itemId/740632.

return on the market portfolio and the risk free rate of return. Beta measures the contribution which the asset makes to the risk of the market portfolio. That is, the risk which the CAPM takes into account in explaining the price of an asset is the contribution made by the asset in question to the riskiness of the market portfolio.

7.42. When the CAPM was first derived in the 1960s, this was an important theoretical insight into the relationship between expected rate of return and risk. When the assumptions listed above are made, the variance or "riskiness" of the return on the asset – its "own risk" – is not a factor which explains the expected rate of return. This insight – and not the model's superiority in estimating rates of return – is the reason why the CAPM is a well accepted financial model.

7.43. That the CAPM does not provide good estimates or forecasts of expected rates of return became apparent when the first econometric tests of the model were carried out in the late 1960s and early 1970s.[8] Early empirical work on the CAPM indicated that it broadly explained the behaviour of asset prices: high beta shares tended to have higher returns than low beta shares, and the relationship between rate of return and share price was "roughly linear". However, the slope of the relationship between rate of return and beta appeared to be less than the slope implied by the CAPM, and the model appeared to "explain" only a small percentage of the variation in rates of return.[9, 10]

7.44. Subsequent studies, using more refined statistical methods, continued to show that the CAPM was not a particularly good model of asset pricing.[11]

7.45. A number of the assumptions listed above are questionable, and have been identified as possible causes of the empirical failure of the CAPM. Michael Brennan and Fisher Black, for example, identified the assumption of unrestricted borrowing and lending at the risk free rate of return as being problematic, and derived asset pricing models within the mean-variance framework within which the CAPM was derived, without assuming the

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[8] See, for example, Irwin Friend and Marshall Blume (1970), "Measurement of Portfolio Performance Under Uncertainty", American Economic Review, 60(4): 561-575; Fisher Black, Michael C. Jensen and Myron Scholes (1972), "The Capital Asset Pricing Model: Some Empirical Tests", in Michael C. Jensen (ed.), *Studies in the Theory of Capital Markets*, New York: Praeger; Marshall E. Bloom and Irwin Friend (1973), "A New Look at the Capital Asset Pricing Model", Journal of Finance, 28(1): 19-33; Marshall E. Bloom and Frank Husic (1973), "Price, Beta, and Exchange Listing", Journal of Finance, 28(2): 283-299; and Eugene F. Fama and James D. MacBeth (1973), "Risk, Return, and Equilibrium: Empirical Tests", Journal of Political Economy, 81(3): 607-636.

[9] Empirical studies of the Sharpe-Lintner CAPM are reviewed in John Y Campbell, Andrew W Lo and A Craig MacKinlay (1997), *The Econometrics of Financial Markets*, Princeton: Princeton University Press; John Y Campbell (2000), "Asset Pricing at the Millennium", Journal of Finance, 55(4): 1515-1567, and John H. Cochrane, *Asset Pricing*, revised ed., Princeton: Princeton University Press.

[10] See Ravi Jagannathan and Zhenyu Wang (1996), "The Conditional CAPM and the Cross-Section of Expected Returns", Journal of Finance, 51(1): 3-53, and Nick Durack, Robert B Durand and Ross A Maller (2004), "A best choice among asset pricing models? The Conditional Capital Asset Pricing Model in Australia", Accounting and Finance, 44: 139-162. Jagannathan and Wang note that the Sharpe-Lintner CAPM explains only 1% of the cross sectional variation in average returns on 100 portfolios constructed from US stock market data. In a study estimating alternative asset pricing models using Australian share price data, Durand, Durack and Maller report that the Sharpe-Lintner CAPM explained only 7.25% of return variation.

[11] See, for example, Rolf W. Banz (1981), "The Relationship Between return and Market value of Common Stocks", Journal of Financial Economics, 9: 3-18; Marc R. Reinganum (1982), "Misspecification of Capital Asset Pricing: Empirical Anomalies Based on Earnings' Yields and Market values", Journal of Financial Economics, 9: 19-46; Michael R. Gibbons (1982), "Multivariate Tests of Financial Models: A New Approach", Journal of Financial Economics, 10: 3-27; Robert F. Stambaugh (1982), "On the Exclusion of Assets from Tests of the Two Parameter Model: A Sensitivity Analysis", Journal of Financial Economics, 10: 237-268; Jay Shanken (1987), "Multivariate Proxies and Asset Pricing Relations: Living with the Roll Critique", Journal of Financial Economics, 18: 91-110; and Eugene F. Fama and Kenneth R. French (1992), "The Cross Section of Expected Stock Returns", Journal of Finance, 47(2): 427-465.

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existence of a risk free asset, and without assuming unrestricted borrowing and lending.[12]

7.46.   The model of choice from which the CAPM is derived is a simple model. The only economic activity which is modelled is the buying and selling of assets. In consequence, the CAPM explains expected rates of return in terms of only one type of risk (the contribution of the asset being priced to the riskiness of the market portfolio).

7.47.   The model of choice from which the CAPM is derived does not incorporate the buying and selling of goods and services, their production, technological change, government and the regulation of economic activity, or economic growth. The CAPM cannot, therefore, provide a comprehensive explanation of the risks which determine expected rates of return. In particular, the CAPM cannot explain expected rates of return in terms of technological and regulatory risks, risks which are potentially important for gas pipeline systems (they are risks involved in providing reference services, and commercial and regulatory risks involved in the provision of a reference service to which a reference tariff relates). The effects of these risks are excluded by the form of the model of choice from which the CAPM is derived.[13]

7.48.   The CAPM is derived from a model of choice in which investors choose, at a point in time, portfolios of assets which yield returns one period later. This model of choice does not explicitly incorporate time, and yet time is fundamental to issues of investment and return.

7.49.   At any point in time, prices play a key role in ensuring that the resources available in an economy are allocated to their most highly valued uses. Properly determined prices – those which recover only efficiently incurred costs, and not the rents available from dominant market positions – promote efficient use of resources in the interests of consumers.

7.50.   Properly determined prices of goods and services ensure that, at any point in time, the available resources are allocated the most highly valued uses at that time. Properly determined asset prices ensure that the available resources are allocated to the most highly valued uses over time (and not just at a point in time), and that risks at any point in time and over time can be managed through hedging (or, indeed, can be exploited through speculation).

7.51.   When time is explicitly taken into account, the expected rate of return must not only compensate investors for bearing market risk (the key insight of the CAPM); it must also compensate them for the bearing of the risk of unfavourable shifts in the set of investment opportunities over time. The explanation of the CAPM is inadequate, and additional risk factors are required to explain asset prices.[14]

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[12]   M J Brennan (1970), "Capital Market Equilibrium with Divergent Borrowing and Lending Rates", Journal of Financial and Quantitative Analysis, 6(5): 1197-1205. Fischer Black (1972), "Capital Market Equilibrium with Restricted Borrowing", Journal of Business, 45(3): 444-455.

[13]   That technological and other risks may be important in the explanation of asset prices is indicated by the growing number of pricing models developed within a dynamic general equilibrium framework incorporating production as well as exchange and consumption. These models are relatively new and untested. See, for example, John H. Cochrane (1996), "A Cross-Sectional Test of an Investment-Based Asset Pricing Model", Journal of Political Economy, 104(3): 572-621; Urban J. Jermann (1998), "Asset pricing in production economies", Journal of Monetary Economics 41: 257-275; Joao F. Gomes, Leonid Kogan and Lu Zhang (2003), "Equilibrium Cross Section of Returns", Journal of Political Economy, 111(4): 693-732, Leonid Kogan (2004), "Asset prices and real investment", Journal of Financial Economics, 73: 411-431; and Joao F. Gomes, Leonid Kogan and Motohiro Yogo (2009), "Durability of Output and Expected Stock Returns", Journal of Political Economy, 117(5): 941-986.

[14]   See Robert Merton (1973). "An Intertemporal Capital Asset Pricing Model", Econometrica, 41(5): 867-887. Merton sought to avoid the theoretical objections to the mean-variance framework within which the CAPM (and Black's CAPM) had been

7.52. Since the 1970s, asset pricing models have explicitly incorporated the time dimension which is absent from the CAPM.[15] The standard economic framework which has developed for the investigation of asset pricing is summarized in the Annexure to Attachment 1 to this Submission. As noted in the Annexure, since the 1970s financial economists have advanced a large number of asset pricing models examining a wider range of factors within a multiple linear factors framework.

7.53. .The risk captured by the CAPM is commonly referred to as systematic risk. Systematic risk is described, somewhat loosely, as the risk which is measured by the covariation of asset return with another variable representing the state of the economy (in the case of the CAPM, the expected rate of return on the market portfolio). Equally loosely, risks which are independent of the state of the economy, but which affect the returns on particular assets, are called "unsystematic" or "idiosyncratic" risks.

7.54. Systematic risk is, from the perspective of the CAPM, the only type of risk for which investors are compensated by market rates of return. Underlying the CAPM is a view that investors do not need to be exposed to idiosyncratic risks. By holding well diversified portfolios, they can limit the risk to which they are exposed to systematic risk (which, because it is economy-wide, cannot be eliminated by diversification). Market rates of return do not, therefore, need to compensate investors for bearing idiosyncratic risks.

7.55. The view that portfolio diversification limits the risk to which investors are exposed to systematic risk is a theoretical view. It is a conclusion reached in a process of reasoning from certain premises. It is not a statement of fact. Investors typically do not hold well diversified portfolios of assets.[16] A large percentage of household wealth is held in the form of human capital, sole proprietorships, partnerships, pension plans, superannuation funds, and residential real estate. Among institutional investors, an increasing amount of wealth is allocated to a limited number of asset types including private equity, venture capital, commercial real estate, and hedge fund investments.

7.56. This failure to hold well diversified asset portfolios is not, as some have suggested, the result of investor irrationality, and something which should therefore be ignored. Recent research has shown that when some investors hold expectations about investment opportunities and expected returns which are different from the expectations held by other investors (that is, when expectations are not, as assumed for CAPM derivation, homogeneous), optimal portfolios will not be well diversified, and idiosyncratic factors are important in explaining asset prices.[17]

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derived, by deriving a general form of the asset pricing relationship using the standard model of intertemporal choice from economic theory. His use of intertemporal choice theory allowed another of the strong assumptions required for derivation of the CAPM – the assumption of a single time period – to be dropped, and opened the way to explicit consideration of the role of time in asset pricing.

[15]   See, for example, John H. Cochrane, *Asset Pricing*, revised ed., Princeton: Princeton University Press; and Sumru Altug and Pamela Labadie (2008), *Asset Pricing for Dynamic Economies*, Cambridge: Cambridge University Press.

[16]   See, for example, John Y. Campbell, Martin Lettau, Burton G. Malkiel and Yexiao Xu (2001), "Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk", Journal of Finance, 56(1): 1-43.

[17]   The models are relatively new and untested, but are indicative of a growing areas of research in asset pricing. See, for example, George M. Constantinides and Darrell Duffie (1996), "Asset Pricing with Heterogeneous Consumers", Journal of Political Economy 104(2): 219-240; John Y. Campbell, Martin Lettau, Burton G. Malkiel and Yexiao Xu (2001), "Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk", Journal of Finance, 54(1): 1-43; Alon Brav, George M. Constantinides, Christopher C. Geczy (2002), "Asset Pricing with Heterogeneous Consumers and Limited Participation: Empirical Evidence", Journal of Political Economy, 110(4): 793-824; Fangjian Fu (2009), "Idiosyncratic Risk and the cross-section of expected stock returns", Journal of Financial Economics, 91: 24-37; Francis A. Longstaff (2009), "Portfolio Claustrophobia: Asset Pricing in Markets with Illiquid Assets", American Economic Review, 99(4): 1119-1144.

7.57. This research is being carried out within a conceptual framework in which investors are assumed to maximise expected utility subject to constraints on investment and consumption opportunities, including constraints on wealth and on the availability of information.[18] It is being carried out within the "rational actor" framework of standard microeconomic theory. This was the framework within which the CAPM was derived.

7.58. Periodically, concern has been expressed over the naivety of the psychological foundations of the rational actor framework and, more specifically, over the presumption of expected utility maximization. During the 1980s, these concerns, and the fact that rational actor models did not seem to provide adequate explanations of financial markets, drove the emergence of a new conceptual framework – behavioural finance – based on more realistic psychological foundations, and supported by experimental and empirical analysis.[19]

7.59. After reviewing the then recent research on asset pricing models which relates a stochastic discount factor to macroeconomic risks, and nearly two decades of work in behavioural finance, Campbell concluded his 2000 survey of asset pricing:

Despite the promise of such [stochastic discount factor] research, in my opinion it is unrealistic to hope for a fully rational, risk based explanation of all the empirical patterns that have been discovered in stock returns. A more reasonable view is that rational models of risk and return describe a long-run equilibrium toward which financial markets gradually evolve. Some deviations from such models can be quickly arbitraged away by rational investors; others are much harder to arbitrage and may disappear only after a slow process of learning and institutional innovation.[20]

7.60. The research which has been undertaken within the behavioural finance paradigm provides further reasons to expect that the CAPM does not provide a complete view of the economic processes through which asset prices are determined.

7.61. There are, then, at least six reasons why the CAPM cannot, of itself, provide an estimate of the cost of equity which is commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services. These are:

(a) empirical research has shown that the CAPM does not provide good estimates of expected rates of return on financial assets;

(b) the CAPM explains expected rates of return in terms of only one type of risk; the effects of other types of risks, in particular, technological and regulatory risks, although potentially important, are excluded by the form of the model of choice from which the CAPM is derived;

(c) the CAPM is essentially a static model; when the dynamics of investment behaviour are taken into account at least one other risk factor is required to explain asset prices;

(d) the CAPM does not take into account the effects of idiosyncratic risks on asset prices; the effects of these risks are assumed to be eliminated by portfolio diversification, but the existence of the required diversification is not supported by the evidence;

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[18] On the issues with expected utility maximisation, see Mark Machina (1987), "Choice Under Uncertainty: Problems Solved and Unsolved", Journal of Economic Perspectives, 1(1): 121-154.

[19] A brief history of behavioural finance and a review of the earlier literature is provided by Robert J Shiller (2003), "From Efficient Markets Theory to Behavioral Finance", Journal of Economic Perspectives, 17(1): 83-104.

[20] John Y. Campbell (2000), "Asset Pricing at the Millennium", Journal of Finance, 55(4): 1515-1567. The stochastic discount factor approach to asset pricing is described in the Annexure to Attachment 1.

(e)   for derivation of the CAPM, investor expectations about investment opportunities and returns are assumed to be homogeneous; recent research, which examines the implications of the more reasonable view that investor expectations are heterogeneous, finds that optimal portfolios will not be well diversified, and idiosyncratic factors are important in explaining expected rates of return; and

(f)   dissatisfaction with the naive psychological foundations of the rational actor framework of financial economics has led to the emergence of behavioural finance, which further challenges the adequacy of the CAPM as an explanation of the economic processes through which asset prices are generated.

7.62.   The CAPM cannot, therefore, of itself provide a definitive estimate of the cost of equity. The estimate of the cost of equity obtained from the CAPM must be assessed for whether it is commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.

7.63.   That Rule 87 would permit this conclusion, when the CAPM is identified in Rule 87(2) as a well accepted financial model may, at a superficial level, be regarded as paradoxical.

7.64.   The paradox is, however, easily resolved. The CAPM is widely used despite the fact that it has significant limitations. The CAPM explains, through its characterisation of risk, at least a part of the economic processes through which asset prices are determined. It is a simple model, which is well known to, and easily applied by, financial market practitioners. Alternatives to the CAPM are, at the present time, not well known to practitioners, and are not easily applied in practice (although this is changing).

7.65.   Surveys of financial market practice indicate that the CAPM model is widely used by financial market practitioners. In a survey conducted by Truong, Partington and Peat in 2004, some 72% of the 53 respondent Australian companies indicated that they used the CAPM in estimating the cost of capital.[21] Only one respondent indicated use of a multiple factor model, and no respondent was using the Fama-French three factor model.

7.66.   This widespread use of the CAPM might be expected. The CAPM continues to be used to provide an introduction to asset pricing theory in the teaching of, and in textbooks on, corporate finance. As Fama and French have observed:

We continue to teach the CAPM as an introduction to the fundamental concepts of portfolio theory and asset pricing, to be built on by more complicated models like Merton's (1973) ICAPM.[22]

7.67.   However, the degree of rigour adopted by Australian users of the CAPM in their estimation of the parameters of the model, and in the way in which they actually applied the results, was not clear from the survey by Truong, Partington and Peat. They noted that the majority of respondents claimed to use varying values for the risk free rate, the market risk premium and the equity beta.[23]

7.68.   In the hands of financial market practitioners, the CAPM is a tool for "roughly sizing" a required rate of return on equity. It is not an instrument to be used for the purpose of

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21   Giang Truong, Graham Partington, and Maurice Peat (2008), "Cost-of-Capital Estimation and Capital Budgeting Practice in Australia", Australian Journal of Management, 33(1): 95-121.

22   Eugene F. Fama and Kenneth R. French (2004). "The Capital Asset Pricing Model: Theory and Evidence", Journal of Economic Perspectives, 18(3): 25-46.

23   Truong, Partington and Peat, 109.

obtaining a precise result. This is clear from the submission made by the Financial Investor Group (FIG) to the AER's 2009 review of WACC parameters used in the setting of access prices for regulated electricity networks.[24] Section 4.5 of that submission noted:

In assessing the AER's approach to applying the CAPM, the FIG observes that the CAPM – despite its limitations – is widely used by stockbroker analysts and other sectors of the market.

7.69.   The FIG submission then continues:

Market practitioners often use their commercial judgement in applying the CAPM to ensure the outcomes accord with market reality.

7.70.   Practitioners start with the CAPM, but adjust the results it produces. There is no indication in the FIG submission of how financial market practitioners establish "market reality". The use of "commercial judgment" allows financial market practitioners to be guided by the CAPM without their having to adopt the results it produces.

7.71.   Rule 87 similarly requires the setting of the rate of return to be guided by a well accepted financial model – and offers as the CAPM as a potential candidate – but recognises the inherent limitations of such a model. Rule 87 further requires that the result be tested against the "reality" of prevailing conditions in financial markets, and the risks for which investors in gas pipeline systems must be compensated.

Cost of debt

7.72.   The estimate of the cost of debt of 9.95% used in calculating the real pre-tax WACC of 9.39% is an intermediate result obtained by applying a relatively simple financial model. The cost of debt is estimated as the sum of:

(a)   the nominal risk free rate of return; and

(b)   a debt risk premium.

7.73.   This model for estimating the cost of debt has been used extensively by the AER and the ERA. As Merton has shown, it can be derived by applying the options pricing theory of Black and Scholes.[25] From Merton's derivation, the premium for risk is $-[\ln[N(h_2) + N(h_1)/d]/T$. It is a function of the probability of default through $N(h_1)$ and $N(h_2)$, which is determined by:

(a)   the date on which the bond matures, T;

(b)   the variance or volatility of company returns, σ^2; and

(c)   the quasi debt to total value ratio, $d = Be^{-rT}/V$.

7.74.   These three factors allow a wide range of possible values for the yield, or cost of debt, through their effects on the debt risk premium via the probabilities $N(h_1)$ and $N(h_2)$.

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[24]   Financial Investor Group (AMP Capital Investors/Macquarie, APA Group, Babcock and Brown Infrastructure, Cheung Kong Infrastructure Holdings Limited, Hasting Funds Management, Hong Kong Electric Holdings Limited, Singapore Power and Spark Infrastructure), *Submission to the AER's WACC Parameter Review: The investor perspective*, January 2009.

[25]   See Fischer Black and Myron Scholes (1973), "The Pricing of Options and Corporate Liabilities", Journal of Political Economy, 81(3): 637-654; and Robert C. Merton (1974), "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates", Journal of Finance, 29(2): 229-240. Merton's explanation of the pricing of corporate debt using options pricing theory was pioneering, but is not now the only approach to the debt pricing in the theory of financial economics. Moreover, Merton's results were obtained by making a number of important simplifying assumptions. Some of these assumptions can be removed, but at the cost of adding complexity.

7.75.   In the context of determining a rate of return to be used in the setting of gas pipeline access prices, Rule 87(2) requires use of a financing structure which meets benchmark standards as to gearing and other financial parameters for a going concern and reflects in other respects best practice.   Although DBP doubts that there is a "benchmark standard as to gearing", it accepts that there are patterns in capital structures across industries and, for the purpose of applying Rule 87(2), does not question the assumption usually made for gas pipeline service providers that the benchmark standard for gearing is 60% debt.

7.76.   By fixing the gearing at 60% debt, the quasi debt to total value ratio is effectively fixed, leaving only the period to maturity and the variance or volatility of company returns as factors determining the cost of debt.   The AER assumes, and DBP has accepted for the purpose of applying Rule 87(2), that long lived pipeline assets will be financed by long term debt: the relevant term to maturity is 10 years.

7.77.   This leaves the matter of the variance or volatility of company returns.   The AER seeks to capture this aspect of debt pricing by assuming a benchmark standard credit rating: BBB.

7.78.   Krahnen and Weber offer a reasonably concise definition of a credit rating: a credit rating is a mapping from - a relationship between - the attributes of a company and its default risk.[26]   In practice, company attributes are mapped to a discrete number of rating classes, and the rating classes are, in turn, mapped to probabilities of default on the basis of historical data.   The relationship between rating classes and probabilities of default is essentially a statistical relationship.   The relationship is not a causal relationship; it does not have clear conceptual foundations.

7.79.   In consequence, and as Elton, Gruber, Agrawal and Mann have demonstrated empirically, the bonds within a given (Standard and Poor, or Moody's) rating class cannot be assumed to be of the same default risk.[27]

7.80.   Some financial economists, although acknowledging the undoubted importance of credit ratings to financial market participants, have questioned the economic role of those ratings.   In their well known textbook, Richard Brealey and Stewart Myers have observed that market participants "almost certainly exaggerate the influence of rating agencies, which are as much following investor opinion as leading it".[28]   A recent paper in which Boot, Milbourn and Schmeits seek to understand the economic role of ratings concludes:

> *Credit ratings are one of the most puzzling features of today's financial markets.   Their importance is evident from the behavior of market participants; however, academic researchers have generally been sceptical about their incremental value.[29]*

7.81.   Boot, Milbourn and Schmeits use a theoretical argument to show that credit ratings can play a role coordinating investor expectations within the complex institutional framework of modern capital markets.   This does not mean that the ratings convey no information about default risk.   Rather, like the work Elton, Gruber, Agrawal and Mann, it is a basis

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[26]   Jan Pieter Krahnen and Martin Weber (2001), "Generally accepted rating principles: A primer", Journal of Banking &Finance, 25: 3-23.

[27]   Edwin J. Elton, Martin J. Gruber, Deepak Agrawal and Christopher Mann (2004), "Factors affecting the valuation of corporate bonds", Journal of Banking & Finance, 28: 2747-2767.

[28]   Richard A. Brealey and Stewart C. Myers (2007), *Principles of Corporate Finance*, 7th ed., McGraw Hill, New York, page 685.

[29]   Arnoud W.A. Boot, Todd T. Milbourn and Anjolein Schmeidts (2006), "Credit Ratings as Coordination Mechanisms", Review of Financial Studies, 19(1): 81-118.

for viewing credit ratings as providing an incomplete and imprecise measure of default risk.

7.82. The AER uses a benchmark credit rating as an indicator of default risk and, implicitly, uses the indicated default risk to ascertain the debt risk premium (having standardised for gearing and term to maturity). The national regulator uses the benchmark credit rating to ascertain the premium - $[\ln[N(h_2) + N(h_1)/d]/T$ directly, rather than seeking to ascertain variance or volatility of return (σ^2), and to infer the premium from that (again, given standard gearing and term to maturity). The resulting debt risk premium is, however, at best, a rough approximation because:

    (a)   the premium is not simply the probability of default; and

    (b)   credit ratings are, themselves, incomplete and imprecise measures of default risk.

7.83. Setting aside the issue of the accuracy of the result obtained, the use of benchmark standard credit rating is simple, practical and has intuitive appeal. However, before the benchmark of BBB can be used, consideration must be given to the question of whether it is the benchmark standard required by Rule 87(2).

7.84. In applying the scheme of the NGL and the NGR, effect must be given to the statutory objective of section 24(5) of the NGL: the reference tariff is to allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates. In these circumstances, if a sample of businesses or debt issues is to be considered for the purpose of establishing a benchmark credit rating, the sample cannot be a broad sample. It must be restricted to businesses, or debt issues by businesses, in the gas pipeline industry. Only those businesses provide the reference services in question.

7.85. This is indicative of a more fundamental problem.

7.86. Industry standards or benchmarks are important in schemes of incentive regulation. By allowing a regulated business to recover only those costs of service provision which are benchmarked to standards of industry performance, and by rewarding superior performance through mechanisms like price caps, regulation can provide incentives for low cost service delivery in circumstances where those incentives are not provided by competition.

7.87. However, for incentive regulation to be effective, the benchmarks which it uses must be achievable by a regulated business. If they are obviously not achievable, the business will not be motivated to pursue them.

7.88. In the estimation of the debt risk premium, there may be, as DBP has noted above, some basis for adopting a benchmark standard for gearing. Furthermore, there may be a basis for adopting a benchmark standard for the term to maturity of bond issues for the purpose of estimating the cost of debt (although financial markets are indicating a shift away from the current benchmark standard of 10 years).

7.89. Default risk, in the case of gas pipeline service providers, is clearly different: it cannot be reasonably benchmarked or standardised.

7.90. A gas pipeline service provider uses assets which are business-specific (they have few alternative uses, and much lower values in those alternative uses), and these assets are location-specific (they cannot easily be removed and redeployed in other locations).

7.91.   Most of the services supplied using a gas pipeline are sold under long term contracts (to protect business-specific and location-specific pipeline assets, and to protect the business-specific assets of end-users using large volumes of gas). If a pipeline service provider is regulated, the prices it can charge for service are fixed for extended periods, and subject to change only in accordance with the rules of the regulatory regime which applies. Revenues from a given user base are, then, to a large extent fixed, depending on whether the long term contracts for services are long term contracts for capacity or for volume transported. Costs, being mainly capital costs, are also largely fixed. In these circumstances, net cash flows are relatively stable and certain.

7.92.   With assets which are business- and location-specific, the relatively stable and certain net cash flow of a gas pipeline service provider is the principal security available to providers of debt finance. (The physical pipeline assets provide little recompense to providers of debt in the event of business failure.) The default risk to which providers of debt are exposed is, then, primarily the counterparty risk in the long term sales contracts of the pipeline service provider. That counterparty risk may also transmit general macroeconomic risks, of the type which are captured by equity pricing models such as the Capital Asset Pricing Model, but there is evidence that this transmission is not complete.[30]

7.93.   When the default risk to which providers of debt are exposed is, primarily, the counterparty risk in long term sales contracts, that risk will vary systematically across gas pipeline service providers with differences in the users served. A pipeline service provider providing transportation of gas to mining and mineral processing operations will be exposed to counterparty risk which is different from the counterparty risk arising from the long term contracts of a pipeline service provider providing transportation services to large industrial users of gas, or to electricity generators. The counterparty risks of these service providers will, in turn, be different from the counterparty risk of a pipeline service provider which transports gas mainly for retailers supplying smaller commercial and residential end-users.

7.94.   Differences in default risk are driven by differences in pipeline user bases. A pipeline service provider does not choose the industries in which its users operate and, beyond ensuring that its contracting practices reflect best practice, cannot control the counterparty risks in its long term sales contracts. These risks are specific to the user base of a particular pipeline, and cannot reasonably be benchmarked. To benchmark them, albeit imperfectly, as the AER has attempted to do through "benchmarking" the credit rating used for the purpose of estimating the debt risk premium allows some service providers to earn higher returns than those which result from applying the "benchmark" for no other reason than they serve particular types of users. Moreover, it expropriates return from those service providers which cannot, through any action which might be taken by management, achieve the "benchmark" because this is precluded by the composition of their user bases. The pipeline service providers in this latter class are deprived of the opportunity to recover their efficiently incurred financing costs.

7.95.   Rule 87(1) requires a rate of return which is not only commensurate with prevailing capital market conditions, but which is also commensurate with the risks involved in providing reference services. Through the application of the criteria of Rule 87(1), the statutory objective of section 24(5) of the NGL is to be achieved. Section 24(5) refers to specific reference services: those for which a reference tariff is being determined. In

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[30]   See, for example, Edwin J. Elton, Martin J. Gruber, Deepak Agrawal and Christopher Mann (2001), "Explaining the rate Spread on Corporate Bonds", Journal of Finance, 54(1): 247-277, and Francis A. Longstaff, Sanjay Mithal and Eric Neis (2005), "Corporate Yield Spreads: Default Risk or Liquidity? New Evidence from the Credit Default Swap Market", Journal of Finance, 55(5): 2213-2253.

consequence, the reference services to which Rule 87(1) refers are those of the pipeline for which reference tariffs are being determined. Rule 87(1) does not use the term reference service in some non-specific or generic sense. In these circumstances, any measure of the debt risk premium (which cannot be benchmarked) must be business-specific. If the debt risk premium were, in some way, benchmarked across a range of businesses (by, for example, benchmarking the credit rating used in determining the premium), any rate of return which resulted from the process of applying Rule 87 would not be a rate which was commensurate with the risks involved in providing reference services.

7.96. DBP notes that, although the requirement of Rule 87 of the NGR for a benchmark standard for gearing is explicit, the Rule does not require a benchmark standard for credit rating. Although Rule 87(2)(b) anticipates benchmark standards for financial parameters (and specifically for gearing) for a going concern, and which reflect in other respects best practice, it makes no specific reference to credit rating. DBP sees this as being entirely consistent with its view that, in the case of gas pipeline service providers, credit rating cannot be benchmarked.

7.97. In these circumstances, the AER's model, and the way in which it is applied using a benchmark credit rating to establish the debt risk premium, cannot provide a definitive estimate of the cost of debt. The estimate of the cost of debt obtained from this model and method must be assessed for whether it is commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.

Is a real pre-tax WACC of 9.39% the rate of return required by Rule 87?

7.98. The real pre-tax WACC of 9.39% which results from applying the method of Rule 87(2) has been obtained using:

(a) an estimate of the nominal post-tax cost of equity of 10.91%, made using the CAPM, which may not be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services; and

(b) an estimate of the cost of debt of 9.95%, made by applying a model and method used by the AER, which may not be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.

7.99. The real pre-tax WACC of 9.39% which results from the application of Rule 87(2) may not, therefore, be the rate of return required by Rule 87. It may not satisfy the criteria of Rule 87(1), and must be assessed against the criteria of that rule and, if necessary, adjusted to produce an outcome which does satisfy those criteria. The required assessment, and process of adjustment which DBP has undertaken, are described in the next section of this response.

8. DETERMINING THE RATE OF RETURN

Cost of equity

8.1. DBP has assessed the estimate of the nominal post-tax cost of equity of 10.91% which it made using the CAPM by comparing that estimate with:

(a) estimates of the nominal post-tax cost of equity obtained from three other asset pricing models; and

(b) estimates of the nominal post-tax cost of equity which equity analysts have advised that prospective investors in similar infrastructure businesses might reasonably expect.

8.2. Economics consultancy firm NERA was retained by DBP to provide estimates of the cost of equity using:

(a) Black's capital asset pricing model;

(b) the Fama-French three factor model; and

(c) a zero-beta version of the Fama-French three factor model.

8.3. NERA's estimates of the cost of equity are summarized in Table 3, and NERA's report prepared for DBP is attached to this response as Attachment 4.

Table 3
Cost of equity estimates for an Australian infrastructure business computed using weekly data

Model	Risk free rate	Zero-beta premium	Beta			Risk premium			Return on equity
			Market	*HML*	*SMB*	Market	*HML*	*SMB*	
Black's capital asset pricing model	5.71%	6.50%	0.53			0.00			12.21%
Fama-French three factor model	5.71%		0.56	0.40	0.30	6.50	5.90	-0.08	11.72%
Zero-beta Fama-French model	5.71%	6.50%	0.56	0.40	0.30	0.00	5.90	-0.08	14.56%

DBP's application of the CAPM produced a nominal post-tax rate of return on equity – cost of equity – of 10.91% (see

8.4. Table 2 above).

8.5. However, the CAPM does not adequately take into account systematic risks as they affect expected rates of return on equity, and takes no account of idiosyncratic risks, which include, but are not limited to, the risks involved in providing reference services.

8.6. Black's capital asset pricing model is derived in a way which addressed one of the more contentious assumptions made for derivation of the CAPM. It is derived without assuming unrestricted borrowing and lending at the risk free rate of return. Using Black's capital asset pricing model, NERA has estimated the cost of equity to be 12.21%.

8.7. The difference between the estimate of the cost of equity made using Black's capital asset pricing model and the estimate of the cost of equity made using the CAPM is 1.3%. This difference is, in part, a measure of the error attributable to the inappropriate assumption about borrowing and lending at the risk free rate made for CAPM derivation.

8.8. Black's capital asset pricing model incorporates a view of systematic risk which is the same as that incorporated in the CAPM and, like the CAPM, Black's capital asset pricing model takes no account of idiosyncratic risks, which include, but are not limited to, the risks involved in providing reference services.

8.9. A broader – although by no means complete – view of systematic risk is incorporated in the Fama-French three factor model. Using the Fama-French three factor model, NERA has estimated the cost of equity to be 11.72%.

8.10. The broader view of systematic risk incorporated in the Fama-French three factor model, and its capture of the effects of intertemporal substitution, result in an estimate of the cost of equity which is higher than the estimate obtained from the CAPM. The difference between the estimate of the cost of equity made using the Fama-French three factor model and the estimate of the cost of equity made using the CAPM is 0.8%. This difference is, in part, a measure of the error attributable to the limited characterisation of risk in the CAPM, and to the static nature of the model. Like the CAPM and Black's capital asset pricing model, the Fama-French three factor model takes no account of idiosyncratic risks, which include, but are not limited to, the risks involved in providing reference services.

8.11. A zero-beta version of the Fama-French three factor model "corrects" the assumption about unrestricted borrowing and lending at the risk free rate of return. Using the zero-beta version of the Fama-French three factor model, NERA has estimated the cost of equity to be 14.56%.

8.12. The estimates made using Black's capital asset pricing model, the Fama-French three factor model and the zero-beta version of the Fama-French three factor model all indicate that the cost of equity is likely to be higher than 10.91%, the estimate made using the CAPM. Black's capital asset pricing model and the Fama-French three factor model both point to a cost of equity of around 12.0%. The zero-beta version of the Fama-French model points to a higher cost of equity.

8.13. Furthermore, none of the CAPM, Black's capital asset pricing model, the Fama-French three factor model, and the zero-beta version of the Fama-French three factor model, takes account of idiosyncratic risks, which include, but are not limited to, the risks involved in providing reference services. In consequence, the estimates made using these models are likely to understate the return that equity investors require from the provision of reference services using the DBNGP.

8.14. As noted in paragraph 4.22 above, asset pricing models are simplifications of a complex reality and necessarily involve approximations, allowing the possibility that an estimate of the cost of equity obtained using a particular model is not commensurate with prevailing conditions in financial markets, and with the risks of service provision financed using the equity in question. DBP therefore sought alternative estimates of the cost of equity which did not depend on the use of asset pricing models.

8.15. For the purpose of determining the rate of return and the proposed reference tariffs which were submitted to the ERA in April 2010, DBP engaged financial consultants SFG to estimate, using data from equity analysts' reports, the returns on equity expected by investors in six energy infrastructure businesses. The six infrastructure businesses (APA Group, DUET, Envestra, Hastings Diversified Utilities Fund, Spark Infrastructure Group and SP AusNet) were seen as being comparable to DBP in the sense that an investment in any of them would be regarded by investors as an alternative to an investment in DBP.

8.16. The equity analysts' reports provided forecasts of dividend yields, from which estimates of expected returns could readily be determined. SFG also applied a simultaneous estimation technique to jointly estimate dividend yield and expected long term share price appreciation. This was done in a way which reconciled each equity analyst's yield and growth forecasts with the same analyst's price projection, thereby removing the effects of potential biases in the forecasts. The simultaneous estimation technique also produced a range for the estimate of the nominal rate return on equity which was similar to the range obtained directly from the analysts' forecasts of dividend yields.

8.17. Recognizing the possibility of changes in financial market conditions since April 2010, DBP asked SFG, in April 2011, to update the analysis of its earlier report, and to respond to issues raised about its methods by both the ERA and the AER. SFG's update report is attached to this response as Attachment 5.

8.18. SFG found that the forecasts of dividend yield which equity analysts had recently made for the six comparable infrastructure businesses averaged approximately 9% (as compared with 10.5% in April 2010).

8.19. Dividend yield was, of course, only one component of the return available to equity investors. Those investors would also have expected a component of return from stock price appreciation. SFG adopted a conservative view of price appreciation – 2.5% to 3.0% – noting that this implied real capital growth of only 0% to 1%. SFG therefore advised that a reasonable estimate of the expected nominal return on equity, based on current analysts' forecasts, was in the range 11.5% to 12.5%.

8.20. An estimate of around 12.0%, as might be obtained using Black's CAPM or the Fama-French three factor model understates the cost of equity because it ignores important elements for risk for which equity investors seek compensation. The results obtained by SFG incorporate a more comprehensive view of risk to the extent that equity analysts use all of the available information – about the economy and, about specific businesses – when making their projections of dividend yields. They also – conservatively – indicate that the rate of return is likely to be in excess of 12.0%. The zero-beta version of the Fama-French three factor model suggest the cost of equity may be as high as 14.56%. DBP's view is that an estimate of the cost of equity of 12.5% is consistent with prevailing conditions in the market for funds and the risks involved in providing reference services.

Cost of debt

8.21. DBP has assessed the estimate of the nominal pre-tax cost of debt of 9.95%, which it made by applying the provisions of Rule 87(2), by comparing it with the cost of debt determined by an experienced capital markets advisor.

8.22. DBP had, earlier, engaged capital markets advisor, AMP Capital Investors (**AMPCI**), to estimate the cost of debt which was used in determining the rate of return proposed for the access arrangement revisions proposal which it submitted to the ERA on 1 April 2010. In April 2011, AMPCI was asked to update its earlier work.

8.23. For its work in 2010, AMPCI was asked to assume a borrower which was a large regulated utility, operating in Australian market, and with a regulated asset base in excess of $2 billion. This borrower was to have a gearing of around 60% of the regulated asset base, and was to have a credit rating in the BBB range.

8.24. AMPCI has continued to make these assumptions. However, it has advised that lenders do not rely on these general attributes when assessing the credit quality of a particular

entity.   They will make both top-down and bottom-up assessments.   A top-down assessment will consider the class of assets for which finance is being sought, and the current stages of the economic and credit cycles. A bottom-up assessment will examine the business and financial risks of the entity. An internal credit score may be computed and compared with external ratings, but, in general, a specific borrower or credit risk is compared against comparables in a global market for funds, and the cost of debt is determined from that comparison.

8.25.   AMPCI's estimation of the cost of debt has been guided by its understanding of the business and financial risks of the DBNGP. A substantial part of the debt which currently finances the pipeline was to be refinanced in 2010 and 2011 and, in 2009, AMPCI had been engaged, by DBP, to advise on refinancing options.

8.26.   AMPCI reported, in April 2011, that the markets in which the large regulated utility would seek finance would still be those identified in 2010. They would be:

    (a)   the Australian bank market;

    (b)   the Australian bond market;

    (c)   the US public bond (144a) market; and

    (d)   the US private placement market.

8.27.   These were markets in which investors have the capacity to provide the finance required, and who understand the operations of, and the credit risks associated with, large regulated utility businesses.

8.28.   Conditions in these markets continued to be volatile and susceptible to "shocks" (such as the European sovereign debt crises), but the availability of finance had improved since the Global Financial Crisis, and shorter term credit margins had fallen, although margins on longer term debt remained high. Credit margins for cross currency and interest rate swaps had also fallen, but margins in general remained significantly higher than they were before the Global Financial Crisis.

8.29.   AMPCI also drew attention to what it considered to be the key lesson from experience during the Global Financial Crisis. Companies seeking debt finance cannot rely on a narrow group of counterparties, markets and debt instruments. Diversification is critical to managing the risk of a portfolio of debt.
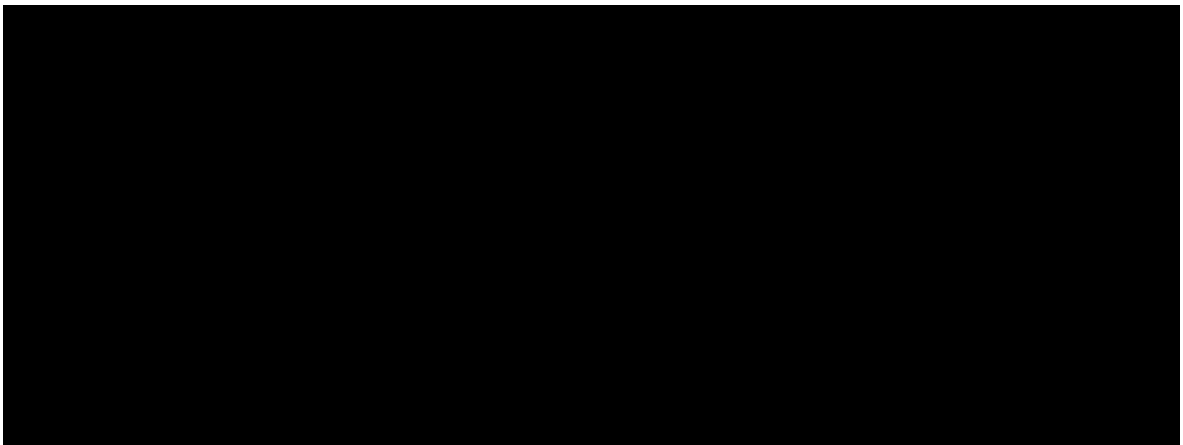
8.30.

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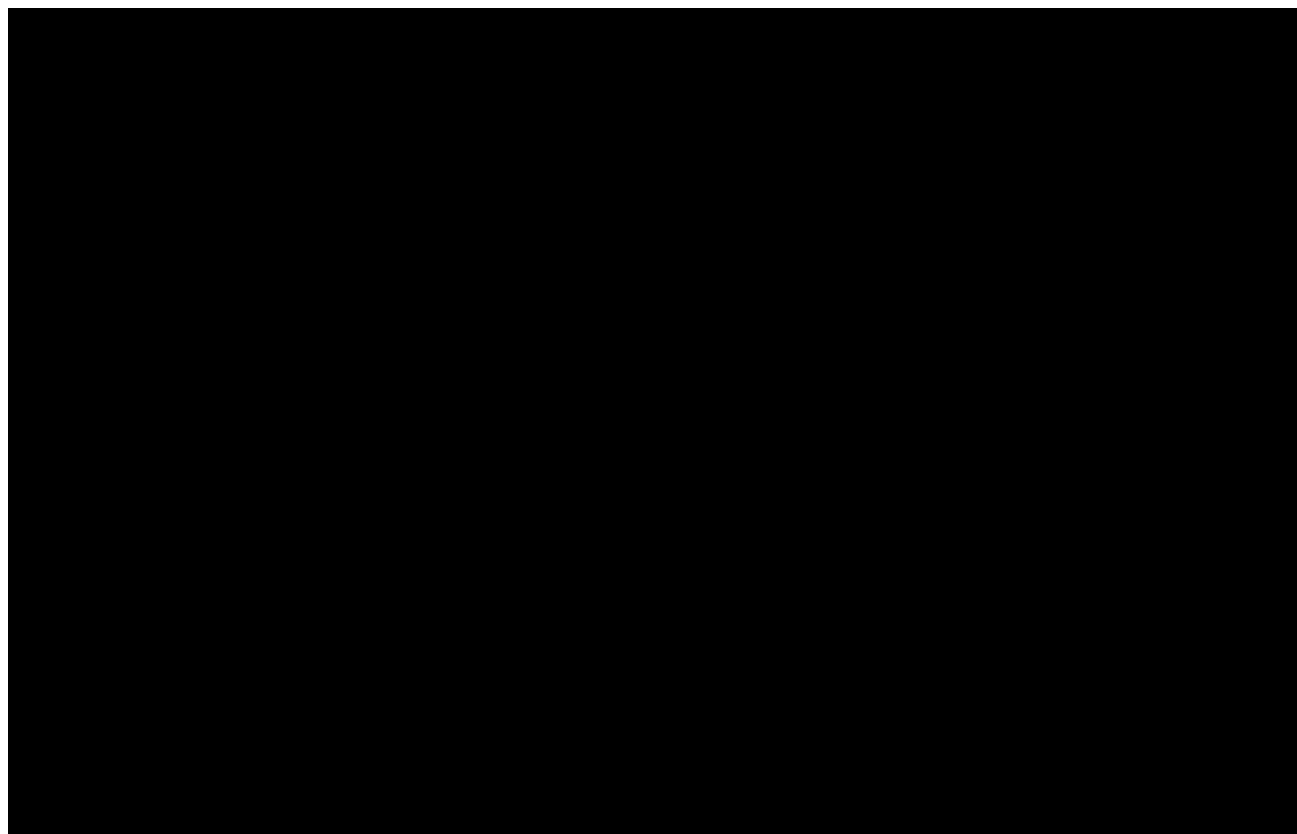
8.34. Although it uses a nominal risk free rate of return and a debt risk premium which are current in the sense that they have been calculated using current data, the AER's method otherwise ignores current financial market conditions. It ignores the limited financing capacity of particular markets and market segments (especially Australian debt markets), and it ignores diversification across markets as a prudent way of reducing portfolio risk.

8.35. Furthermore, the AER's method uses a debt risk premium calculated as a weighted average of an estimate of the premium on bonds rated BBB with term to maturity of 10 years, and the premium on a recent bond issue by APT. The resulting premium, and hence the estimated cost of debt, are imprecise for the following reasons:

(a) the premium on bonds rated BBB with a term to maturity of 10 years is estimated as the premium on bonds with a term of seven years (for which data are available), adjusted for the difference between the premiums on AAA bonds with a term to maturity of 10 years, and AAA bonds with a term of seven years; the premium obtainable from the Bloomberg curves is not for bonds rated BBB with a term to maturity of 10 years because such bonds are not currently traded;

(b) risk is taken into account via an assumed benchmark credit rating, but a benchmark credit rating cannot provide an accurate indication of service provider default risk; and

(c) averaging the premium estimated from Bloomberg fair value curves with the premium on a particular (APT) bond is inherently arbitrary.

8.36. In these circumstances, DBP has determined that an estimate of the cost of debt of 9.52% is consistent with prevailing conditions in the market for funds and the risks involved in providing reference services.

Real pre-tax WACC and rate of return

8.37. These estimates of the cost of equity and the cost of debt, which are commensurate with prevailing conditions in the market for funds and the risks involved in providing reference

services, can be used to calculate a real pre-tax WACC (assuming, as above, an estimate of gearing of 60.0%, an estimate of the tax rate of 30.0%, an estimate of gamma of 0, and an estimate of expected inflation of 2.57%). The calculation is summarised in Table 6.

Table 6
Calculation of real pre-tax WACC

| Parameter		Estimate
Cost of equity	$E(r_e)$	12.50%
Cost of debt	$E(r_d)$	9.52%
Ratio of equity to total value	$1 - D/V$	40.00%
Gearing: ratio of debt to total value	D/V	60.00%
Tax rate	T_c	30.00%
Value of imputation credits	γ	0
Expected inflation	π^e	2.57%
Nominal pre-tax WACC	$WACC_{nominal\ pre-tax} = E(r_e) \times (1/(1 - T_c \times (1 - \gamma) \times E/V + E(r_d) \times D/V$	12.85%
Real pre-tax WACC	$WACC_{real\ pre-tax} = (1 + WACC_{nominal\ pre-tax})/(1 + \pi^e) - 1$	**10.03%**

8.38. The resulting real pre-tax WACC of 10.03% is an estimate of the rate of return expected by investors which is commensurate with prevailing conditions in the market for funds and with the risks involved in delivering the reference services.

8.39. This estimate of the rate of return has been arrived at by:

(a) using a well accepted approach – a weighted average of the cost of equity and the cost of debt;

(b) using an estimate of the cost of equity and an estimate of the cost of debt each of which has been determined using a well accepted financial model (the CAPM for the cost of equity, the sum of the risk free rate of return and a debt risk premium in the case of the cost of debt);

(c) estimating the cost of equity and the cost of debt, and calculating their weighted average, using estimates which were either well accepted in the context of asset pricing (for example, the estimate of the equity beta of 0.8), or which had been made by relevant experts, using appropriate methods, specifically for the purpose of amending the rate of return of the access arrangement revisions proposal (for example, the estimate of the market risk premium of 6.5% and the estimate of gamma of 0);

(d) (d) comparing the estimate of the cost of equity made using the CAPM with estimates of that cost made using three other asset pricing models which are well established in the literature of financial economics, and with an estimate of the cost of equity made using information from reports prepared by equity analysts for the purpose of advising their clients on investment opportunities;

(e) explicitly adjusting the estimate of the cost of equity made using the CAPM so that it was consistent with the estimates of that cost obtained from the other asset pricing models and from the equity analysts' reports, thereby ensuring its commensurability with prevailing conditions in the market for funds and with the risks involved in providing reference services;

(f)   comparing the estimate of the cost of debt made as the sum of the nominal risk free rate of return and a debt risk premium with an estimate of that cost made by an experienced debt advisor taking into account prevailing conditions in financial markets and business risks; and

(g)   explicitly adjusting the estimate of the cost of debt made as the sum of the nominal risk free rate of return and a debt risk premium so that it was consistent with the estimate made by the experienced debt advisor taking into account prevailing conditions in financial markets and business risks, thereby ensuring its commensurability with prevailing conditions in the market for funds and with the risks involved in providing reference services.

8.40.   That is, the estimate of the rate of return of 10.03% has been arrived at on a reasonable basis.

8.41.   The estimate of the rate of return of 10.03% has been determined using well accepted financial models, and from the properly estimated parameters of those models. The results from applying these models – essentially theoretical results – have then been compared with, and adjusted according to, direct evidence from financial market practitioners on the cost of equity and the cost of debt, so that the resulting estimate of the rate of return represents the best estimate possible in the circumstances.

8.42.   The estimate of 10.03% (real, pre-tax) satisfies the requirements of Rule 74. Moreover it is an estimate which is commensurate with prevailing conditions in the market for funds and with the risks involved in providing reference services in accordance with the requirements of Rule 87(1). It is, therefore, the rate of return required of the NGR.

9. CONFIDENTIALITY
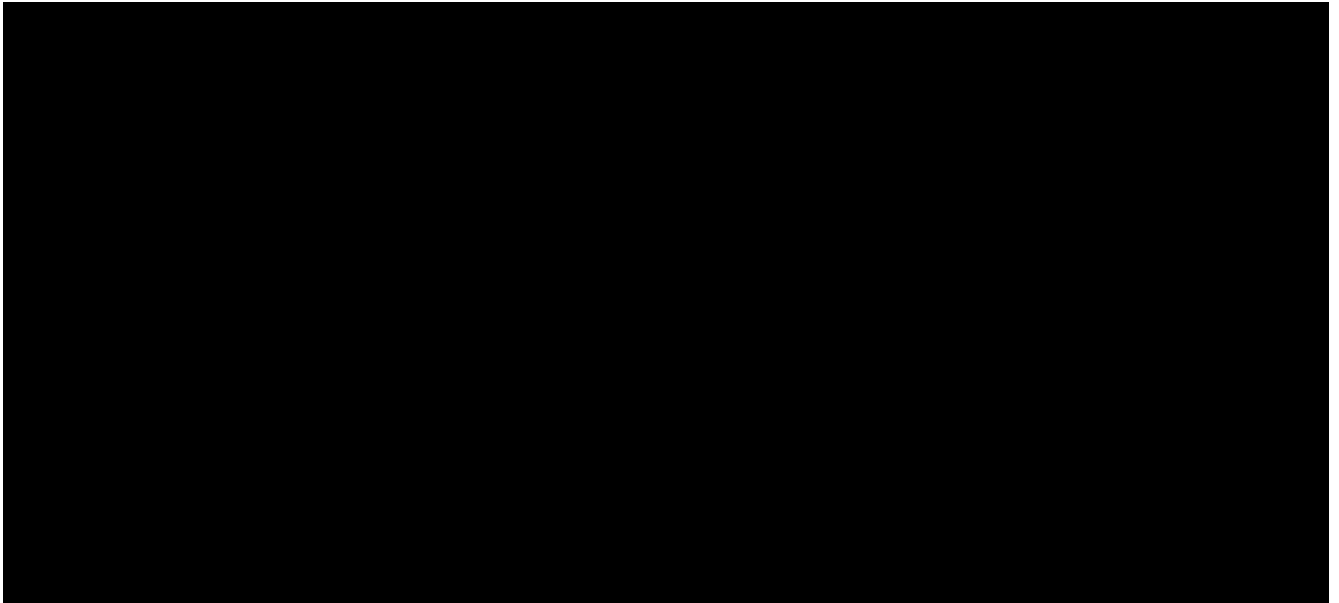
10. ATTACHMENTS

ATTACHMENT 1:   RATE OF RETURN IN THE DRAFT DECISION

ATTACHMENT 2:   THE PROVISION OF ANALYSIS SUPPORTING THE VALUE FOR MARKET RISK PREMIUM (MRP)

ATTACHMENT 3:   REGULATORY ESTIMATE OF GAMMA UNDER THE NATIONAL GAS RULES : RESPONSE TO DRAFT DECISION

**ATTACHMENT 4:   ESTIMATING THE REQUIRED RATE OF RETURN ON EQUITY FOR
                    A GAS TRANSMISSION PIPELINE**

ATTACHMENT 5: **THE REQUIRED RETURN ON EQUITY COMMENSURATE WITH PREVAILING CONDITIONS IN THE MARKET FOR FUNDS: RESPONSE TO DRAFT DECISION**

ATTACHMENT 6:   AMPCI COST OF DEBT SUMMARY PAPER

ATTACHMENT 7:   COST OF EQUITY IN THE ERA – DBNGP DRAFT DECISION

ATTACHMENT 8:   AMPCI DRAFT DECISION ISSUES PAPER