Assessment of the WACC in the transmission price control review proposals

Note prepared for gas distribution network operators by Oxera and Professor Julian Franks

July 17th 2006

1 Introduction

This summary note provides an independent assessment of the appropriate weighted average cost of capital (WACC) in the energy network sector. It takes account of Ofgem's initial proposals for the transmission price control review (TPCR), published in June 2006,[1] and draws on analysis and research undertaken for the gas distribution network operators (gas DNs) by Oxera and Professor Julian Franks of London Business School.

The conclusion reached is that, although Ofgem has followed a sound approach in assessing the cost of capital—in terms of taking account of longer-term averages for various parameters—there are public-interest reasons for a somewhat higher cost of capital estimate. This applies to both the transmission companies specifically, and the energy network sector more generally.

However, before providing the analysis to support this conclusion, it is necessary to note a few important principles that need to be taken into account in setting the cost of capital.

2 Key issues to be considered in setting the WACC

The following three important issues have been identified.

i. Cost of capital sufficient to attract/retain equity in the sector

In recent years, there has been growing public-interest concern about the gearing levels adopted by a range of companies in the network utilities,[2] in particular with regard to:

[1] Ofgem (2006), 'Transmission Price Control Review: Initial Proposals', June.

[2] HM Treasury and DTI (2004), 'The Drivers and Public Policy Consequences of Increased Gearing', October.

– the potential that the long-term sustainability of more highly geared structures remains untested. This concern is compounded by the possibility that, if one network utility were to face financial difficulties, there may be a 'contagion' effect leading to systemic problems;

– the possibility that these concerns may lead to underinvestment, resulting in a long-term detrimental impact for consumers.

Although the Ofwat/Ofgem Financing Networks paper indicates that these concerns have not, as yet, been felt acutely in the water and energy network sectors, experience from other UK regulated sectors illustrates that these concerns are not only of theoretical interest.[3] This suggests that there is a public-interest benefit from determining a cost of capital that is sufficiently high to encourage investment and, where necessary, attract new equity capital into the energy network sector.

For these reasons, Ofcom has noted that it:

> believes that the costs associated with setting too low a cost of capital are greater than those associated with setting it too high.[4]

ii. Regulatory commitment

In parallel with the concern regarding gearing levels, interest has focused on 'regulatory commitment'. In the cost of capital debate, one of the important facets of this concept is recognition that investors will make decisions on whether to undertake investment based on the expected risk and return profile *over the lifetime of the asset*. Ofgem's determination of the cost of capital will determine the return not only on marginal new investment but also on existing assets. Consequently, there is a need, as Ofgem has acknowledged, to treat recent market-based evidence with care. Responding too aggressively to current, market-based information could lead to lifetime returns on some assets being lower than anticipated at the time of the investment decision, increasing perceptions of regulatory risk, and potentially damaging long-term investment incentives in the sector. This problem has analogies with the time-inconsistency problem discussed in the economics literature, which illustrates the benefits to be derived from long-term commitment to particular policies.

iii. Regulatory precedent

In addition to its 'intertemporal' aspect, the commitment debate has cross-sectoral implications. Predictability and consistency will be enhanced by taking account of decisions in other sectors, and, indeed, are expected by the capital markets. Furthermore, the energy network sector will be competing with other UK regulated sectors for internationally mobile capital. Hence, there are strong grounds to place the networks on a level playing field with these other sectors to ensure that the former is not disadvantaged in attracting sufficient capital required for its projected investment programme.

[3] The example of National Air Traffic Services (NATS), and the problems that it faced owing to its highly geared structure following the downturn in volumes after September 11th, are pertinent. In the end, NATS's financial difficulties were resolved by a combination of financial restructuring and an increase in prices.

[4] Ofcom (2005), 'Ofcom's approach to risk in the assessment of the cost of capital', January.

3 Parameter estimates

The individual parameter estimates for the cost of capital components are considered below.

3.1 Risk-free rate

In determining the appropriate risk-free rate, there is a need to take account of the principles outlined above. Current market rates suggest a rate close to historic lows. However, for the reasons outlined below, the current market real rates are not suitable for use in regulatory determinations.

The issue regarding regulatory precedent is particularly important. In a very recent determination, the Competition Commission—to which an appeal would be made in the event of a disagreement—concluded that an appropriate range for the nominal risk-free rate was between 4.1% and 4.9%.[5] Using the same inflation assumption as the Commission implies a real risk-free rate of between 2.06% and 2.74% with a midpoint of 2.4%. Other recent determinations have also indicated a willingness to adopt a risk-free rate in excess of recent market rates, as shown in Table 3.1.

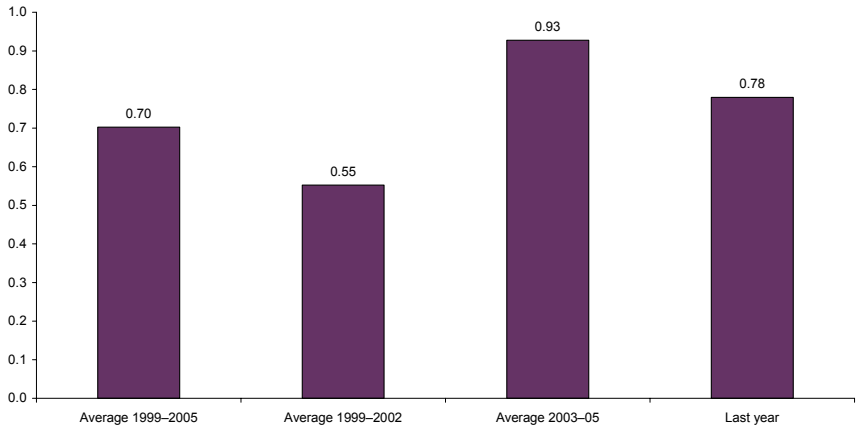
Table 3.1 Regulatory precedents on the risk-free rate—recent decisions

Regulator (case)	Risk-free rate assumption (%)
Ofwat (PR04)	2.3–3 (real)
Ofgem (DNOs, 2004)	2.75 (real)
Ofcom (BT, 2005)	4.6% (for the nominal risk-free), equivalent to c. 2.1% real
CAA (NATS, 2005)	2.5 (real)
Postcomm (Royal Mail, 2005)	2.5 (real)

Sources: Regulatory documents and Oxera calculations.

The average risk-free rate assumption used by regulators in decisions made in the last 12 months is 2.4%. Typically, as shown in Figure 3.1 below, these decisions have involved applying a premium over the market spot rate of around 80 basis points.

Figure 3.1 Margin between regulatory decisions on the risk-free rate and the real spot rate



Sources: Bank of England data, regulatory documents and Oxera calculations.

[5] Competition Commission (2006), 'Domestic Bulk Liquefied Petroleum Gas', Appendix K, June.

Indeed, the current average yield for index-linked gilts (averaged over 5-, 10- and 20-year maturities) is only 15 basis points lower than the equivalent average in November 2004. Furthermore, as a study by Smithers & Co noted: 'A common estimate of the equilibrium risk-free rate would be of the order of 2 1/2%.'[6]

The regulatory commitment point discussed above is also significant: in the previous regulatory determination of the risk-free rate in gas distribution, a 2.75% rate was used. This does not mean that the same value need also be used in the future. However, it does caution against relatively large reductions in the risk-free rate over relatively short intervals.

Reinforcing these concerns, there is some academic evidence that supports the idea of mean reversion in long-term interest rates—ie, when the rate is below or above a long-term trend, it 'mean-reverts' to this long-term value. Many regulators, including Ofgem in other decisions, have acknowledged that reliance on what are, by historical standards, low spot rates is unlikely to be appropriate if the risk of rates rising in the future is greater than the risk of them falling. It is also worth noting not only that UK gilt yields have risen appreciably in the last few months, but US Treasury Inflation Protected Securities have also 'rebounded' from historic lows.

It is recognised that Ofgem has already taken into account some of this evidence in estimating a risk-free rate of 2.3%. However, the evidence presented above—particularly the regulatory precedent from the Competition Commission, the Smithers & Co. study and the other recent regulatory precedents—suggests that further consideration should be given to these arguments and that a somewhat higher rate should be used. Taking these into account suggests that although estimates of the risk-free rate could vary between 1.7% (based on market yields) and 2.75% (based on regulatory precedent), an estimate between 2.3% and 2.5% would be reasonable.

3.2 Equity risk premium

Historical averages, market-based forward-looking approaches, academic assessments and regulatory precedent can all be used to inform an equity risk premium estimate of 3.5–5.0%. Furthermore, regulatory precedent—either implicit or explicit—supports a point estimate towards the higher end of this range.

It is noted that, in its choice of point estimate for the equity risk premium, Ofgem has acknowledged the importance of choosing a relatively high value for this parameter and has chosen a value of 5.2%. In picking this number, Ofgem appears to have had regard to the finding from the Smithers & Co. study that, on average, long-run equity market returns are between 6.5% and 7.5% real, and hence, taking a conservative approach, the sum of the risk-free rate and the equity risk premium should be 7.5%. It is recognised that if a slightly higher risk-free rate assumption were adopted—of, say, 2.5%, as suggested in section 3.1—this finding would suggest a somewhat lower equity risk premium estimate than the current Ofgem estimate of 5.2%. However, with a risk-free rate assumption of 2.5% it would be possible to adopt an equity risk premium at the high end of the range suggested above (ie, 5%) and still remain consistent with the findings from the Smithers and Co. work.

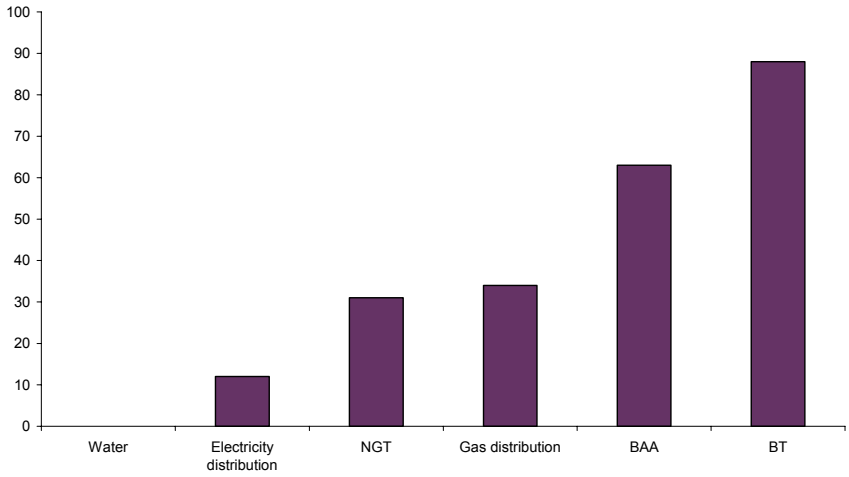
3.3 Equity beta

The work for the gas DNs on this parameter has focused on the systematic risks of the gas distribution sector and is therefore not relevant in the current context of the transmission price control.

[6] Smithers & Co (2003), 'A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the UK', February.

However, some of the evidence collected as part of this research relates to investor perception of the risk differences between UK regulated sectors. This evidence—collected as part of the Water UK investor survey[7]—suggests that investors view investing in energy network as being riskier than investing in the water sector. In particular, Figure 3.2 below shows the difference between the number of investors who considered that the particular sector/company was more risky than the water sector and those who considered it less risky.

Figure 3.2 Perceived riskiness of utility investments relative to UK water sector (%)



Sources: Water UK investor survey and Oxera calculations.

In the electricity distribution and gas distribution sectors, as well as National Grid Transco (NGT), more investors considered these sectors/companies to be riskier relative to the water sector than less risky.

Given that there appears to have been no substantial differences in the systematic risk exposure of the different sectors since this survey was undertaken, or since Ofwat made its determination in the water sector, this evidence suggests that adopting a lower equity beta in the energy network sector than in the water sector would be inappropriate. More generally, considerable regulatory precedent has developed to support the use of an equity beta of 1.0.

3.4 Debt premium

As with the equity beta, the analysis for the gas DNs has focused on the specific arguments regarding the risk of these relative to other sectors. This is not relevant to the transmission price control review and so is not discussed here.

However, at this stage, focus is placed on the generic arguments regarding debt premium; in particular, two questions can be addressed:

- what is the evidence on the debt premium of companies of different credit quality?
- what credit quality benchmark should be used to assess the appropriate cost of debt?

[7] Whelan, A. (2005), 'Water UK Investor Survey 2005 Key Findings', March.

Table 3.2 presents evidence for debt of five- and ten-year maturities across a range of credit qualities.

Table 3.2 Debt premium for corporates of different credit quality

	Five-year+ maturity			Ten-year+ maturity		
	AA	A	BBB	AA	A	BBB
Current	0.63	0.89	1.19	0.66	0.93	1.22
1-year	0.68	0.90	1.32	0.71	0.93	1.38
3-year	0.76	0.98	1.43	0.73	0.95	1.42
5-year	n/a	n/a	n/a	0.85	1.15	1.69
10-year	n/a	n/a	n/a	1.00	1.29	1.72

Sources: Datastream and Oxera calculations.

The table suggests that the five-year average spread for A-rated bonds of ten-year+ maturity is 1.15%, slightly higher than the 1.1% estimated by Ofgem over an average of ten years. Furthermore, taking an average over ten years for the same series suggests a debt premium of 1.29% rather than 1.1%.

In addition, given the conventional regulatory focus on BBB+ ratings, some weight should be attached to the yields on BBB-rated bonds as well as A-rated bonds. It can be seen that the average yield over five and ten years of longer-dated BBB bonds is around 1.7%. Taking a simple average of the A and BBB spreads over a five-year period suggests an average of 1.42%, while over a ten-year period would suggest a value of 1.5%. These values are slightly higher than the 1.35% adopted by Ofgem in the most recent Distribution Price Control Review (DPCR).

3.5 Gearing

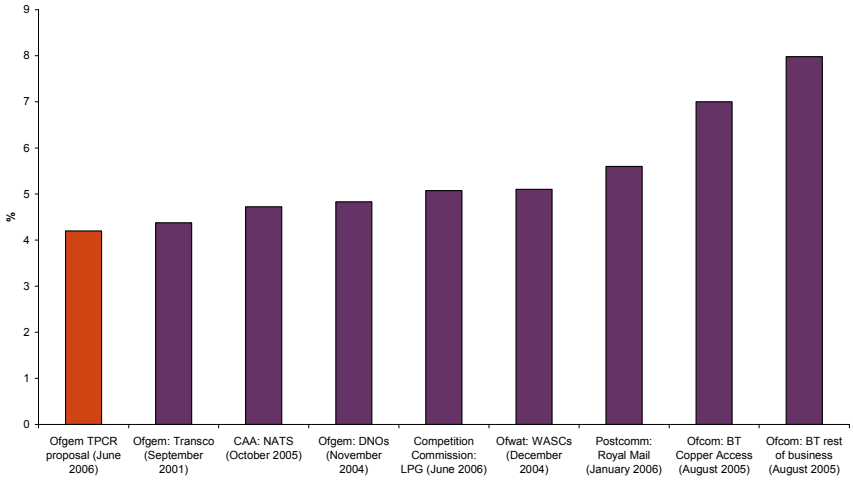
In light of the finding from previous Oxera work for Ofwat—that there is no clear evidence in the academic literature that companies tend towards an optimal capital structure—no attempt has been made to assess the optimal gearing of the gas DNs or other energy network companies; nor is attention focused on the actual gearing of each company in the sector (which differs significantly). Instead, the work for the gas DNs assumed a gearing level of between 50% and 60%. It should be noted that the sensitivity of the WACC analysis to the gearing assumption is limited when the approach taken is to estimate asset betas and then relever them to estimate the equity beta, as is adopted in this analysis.

3.6 Overall assessment

As well as considering each of the individual parameter estimates, a final assessment of the reasonableness of the approach taken by Ofgem needs to consider the overall WACC. Following the principles outlined in section 2, the final value of the WACC will determine the attractiveness or otherwise of the sector to equity and whether perceptions of regulatory commitment have been undermined.

Figure 3.3 presents recent UK regulatory precedents on the overall WACC and compares this with the figure stated in Ofgem's initial proposals. The numbers are presented on an equivalent post-tax WACC basis, comparable with the 4.2% proposed by Ofgem.

Figure 3.3 Real, post-tax WACC estimates used by various regulatory authorities



Sources: Regulatory documents and Oxera calculations.

It can be seen that Ofgem's current estimate for the TPCR is the lowest estimate across all these comparators. It is almost 100 basis points lower than the decision reached in the water sector in December 2004. This is despite the evidence presented above, which suggests that investors consider the energy network to be a more risky investment proposition than the water sector. Moreover, this divergence does not appear to be adequately explained by changes in market conditions between these two decisions. For example, as discussed above, the gilt yields in June 2006 averaged across five-, ten- and 20-year maturities were only 15 basis points lower than the equivalent calculation in November 2004, close to when the Ofwat (and Ofgem DPCR) decision was reached.

4 Conclusion

Through the use of a methodology that concentrates on the longer-term averages for various parameters, Ofgem's approach to estimating the cost of capital is appropriate, and takes account of many of the generally accepted principles stated at the beginning of this note. However, as has been illustrated by reference to both the individual parameter estimates and the overall decision reached on the WACC, there are convincing public-interest reasons and evidence for Ofgem to use a somewhat higher estimate.

In particular, the note suggests an alternative range for the cost of capital, consisting of the following parameter estimates.

– **Risk free rate**—recent regulatory precedents, including that from the Competition Commission, where risk-free rate determinations have typically been around 80 basis points higher than the prevailing spot rates, as well as the Smithers and Co. finding of a long-run equilibrium estimate for the risk-free rate of 2.5%, suggest a range for the risk-free rate of 2.3–2.5% (truncated at both ends from a wider range of 1.7%, based on current spot rates, to 2.75%, based on regulatory precedent.)

– **Equity risk premium**—historical averages, market-based forward-looking approaches, academic assessments and regulatory precedent can all be used to inform an equity risk premium estimate of 3.5–5.0%.

– **Equity beta**—taking account of the findings from the Water UK survey that investors perceive the energy sector to be a riskier investment proposition than the water sector (and that, within the energy sector, transmission and gas distribution are perceived as riskier than electricity distribution) suggests, prima facie, that there is little reason for

departing from the precedent in the water and electricity distribution sectors of using an equity beta assumption of 1.

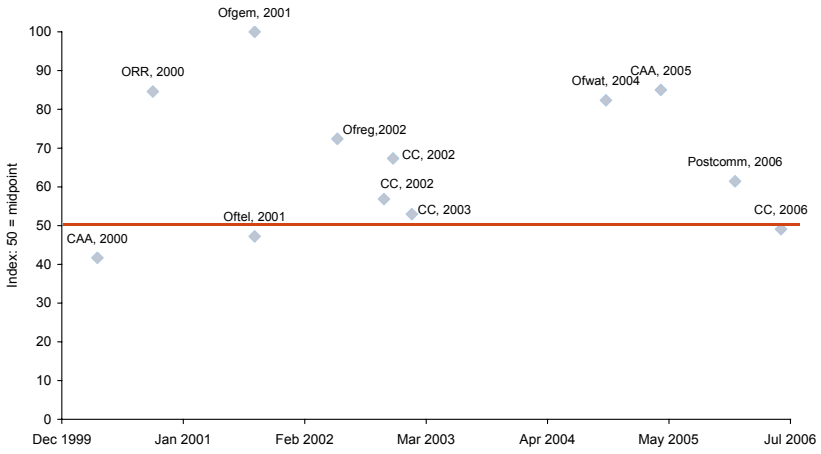
– **Debt premium**—taking account of the fact that an alternative source to that used by Ofgem suggests that the ten-year trailing average yield of long-maturity A-rated bonds is slightly higher than indicated by Ofgem (1.29% rather than 1.1%), and that some weight should be given to BBB-rated bonds as well as A-rated bonds, suggests a range for the debt premium of 1.1–1.4%.

– **Gearing**—taking account of the Oxera finding for Ofwat on the capital structure of water companies,[8] regulatory precedent is used to suggest a gearing range of between 50% and 60%.

It is noted that, in relation to the equity beta and debt premium, the analysis is only indicative, as the main focus of the related research has been on the risks of gas distribution.

Adopting these parameter estimates results in a midpoint estimate for the real, post-tax cost of capital of 4.43%. However, following the discussion in section 2, there are advantages for Ofgem adopting a point estimate higher than the midpoint of the range, particularly in terms of preserving incentives to invest and setting a cost of capital sufficient to retain/attract equity in the energy network sector. Moreover, also taking account of the third point in the discussion in section 2, such a policy is supported by regulatory precedent. Figure 4.1 identifies where, within the stated range for the cost of capital, the regulator adopted a point estimate. It is normalised on a scale of 0–100 such that 0 would be at the bottom end of the range and 100 at the top end.

Table 4.1 Choice of point estimate for WACC within range



Source: Regulatory documents and Oxera calculations.

As can be seen, regulatory precedent clearly supports a point estimate towards the top end of the identified range.

To take account of this precedent, one option available to Ofgem is to combine it with two findings from the Smithers and Co. study. The first is that long-term, arithmetic averages of total equity market returns are between 6.5% and 7.5%. The second is that a common estimate of the equilibrium risk-free rate is 2.5%. Taking account of these pieces of information suggests two ways to identify a point estimate.

[8] Oxera (2003), 'The Capital Structure of Water Companies', report prepared for Ofwat.

– Adopting the midpoint of the long-term arithmetic average of total equity market returns (ie, 7%), along with a risk-free rate of 2.5%, implies an ERP estimate of 4.5%. Using these parameter estimates for these variables—along with the midpoint for the remaining variables—would result in a post-tax cost of capital of around 4.6%.

– Following the policy considered by Ofgem as appropriate at the DPCR, the higher end of the long-term arithmetic average of total equity market returns could be used (ie, 7.5%). This would imply an equity risk premium estimate of 5.0% (at the high end of the range identified above) and a risk-free rate assumption of 2.5%. Using these in conjunction with the midpoint of the remaining variables would result in a point estimate of around 4.8%.