FIRST ECONOMICS

www.first-economics.com

An Estimate of NIE's RP6 Cost of Capital

Prepared for the Utility Regulator

1 February 2017

1. Introduction

This report contains First Economics' estimate of the cost of capital for NIE Networks' transmission and distribution (T&D) networks. It is intended to inform the Utility Regulator's calculation of allowed returns for the new RP6 price control, covering the 6.5-year period starting 1 October 2017.

The paper is structured into six main parts:

- section 2 outlines the methodology that we have used in our work;
- section 3 assesses the risk that an investor in the T&D networks carries and puts forward an estimate of beta;
- section 4 proposes a figure for gearing;
- section 5 provides a calculation of the cost of debt;
- section 6 contains estimates of the two generic parameters in the cost of equity calculation – the risk-free rate and the expected return on the market portfolio; and
- section 7 brings all of the preceding inputs together into an overall estimate of the cost of capital.

2. Approach

The cost of capital that we consider in this paper is a forward-looking estimate of the real, RPI-stripped rate of return that NIE needs to provide to investors in order to attract and retain capital within the T&D business. In line with the terms of reference that were given to us by the Utility Regulator, and consistent with regulatory practice more generally, we have deliberately sought to estimate this cost of capital independently from NIE's current ownership arrangements so that the return on offer through the price control is capable of supporting any reasonable and efficient investor set.

The cost of capital is a weighted average of two components: the cost of equity (K_e); and the cost of debt (K_d), where the weightings (gearing or g) reflect the relative importance of each type of financing in a firm's capital structure.

$$\text{vanilla WACC} = g \cdot K_d + (1 - g) \cdot K_e$$

The interest costs paid by NIE and other comparable firms are directly measurable and in the analysis that follows we explain how the Utility Regulator might use empirical evidence to set an appropriate value for K_d. The cost of equity, by contrast, cannot be directly observed and we have instead modelled the returns that we would expect a shareholder to demand in exchange for holding shares in the T&D business. The primary tool that we have used in our analysis is the CAPM, which relates the cost of equity to the risk-free rate (R_f), the expected return on the market portfolio (R_m), and a business-specific measure of investors' exposure to systematic risk (beta or β_e):

$$K_e = R_f + \beta_e \cdot (R_m - R_f)$$

The two equations together show that our cost of capital calculation is based on estimates of five parameters: g, K_d, R_f, R_m and beta. In putting specific figures against each of these inputs we have sought to draw as far as possible on primary market data. We have also taken account of recent regulatory precedent, giving particular attention to the views that the Competition Commission (CC), now the Competition & Markets Authority (CMA), expressed in its 2014 determination of NIE's RP5 price controls. Inevitably, in many areas we have had ultimately to exercise a degree of judgment in order to be able to select precise numbers from the evidence we have collected, but we have tried in the analysis that follows to give a clear explanation for these judgments and to make our thinking as transparent as possible in order to assist the parties to the RP6 process.

3. Riskiness and Beta

We start deliberately with an assessment of NIE's risk profile and beta on the basis that the analysis that follows will also be a key input into a number of the other cost of capital assumptions.

3.1 Preliminaries

Methodology

A firm's equity beta is a measure of the riskiness of a firm – or more specifically, a measure of the systematic risk that a firm presents – relative to the market portfolio. Firms that exhibit a beta of more than 1 can be considered more risky than the average firm in the portfolio and need to pay their investors a higher-than-average return; firms with a beta of less than 1 are less risky and warrant lower returns; and firms with a beta of exactly 1 are seen by investors as being of equal risk to the market portfolio and are expected to generate a return in line with R_m.

Empirical estimates of beta are usually obtained by measuring the covariance between movements in a company's share price and movements in the value of the stock market as a whole. However, in this report we are interested in obtaining beta estimates for an unlisted business and cannot use market data directly. The next best alternative that we have is to collect beta estimates for companies that look to be in some sense similar and to make a judgment about the value of NIE's beta on the basis of this comparator evidence. This is an approach that has been deployed in an increasing number of periodic reviews, including several CC/CMA inquiries, during recent years as the number of regulated companies with a stock market listing has declined, and is regarded as a robust and reliable way of assessing beta in the absence of direct stock market data.

Asset beta

When comparing the betas of different firms, one has to be careful to take account of the different gearing levels that firms choose since, all other things being equal, a firm with higher gearing will exhibit a higher equity beta. Unless one controls for this effect, there is a danger of confusing the risk that comes from high leverage with the underlying business risk that a firm faces by virtue of the nature of the activities it is carrying out.

This is where the concept of an asset beta proves useful. An asset beta is a hypothetical measure of the beta that a firm would have if it had no debt and were financed entirely by equity. By comparing different firms' asset betas it becomes possible to isolate the underlying systematic risk that a company has and carry out an assessment of the relative riskiness of different businesses.

The asset beta is calculated using the following formula:

$$\beta_a = (1 - g) \,.\, \beta_e + g \,.\, \beta_d$$

where β_a is a firm's asset beta, g is gearing and β_d is the firm's debt beta.[1]

A firm's actual gearing is something that is easily calculated using reported debt figures and the firm's market capitalisation, but a firm's debt beta is not something that is directly observable. We have assumed in our work that β_d is a constant of 0.1 (a value that economic regulators have commonly used in reviews of companies with approximately the same gearing as we identify in section 4).

Confidence intervals

This provides a complete description of our methodology for estimating asset betas. The only other point we must make is that beta estimates are exactly that: estimates. Every estimate that we identify comes with a standard error and the figures that follow must be regarded as mid-points within wider confidence intervals.

3.2 Comparator analysis

Our comparator set comprises two types of data:

- calculated betas for comparator firms with a stock market listing; and
- the beta estimates that regulators have made in recent periodic reviews.

In the first of these groups we have collected beta estimates[2] for the last remaining network-dominated companies with a UK stock market listing – National Grid, Pennon Group, Severn Trent and United Utilities – which we have averaged over the last five years to be consistent with recent CC/CMA practice.[3] The second group comprises the most recent assessments by the CC, Ofgem, Ofwat and the Utility Regulator of betas for regulated networks

The comparator data is presented in tables 1 and 2.

Table 1: Calculated asset betas

	Average asset beta
National Grid	0.35
Pennon Group	0.36
Severn Trent	0.34
United Utilities	0.32

Source: Bloomberg and First Economics' calculations using data up to July 2016.

[1] For those that have not come across this concept before, a debt beta is similar to the equity beta, but rather than measuring the systematic risk taken by the company's shareholders, it represents such risk presented to the company's lenders.
[2] Our calculations use two years of daily share price data.
[3] This approach ensures that estimates of beta are not overly swayed by short-term movements in share price data.

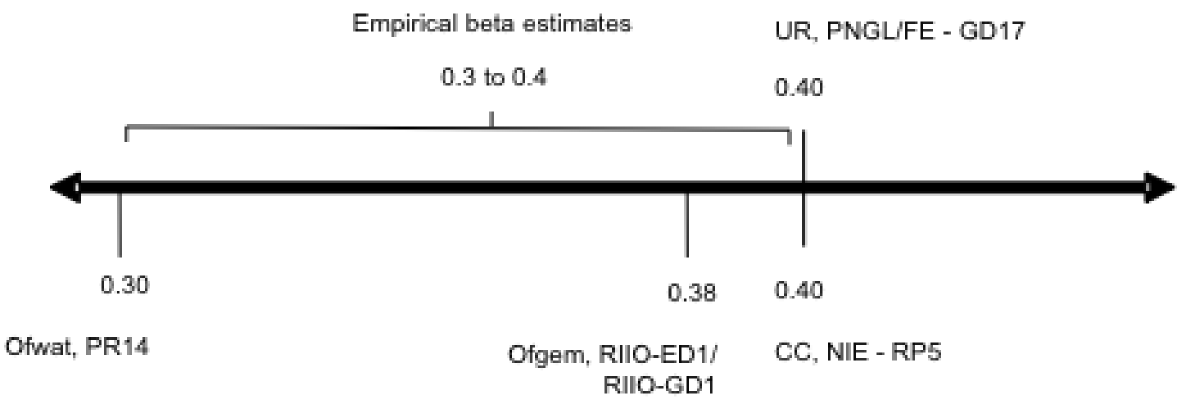
Table 2: Beta estimates used in recent periodic reviews

	Year	Regulator's estimates of asset beta
Ofgem, gas distribution networks	2012	0.38
Ofwat, water and sewerage networks	2014	0.30
Ofgem, electricity distribution networks	2014	0.38
CC, NIE	2014	0.40
CC, GB regulated networks	2014	0.31 to 0.40
Utility Regulator, gas distribution networks	2016	0.40

References: CC (2014), Northern Ireland Electricity Ltd price determination; Ofgem (2014), RIIO-ED1 draft determination for the slow-track electricity distribution companies; (2012), RIIO-GD1 initial proposals; Ofwat (2014), Setting price controls for 2015-20 – risk and reward guidance; Ofgem Utility Regulator (2016), Price control for Northern Ireland's gas distribution networks GD17 – final determination.

Figure 3 summarises the picture that emerges from these tables.

Figure 3: Asset beta estimates



The tables show that the comparator betas sit in a relatively narrow range of 0.30 to 0.40. The task that we face is to position NIE's T&D business at an appropriate point relative to the comparators.

3.3 Benchmarking of the NIE beta

Approach to comparisons of riskiness

In working through this task it is useful to highlight four main determinants of the (systematic) risk that shareholders bear through their ownership of the NIE T&D network and the above-mentioned networks.

- Demand variability – the networks operate in markets where demand for network access is very closely correlated to the overall demand for energy. This demand will in turn be sensitive to macroeconomic conditions, insofar as a downturn in the economy will cause both households and businesses to use less energy while strong growth will bring about increases in volumes.

- Cost variability – networks rely heavily on direct and indirect staff to carry out their functions. As labour becomes more expensive costs will go up, and as labour becomes less expensive costs will go down. Similarly, the networks are exposed to changes in the costs of other inputs like materials and business rates.
- Regulation – the two previous risk factors cannot be looked at in isolation from the important role that regulation plays in determining the way in which changes in volumes or costs translate into changes in profit. Through its design of the price control and associated incentive mechanisms, a regulator has a significant degree of control over the degree to which shareholders are exposed to risk – a situation that distinguishes regulated companies from unregulated companies. In particular, revenue caps may offer investors quite significant protection against changes in demand, while a regulator's design of opex and capex incentives are a key determinant of exposure to cost risk.
- Cost/revenue structure – a final consideration is the sensitivity of profit to out-/under-performance against the networks' price control assumptions. In particular, it is now widely acknowledged in regulation that companies which have small regulatory asset bases (RABs) in comparison to ongoing revenues present shareholders with greater risk than companies which have large RABs in comparison to ongoing revenues.

The first three items on this list are fairly straightforward to understand, but the fourth merits a slightly more detailed explanation. In the worked example below, we depict two companies with identical ongoing expenditures. They differ only insofar as company A has a small investor capital base and company B has a large investor capital base, as measured by their RABs. Both companies set charges so as to be able to cover their expenditure plus a return on the RAB. For the purposes of this illustration, let us assume initially that both companies seek a return of 10% per annum.

Table 4: Illustrative worked example

	Company A	Company B
RAB	£100m	£1,000m
Expenditure	£200m	£200m
Return on RAB @ 10%	£10m	£100m
Revenues	£210m	£300m

Now consider what happens to these companies when they experience the same percentage cost overrun or the same percentage revenue loss. Although the absolute £m loss of profit is similar in both companies, the percentage loss is far greater for company A with the small RAB than it is for the company B with the larger RAB.

Table 5: Revenues, costs and profits after a 2% cost shock

	Company A	Company B
RAB	£100m	£1,000m
Revenue	£210m	£300m
Expenditure	£204m	£204m
Profit	£6m	£96m
Profit as % of RAB	6%	9.6%

Table 6: Revenues, costs and profits after a 2% revenue shock

	Company A	Company B
RAB	£100m	£1,000m
Revenue	£205.8m	£294m
Expenditure	£200m	£200m
Profit	£5.8m	£90m
Profit as % of RAB	5.8%	9.4%

An exactly analogous story can be told of the effects of unexpected cost reductions and about revenue gains, insofar as a given cost or revenue shock causes a greater percentage change in returns for companies with small RABs.

This provides important insights into the riskiness of different firms because it shows that the variability in out-turn profits is not just a function of the likelihood and scale of cost and demand shocks, but also the size of the capital base. Holding all other things equal, shareholders in a regulated company with a small RAB relative to ongoing costs are likely to suffer proportionately more when downside shocks occur (and gain more following upside events) in comparison to shareholders in firms whose RABs are large relative to ongoing costs.

This higher potential volatility in profits makes companies with high 'operational gearing' more risky in the eyes of shareholders. Consequently, a firm with a small RAB would not have the same cost of capital and would not seek the same return as a company with a large RAB. It would instead need to factor a higher cost of capital upfront into its charges.

Comparison of risk profiles

It follows that in order to understand how much risk the different shareholders in our sample of firms are exposed to one has to look holistically at the potential volatility in demand and costs, take the range of outcomes that one can envisage through the sector's regulatory rules and then examine the impact on each comparator's profits. It is not possible to evaluate riskiness without taking the full chain of events into account – in particular, we would caution anyone from making judgments about a business's risk profile on the basis of perceptions of pure demand and cost variability alone.

The characteristics of the UK's network companies are set out in table 7.

Table 7: Characteristics of regulated companies

	Exposure to demand risk	Exposure to cost risk	Operational gearing – average annual totex-to-RAB ratio
GB electricity distribution	Low – companies have revenue caps	Low – costs are mainly repeated opex and capital works. Costs have high labour content, with some exposure to commodity prices and the construction cycle. Price control design incorporates incentive rates of around 55%.	Low – around 15-20%

GB gas distribution	Low – companies have revenue caps	Low – costs are mainly repeated opex and capital works. Costs have high labour content, with some exposure to commodity prices and the construction cycle. Price control design incorporates incentive rates of around 60%.	Low – around 15-20%
England & Wales water and sewerage	Low – companies have revenue caps	Low to moderate – costs are mainly repeated opex and capital works, but with some major enhancement schemes. Costs have high labour content, with some exposure to commodity prices and the construction cycle. Price control design incorporates incentive rates of around 50%.	Low – around 10-15%
NI gas distribution, FE and PNGL	Low – companies have revenue caps	Low – costs are mainly repeated opex and capital works. Costs have high labour content, with some exposure to commodity prices and the construction cycle. Price control design incorporates uncertainty mechanisms and rolling incentive mechanisms.	FE: low – around 10-15% PNGL: very low – around 5%

Source: First Economics' analysis.
Note: the totex-to-RAB metric is intended to capture the observations we made earlier about the higher riskiness of firms with small RABs/profits. A low totex-to-RAB ratio implies that profits are fairly resilient in the face of shocks and a high totex-to-RAB ratio implies that returns can be affected quite significantly by even small variations in costs and revenues.

We make the following observations about the entries in this table:

- the conventional network businesses all exhibit negligible revenue risk, relatively low cost risk, and have sizeable RABs; and

- PNGL/FE are not obviously dissimilar to the GB utilities on the three highlighted criteria, other than with respect to PNGL's very low totex-to-RAB ratio. Their slightly higher betas reflect a view from the Utility Regulator that the NI gas distribution networks ought to be positioned in the GD17 period at the top end of the beta range for conventional utilities due to the differences that there are in the frameworks of gas network regulation in Great Britain and Northern Ireland (e.g. the Profile Adjustment).

The positioning of NIE depends on the regulatory framework that the Utility Regulator puts in place for RP6. We have been told to assume that the business will:

- be subject to a revenue cap, which will give NIE an income entitlement irrespective of the volumes passing through its network;

- be given 6.5-year allowances for opex and base capex, and split 50:50 with customers any out-turn under- or over-spending against these allowances; and

- receive additional capex allowance as the design and costings of certain enhancement capex projects firm up during the RP6 period.

We can therefore add a further entry to the list in table 7 as follows.

Table 8: Characteristics of NIE

	Exposure to demand risk	**Exposure to cost risk**	**Operational gearing – average annual totex-to-RAB ratio**
NIE T&D	Low – company has a revenue cap	Low – costs are mainly repeated opex and capital works. Costs have high labour content, with some exposure to commodity prices and the construction cycle. Price control design incorporates an incentive rate of around 50%.	Low – around 10-15%

The key points to note here are that:

- the revenue and cost risk borne by NIE's shareholders is not dissimilar from the risk that investors in other UK utilities carry, although the precise designs of the price control formula and associated incentive framework differ slightly from the specifications that have been put in place in other sectors; and
- there is also nothing in NIE's totex-to-RAB ratio to distinguish it from other network businesses.

From our perspective, therefore, one might reasonably expect NIE's beta to sit in line with the GB electricity networks that are regulated by Ofgem.

We note that in its 2014 determination the CC decided to position NIE's beta at the top end of the 0.30 to 0.40 range that we depict in figure 3. The CC stated in its decision document that it did this because the "the comparator set is not an exact match for NIE and its regulatory framework". The CC also notes that there is a view in some quarters that regulation in Northern Ireland "is less well established". Our own view on this matter is that it is very hard to understand why sophisticated investors would be unable to identify the intrinsic exposure to (systematic) risk that investment in NIE brings, which we are clear is not noticeably different from the risk in investing in the GB networks. Our preferred asset beta estimate is therefore 0.38 to align to the Ofgem RIIO-ED1 beta for similar businesses.

We nonetheless provide for a range of 0.38 to 0.40 to give acknowledgment to the position that the CC put forward two years ago and to suggest that it is for the Utility Regulator to form a view on the matter.

4. Gearing

Assumptions about gearing affect directly the weightings of the cost of debt and cost of equity components of the weighted average cost of capital calculation. They are also important inputs to the calculation of the cost of debt and cost of equity themselves as, all other things being equal, a higher level of gearing will increase the risk to both debt and equity holders, causing them to demand a higher return in exchange for making capital available.

Regulatory precedent in this area is shown in table 9. In each case the regulator concerned sought to select a figure for gearing which is consistent with the regulated company maintaining an A to BBB/Baa credit rating.

Table 9: Gearing assumptions in relevant regulatory reviews

Decision	**Gearing assumption**	**Year**
Ofgem, gas distribution	65%	2012
CC, NIE	45%	2014
Ofgem, electricity distribution	65%	2014
Ofwat, water and sewerage	62.5%	2014
Utility Regulator, gas distribution	55%	2016

The table gives a range of 45% to 65%. In comparing NIE against these other companies, it is important to be cognizant of the assessment of relative risk given in section 3. This tells us that there is no particular reason to think that the business should not be 'in the pack' with the other regulated utilities.

Reference may also usefully be made to the 'exit rate' of gearing in the CC's 2014 modelling. This was a figure of approximately 45%. On the basis that there is no compelling reason to depart from CC's modelling of NIE's capital structure, we propose to use a figure of 45%.

5. Cost of Debt

Our task in putting a value to the cost of debt is to use available data to benchmark the interest that we would expect an efficiently financed business with an A to BBB/Baa rating to pay on its borrowings.

In previous cost of capital reports, we have expressed a preference for focusing on the interest paid by the real-life company as the natural starting point in this analysis. Although we would not want to go as far as to match pound-for-pound the monies paid by NIE in all circumstances, we think we should also feel comfortable about drawing information from the actual borrowing arrangements the company has entered into at times when the T&D business has encountered externally driven financing challenges. If we can say that NIE responded to those challenges in the way that any normal commercial company would when faced with the same situation, it would seem logical to take the resulting interest payments as the efficient costs of financing the networks.

We note that this is also consistent with the approach taken by the CC/CMA in recent inquiries. When the CC looked at NIE's borrowing in 2014, it found no reason to think that NIE's existing debts had been improperly or imprudently incurred. Accordingly, our cost of debt calculation starts with the interest payable on NIE's actual borrowings, as follows:

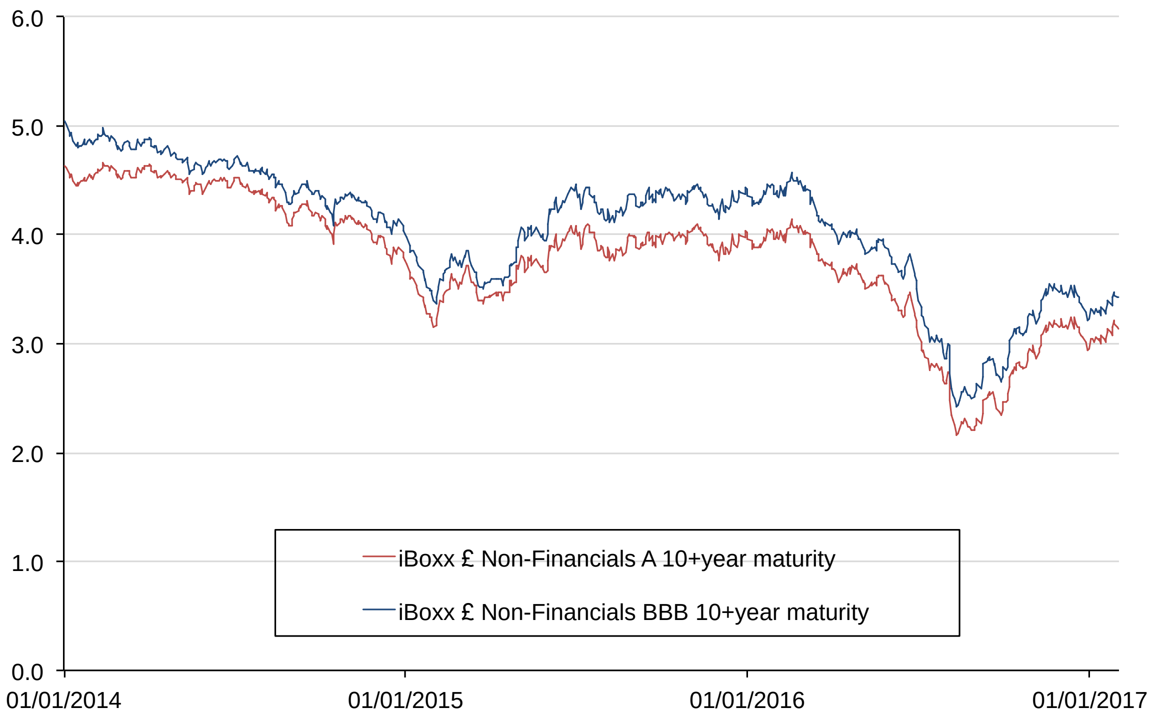
- a £175m loan from the European Investment Bank which pays an interest rate of 6.875% per annum and which matures in September 2018; and
- £400m of publicly traded bonds which pay an interest rate of 6.375% per annum and which mature in 2026.

The weighted average cost of this embedded debt over a 6.5-year period from October 2017 to March 2024 is 6.40%.

NIE will need to refinance £175m of debt before the end of the first year of the new RP6 control. It may also wish to borrow additional monies to support ongoing investments in the network. Our cost of debt calculation therefore needs to include a component which reflects the cost of the new debt which NIE is likely to take out during the RP6 period.

Figure 10 shows the yields on A and BBB rated UK corporate bonds with 10+ years to maturity.

Figure 10: iBoxx bond yield indices



Source: iBoxx.

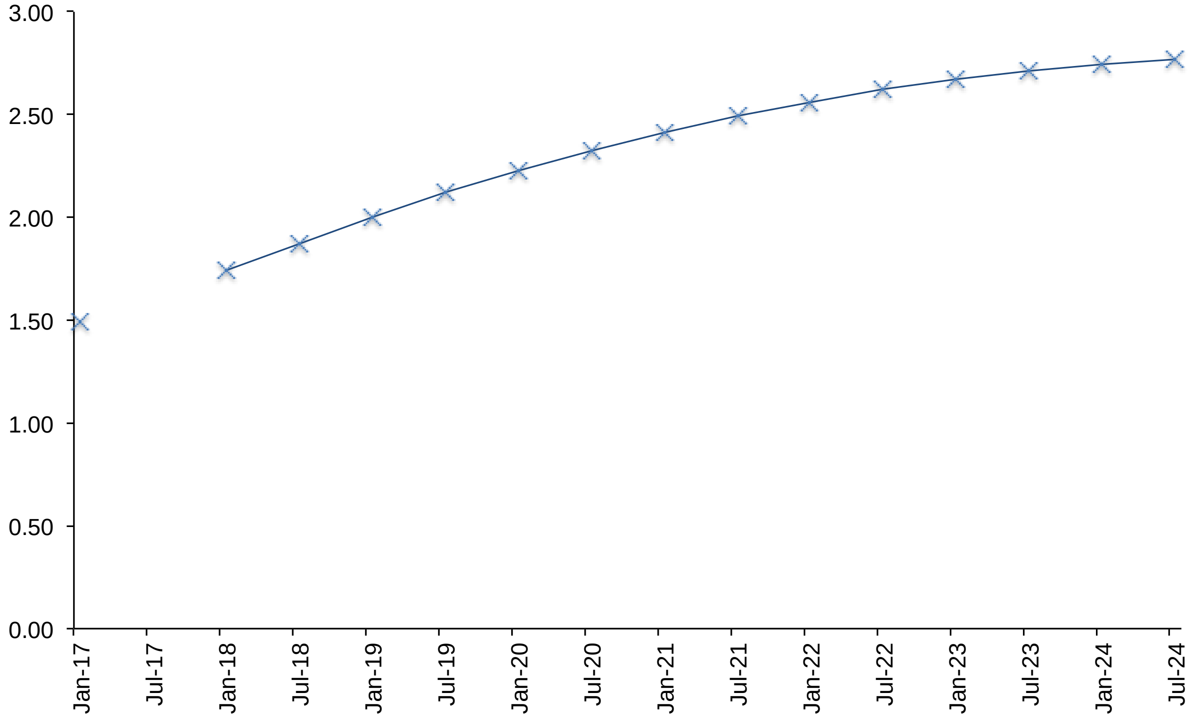
Prevailing yields at the time of writing are approximately 3.15% for A rated debt and 3.4% for BBB rated debt. These are noticeably lower figures than the rates of above 4% that were seen in 2015 and at the start of 2016, reflecting the consequences that the UK's Brexit vote has had in financial markets. In its September 2016 GD17 price control determination, the Utility Regulator expressed the view that it is too early to say if figure 10 shows that interest rates have moved to a new equilibrium. While we understand the reasons for caution in the immediate aftermath of the referendum, the regulator will issue its RP6 decision in mid-2017, by which time there will be a longer run of data with which to anchor judgments about the level of future interest rates.

It ought, therefore, to be feasible for the Utility Regulator to make a forward-looking assessment of the cost of new debt next year, factoring in all relevant information that is available to it at the time it makes its determination. In addition, the Utility Regulator may wish to give consideration to an ex post adjustment mechanism which will enable this allowance to move up or down as market conditions change. The Utility Regulator provided for such a mechanism in its recent GD17 price controls and, notwithstanding that the circumstances of the GD17 and RP6 reviews are different (e.g. as regards the amount of new debt that the companies are taking on), it ought to be possible to bring a virtually identical adjustment formula into the NIE price control.

In any case, we can set out here, as a holding assumption only, a central forecast of the cost of NIE's new debt as at 31 January 2017.

We start from a 3.3% market cost of debt in our cost of capital calculation, as the average of the current yield on A and BBB 10+ year corporate bonds. We next allow for a small move up in borrowing costs to be consistent with forward gilt rates. These are shown in figure 11.

Figure 11: Forward rates for 10-year nominal gilts



Source: Bank of England website and First Economics' calculations.

The curve shows that markets are currently pricing in a ~20 basis points increase in gilt rates by October 2017 and a ~125 basis points increase by April 2024. All other things being equal, we might expect similar upward pressure on corporate interest rates in the same time frames. NIE has indicated that it intends to raise all of the debt that it requires for RP6 in one go at the point where it is required to refinance its £175m loan – i.e. by no later than September 2018. This gives a best estimate of the cost of new RP6 debt of approximately 3.75%.

Finally, it is necessary to make allowance for transaction costs. We initially provide for 20 basis points to be consistent with the allowance that the CC gave its in 2014 inquiry. We note that further discussion with the Utility Regulator is likely to be required on these costs, having regard to factors such as the type, quantum and tenor of debt that NIE proposes to raise in its financing exercise.

The preceding numbers come together into the calculation of the overall cost of debt shown in table 12. The weights for the cost of existing debt and new debt are 4:5 to be consistent with the figures that NIE put forward in its plan. However, we note that the weights are sensitive to the size of NIE's RP6 capex allowance and, hence, there may be a need to revise the figures prior to the regulator's determination.

Table 12: Forecast average costs of debts for RP6

Average nominal cost of debt			
		Current market rates	3.3%
Average interest costs	6.4%	Forward rate adjustment	0.45%
Transaction costs	0.2%	Transaction costs	0.2%
Embedded debt	6.6%	Cost of new debt	3.95%

4:5 weighted average

Weighted average cost of debt = 5.1%

We also need to convert from a nominal figure to a real cost of debt for inputting into our real, RPI-stripped cost of capital computation. We advise that the conversion for inflation should be consistent with the inflation forecasts that the regulator is using throughout the RP6 review. Pending detail on what these forecasts are we use an average annual inflation rate of 3.2% for the reasons set out in annex 1. This means that we convert the nominal cost of debt into a real, RPI-stripped cost of debt of 1.87%.[4]

6. Generic Cost of Equity Parameters

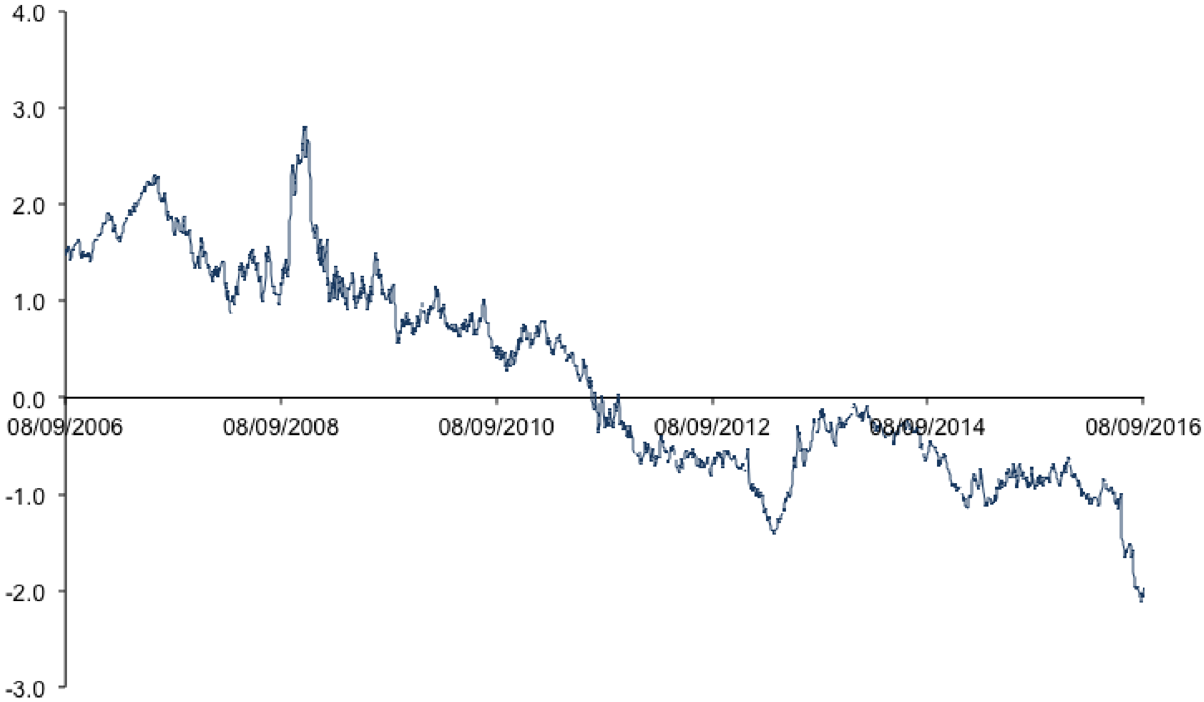
6.1 Risk-free rate

Having estimated the cost of debt directly, an estimate of the risk-free rate is needed solely for the purpose of estimating the cost of equity.

The approach used by regulators to assess the risk-free rate has in the past been to analyse yields on government-issued index-linked gilts. Figure 13 below plots the yield on 10-year index-linked gilt yields over the last decade.

[4] The conversion formula is (1 + real cost of debt) = (1 + nominal cost of debt) / (1 + forecast inflation).

Figure 13: Index-linked gilt yields



Source: Bank of England.

The chart shows that investors are currently willing to lend to the UK government at negative real (i.e. RPI-stripped) rates of interest. This is partly a function of the economic and political turbulence of recent times, and partly a function of policymakers' response to that turbulence, particularly the programme of quantitative easing – a coordinated effort by the Bank of England and other central banks to intervene in financial markets and bring the returns on low-risk assets down in an effort to divert capital to more productive uses.

It is uncontroversial to state that yields on government bonds have been distorted by these actions. The Bank of England made the following estimate in a 2011 paper:[5]

> Based on analysis of the reaction of financial market prices and model based estimates, we find that asset purchases financed by the issuance of central bank reserves—which by February 2010 totalled £200 billion—may have depressed medium to long term government bond yields by about 100 basis points

Since this time, the Bank has increased its gilt purchases to more than £400 billion. In the circumstances, the UK's economic regulators have tended to allow for positive real risk-free rates in recent cost of capital assessments. Relevant data points are summarised in Table 14 below.

[5] Joyce, Lasaosa, Stevens, Tong (2011), The financial market impact of quantitative easing in the United Kingdom.

Table 14: Risk-free rate assumptions in recent regulatory reviews

Decision	Risk-free rate assumption	Year
CAA, Heathrow/Gatwick Airports	0.5%	2014
Competition Commission, NIE	1.5%	2014
Ofgem, RIIO-ED1	1.5%	2014
Ofwat, PR14	1.25%	2014
CMA, Bristol Water	1.25%	2015
Ofcom, BT Openreach	1.0%	2016
Utility Regulator, GD17	1.25%	2016

We do not think that there is any single 'right' answer to the question: what will the risk-free rate be in the RP6 period? Predicting market shifts is not an exact science and the table above shows that the Utility Regulator can justify a risk-free rate anywhere in the range 0.5% to 1.5% on the basis of regulatory precedent. It may also be possible to justify a lower value on the basis of current market rates.

We recommend selecting a 1.25% point estimate from within this range to align with the CMA's 2015 estimate. We note that if this figure turns out to be too high or too low, the effect on the overall cost of capital calculation is small.

6.2 Market return/ Equity risk premium

The final input into CAPM is R_m, the return on the market portfolio. Some cost of capital studies arrive at a value for R_m only indirectly by estimating an equity-risk premium and adding this figure to the risk-free rate. Like the CMA, we prefer to estimate R_m directly so as to ensure that there is no inconsistency in the cost of equity calculation.[6]

Recent regulatory assumptions for the overall market return for equities are given in table 15 below.

Table 15: Equity market return assumptions in recent regulatory reviews

Decision	Equity market return assumption	Year
CAA, Heathrow/Gatwick Airports	6.25%	2014
Competition Commission, NIE	6.5%	2014
Ofgem, RIIO-ED1	6.5%	2014
Ofwat, PR14	6.75%	2014
CMA, Bristol Water	6.5%	2015
Ofcom, BT Openreach	6.3%	2016
Utility Regulator, GD17	6.5%	2016

[6] The main risk of inconsistency comes from using an R_f in the derivation of an equity-risk premium that differs from the choice of R_f that we made earlier (note that R_f appears twice in the CAPM formula and should take the same value each time). Among other things inconsistencies can arise due to the measurement of R_f over different times periods or as a result of using data from different 'risk-free' securities when deriving an equity-risk premium.

This body of precedent presents a fairly narrow range for the market return of 6.25%% to 6.75%. This is mainly a function of the statements that the Competition Commission made about the value of R_m in its determination for NIE:

> The interpretation of the evidence on market returns remains subject to considerable uncertainty. The CC said in recent regulatory inquiries that 7 per cent is an upper limit for the expected market return, based on the approximate historical average realized return for short holding periods. We think that it may be appropriate to move away from this upper limit based on historical realized returns and place greater reliance on ex ante estimates derived from historical data which tend to support an upper limit of 6.5 per cent. We note the following points in support of setting an upper limit for the market return of 6.5 per cent:
>
> (a) We consider that the return on the market is a more stable parameter than the ERP. However, it remains the case that it exhibits considerable volatility and cannot therefore be regarded as fixed over time.
>
> (b) We note that past returns necessarily incorporate, inter alia, revisions in expectations for future cash flows and discount rates. DMS (2007) attempted to address this issue directly by decomposing past realized returns. We share its view that some elements of the return, in particular the historical expansion in valuation ratios, is unlikely to be repeated in the future.
>
> (c) In applying the CAPM, we seek to derive the expected return on the market. This is not necessarily the same as the realized return, even over long time horizons, if unexpected events occur. In this regard we note that attempts to estimate the historical expected ex ante return suggest that this is considerably lower than the realized return.
>
> (d) A forward-looking expectation of a return on the market of 7 per cent does not appear credible to us, given economic conditions observed since the credit crunch and lowered expectations of returns.
>
> We consider that the appropriate upper limit for the market return is 6.5 per cent.

Given this strong steer from the CC, along with the recent regulatory precedent shown in table 15, we do not think it is credible for us to recommend a different value to the Utility Regulator, although we would also observe that there are perhaps now grounds for revisiting and refreshing the CMA's analysis in the context of the current low interest rate outlook and the high transaction premia seen in Great Britain recent months. Our proposed R_m matches the CC/CMA figure of 6.5%. When taken alongside the proposed risk-free rate of 1.25%, this gives a value for the equity-risk premium of 5.25%.

7. Overall Cost of Capital Calculation and Conclusions

Table 16 combines our individual component estimates into a range for the overall real, RPI-stripped vanilla cost of capital.

Table 16: Proposed range for NIE's RP6 Cost of Capital

	Low	High
Gearing	0.45	0.45
Cost of debt (%)	1.87	1.87
Risk-free rate (%)	1.25	1.25
Market return (%)	6.5	6.5
Asset beta	0.38	0.40
Equity beta	0.61	0.65
Post-tax cost of equity (%)	4.45	4.64
Vanilla WACC (%)	3.29	3.39

The calculations give a real vanilla cost of capital of 3.3% to 3.4%.

These figures are lower than the current rate of return of 4.1%, reflecting the shift down in market interest rates since the CC's RP5 determination.

In selecting a point estimate from our table 16 range, our advice to the Utility Regulator is that it needs to reflect first and foremost on the analysis of riskiness that we highlight in section 3. A rate of return at the bottom end of the range will be appropriate if the regulator wishes to align the allowed return on equity to the return that Ofgem offered GB networks in its RIIO-ED1 determination. A rate of return at the top end of the range can be justified if the regulator considers that NIE is a more risky business in the eyes of investors when compared to GB utility companies.

The Utility Regulatory will also wish to pay attention to movements in market interest rates after the date of this paper (31 January 2017), with a view to incorporating the best available forecast of the cost of debt into NIE's RP6 allowed return.

Annex 1: Inflation

In our analysis of the cost of debt we need to convert a nominal rate of interest to its real equivalent. We recommend that the Utility Regulator uses the RPI forecasts that it is using across the RP6 review in this conversion; pending these forecasts, we set out below a ‘holding assumption’ that permits us to put forward indicative cost of debt and cost of capital calculations.

Our calculations make use of the Office of Budget Responsibility November 2016 forecasts. Although these are by no means the only possible assumptions about the future direction of inflation, they have the quality of being the underpinning to all of the public-sector forecasting currently being carried out in the UK. We think this means that they carry an authority which any alternative forecast we might otherwise choose will lack.

The November 2016 forecasts are set out in table A1 below.

Table A1: RPI forecasts

	2017/18	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**Long term**
% change	3.3	3.5	3.1	3.2	3.2	3.0

Source: OBR economic and fiscal outlook.

The figures show quite elevated rates of inflation, due in part to the recent shift up in the ‘formula effect’ difference between CPI and RPI inflation and in part due to expectations that there will be a small bounce-back in mortgage interest rates during the RP6 period.

If we average inflation over the 6.5-year RP6 period, we find that the appropriate inflation rate for our cost of debt calculations is 3.2%.