

1. Introduction

This paper contains our assessment of: (i) the risks facing Great Britain's electricity and gas suppliers; and (ii) the resulting cost of capital.

We approach this task as a consultancy that assisted the Competition & Markets Authority (CMA) during its 2014-16 energy market investigation but which has not subsequently had first-hand interaction with the sector.¹ We have therefore set out to understand how much has changed during the last six years and what impact new developments might have had on investors' required returns.

2. Risk Profile

2.1 The CMA's 2016 assessment

The CMA's final inquiry report contains a succinct examination of the key risk factors that have previously been identified as having the potential to cause variations in retail supply business profits. The CMA's 2016 report cited, in particular:²

- fluctuations in the demand for electricity and gas arising from –
 - weather;
 - the state of the economy;
- input price variation, including but not limited to changes in the natural gas and/or power prices; and
- changes in government scheme costs.

After considering these risk factors, the CMA concluded that energy retailers should be viewed as facing risks that are no higher than the average firm in the economy. This stemmed in large part from its view that energy is a basic necessity for domestic customers and, hence, that the demand risk faced by energy suppliers is no greater than the risk around demand in the economy as a whole.

When thinking about natural comparator sectors, the CMA found that energy suppliers were likely to be less risky than airlines and high street retailers, noting that such firms were exposed to greater volatility in demand due to the more discretionary nature of their products. However, the CMA felt that useful parallels could be drawn to supermarkets on the grounds that a proportion of a consumer's grocery purchases is also likely to be non-discretionary in character.

These considerations in turn led the CMA to select an asset beta for insertion into its cost of capital and EBIT margin calculations that was broadly in line with the beta of the average UK listed company.³

¹ We have worked extensively on cost of capital issues in the regulated aviation, communications, energy network, rail and water industries, including during Ofgem's recent RIIO-GD2, RIIO-T2 and RIIO-ED2 price control reviews. We have also advised the NI Utility Regulator on the cost of capital for energy retailers in Northern Ireland's energy retail markets.

² CMA (2016), Energy market investigation: final report, appendix 9.12.

³ The CMA's cost of capital range was 9.3% to 11.5%. The EBIT margin benchmark was 1.25%.

2.2 An updated assessment

As we work forward from the CMA's 2016 assessment,⁴ two factors jump out as constituting very material changes in circumstances:

- first, in 2018 the government legislated for a brand new cap on suppliers' standard variable tariffs (SVTs), which came into force in January 2019; and
- second, from spring/summer 2021, wholesale electricity and gas prices have both increased to historically unprecedented levels and shown very high levels of volatility.

These two things, both separately and in combination, straight away make for a very different picture from the one that we remember from our work of six years ago. As part of this assignment, we have therefore sought through conversations with suppliers, as well as our own desktop research, to obtain an up-to-date breakdown of the factors that have been affecting, and will continue to affect, suppliers' profit levels.

Our updated assessment of the main categories of risks is set out in a three-part chronology in the tables below.

2.2.1 Risks facing retailers as at H2 2021

We start by describing sector risks as they stood during the second half of last year.

Table 1

Risk category	Description
Wholesale price risk	<p>As intermediaries between customers and wholesalers, suppliers have continued to face the risk that the prices of the electricity and gas that they purchase on customers' behalf will change in an unpredictable manner. This risk crystallised in an extreme way during the recovery from the global COVID pandemic and then again following Russia's aggression towards Ukraine. These events, in turn, then brought forth a period of very high volatility in wholesale prices caused by:</p> <ul style="list-style-type: none">- short-term dislocations in markets; and- the sheer level of uncertainty that there has been about the extent to which the macroeconomic and geopolitical factors that have moved prices higher might exacerbate, stabilise or resolve themselves. <p>All other things being equal, the higher short-term volatility and heightened uncertainty about the path of prices in medium term both straight away meant higher risks around suppliers' future profits.</p>
Incomplete hedging risk	<p>Suppliers can, in principle, limit their exposure to wholesale price risk by locking into fixed prices for future electricity and gas purchases and aligning customer tariffs to those hedged prices. However, suppliers' ability to hedge wholesale prices can be impacted by trading counterparties' willingness to enter into forward contracts and/or energy suppliers' ability to meet collateral requirements and margin calls.</p> <p>Our understanding, based on the conversations that we have had with suppliers, is that some established trading partners last year started to step away from the market after deciding that the risks they were being asked to bear exceeded their willingness and/or ability to absorb losses. At the same time, those counterparties that stayed in the market increased collateral requirements significantly.</p> <p>This meant that suppliers faced a heightened risk of unwanted exposure to spot prices.</p>

⁴ We focus in this paper on the changes in suppliers' risk profile. Detail of companies' actual profitability since 2016 can be found at: <https://www.ofgem.gov.uk/energy-data-and-research/data-portal/all-available-charts>

Hedging mismatch risk	<p>Previously hedging strategy and hedging risk was strictly a commercial matter. However, following the introduction of the tariff cap, there is now a regulatory dimension. Specifically, the price cap regime provides for customers to pay an Ofgem-calculated price for their electricity and gas based on the costs that a notionally efficient supplier would incur if it adopted a particular purchasing strategy that is devised and costed by the regulator.</p> <p>From the outset, this introduced a risk that real-life supplier would make money or lose money if, for whatever reason, it was unable exactly replicate the regulator-determined hedging strategy. Following the sudden changes in the level and volatility of wholesale prices, suppliers encountered even greater difficulties especially due to illiquidity and/or mismatches arising from:</p> <ul style="list-style-type: none"> - intraday price variation vs the reference that Ofgem makes in its calculations to a single daily price reading at a specific point in the day; - the six-month periodicity of the price cap vs Ofgem's setting of a cap on annual p/kWh prices. <p>This meant that the scope to make or lose money as a result of hedging mismatches increased substantially.</p>
Tariff switching risk	<p>The introduction of the tariff cap inserted a regulated price into an otherwise competitive market.</p> <p>This regulated tariff was originally fixed by Ofgem in month t for a period covering month t+3 to month t+8. This design meant suppliers faced a risk that the regulated price would turn out to be more attractive to customers than any other new tariff that suppliers could realistically offer to customers. Specifically, the risk was that wholesale prices would rise at some point after month t and that customers switch to the regulated SVT in preference to any of the competitive tariffs in the market.</p> <p>This 'unexpected SVT volume' risk was a problem in that by the time a customer switches to the regulated tariff it is generally too late for the supplier to enter into the purchases that it would need to make in order to buy energy for consumer at the cost assumed by Ofgem when fixing the regulated tariff.</p>
Demand risk	<p>Suppliers have continued to face the risk that a customer might use more or less energy than the supplier forecasts.</p> <p>The level of demand risk grew both directly and indirectly as prices moved higher for at least two reasons:</p> <ul style="list-style-type: none"> - first, all other things being equal, the elasticity of demand for energy with respect to prices is higher at elevated price levels; and - second, higher energy bills had a significant knock-on effects on inflation, household purchasing power, interest rates, and GDP, making for a less stable economy and greater uncertainty about future patterns of consumption. <p>In a market with rising and volatile prices, and direct and indirect feed-through into customer usage, suppliers found themselves in a position where:</p> <ul style="list-style-type: none"> - over-forecasting volumes is costly because the supplier finds that it has purchased electricity or gas that it does not need; and - under-forecasting is also costly because the supplier has to purchase additional gas and electricity at prevailing, unhedged prices.
Bad debt risk	<p>Suppliers face the risk that the number of customers who are unable or choose not to pay their bills will change unexpectedly.</p> <p>As the absolute value of energy bills increased last year, default rates became harder to predict both among:</p> <ul style="list-style-type: none"> - domestic customers whose bills were increasing much more quickly than household incomes; and - non-domestic customers, insofar as not all businesses have the pricing power to pass higher costs on in full to their customers.

Policy risk	<p>Finally, all of the above risks have to be considered in conjunction with the keen interest that policymakers have had in the impacts on consumers.</p> <p>Regulatory risk and government policy risk is ever-present in energy markets. But the level of policy risk in a market with low and stable prices is not comparable to the level of policy risk in a market with high and volatile prices. In the next table, we identify a number of ways in which Ofgem and government have sought to support the market and contain the risks facing suppliers. But a supplier in H2 2021 would have found it very difficult to foresee what form policy interventions would take, what level of support they would provide, and when new measures would take effect, thus making policy risk an additional form of risk in itself.</p>
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Taken together, the risk profile set out across the seven rows of table 1 is a world away from the risk profile that the CMA identified in its work.

One thing that particularly stands out is that the change in the sector's risk profile is partly a function of externally driven change in the upstream wholesale electricity and gas markets but also partly a consequence of regulatory intervention. In other sectors that we work in, economic regulation almost always reduces risk by giving companies greater certainty of cost recovery than they would get in a competitive market – e.g. by handing companies fixed revenue entitlements irrespective of volumes and by setting up Regulatory Asset Values (RAVs) to create legitimate expectations about the reimbursement of historical investments. By contrast, in the energy retail sector, regulation looks to have created risks that would not have been present had suppliers been permitted to set their own cost-reflective tariffs.

The result this had is that the energy suppliers of H2 2021 no longer had that much in common with the high-street retailers and supermarkets that the CMA previously drew parallels to. To the best of our knowledge, no other firm that sells to Britain's household and businesses was having to deal with the scale of upstream price shock that energy suppliers were having to manage in the second half of last year. And no other firm has simultaneously been faced with the kind of regulator-led distortion of prices that Ofgem has inserted into the sector during that period of change.

Accordingly, we think it is uncontroversial to state that an energy supplier in H2 of 2021 was bearing an order of magnitude more risk compared to an energy supplier in previous years.

2.2.2 Risks facing retailers as at Q4 2022

Looking back over the last 12 months, it is clear that the wholesale price volatility of H2 2021 was not a short-lived phenomenon. We can also see that policymakers have been alert to the change in the level of risks faced by suppliers and have acted to contain risk through a series of interventions in the market and/or adjustments to regulatory policies.

In table 2 we update our previous snapshot to take account of both the broader evolution of risks and the effects of Ofgem and government actions.

Table 2

Risk category	Description
Wholesale price risk	<p>The underlying risks in the wholesale market do not look to us to have changed materially in the last 12 months.</p> <p>Suppliers are still facing significant short-term price volatility. And there remains considerable uncertainty about the path of wholesale prices in the coming weeks, months and years.</p>

Incomplete hedging risk	<p>Our understanding is that liquidity issues continued to grow during 2022 to the point where HM Treasury and the Bank of England were forced in September 2022 to step in with a backstop Energy Market Financing Scheme (EMFS).</p> <p>The express purpose of the EMFS is to ensure that energy market participants can continue to hedge wholesale price exposure. In practice, the scheme has not to date been used by suppliers.</p>
Hedging mismatch risk	<p>In the previous table, we noted that there is a potential mismatch between: (a) the prices that suppliers pay for the purchase of energy over the course of a particular day and the single daily price reading that Ofgem takes into its price cap calculation; and (b) short-duration price cap periods and Ofgem's cap on annual p/kWh prices.</p> <p>In February 2022, Ofgem amended its price cap with effect from April 2022 to include an explicit allowance for backwardation costs that emerged in winter 2021/22. In August 2022, Ofgem made another amendment to provide from January 2023 for an ex ante allowance for expected backwardation costs in winter 2022/23.</p> <p>The revised methodology remunerates suppliers for the expected cost of (b), but still leaves suppliers exposed to the risk that backwardation costs may be higher or lower than anticipated. In addition, suppliers continue to face risk (a).</p>
Tariff switching risk	<p>In August 2022, Ofgem decided that it would adjust the level of the tariff cap every three months rather than every six months. Ofgem also decided that it would fix the level of the cap 25 working days before each reset, rather than ~2 months beforehand as was the case previously. By reducing the amount of time that a regulator-determined tariff set in month t remains in the market from ~8 months to ~4 months, Ofgem has reduced the risk that the regulated SVT will come to sit out of line with prevailing competitive tariffs and drive unforeseen levels of switching.</p> <p>Where one year ago the main risk faced by suppliers was that the regulated tariff would turn out to be cheaper than a supplier's competitive offerings, the main risk that suppliers currently face is now the opposite problem – i.e. the risk that wholesale prices will fall and customers will switch away from the Ofgem-set SVT to a lower, cost-reflective tariff. This exposes suppliers to potential losses on energy already bought.</p> <p>Recognising this risk, in February 2022 Ofgem suppliers' licence to include a market stabilisation charge (MSC) with effect from 14 April 2022. The MSC provides for suppliers acquiring a domestic customer to pay a charge to the losing supplier when wholesale costs fall more than 10% lower than the wholesale element of Ofgem's price cap. The charge has been calibrated in such a way as to enable the losing supplier to recover most, but not all, of the losses it can suffer.</p> <p>Ofgem also announced a ban on new acquisition-only tariffs.</p>
Demand risk	<p>Suppliers continue to face the risk that customers will use more or less energy than the supplier forecasts.</p> <p>This risk has almost certainly increased due to:</p> <ul style="list-style-type: none"> - the impossibility of knowing how customers will adjust usage in the face of unprecedentedly high prices; and - uncertainty around the indirect effects that higher inflation, higher interest rates, etc. will have on household spending and economic activity.
Bad debt risk	<p>On seeing the strain that higher energy prices have been putting on households and businesses, the government stepped in with a series of subsidy schemes: the Energy Bills Support Scheme; the Energy Price Guarantee (EPG); and the Energy Bill Relief Scheme.</p> <p>This support has helped to contain, but not eliminate, bad debt risks. Suppliers still face elevated uncertainty in this area due to the level of prices customers are paying even after the application of the various support schemes and the wider economic pressures that households and businesses are experiencing.</p>

Policy risk	<p>Policy risks at present are rooted mainly in the uncertainties that there are about Ofgem's and government's willingness to retain many of the policy interventions mentioned under previous headings. As examples of this:</p> <ul style="list-style-type: none"> - the EMFS is open only until 27 January 2023; - the MSC is formally in place only until the end of March 2023; and - the EPG formally expires in April 2024. <p>Insofar as we noted above that these interventions have helped to contain risks, it follows that the risks faced by suppliers are directly affected by uncertainties over whether the above sorts of measures will be extended or replaced with new schemes if the need arises.</p>
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Our assessment when we look compare the entries in the above table to the entries in the earlier table 1 is that the risk faced by suppliers have moderated over the last year due in large part to the various Ofgem and government policy interventions. However, this is not the same as saying that the level of risk in the sector has reverted to pre-2021 or pre-2016 levels. The residual risks under the above seven headings all look to be significantly greater than the risks that energy suppliers were previously having to bear in the recent past, due to both the sheer scale of the underlying level of and volatility/uncertainty about wholesale prices and the way in which the design of Ofgem's price cap and associated schemes continue to expose suppliers to risks that would not exist in an unregulated market.

2.2.3 Risks facing retailers one year from now?

Energy UK asked us as part of the terms of reference for this study to think ahead to the sector's possible risk profile one year from now.

We would not claim to be able to predict the path that wholesale markets will follow in the coming 12 months, but we can identify several ways in which policy changes could affect the risks borne by suppliers.

Table 3

Risk category	Description
Wholesale price risk	<p>As stated above, we do not feel qualified to opine on the level of wholesale price volatility/uncertainty that suppliers will be exposed to one year from now.</p> <p>We do feel confident in saying that the events of the last 18 months will give rise in most quarters to a lasting mental recalibration of the degree of price risk that supply companies are unavoidably exposed to.</p>
Incomplete hedging risk	<p>The expiry of the EMFS will remove the backstop protection that suppliers have against liquidity risks.</p> <p>This in and of itself constitutes a small increase in exposure to risk.</p>
Hedging mismatch risk	<p>Suppliers' exposure to hedging mismatch risk caused by the basic design of Ofgem's tariff cap will continue.</p> <p>The scale of this risk will be closely related to the degree of enduring wholesale price risk in the market.</p>
Tariff switching risk	<p>Ofgem has been clear that its MSC and its ban on acquisition-only tariffs are temporary, time-limited measures.</p> <p>Formally speaking, suppliers will one year from now bear the full risk of costs caused by customers switching back and forth between the regulated tariff in periods characterised by sharp changes in wholesale costs.</p>

Demand risk	Forecasts from the Bank of England and the Office for Budget Responsibility suggest that Britain could be in for a long period of economic recession. This, coupled with the formal expiry of the Energy Price Guarantee in April 2023, creates a very uncertain backdrop for suppliers to forecast future volumes and suggests that volume risks will remain elevated for the foreseeable future.
Bad debt risk	A long recession, combined with the expiry of government support schemes, will increase the scale of the risks that suppliers face around the amount of bad debt.
Policy risk	All of the above risks have to be considered alongside the impossibility of knowing what policy initiative Ofgem and the government may pursue in the face of the new 'normal' level of energy prices.

This tabulation leads us to conclude that an enduring rebasing of the sector's risk profile vs pre-2016 perceptions is warranted even if the present period of crisis comes to an end.

3. Cost of Capital Estimation

Having described risks affecting energy retail businesses in a qualitative way, we now move on to the estimation of the cost of capital.

3.1 Framework

We use the same framework of analysis that the CMA used in its 2016 report. In particular, we:

- calculate the cost of capital for a stand-alone energy retailer;
- assume that this entity does not borrow and finances itself solely via equity capital; and
- use the capital asset pricing model (CAPM) to estimate the cost of equity.

The CAPM formula is:

$$\text{cost of equity} = \text{risk-free rate} + \beta \times (\text{expected market return} - \text{risk-free rate})$$

Our focus is on the nominal pre-tax cost of equity, i.e.:

$$\text{pre-tax cost of equity} = \text{cost of equity} / (1 - \text{tax rate})$$

The following sections give our proposed values for each of these parameters.

3.2 Beta

Our assessment of beta is hampered by the absence of a pure-play listed GB energy supplier.

In its 2016 work, the CMA concluded that the betas of listed vertically integrated energy companies that own energy retail businesses were likely to give very little useful information about the riskiness of the firms' energy supply businesses. The CMA therefore focused in its calibrations on:

- the beta of Just Energy, a Canadian-/US-listed energy supplier; and
- parallels that could be drawn to the betas of other companies engaged in retail activities, like high-street retailers and supermarkets.

The first of these data points is no longer useful for two reasons: first, Just Energy exited the GB market in 2019; and, second, in 2021 the company filed for bankruptcy protection. These things

mean that Just Energy's share price tells us very little about a GB energy supplier's exposure to risk in the market conditions that have seen since mid-2021.

The other retail comparator betas are also less interesting now than they were six years ago because tables 1 to 3 above give a strong *prima facie* reason to think that the comparisons that the CMA previously made to general retailing activities are nowadays far too simplistic.

We note that Ofgem has consulted in recent months on the case for putting more weight on the observed betas of vertically integrated owners of energy companies (i.e. Centrica, SSE, EDF, E.ON, Iberdrola and RWE). We consider this to be a complete non-starter for the simple reason that investors in generation capacity have been *benefiting* from high wholesale prices – i.e. the complete opposite to the experience of investors in energy supply businesses. As such, we would expect vertically integrated companies' share prices to have exhibited a very different covariance with stock market returns, rendering their betas unusable for the purpose in hand.

In the absence of any sort of reliable direct or indirect empirical estimates of energy supply company betas, the number that one ascribes to beta has to be a matter of judgment. Ofgem has offered two different judgments in recent months:

- in September, Ofgem published a report from the consultancy CEPA which concluded that beta could currently be in the range 1.0 to 1.2; and
- in November, Ofgem consulted on a range of 0.7 to 0.8, in line with the CMA's estimated range from 2016.

In our opinion, the lower of these ranges is wholly implausible. We do not think that anyone could credibly claim that investors in energy supply businesses have been indifferent towards the sharp increase in wholesale price volatility, the difficulties that the regulated price cap have been causing, the uncertainties that a higher level of prices are injecting into volume and bad debt forecasts, or the greater role that government now plays in the sector, to name just a few of the changes in suppliers' risk profile identified in section 2.

CEPA's position that investors have been affected by the changes that have impacted the sector is much more logical. However, we think that CEPA's report understated the effect that heightened risk has had on betas due to an unnecessary and erroneous downplaying of risks that CEPA considers are partly non-systematic in nature.⁵

We recognise that CAPM states that only exposure to systematic risks affects beta and that all symmetrically distributed company- and industry-specific risks are diversifiable. However, it is not at all clear that this distinction is meaningful or helpful in the particular circumstances of the energy supply industry at the current time. If we were to write down the systematic risks facing the UK and global economies, the energy prices paid by end consumers would feature at the very top of the list of investor concerns. Among other things, the current and future level of retail electricity and gas prices are exerting a very significant influence on: the level of inflation; central bank interest rate policies; the government's fiscal position and policies; household purchasing power; GDP; corporate profits; and the performance of the stock market. As such, it is very hard to think at present of a non-systematic risk affecting the energy supply industry – i.e. a risk that has the potential to impact suppliers' revenues, costs and profits but that is uninteresting to firms more generally and, hence, diversifiable.

⁵ See table 4.1 in CEPA (2022), Default tariff cap cost of capital.

As one illustration of this, weather risk is would normally be considered an industry-specific, non-systematic risk. This is clearly not true at the present time, however. The weather we get in the near term will impact energy prices and those energy prices in turn will impact the wider economy through the channels listed above. Accordingly, weather risk has very definitely moved from the non-systematic column to the systematic column of the ledger.

We therefore adopt the view that the vast majority of the risks identified in section 2 of this paper currently have a systematic character. There is no precise way of ascertaining what this means for beta, but we think it will be helpful to all parties to think in terms of the benchmark provided by the average firm in the economy – i.e. a firm an asset beta of about 0.7.⁶ Our professional judgment is that it would be reasonable to view energy supply companies' relative riskiness in the following sorts of terms:

- H2 2021 – energy suppliers twice as risky as the average firm in the economy
- Q4 2022 – energy suppliers between 1.5 times and 2 times as risky as the average firm in the economy;
- Q4 2023 – energy suppliers around 1.5 times as risky as the average firm in the economy.

This downward trend reflects the way in which Ofgem and government have helped to contain risks during 2022 and expectations that (a) the recent level of and volatility in wholesale prices will not persist indefinitely and (b) Ofgem and/or government will continue to intervene as necessary to prevent perverse outcomes that could otherwise arise from the interaction of a price cap and a competitive market (albeit with suppliers suffering lasting 'scarring' in the way that they are perceived by investors after all that has happened since mid-2021).

The resulting beta values are shown in table 4. The figures are slightly higher than CEPA's range, reflecting our reluctance to discard risks facing energy suppliers on the basis that they are somehow non-systematic in nature.

Table 4

	H2 2021	Q4 2022	Q4 2023?
Beta	1.4	1.05 to 1.4	1.05

3.3 Risk-free rate

An estimate of the risk-free rate can be obtained by looking at the yields on government bonds.

Because the cost of capital we are calculating is a nominal cost of capital, we focus on the yields on nominal gilts. In principle, it is also possible to convert yields in index-linked gilts to a nominal equivalent by making a suitable conversion for inflation. However, there are severe practical difficulties in applying this approach at the current time given the impossibility of knowing what investors in index-linked bonds currently expect of inflation both in the short-term (due to macroeconomic uncertainties) and in the longer term (due to the impending discontinuation of RPI).⁷

⁶ The average firm's equity beta is 1.0. The asset beta of 0.7 is a figure that has been quoted by the CMA and others after stripping out the risks that comes from leverage.

⁷ A separate First Economics paper on this topic is available at: https://www.ofwat.gov.uk/wp-content/uploads/2022/09/NWG_Risk_Free_Rate_FE.pdf

Table 5 reports the average yields on 10- and 20-year gilts during the months of August 2021 and November 2022. Our forecast for Q4 2023 is broadly in line with November 2022 yields to be consistent with forward curves that show no material change in market rates for the foreseeable future.

Table 5

	H2 2021	Q4 2022	Q4 2023?
Risk-free rate	0.65% to 1.01%	3.36% to 3.66%	3.5%

3.4 Expected market return

Ofgem has a standing policy of calculating the expected market return in accordance with the returns that investors have historically taken from stock market investments. We see no reason to depart from this approach in this report.

Ofgem's preferred range for the expected market return is 6.25% to 6.75% in real, CPI-stripped terms. We convert this to a nominal equivalent using expected average annual inflation over a 10- to 20-year horizon of 2.0% per annum as at H2 2021, 2.5% per annum as at Q4 2022, and 2.0% inflation as at Q4 2023. This gives recognition to the known shift up in the inflation rate during the final months of 2022 and through into 2023.

Table 6

	H2 2021	Q4 2022	Q4 2023?
Expected market return	8.4% to 8.9%	8.9% to 9.4%	8.4% to 8.9%

3.5 Tax

We convert to a pre-tax cost of equity using a common future tax rate of 25%. (NB: the switch to a 25% corporation tax rate was first announced in March 2021.)

Table 7

	H2 2021	Q4 2022	Q4 2023?
Tax rate	25%		

3.6 Cost of capital computation

Table 8 brings the preceding figures together into estimates of the cost of capital at our three reference dates.

Table 8

	H2 2021	Q4 2022	Q4 2023?
Risk-free rate	0.65% to 1.01%	3.36% to 3.66%	3.5%
Expected market return	8.4% to 8.9%	8.9% to 9.4%	8.4% to 8.9%
Beta	1.4	1.05 to 1.4	1.05
Cost of equity	11.5% to 12.1%	9.2% to 11.7%	8.6% to 9.2%
Tax rate	25%	25%	25%
Pre-tax cost of capital	15.3% to 16.1%	12.2% to 15.6%	11.5% to 12.2%

NB: For completeness, we note that it is open to Ofgem to recognise the increased risks faced by suppliers other than via a change in the assumed beta. Ofgem could, for example, capture a changing risk profile by including period-specific uplifts in the cost of capital calculation. This would yield the same mathematical results as we produce table 8 but with a different form of presentation to stakeholders.