

ADDITIONAL CONSIDERATIONS FOR THE PR24 ALLOWED RETURN ON EQUITY

A REPORT PREPARED FOR ANGLIAN

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Executive Summary

- 1 Ofwat is currently undertaking the 2024 price review (PR24) with the Final Determination (FD) due in December 2024. The determinations will consider the information provided by companies in their respective business plans.
- 2 What is clear from the plans submitted is that major new investments are required across the water and wastewater value chain. This is in response to multiple challenges faced by the sector, including resilience to climate change and meeting environmental standards.¹
- 3 What is also clear is that investments made in the next five-year period² are an essential part of long-term (25-year) delivery strategies to meet the challenges the sector faces. Ofwat recognises this saying that, “*Funding will support efficient enhancement investment, both in the short and long term.*”³ This means that the next five years are far from ‘business as usual’ for the sector, as companies strive to transform the value chain and improve outcomes, facilitated by a step-change in investment.
- 4 Investors therefore have a key role to play in the next five-year period. Significant sums of capital are required to make the investments set out in long-term plans a reality. However, capital cannot be transformed into assets if the sector cannot attract that capital in the first place. It is the challenge of attracting and retaining capital in the sector that this report provides a fresh perspective on.⁴
- 5 In this report we focus on the topic of attracting and retaining *equity capital* – but note that attracting all types of capital is essential for the sector to deliver on investment plans.
- 6 The work presented in this report was initially developed in response to Ofgem’s Sector Specific Methodology Consultation (SSMC) for the RIIO-3 process. The analysis was therefore developed through late 2023 and early 2024. However, there are common challenges across sectors which mean the outputs are relevant for water networks as well as energy networks. We have therefore set out the implications from that work for Ofwat at the earliest opportunity following its completion.

¹ Water UK estimates that PR24 business plans set out £96bn of investment between 2025 and 2030. This represents a 63% increase, in real terms, on the expenditure allowed by Ofwat in the current five year period.

² The next five-year period running from April 2025 to March 2030 is often referred to as “AMP8” (Asset Management Period 8).

³ Ofwat (2022), “Our final methodology for PR24: foreword and executive summary”, pg.7.

⁴ Further detail on sector-specific and market context is provided in Section 2.

What is the challenge?

- 7 In the past two years capital market conditions have changed substantially. In response to a variety of global shocks, the period of accommodative macroeconomic policy has ended. There has been an abrupt rise in interest rates and the cost of borrowing – gilt yields have increased by c.3.5% over a short space of time. It is arguable that this was not fully factored into the PR24 Final Methodology, particularly where the allowed rate of return was discussed.⁵
- 8 The PR24 DD and FD will be taken in a very different environment to the equivalent at PR19. Allowances which reflected the era of low interest rates and required returns in the past will now have to be adapted to reflect the new conditions in financial markets. The challenge is to how adapt allowances proportionally to current market conditions.
- 9 In addition, it is not just water networks which have growing capital requirements. This challenge is arriving at a time when infrastructure investors have many competing opportunities (projects, companies and geographies) for deploying capital. This is driven by countries all over the world seeking rapid progress towards a decarbonised future – enabled, in many instances, by infrastructure investments. The financing costs faced by the water sector will reflect the competition for capital from other investment opportunities in these market conditions.
- 10 As the cost of equity cannot be directly observed, a range of tools are needed to assess what the new capital market environment means for the cost of equity. We consider it is important to review evidence produced by a range of tools – and note that this is consistent with UKRN guidance on the cost of capital.⁶ Drawing upon a range of sources is a key way to ensure the allowed rate of return is set in a way that encourages long-term equity investment.
- 11 We present a new cross-check derived from hybrid bonds for understanding the relationship between capital market conditions and the cost of equity. It draws upon capital market data to support developing an appropriate allowed return on equity for PR24.
- 12 As the name suggests, hybrid bonds are securities that combine debt and equity characteristics. But, as traded bonds, there is market information on the yields of these securities. This means those yields can be analysed to infer required equity

⁵ At the time the final methodology was being prepared, there was greater uncertainty around how persistent rate rises could be – the data cut-off used was September 2022.

⁶ The UKRN guidance says, “*The CAPM is a model of required returns; there is inherently some degree of parameter uncertainty. It is therefore important to sense check the resulting point estimate where there is evidence to do so.*” UKRN guidance for regulators on the methodology for setting the cost of capital, page 26.

returns. This cross-check provides a clear link from capital market conditions through to the equity returns that utilities investors are likely to require. It also helps to test whether the difference between the cost of equity and cost of new debt is consistent within reasonable bounds of the CAPM logic. As far as we are aware this evidence source and cross-check has not been discussed in the context of PR24.

- 13 We have developed this evidence in response to the persistence of capital market conditions at a level significantly different to PR19. Arguably even at PR24 Final Methodology, markets already started to show material changes (relative to the conditions during PR19, which had persisted for around a decade at that point), although it was then unclear how significant the changes would ultimately become and quite how enduring this would prove to be. The persistence of this change has now become more evident in the past two years – meaning the need to carefully consider this issue has grown. We set out our key findings below.

Key findings of the hybrid bond cross-check on the cost of equity

- 14 We have developed a new cross-check on the cost of equity. This cross-check is based on ensuring that the cost of equity lies sufficiently far above the long-term return on senior investment-grade debt. This condition derives from the relative risk profile of debt and equity.
- 15 Senior debt implies lower risk and better recovery prospects: senior debt is paid first and it is paid a contractually stipulated sum, with contractual protections available as a backup. In contrast, holders of equity are paid last, and act as residual claimants on the business with no guarantee they receive anything, in particular in times of financial distress. Because of this marked difference in risk, it would be irrational for investors to opt for equity if equity returns are not sufficiently above the rates that could be earned from providing senior debt instead.
- 16 Given the large gap in relative risk between senior conventional debt and equity, comparing unadjusted yields on senior debt to equity returns would only provide a limited cross-check on equity returns, i.e. a test that we would typically expect to be easily passed.. A meaningful cross-check must reflect the incremental return that equity requires over debt.
- 17 We find that hybrid bonds, which are closer to equity in nature, provide a more meaningful point of comparison.⁷ Since the yield on these hybrid bonds is directly observable, with an appropriate assumption on the proportion of equity like feature

⁷ Hybrid bonds can be of very long tenor – covering multiple decades, making it more similar to the perpetual nature of equity. These securities can also have debt like qualities, including periodic coupon payments, however, in certain circumstances there can be a higher degree of flexibility over when these are paid. Hybrid bonds also sit between senior debt and ordinary shares in a company structure, being eligible for payments prior to equity-holders, but after senior debt-holders.

of the hybrid bond, an expected return on equity can be implied from a relatively simple formula. If the allowed equity return is set below the level implied by the yields of hybrid bonds, then risks to attracting sufficient equity capital are greater.

- 18 Specifically, we use hybrid bonds issued by regulated UK utility networks companies as the basis of the cross-check.⁸ This provides an output which is relevant for PR24 given the similarities in regulation between water networks and the other utility networks. To provide further confidence that results from the hybrid bond cross-check are applicable to the water sector we have undertaken a range of sector-specific analysis. Most notably, we have used a recent direct market quote on a potential hybrid bond issuance for Severn Trent, and found very similar results to our original analysis. Concluding that the outputs from the cross-check are relevant and appropriate to apply to water company cost of equity.
- 19 Drawing on recent capital market data, evidence from hybrid bonds indicates that the cost of equity should fall in the range 5.8% to 8.4% (CPIH deflated), with a central estimate of 6.6%.⁹ This compares with an 'early central view' allowed return on equity from the PR24 methodology of 4.14%.
- 20 Our view is that a cost of equity set below this range would heighten equity financing risks at PR24 and is therefore a cross-check we would encourage Ofwat to carefully consider.

What next?

- 21 This report provides a new tool which can be used by Ofwat to help calibrate the appropriate cost of equity for PR24. It has been developed so that the regulatory framework is able to adapt to the challenges posed by the new capital market environment which has emerged.
- 22 Our hybrid bond analysis is able to capture the impact of this new environment as its inputs are directly sourced from capital markets. The outputs from the hybrid bond cross-check on the current cost of equity show a need to revise upwards the CAPM inputs used at PR19 to calculate the cost of equity. Without revision there are heightened risks to the sector in terms of the equity capital is able to raise.
- 23 We note that CAPM inputs which may also require revision in order to reach an appropriate cost of equity PR24 include TMR, beta, and potentially aiming up. But those other inputs are beyond the scope of this report.

⁸ NGG Finance (a part of the wider National Grid group of companies) issues hybrid securities. Therefore, they provide a specific figure that reflects risk for regulated network businesses.

⁹ Expressed in CPIH-deflated terms; using data to the end of February 2024.

- 24 We invite further engagement with Ofwat on the analysis set out in this report and the fresh perspectives they provide for the PR24 cost of equity.

1 Introduction

- 25 Frontier Economics has been commissioned by a group of water companies to explore the relationship between capital market conditions and allowed equity return at the PR24. This report supports Anglian Water for its submission to Ofwat on additional considerations for the cost of equity in PR24. The work presented in this report was initially developed in response to Ofgem's Sector Specific Methodology Consultation (SSMC) for the RIIO-3 process. The analysis was therefore developed through late 2023 and early 2024. However, there are common challenges across sectors which mean the outputs are relevant for water networks as well as energy networks. We have therefore set out the implications from that work for Ofwat at the earliest opportunity following its completion.
- 26 At a time when the water sector is going to require substantial investment, it is critical that equity capital can be attracted, at competitive costs, to the level required. Capital raised and invested during the next five year period is key for ensuring companies can deliver their long term strategies.
- 27 The specific challenge this report considers is how the allowed equity return should adapt to capital market conditions which have changed substantially since PR19. As the price control process has progressed it has become clear that conditions markedly different to PR19 are likely to persist into the next price control period. The need to carefully consider this issue has therefore grown.
- 28 In this report we a new perspective on the relationship between capital markets and the cost of equity, a cross-check on the cost of equity based on hybrid bonds. To our knowledge, this has not been explored in the price review to date.
- 29 The result of our analysis demonstrates the need for CAPM inputs applied during the era of low interest rates and required returns to be revised significantly. We are not arguing that CAPM should be disregarded or that an entirely new methodology should be used to set the allowance. Rather we recommend Ofwat to take into account these relevant factors while exercising its regulatory judgement. We invite Ofwat to engage with the findings of this report and consider them when setting the allowed equity return for PR24.
- 30 The remainder of this report provides a full exposition of the points made in the Executive Summary, and is structured as follows:
- In Section 2 we set out the capital market and sector-specific context and the need for additional considerations when setting the PR24 cost of equity.
 - In Section 3 we set out the hybrid bond cross-check on the cost of equity we have developed.
 - Section 4 concludes with the overall implications for the PR24 cost of equity.

- The annexes provide the further detail, to aid review of our work.

2 Context and the need for additional considerations when setting the PR24 cost of equity

31 In this section we:

- Outline the changes in market conditions that have occurred. We show that these have been significant, and that the deeply negative interest rate environment has come to an abrupt end.
- Outline sector-specific PR24 context on the scale of investment and financing.
- Conclude the section by setting out the implications for the PR24 cost of equity if market conditions are not adequately reflected.

2.1 Macroeconomic context

2.1.1 Interest rate expectations at PR19

32 The final determination for PR19 was published in December 2019. At the time, there had been a prolonged period of extremely accommodative monetary policy since the Global Financial Crisis (GFC). This low interest rate period was projected to continue. This is illustrated in Table 1 below, which sets out the market projected path for the Bank of England base rate at the time.

33 As shown in the table, the market anticipated the base rate remaining at 0.5% for the foreseeable future. There was no indication that upward interest rates pressure would be a feature of the next regulatory cycle.

Table 1 Base rate market expectations from November 2019

Month	Dec 2019	Dec 2020	Dec 2021	Dec 2022
Base rate	0.7%	0.5%	0.5%	0.5%

Source: Bank of England, November 2019 Monetary Policy Report

Note: Base rate projection rounded to 1dp

34 This view of the macroeconomy was consistent with the earlier view of Ofwat at the time the PR19 methodology was being developed. Ofwat stated that:

35 *“The latest medium-term forecasts for the UK economy support the view that prospects for future growth will remain weak, decreasing the*

probability that interest rates and returns will normalise to the higher rates seen in the last few decades.”¹⁰

36 Ofwat’s decisions on the cost of equity were taken with the macroeconomic backdrop in mind. And it is clear that this supported their thinking when making allowances. Ofwat stated that:

“low interest rates will be accompanied by low equity returns in coming years.”¹¹

37 As such, at the time of the PR19 decision, there was no expectation of any imminent departure from the era of very low interest rates. Even at the time of the CMA’s PR19 final determination, for those companies that appealed, there was a continued expectation that low interest rates would persist years ahead.¹²

2.1.2 The abrupt end of the era of low interest rates

38 The interest rate environment at PR24 is now fundamentally different. It is clear that the monetary policy environment has abruptly changed, in response to major global shocks that have affected both real and financial markets. The base rate rose sharply from 0.25% at the start of 2022 to 5.25% today (see Figure 1). There is no indication of a near-term return to the period of extremely accommodative monetary policy.¹³

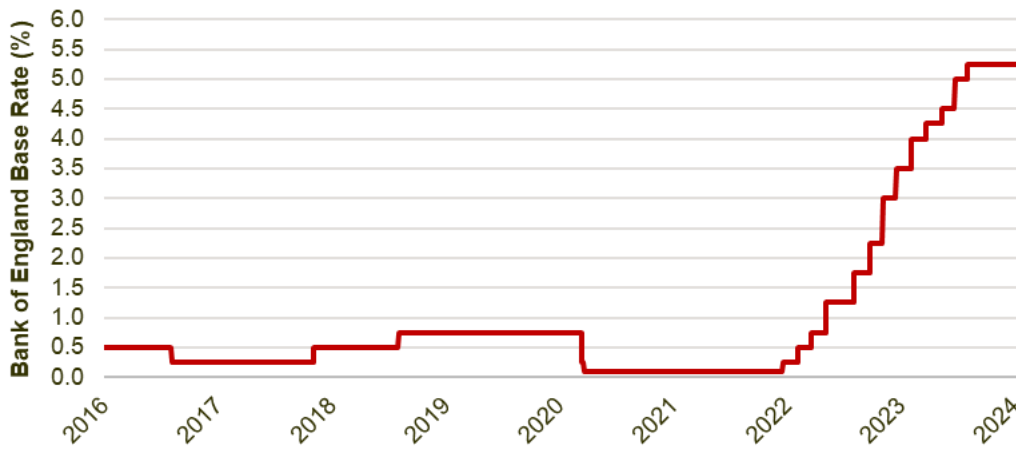
¹⁰ Ofwat (2017), “Delivering Water 2020: Our methodology for the 2019 price review; Appendix 12: Aligning risk and return; section 5.4.

¹¹ Ofwat (2017), “Delivering Water 2020: Our methodology for the 2019 price review; Appendix 12: Aligning risk and return; section 5.4.

¹² See, for example, Table 1.A and Chart 2.6 in the BoE Monetary Policy Report February 2021.

¹³ See, for example, Table 1.A and Chart 2.6 in the BoE Monetary Policy Report February 2024.

Figure 1 Bank of England base rate



Source: Bank of England

- 39 Since PR19, long-term gilt yields have also moved upwards by around 3.5 percentage points – a substantial increase over a relatively short period of time.
- 40 Together, this shows that PR24 decisions cannot be made with the same mindset as PR19, as the market outlook has fundamentally changed. However, we note that Ofwat’s early view resulted in a lower allowed equity return for PR24 than for PR19. It is clear to us that there is a need to re-assess what Ofwat considered to be appropriate at its PR24 FM.

2.2 Investment and financing challenges going into PR24

- 41 Alongside the macro-economic situation described above, the water sector is heading into the PR24 price control facing a substantial increase in its investment programme. The water company business plans for the period 2025 to 2030, submitted in October 2023, implied spending requirements of £96 billion on delivering water and wastewater services. This represents a 63% increase, in real terms, on the expenditure allowed by Ofwat in the current five year period.
- 42 More specifically, that expenditure total includes £41 billion on enhancement schemes, compared to £11 billion allowed by Ofwat for 2020 to 2025. This represents a 271% increase. It includes £11 billion to upgrade the wastewater system to reduce sewage spills and the construction of up to ten new reservoirs to improve water supply resilience in the face of climate change.¹⁴
- 43 The scale of the investment programme implies the need for significant new financing over the period 2025 to 2030. This will consist of both new equity and

¹⁴ Source: Water UK; <https://www.water.org.uk/investing-future/pr24>

new debt finance. Most of the companies in the sector propose some level of equity injection during the PR24 period. In addition, all companies propose a level of dividend yield that is materially below the long-term level implied by the cost of equity, providing a further source of equity injection into the companies.

44 Ofwat is in the process of assessing these business plan proposals and will publish its determinations later this year. Nevertheless, given the underlying drivers for investment in the sector it is inevitable that the final determination will include a significant increase in investment, with the associated implications for new financing.

2.3 Implications for setting an appropriate allowed equity return at PR24

45 The water sector needs to undergo a period of significant transformation to meet environmental and resilience goals.

46 The success of meeting these challenges will depend crucially on maintaining efficient ongoing access to capital markets, to raise and retain funding at efficient cost from both debt and equity investors. Without the ability to raise and retain capital in this way, it will not be possible to deliver the large scale investment needed.

47 What is also clear is that investments made in the next five-year period¹⁵ are an essential part of long-term (25-year) delivery strategies to meet the challenges the sector faces. Ofwat recognises this saying that, “*Funding will support efficient enhancement investment, both in the short and long term.*”¹⁶ This means that the next five years are far from “business as usual” for the sector, as companies strive to transform the value chain and improve outcomes, facilitated by a step-change in investment.

48 Investors therefore have a key role to play – both in the next five-years and beyond. Significant sums of capital are required to make the investments set out in long-term plans a reality. However, capital cannot be transformed into assets if the sector cannot attract that capital in the first place. An open approach to engagement has the potential to buttress investor confidence, by making it clear what investors can expect.

49 In the PR24 methodology Ofwat has signalled that they expected the balance of financing to change relative to past regulatory cycles. Its view is that a 55% level of gearing is appropriate for a notional company, a reduction from 60% at PR19.

¹⁵ The next five-year period running from April 2025 to March 2030 is often referred to as “AMP8” (Asset Management Period 8).

¹⁶ Ofwat (2022), “Our final methodology for PR24: foreword and executive summary”, pg.7.

This demonstrates greater scope Ofwat sees for equity in the sector going forward, and therefore emphasises the importance of setting an appropriate allowed return on equity to ensure that the required financing is forthcoming.

- 50 It is the allowed return on equity – and the impact of changing capital market conditions on that allowance – that we focus on in this report. Given the role of equity in financing the sector’s investments, we believe that the hybrid bond cross-check to the cost of equity set out in Section 3 requires careful consideration. By considering all available evidence, including this cross-check, there is a greater likelihood of striking an appropriate balance between customers and investors.

3 Hybrid bond cross-check

51 This part of the report outlines the details of our hybrid bond cross-check methodology. It covers:

- The context – explaining the rationale for hybrid debt as a cross-check;
- The methodology we have used to estimate the cost of equity cross-check;
- Results of the cost of equity cross-check; and
- How we have ensured the findings are applicable to the water sector.

52 In Annex A we provide further details on sensitivity tests on the key assumptions, and additional robustness tests supporting the methodology.

3.1 Context

53 The risk and return principles in corporate finance requires that the expected return on equity lies sufficiently far above the long-term return on senior investment-grade debt of the same entity. This condition derives from their relative risk profile. Senior debt implies lower risk and better recovery prospects. It is paid first and it is paid a contractually stipulated sum. In contrast, holders of equity are paid last, and act as residual claimants on the business with no guarantee they receive anything, particularly in times of financial distress. Because of this difference in risk, it would be irrational for investors to opt for equity if expected returns were similar to or below the expected returns on senior debt.

54 Therefore, the relevant question is how much higher should equity returns be, relative to debt. Given the large gap in relative risk between senior conventional debt and equity, the unadjusted yield on senior debt would only provide a limited cross-check on equity returns, i.e. a test that we would typically expect to be easily passed (although Ofwat's early view can be considered to not even pass this test in places).¹⁷

55 To provide stronger, more suitable cross-check we have considered securities that are somewhat debt like, but more similar to equity, for which yield information is available. Specifically, we focus on hybrid bonds to infer required equity returns.

56 Hybrid bonds, as the name suggests, are securities that combine debt and equity characteristics. For example, hybrid bonds can be of very long tenor – covering multiple decades, making them more similar to the perpetual nature of equity.

¹⁷ Ofwat's early view of the allowed return on equity is 3.67% - 4.60%, with a central estimate of 4.14%, all figures in CPIH-real. Using a CPIH assumption of 2%, this translates approximately to 5.74% - 6.69% nominal, with a central estimate of 6.22%. At the end of February 2024, the iBoxx £ Non-Financial BBB 10Y+ recorded a nominal yield of 5.86%. If this was the relevant benchmark, the low end of Ofwat's early view on the allowed return of equity fails this check of relative risk and return between debt and equity.

These securities can also have debt-like qualities, including periodic coupon payments. But, importantly, in certain circumstances there can be a higher degree of flexibility over when these are paid.¹⁸ Hybrid bonds also sit between senior debt and ordinary shares in a company structure, being eligible for payments prior to equity-holders, but after senior debt-holders.

57 Since the yield on these hybrid bonds is directly observable, with an appropriate assumption on the proportion of equity-like feature of the hybrid bond, an expected return on equity can be implied from a relatively simple formula. If the allowed equity return is set below the level implied by of the yields of hybrid bonds, then a rational investor would not invest in equity capital.

3.2 Hybrid debt

58 Our work is focused on hybrid bonds issued by GB utilities. The table below provides an overview of the available securities. They are issued by NGG Finance Plc, a financing subsidiary of National Grid Plc, and by SSE Plc. We have not identified any hybrid bonds issued by water companies which are currently outstanding. However, we review in detail the applicability of analysis based on hybrid bonds issued by these other GB Utilities in Section 3.5.

Table 2 Hybrid bonds for GB utilities

Issuer	Issue date	Maturity date	Amount
NGG Finance Plc	Mar 2013	Jun 2073	£1,000m
NGG Finance Plc	Sep 2019	Dec 2079	€500m
NGG Finance Plc	Sep 2019	Sep 2082	€750m
SSE Plc	July 2020	Perpetual	£600m
SSE Plc	July 2020	Perpetual	€500m
SSE Plc	April 2022	Perpetual	€1,000m

Source: Fitch, Bloomberg

Note: Our analysis excludes SSE bonds that have been superseded by more recent hybrid bonds

59 These hybrid bonds present the following characteristics:

- Subordination: Hybrid debt-holders receive payment after senior debt-holders but before ordinary shareholders;
- Extended tenors: All bonds have a maturity of more than 60 years at issuance;

¹⁸ Coupons payments can sometimes be deferred. This flexibility over payments is closer to the nature of dividend payments on equity.

- Deferrable coupons: The coupons attached to these bonds are deferrable;
- Call dates: Periodic call dates are incorporated into the structure of all bonds, with the specifics varying by security;
- 50% equity attributes: Rating agencies designate these hybrid bonds as 50% equity-like and 50% debt-like from an analytical standpoint;¹⁹ and
- All the bonds listed above were issued during the period when the RIIO framework (which has similarities to the model adopted by Ofwat since PR14) was operational and are currently traded.

3.3 Inferring the right level of equity returns from hybrid debt

60 We use the hybrid bond data to estimate the implied cost of equity. Assuming the allocation of securities between debt and equity stands at 50%, the spread between the expected return on hybrid bonds and conventional senior debt would fall at the midpoint between equity and senior debt costs. This approach enables us to sense check the allowed cost of equity.

3.4 Methodology and results based on available traded hybrid debt

61 This section summarises the methodology that estimates the hybrid bond cross-check, including the selection of bonds, and the approach to computing the cost of equity in nominal and real terms.

62 Our method for deducing equity returns from hybrid bonds involves the following steps:

- We estimate the spread between expected returns of hybrid bonds and senior debt;
- Assuming 50% equity-like characteristics in hybrid bonds, we calculate additional returns from equity attributes; and
- We calculate the cost of equity by adding senior debt returns to the extra returns from equity attributes.²⁰

3.4.1 Selection of hybrid bonds

63 Our approach to selecting hybrid bonds is guided by two key considerations.

- **We focus on the yield to next call date at issuance.**

¹⁹ The details of analytical treatment can vary between agencies.

²⁰ The spread between debt and hybrids is assumed to reflect the 50% equity-like characteristics of hybrid bonds. Hence, the extra returns of 100% equity compared to debt can be inferred as twice this spread, i.e. Equity returns = Debt yield + 2 x Spread hybrid to debt.

- A call date refers to the date when the issuer can repay the bond for a predetermined call price before its maturity.²¹ Hybrid bonds can have multiple call dates. The issuer's decision to exercise the call is influenced by market conditions. For instance, in periods of declining interest rates, the issuer may choose to call the bond to avoid paying interest above the prevailing rate.
- The 'yield to next call date' refers to the estimated annualised rate of return if the hybrid bond is called by the issuer on its next available call date. This can differ from the 'yield to maturity', which provides an estimate over a more extended period. Since call options can imply that the yield of hybrid bonds behaves more like shorter-tenor debt as capital market conditions change, the yield-to-maturity of these bonds may not provide useful insights. Therefore, we look at the yield-to-next-call at the issue date in our cross-check analysis.
- **We prioritise hybrid bonds issued by GB utilities.** We select hybrid bonds secured by GB utilities to ensure we reflect regulatory and operational risk of regulated networks. As a result, the returns from these bonds will accurately mirror the unique risks associated with companies of a similar nature. In Section 3.5 we also discuss how we have ensured the results from the cross-check are applicable to water networks in particular.

64 Table 3 provides a list of hybrid bonds issued by GB utilities, with the tenor to next call date at issue.

²¹ At a par or at a premium, depending on the terms stipulated at issuance.

Table 3 List of hybrid bonds for GB utilities

Issuer name	Issue date	Maturity date	Next call date	Tenor (years to call at issue date)
NGG Finance Plc	Mar 2013	Jun 2073	18/06/2025	12.3
NGG Finance Plc	Sep 2019	Dec 2079	05/09/2024	5.0
NGG Finance Plc	Sep 2019	Sep 2082	05/06/2027	7.8
SSE Plc	July 2020	Perpetual	16/04/2026	5.8
SSE Plc	July 2020	Perpetual	14/07/2026	6.8
SSE Plc	Apr 2022	Perpetual	21/01/2028	5.8

Source: National Grid, SSE, Bloomberg

Note: The next call dates listed are all first call dates

- 65 Among the options, we examine the evidence from the **NGG Finance Plc June 2073 hybrid** (NGG 2073 hybrid). This choice is driven by its longest years to call at issue date, extending beyond a decade (see Table 3).²² This date maximises the remaining tenor and thereby allows us to measure long-term return expectations. Selecting a security denominated in sterling further avoids currency exchange complications.²³
- 66 We place less emphasis on the SSE Plc bonds as SSE has a greater share of activities outside of regulated networks (for example, generation activity), however we do sense check our results against SSE securities in Annex A.2. We find similar, logically ordered outcomes

3.4.2 Measuring the spread of expected returns relative to senior debt

- 67 We assess the hybrid bond yield spread against a well-known market cost of debt benchmark, the iBoxx £ Utilities index. Specifically, we compare against average of the iBoxx £ 10-15Y Utilities index, which provides a comparable tenor to the NGG 2073 hybrid at issuance.²⁴ **By comparing the yield of the hybrid bond (5.65%) to that of the iBoxx benchmark (4.14%) as of 18 March 2013, we estimate a spread equal to 151bps at issue.**

²² The liquidity of this bond is also comparable with other conventional corporate bonds as measured by bid-ask spread, and we also find that yield data for this bond changes on a daily basis.

²³ At the time of writing this report, we did not find any traded hybrid bonds issued by regulated water networks in England and Wales but have used information specific to water companies in Section 3.5 to ensure applicability.

²⁴ Ofwat (2022) PR24 Final Methodology, Appendix 11, page 58. The NGG 2073 hybrid has a tenor of 12.3 years to the first call at issue, which is broadly consistent with an average tenor of the selected iBoxx index.

- 68 This spread could be applied to the current long-term iBoxx value, providing an estimate for the yield on a long-tenor hybrid bond in current market conditions. However, when determining the spread that will be applied to the present iBoxx, we consider the relatively higher risk profile of hybrid debt. Hence, we estimate the 'expected return' on the hybrid bond, factoring in the potential for the bond to not deliver the promised cash flows, that is, the default risk.²⁵ By estimating expected return on the bond, the outputs are more consistent with the expected cost of equity that the spread will imply.²⁶
- 69 We follow the methodology outlined in the UKRN cost of equity study (2018)²⁷ to estimate the expected returns. This approach uses historical default rate data by credit rating bands and incorporates recovery rate assumptions to determine a downward adjustment to the yield figure.²⁸
- 70 Table 4 displays the results. The spread between the expected return on the NGG 2073 hybrid (5.50%) and the corresponding iBoxx indices at the time of issue (4.14%) is estimated at 136bps.²⁹ This figure is estimated using expected returns to avoid capturing the default risk premium in the yield.

Table 4 Spread of selected hybrid bond relative to benchmark

Hybrid bond	Yield to next call at issue date	Expected return	Selected index	iBoxx yield at issue date	Yield spread at issue date	Expected return spread at issue date
	(1)	(2)		(3)	(1 - 3)	(2 - 3)
NGG Finance Plc, 2073	5.65%	5.50%	iBoxx £ Utilities 10-15Y	4.14%	1.51%	1.36%

Source: Bloomberg, Frontier calculations

Note: The expected return adjustment is based on the 2018 UKRN cost of equity study

- 71 Our estimate uses the spread at issue, effectively assuming that the spread has remained relatively stable since the bond's issuance. While the spread will have fluctuated since issuance, not least to reflect different levels of business risks at

²⁵ We do not adjust the iBoxx Utilities index since it holds an investment-grade status, indicating a lower default risk and potentially higher recovery rates for constituents. This makes our estimate more conservative as the gap between expected return and yield is narrower than it would have been had we carried out a similar adjustment on the senior debt.

²⁶ The CMA recently highlighted the importance of this adjustment in the Heathrow appeal, FD 6.262 page 212.

²⁷ UKRN (2018), 'Estimating the cost of capital for implementation of price controls by UK regulators', Appendix H.

²⁸ We assume a recovery rate of 80% for the purposes of this adjustment. Our sensitivity analysis shows this spread changes by approximately 10bps for every 10 percentage point change in the recovery rate.

²⁹ A risk of default for an 80% recovery rate and credit rating of BBB- results in a downward of 15bps.

any given time, we cannot accurately disentangle that effect from the general market credit spread conditions. Our approach has the advantage of avoiding the complexity of estimating a meaningful yield to maturity for a security as it approaches a potential call date. However, to ensure that this assumption does not drive the result, we conduct sensitivity analysis looking at historic time-varying spread to construct a range of spreads (see Annex A1).

72 We also consider the spread of other hybrid bonds, using the same methodology set out in Table 4 as a sensitivity. As we discussed earlier, we focus our analysis on the NGG June 2073 bond, as our assessment reveals that it has more favourable characteristics over the available alternatives. However, to ensure the robustness of our analysis, we repeat the calculations in Table 4 on the remaining bonds set out in Table 3.³⁰

73 This analysis reveals an average expected return spread of 1.30% for the other National Grid bonds, with a range of 1.08% to 1.53%. Our main results in Table 4 lie towards the centre of this range – suggesting the result is robust to the selection of other bonds. For SSE bonds, the equivalent average spread is 1.93%. We place less weight on this figure given SSE’s involvement in other activities such as generation. However, the spread being greater than National Grid equivalent is logical given SSE’s significant ownership of non-regulated businesses e.g. generation. This is also in consistent with SSE having a higher beta than National Grid.

3.4.3 Estimating the implied cost of equity

74 Hybrid bonds exhibit characteristics that fall between traditional equity and debt securities, making them a hybrid financial product. Rating agencies typically assign these securities a 50% weight to both equity and debt attributes. To estimate the equivalent returns on equity, we evaluate the spread considering that it is influenced by the equity attributes of the hybrid bonds.

75 In essence, our goal is to calculate the cost of equity by determining the additional returns associated with the percentage of equity-like features in hybrid bonds. The greater the resemblance to equity, the smaller the difference between hybrid and equity returns. This is set out in the following formula:

$$\text{Cost of equity}_t = \text{avg}(i\text{Boxx Utilities yield})_t + \frac{\text{Hybrid bond spread to iBoxx}}{\% \text{ equity like}}$$

76 Where:

³⁰ Note that we matched the benchmark iBoxx index to the currency and tenor of the hybrid security in question. Full details are set out in Appendix A.2.

- The ‘iBoxx Utilities yield’ represents the average yield of the iBoxx £ Utilities 10Y+ index over the last recent year;
- The ‘hybrid bond spread to iBoxx’ remains constant at 136bps, aligning with the expected returns on the hybrid bond at the time of issuance relative to the iBoxx £ indices’ yields on the issue date; and
- The ‘% equity-like’ stands for the percentage of equity-like characteristics, assumed at 50%. We set out our sensitivity analysis on this assumption in Annex A1.

77 We estimate the expected long-term returns on senior debt by taking the average of the iBoxx Utilities 10Y+ indices over the last recent year.³¹ We take the yields from the latest calendar year, facilitating comparability and replicability of our analysis, and average them to obtain a robust estimate. We note this is different from Ofwat’s approach of using one-month average for estimating the cost of new debt. A year timeframe allows us to reflect the near-term future outlook and minimise the impact of short-term fluctuations in debt market rates. We conduct sensitivity tests to assess the reliability of this estimate, establishing a reasonable range for potential iBoxx values (see Annex A1).

3.4.4 Results of the hybrid bond cross-check

78 This section outlines the results of the cross-check using hybrid debt according to the methodology set out in the previous subsections.

79 The table below summarises the outputs for the long-term cost of equity estimate. Our point estimate of the expected returns on equity implied from hybrid debt evidence lies at 8.8% in nominal terms (6.6% in real CPIH terms).

Table 5 Results of the cost of equity cross-check

Value	Estimate
Hybrid bond spread (adjusted for default risk, at issue)	+136bps
iBoxx £ Utilities10Y+ (1Y average)	6.04%
Higher returns on equity (based on 50% equity-like)	+272bps
Nominal cost of equity	8.76%
Real cost of equity (CPIH deflated)	6.63%

Source: Frontier calculations

Note: Analysis as of 29 February 2024. We consider a 2% inflation assumption to derive CPIH-real cost of equity.

³¹ As of 29 February 2024.

- 80 To provide further comfort around these results, we have undertaken a set of sensitivity tests on the key assumptions of the analysis, summarised below. The details of these sensitivity checks are included in Annex A1.
- 81 Although the details are not discussed here, the results from those checks are shown in Table 6. As shown, the sensitivities are used to derive a range around the central CPIH real cost of equity of 6.6%. Overall, this results in a low end of the range from the cross-check of 5.8%, and a high end of the range from the cross-check of 8.4%. We note that our point estimate is closer to the lower end than the upper end – this simply reflects the non-symmetric outputs from the sensitivity analysis.³²
- 82 Our range reflects plausible high and low scenarios of hybrid spread, equity-like proportions and iBoxx yields, although the lower and higher bounds of our range do not represent the lowest and highest outcome of all of the scenarios compounded, which would have produced implausibly low and high values. Instead, they represent average lower and higher bounds of these scenarios.

Table 6 Summary of sensitivity checks on key assumptions

Summary results	Low	High
Sensitivity on historical hybrid-iBoxx spread	7.8%	10.1%
Sensitivity on the percentage of equity-like	7.9%	11.5%
Sensitivity on iBoxx averaging	8.2%	10.1%
Nominal cost of equity	7.9%	10.6%
Real cost of equity (CPIH deflated)	5.8%	8.4%
Real cost of equity (CPIH deflated) – point estimate		6.6%

Source: Frontier calculations

Note: Results for the cost of equity are obtained by averaging the low and high values of each sensitivity respectively. We consider a 2% inflation assumption to derive CPIH-real cost of equity.

- 83 As shown in the table above, we conducted three sensitivity tests on our results
- (a) **Sensitivity on the historical hybrid-iBoxx spread.**
- (i) An assumption in our analysis is that the hybrid spread to iBoxx has remained constant over time. We have adopted this approach as spread figure is associated with a long-term hybrid bond yield at issue – making

³² For example, on equity likeness, dividing a constant spread value by different percentage equity-like leads to this results.

it an appropriate observation to use when checking long-term equity returns. It also aids simplicity.

- (ii) Nevertheless, we test the sensitivity of our analysis in response to the hybrid spread volatility over time by constructing a range around the 10th and 90th percentile.³³ We obtain a spread between 86bps and 201bps, resulting in nominal equity returns between 7.8% and 10.1%. Applying the CPIH assumption of 2.0% produces a CPIH deflated range of 5.6% to 7.9%. Our main analysis output lies towards the centre of this sensitivity range.

(b) Sensitivity on the percentage of equity-like.

- (i) In our main analysis, we have taken the assumption that hybrid bonds stand at the midpoint between debt and equity, specifically, we assume 50% equity-likeness from an analytical perspective. However, we test sensitivities ranging from 75% to 25%.
- (ii) This sensitivity tests produces a range of 7.9% to 11.5% (equivalent to 5.7% to 9.3% in real terms). Although the lower end of this range aligns closely with the prior sensitivity, the upper limit exhibits a significant increase in magnitude. This is not surprising since in the upper case a larger multiplier is applied to the hybrid spread to imply the equity premium.

(c) Sensitivity on iBoxx averaging.

- (i) In estimating the cost of equity cross-checks from hybrid debt, we considered the average value of the iBoxx £ Utilities 10Y+ during the latest year.³⁴ This average window, in our view, captures the outlook for debt market in the near future reasonably well whilst smoothing out short-term volatilities on market rates.
- (ii) However, we have conducted sensitivity scenarios on the iBoxx yield, and assessed how different dates and 'milestones' in the hybrid bond's trading history could influence the final value.
- (iii) When we average across these periods, we find that the iBoxx values range from 5.4% to 7.4%. Consequently, the nominal cost of equity falls between 8.2% to 10.1%, which translates to 6.0% to 8.0% in real terms cost of equity. This aligns with the sensitivities observed in the previous sections.

³³ Using traded yield data whereas the main outputs are based on yield at issue data.

³⁴ As of 29 February 2024.

84 In conclusion, our results are a point estimate for the implied cost of equity for 6.6% CPIH-real, within a range of 5.8% - 8.4% CPIH-real.³⁵

3.5 Ensuring the findings are applicable to the water sector

85 The results presented above are derived from the NGG bond explained above. However, they are not sourced from water companies in England and Wales. In this section we demonstrate that the results are applicable to the water sector, and therefore can be applied in the context of the PR24 cost of equity. We ensure this in two ways:

- By comparing the characteristics of the networks being considered – both qualitatively and quantitatively; and
- By assessing information on quoted spreads for newly issued water sector hybrid bonds.

86 We discuss each in turn below.

3.5.1 Comparing the characteristics of the networks being considered

87 As set out in Section 3.4, the central result for the cross-check is based on a hybrid bond issued by National Grid. One way to explore relevance for the water sector is to qualitatively compare water companies to National Grid. We consider that, in the context of the hybrid bond analysis, there are several similarities between National Grid and water companies which mean the results are relevant for the water sector cost of equity, these are:

- **Long-lived network assets** – both types of company manage a large network of assets that provide an essential service. A key characteristic of those networks in both cases is long-lived assets.
- **RCV based regulatory models** – both types of network are regulated through a RCV (or RAV to use Ofgem’s terminology) model. Both earn a return on capital linked to the RCV value, and have a component of revenue linked to the depreciation of that RCV value.
- **Revenue model** – both types of network operate under a regulator model of allowed revenues, which involve an assessment of efficient costs (totex) and a system of rewards and penalties linked to outcomes.
- **Use of water company data by Ofgem** – when assessing the cost of equity, Ofgem directly considers evidence on the beta of listed water companies (Severn Trent, Pennon and United Utilities) alongside that of National Grid.

³⁵ As noted above, our point estimate is closer to the lower end than the upper end – this simply reflects the non-symmetric outputs from the sensitivity analysis

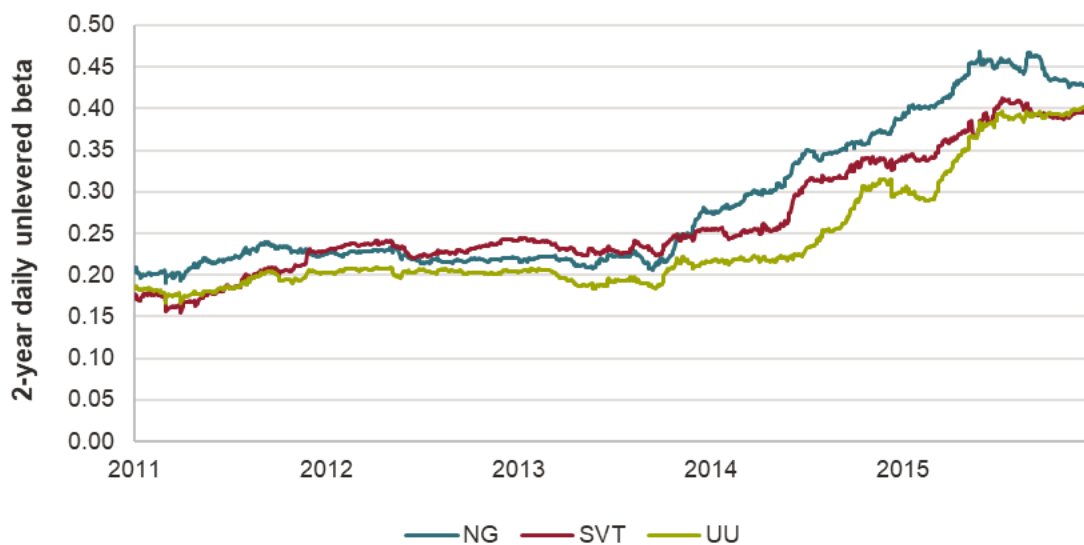
Therefore, Ofgem considers these data points to have sufficient similarity to the networks they regulate to inform its cost of equity allowance.

88 Given these shared characteristics, we consider the results from the cross-check can be utilised in the context of PR24, but have also considered other quantitative data points too.

89 The quantitative data points we consider are focused on how comparable the National Grid was to water companies at the time the NGG 2073 hybrid bond was issued (March 2013). Specifically, by focusing on unlevered beta and gearing estimates from the time, we can ensure there is no large differences in relative risk not being accounted for.

90 Firstly, comparing unlevered beta estimates at the time, we find that there are no large differences. In fact, as shown in Figure 2 below, the unlevered betas for National Grid and two listed water companies were very similar to each other in 2013, with the outputs showed minimal dispersion, between 0.20 and 0.25 at that time.³⁶

Figure 2 Beta comparison to water companies



Source: Frontier analysis, Bloomberg

Note: Unlevered betas shown using 2-years of daily data

91 Secondly, comparing gearing levels at the time, we find that the gearing level (measured by net debt to enterprise value) of National Grid was actually lower than the two water companies around 2013.³⁷ This suggests, given similarities in

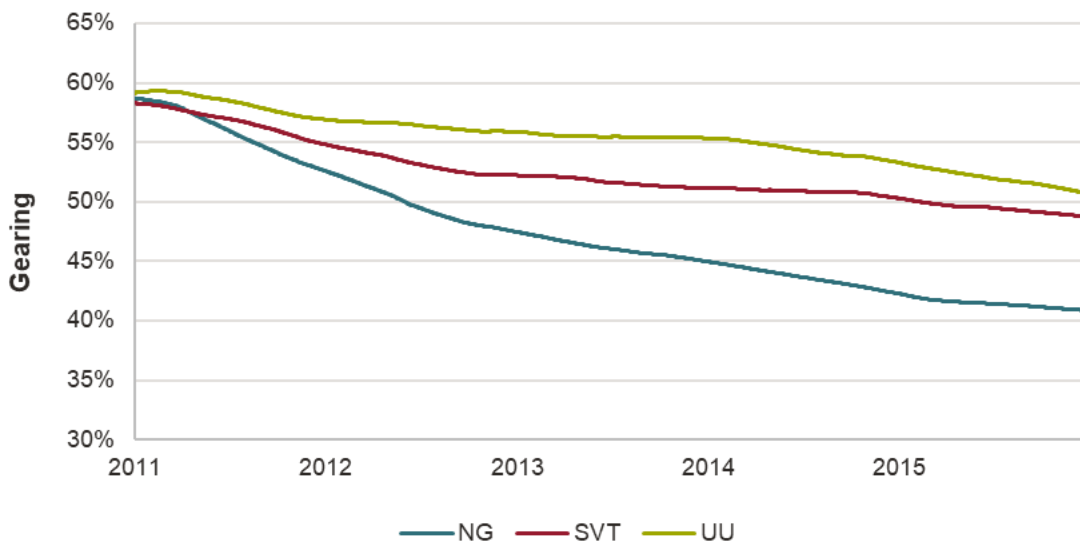
³⁶ Given Pennon's previous holding of waste business assets we do not include this in this analysis.

³⁷ We focus on Enterprise Value rather than RCV/RAV since this is more reflective of an investor's outlook.

unlevered beta, an equity beta for National Grid which happened to be lower than water companies at that particular moment in time. Arguably this implies that the inputs to the cross-check were reflecting risks lower than those present in water network at that time.

92 In addition, we note that around the time of issuance the enterprise value gearing level of National Grid was around 45%. This is significantly lower than Ofwat's PR24 methodology gearing level of 55%.³⁸

Figure 3 Gearing comparison to water companies



Source: Frontier analysis, Bloomberg

Note: Enterprise value based gearing, averaged daily over a 2-year rolling period

93 We consider this evidence supports the use of the cross-check in a water sector context. And again, the points of comparison set out above may even suggest that the cross-check is calibrated in a relatively cautious manner.

3.5.2 Quoted spreads for potential water sector hybrid bonds

94 Even though there is currently no hybrid bond issued by water companies, we have considered relevant evidence from new issuance quotes recently provided by financial advisors on behalf of water companies which should reflect market conditions reasonably well. Specifically, Severn Trent have provided us with data on the spread of a new sterling denominated hybrid bond above their senior bonds. This data is from a hybrid bond issuance quote obtained from its investment bank in early 2024.

³⁸ Measured on an RCV basis.

- 95 The information provided showed that the spread of the new hybrid issuance above senior bonds varied in a range of 155bps to 170bps. Hybrid bonds with a longer number of years to next call (e.g. around 10 years) were at the higher end of the range.³⁹
- 96 Therefore, the higher end of this 155bps to 170bps range is arguably most comparable with the NGG 2073 hybrid bond used in Section 3.4, as this hybrid had around 12 years to the first call date when it was issued.
- 97 As set out earlier in this section, the spread of the NGG 2073 hybrid bond⁴⁰ above the iBoxx Utilities equivalent at issue was 151bps. It is this input to the cross-check methodology that the quote shared by Severn Trent should be compared to.⁴¹ Therefore, we find that this quote for a water hybrid bond is of a very similar magnitude to the inputs used in the cross-check – with the NGG spread sitting just below the quoted new issue range.
- 98 We consider this is further evidence that the values we have used to estimate the hybrid bond cross-check are suitable in the PR24 context. Indeed, the evidence shows that our assumptions may actually on the cautious side relative to recent market conditions reflected in the quote, which extended to 170bps at longer tenors.

3.6 Conclusion on hybrid bond cross-check

- 99 Overall, we find the hybrid bond cross-check developed in this section can be applied reasonably well in the PR24 context.⁴² It provides a direct reading of the capital market conditions, to which Ofwat should have regard if it were to set a price control package that can successfully attract and retain equity capital for PR24. Our analysis shows a range for the implied cost of equity of 5.8% - 8.4% CPIH-real. Within that range, our central estimate for the implied cost of equity is 6.6%. This compares with an 'early central view' allowed return on equity from the PR24 methodology of 4.14% – a figure which lies outside the cross-check range. This could be due to the CAPM parameters used by Ofwat in its early is to skewed to the downside given that they are mostly based on long-term historic averages and the capital markets are currently higher than those levels.

³⁹ Our understanding is that this information relates to the hybrid bond being issued by the opco, and that there is an assumption that the hybrid bonds would receive 50% equity credit (noting that details of that treatment can differ between rating agencies).

⁴⁰ Also sterling denominated.

⁴¹ There is a very minor difference in that the spread for the NGG hybrid was to the iBoxx Utilities, whereas the quote is to Severn Trent senior bonds. However, Severn Trent Water Limited has a credit rating of BBB+/Baa1, meaning any difference will be minor.

⁴² Some data suggests the cross-check outputs may be cautious.

- 100 This range has been developed through extensive sensitivity analysis and robustness checks, the details of which are set out in Annex A. Our view is that an allowed return on equity below this range may fail to adequately reflect the new capital market reality – and therefore would be associated with heightened equity financing risks.

4 Conclusion and implications for the PR24 allowed return on equity

- 101 This report provides a new tool based on hybrid bond data which can be used by Ofwat to help gauge the appropriate cost of equity for PR24. It has been developed so that the regulatory framework is able to adapt to the challenges posed by the new capital market environment which has emerged.
- 102 Our hybrid bond analysis captures the impact of this new environment as their inputs are directly sourced from capital markets. The outputs show a need to significantly revise the CAPM inputs used in the PR24 methodology to calculate the cost of equity. More specifically, our hybrid bond cross-check suggests a market-implied cost of equity of 5.8% to 8.4% while the 'early central view' from the methodology is an allowed equity return for PR24 at 4.14%. Without revision there are heightened risks to the sector in terms of the equity capital is able to raise.
- 103 We note that CAPM inputs may require revision in order to reach an appropriate cost of equity PR24 – such as TMR, beta and potentially aiming up within the CAPM range. But those inputs are beyond the scope of this report.
- 104 Investors clearly have a key role to play in the next five-year period. Significant sums of capital are required to make the investments set out in long-term plans a reality. However, capital cannot be transformed into assets if the sector cannot attract that capital in the first place.
- 105 By considering all available evidence there is a greater likelihood of striking an appropriate balance between customers and investors. We therefore invite further engagement with Ofwat on the tools set out in this report and the fresh perspectives they provide for the PR24 cost of equity.

Annex A – Detailed sensitivity analysis on hybrid bonds

A.1 In the Annex set out the sensitivity checks we have undertaken on key assumptions used in the hybrid bond cross-check (Annex A1). We then outline additional robustness checks that we have undertaken on the cross-check (Annex A2).

A.1 Sensitivity checks on key assumptions

Sensitivity test on historical hybrid/iBoxx spread

A.2 A key assumption in our analysis is that the hybrid spread to iBoxx has remained constant over time. We have adopted this approach for its simplicity, which allows us to address the complexities that could emerge as the bond approaches its first call date. During this time, investor perceptions about potential early calls and shorter maturities could influence price dynamics, making the comparison with iBoxx potentially problematic for measuring long-term expectations. In this section, we relax this assumption and check how the results vary within a reasonable range of scenarios.

A.3 We measure the spread **over time**, allowing for comparisons as maturity approaches.

A.4 **First, we calculate the expected returns of the NGG 2073 hybrid to exclude compensating for higher risk.** We account for the fact that this hybrid bond's credit rating declined over the years (from BBB- to BB+ in March 2021, with 4 years remaining to next call). Table 7 provides an overview of the adjustments over time for BBB- and BB+ credit ratings following the methodology in UKRN (2018). Costs of default risk decrease as securities approach maturity and becomes less likely. At 4 years to maturity, the reduction to yields should shift by -0.06% to -0.14% following the BB+ route to align with the new rating. However, in the interest of simplicity, we take a conservative approach and adjust yields by -0.15% over the hold period. This corresponds with value applied to the hybrid yield at issue.

Table 7 Default risk adjustments for BBB- and BB+ credit rating

Credit rating	Years to maturity											
	1	2	3	4	5	6	7	8	9	10	11	12
BBB-	-0.04%	-0.05%	-0.07%	-0.08%	-0.09%	-0.10%	-0.11%	-0.12%	-0.13%	-0.14%	-0.15%	-0.15%
BB+	-0.07%	-0.09%	-0.12%	-0.14%	-0.16%	-0.17%	-0.19%	-0.20%	-0.22%	-0.23%	-0.24%	-0.24%

Source: Frontier calculations following UKRN (2018).

Note: Assuming 80% recovery rate.

- A.5 Next, we establish a new iBoxx benchmark. For each day, we match the bond’s expected returns with the corresponding iBoxx £ Utilities index according to its maturity to next call (July 2025).⁴³
- A.6 Finally, we calculate the daily spread as the difference between the two measures (NGG 2073 hybrid expected return net of the iBoxx benchmark).
- A.7 We test the sensitivity of our analysis in response to the spread volatility over time by constructing a range around the 10th and 90th percentile. **We obtain a spread between 86 and 201bps, resulting in nominal equity returns between 7.8% and 10.1% (Table 8).** The expected return spread at issue of 136bps lies towards the centre of this sensitivity range.

Table 8 Sensitivity test on historical hybrid/iBoxx spreads

Cost of equity	Low	High
Historical hybrid bond spread to iBoxx	86bps	201bps
iBoxx £ Utilities 10Y+ (1Y average)	6.0%	6.0%
Higher returns on equity (based on 50% equity-like)	1.7%	4.0%
Nominal cost of equity	7.8%	10.1%
Real cost of equity (CPIH deflated)	5.6%	7.9%

Source: Frontier calculations

Note: Analysis as of 29 February 2024. We consider a 2% inflation assumption to derive CPIH-real cost of equity.

- A.8 Based on this analysis, we conclude that the spread at issue on our chosen National Grid hybrid bond is a reliable and reasonable measure of the long-term differentials between hybrid and debt returns over time. In this instance, the simplified approach of taking spread at issuance can be considered robust in respect of the historical spread.

Sensitivity test on the percentage of equity-like

- A.9 In our main analysis, we have taken the assumption that hybrid bonds stand at the midpoint between debt and equity, being assigned 50% equity-like from an analytical perspective. This is an approximation made by credit rating agencies based on investors’ expectations. However, we test some sensitivities, ranging from 75% to 25%.

⁴³ For example, in 2013, we compare it to iBoxx £ Utilities 10-15, and in 2021, which is four years away from maturity, to iBoxx £ Utilities 3-5.

A.10 Table 9 presents a span of nominal equity returns from 7.9% to 11.5% (equivalent to 5.7% to 9.3% in real terms). Although the lower end of this range aligns closely with the prior sensitivity, the upper limit exhibits a significant increase in magnitude. This is not surprising since in the upper case a larger multiplier is applied to the hybrid spread to imply the equity premium. All in all, we consider the resulting range is reasonably tight given the fact we are stretching the limit of the plausibility on the equity proportion assumption.

Table 9 Sensitivity test on the percentage of equity-like

Cost of equity	Low	High
Spread to iBoxx at issue	136bps	136bps
iBoxx £ Utilities 10Y+ (1Y average)	6.0%	6.0%
Higher returns on equity (based on 75-25% equity-like)	1.8%	5.4%
Nominal cost of equity	7.9%	11.5%
Real cost of equity (CPIH deflated)	5.7%	9.3%

Source: Frontier calculations

Note: Analysis as of 29 February 2024. We consider a 2% inflation assumption to derive CPIH-real cost of equity.

Sensitivity test on iBoxx averaging

A.11 In estimating the cost of equity cross-checks from hybrid debt, we considered the average value of the iBoxx £ Utilities 10Y+ during the latest year.⁴⁴ This average window, in our view, captures the outlook for debt market in the near future reasonably well whilst smoothing out short-term volatilities on market rates.

A.12 However, we have conducted sensitivity scenarios on the iBoxx yield, and assessed how different dates could influence the final value. We do so by constructing a number of different reference points for the iBoxx yield:

- **Transition (2 year average).** From late 2021, interest rates started rising in response to the central bank's efforts to control inflation. This shift was gradual but persistent and within the space of one and half years took the economy out of the era of favourable borrowing costs, into the current higher interest rate environment. A two year average captures this transitional period and reflects a reasonable low bound we could expect in the medium term future

⁴⁴ As of 29 February 2024.

should the monetary policy soften in response to potential macro-economic environment.

- **Maximum (12 Oct 2022).** This reflects the point in time when the iBoxx Utilities yields reached their highest level during the recent upward trend. We consider this as a credible upper bound which could be “retested” by the market should conditions worsen and revert back to more stringent tightening of the policy.
- **Settlement (since 12 Oct 2022 to present).** After reaching the peak, interest rates began to decline gradually but remained relatively high. Therefore, this period can be considered to represent a stable phase following the peak, which could be interpreted as a representation of the “high interest environment period to date”.

A.13 Figure provides an overview of the iBoxx £ Utilities 10Y+ evolution since 2013, indicating these key timeframes.

Figure 4 Evolution of the iBoxx £ Utilities 10Y+, 2013 to 2024



Source: Markit

A.14 When we average across these periods, we find that the iBoxx values range from 5.4% to 7.4%. Consequently, the nominal cost of equity falls between 8.2% to 10.1%, which translates to 6.0% to 8.0% in real terms. This aligns with the sensitivities observed in the previous sections.

Table 10 Sensitivity test on iBoxx averaging

Nominal equity returns	Transition	Settlement	Maximum
Spread to iBoxx at issue	136bps	136bps	136bps
iBoxx £ Utilities 10Y+	5.4%	5.9%	7.4%
Higher returns on equity (based on 50% equity-like)	2.7%	2.7%	2.7%
Nominal cost of equity	8.2%	8.6%	10.1%
Real cost of equity (CPIH deflated)	6.0%	6.5%	8.0%

Source: Frontier calculations

Note: Data as of 29 February 2024. We consider a 2% inflation assumption to derive CPIH-real cost of equity.

- A.15 The hybrid bond implied cost of equity from our point estimate, based on the latest year average iBoxx yield, stands at 6.6% in CPIH real terms, which is closely aligned with the middle scenario in our sensitivity test (settlement period).⁴⁵
- A.16 Overall, we consider our point estimate of 6.6% implied cost of equity is robust to the sensitivity test of plausible iBoxx scenarios, and because it is based on a one-year average, is not subject to extreme short-term movement of the bond market.

Summary of sensitivity checks on key assumptions

- A.17 Summarising the three ranges we produced based on the scenarios, we construct an overall range for the hybrid bond implied cost of equity. Taking the average of the lower bounds and higher bounds, we obtain a range of **7.9% to 10.6% in nominal terms (5.8% to 8.4% in CPIH-real terms)**. Our point estimate of 6.6% CPIH-real falls within this range, leaning towards the conservative side as it is closer to the lower bound.

⁴⁵ Furthermore, we'd get a similar results even if one took the latest monthly average of iBoxx yield as of the time of writing of this report (February 2024 average), the resulting implied cost of equity would be 6.3% in CPIH-real terms.

Table 11 Summary of sensitivity checks on key assumptions

Summary results	Low	High
Sensitivity on historical hybrid/iBoxx spread	7.8%	10.1%
Sensitivity on the percentage of equity-like	7.9%	11.5%
Sensitivity on iBoxx averaging	8.2%	10.1%
Nominal cost of equity	7.9%	10.6%
Real cost of equity (CPIH deflated)	5.8%	8.4%
Real cost of equity (CPIH deflated) – point estimate		6.6%

Source: Frontier calculations

Note: Results for the cost of equity are obtained by averaging the low and high values of each sensitivity respectively. We consider a 2% inflation assumption to derive CPIH-real cost of equity.

A.2 Additional robustness checks

A.18 In this section of the annex, we conduct additional analyses to assess the robustness of our hybrid bond results. These tests provide us with additional reassurance regarding our findings and conclusions.

Comparison of hybrid/iBoxx spreads for securities issued by GB utilities

A.19 As an input to the cross-check, we obtained a spread of 136bps between the NGG 2073 hybrid and the iBoxx Utilities benchmark. To check that this result is not specific to this one bond, we expand the analysis to include the remaining NGG Finance and SSE hybrid bonds. The results of this comparison are detailed in Table 12. As shown, the benchmark we consistently apply for the purposes of this robustness check is the iBoxx Utilities index matched to the currency of each hybrid bond.

Table 12 Spread of GB hybrid bonds relative to benchmark

Hybrid bond	Yield to next call at issue date	Expected return	Selected index	iBoxx yield at issue date	Yield spread at issue date	Expected return spread at issue date
	(1)	(2)		(3)	(1 - 3)	(2 - 3)
NGG Finance Plc, 2079	1.63%	1.49%	iBoxx € Utilities	0.42%	1.21%	1.08%
NGG Finance Plc, 2082	2.13%	1.95%	iBoxx € Utilities	0.42%	1.72%	1.53%
NGG Finance average						1.30%
SSE Plc (ISIN XS2195190 876)	3.51%	3.41%	iBoxx £ Utilities 5-7	1.29%	2.22%	2.13%
SSE Plc (ISIN XS2195190 520)	3.00%	2.90%	iBoxx € Utilities	0.79%	2.21%	2.11%
SSE Plc (ISIN XS2439704 318)	3.97%	3.80%	iBoxx € Utilities	2.24%	1.73%	1.56%
SSE average						1.93%

Source: Bloomberg, Frontier calculations

Note: The expected return adjustment is based on the 2018 UKRN cost of equity study

A.20 We obtain similar results using NGG Finance's Euro denominated bonds.⁴⁶ **The range of spreads from NGG Finance hybrid bonds is 108bps to 153bp, with an average of 130bps.** In both cases we match the tenor and currency of the iBoxx to the characteristics of each bond. Using the iBoxx Euro Utilities benchmark approximately matches to the tenors-to-next-call of 5.0 and 7.8 years of the 2079 and 2082 hybrid bonds, respectively.⁴⁷

A.21 **For the SSE hybrid bonds, spreads range from 156bps to 213bps, with an average of 193bps.** These spreads are higher than the spreads observed for the National Grid hybrid bonds, but this is not surprising as the implied cost of equity for SSE is expected to be higher due to its significant ownership of non-regulated

⁴⁶ Note that both were issued in Euro currency so are compared to Euro denominated iBoxx indices.

⁴⁷ The average years to maturity on this index has been relatively stable at around 6 years.

businesses. This is also in line with SSE having a significantly higher beta than NG.

A.22 Overall, we find these robustness checks are supportive of our analysis.

Comparison between hybrid/iBoxx and bond/iBoxx spreads

A.23 In this exercise, we assess the spreads of hybrid-to-iBoxx compared to NG plc bonds-to-iBoxx. We focus on the NGG 2082 hybrid, denominated in EUR, to ensure a direct comparison with NG plc bonds which are also issued in Euros.

Figure 5 Spread of yield to next call (Jun 2027) on the NGG Finance 2082 Hybrid to the iBoxx € Utilities



Source: Frontier calculations based on Bloomberg and Markit data

Note: Both series are Euro denominated

A.24 The results in Figure show that the spread between National Grid hybrid and National Grid senior debt follows similar pattern as the spread over iBoxx in our main analysis. We note that the spread to National Grid senior debt is almost always higher than the € iBoxx utilities index.

A.25 This suggests that there is unlikely any systematic over-estimation of the hybrid spread when we use market benchmark, in comparison with the senior debt issued by the relevant company. This is also consistent with the finding using SVT's hybrid bond quotes.

Comparison of National Grid's regulatory gearing from FY2013

A.26 In our main analysis, we have used National Grid specific hybrid bond data from March 2013 as a key part of the methodology for the hybrid bond cross-check. As this cross-check is being used as a point of comparison with allowed equity return based on a notional gearing assumption, we have checked if National Grid's GB network regulatory gearing (RAV based) from the same time period which

underpins the hybrid bond has roughly the same level of gearing as is being applied by regulators today.

- A.27 In the table below we set out regulatory gearing for National Grid’s electricity transmission and gas business as of March 2013, using figures from the regulatory accounting statements for each. As shown, the actual gearing figures from those business are around 60%. This aligns with the gearing assumptions adopted by Ofwat for PR19, and by Ofgem recently. Albeit it is slightly higher than Ofwat’s PR24 methodology figure of 55%. when calculating the cost of equity – both on a network specific basis, and in total.
- A.28 As a matter of principle, one would ideally re-gear the outcome of this cross check to match the notional gearing adopted in the relevant price control, in order to ensure a completely like-for-like comparison. However, given that actual gearing is close to the notional gearing as well as the actual gearing of UU and SVT at the time the hybrid bond was issued, we have not undertaken this step at this stage. This could be considered in future work.

Table 13 Gearing of National Grid’s network activities, as of 31 March 2013

Activity	Net debt (£m)	RAV (£m)	Gearing
Electricity transmission	5,919	10,145	58%
Gas transmission	8,669	5,340	63%
Gas distribution		8,330	
All activities	14,588	23,815	61%

Source: Annual Report and Accounts 2012/13 National Grid Electricity Transmission plc; and National Grid Gas plc NTS Regulatory Accounting Statements 2012/13

Note: Net debt combined for both gas businesses



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