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EQUITY INVESTABILITY IN RIIO-3

A REPORT PREPARED FOR THE ENA

05 MARCH 2024

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Executive Summary

1 In its SSMC, Ofgem stated that the purpose of investability should be to test whether it is possible for networks to **attract and retain equity** given the calibration of its price controls.[1] It then follows that investability[2] must focus on assessing whether the equity return on offer at RIIO-3[3] is competitive versus the set of other opportunities that exist in the wider capital markets.

Why investability is critical at RIIO-3

2 We see investability as a concept which applies to all energy networks, is critical to the design of RIIO-3, and which may prove a key concept to aid the calibration of future price controls. But if the RIIO system has operated hitherto without active consideration of investability, what now makes an investability concept necessary? In our view there are two obvious things.

(a) Very material changes in capital market conditions have occurred since the RIIO-2 price controls, in particular the T2/GD2 price controls, were set. In response to a variety of global shocks, the period of ultra loose 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. Prior to this, regulators had lowered their estimate of TMR over time explicitly in response to the fall in gilt yields, and their subjective assessment of wider market conditions. Allowances which reflected the era of cheap money in the past must now be adapted to reflect the new conditions in financial markets.

(b) Importantly, networks are entering into a phase of their development that is far from "business as usual", as they strive to support decarbonisation. They are facing huge challenges, and materially heightened risk in the process. Miscalibration of allowed returns now would fatally undermine the ability of the networks to meet the challenges of net zero, as it would undermine their ability to raise and retain capital.

3 These challenges are also arriving at a time when investors have many competing opportunities (projects, companies and geographies) into which they can deploy capital, as countries all over the world also seek rapid progress towards a

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1 Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation – Finance Annex, para 5.9

2 Where we refer to 'investability' in this report we are specifically referring to equity investability, which we understand (like debt financeability) to be fully grounded in Ofgem's statutory duties.

3 The current phase of the RIIO-3 process will lead to fresh regulatory controls for the transmission and gas distribution companies. Electricity distribution price controls will be revisited two years later, although for the avoidance of doubt we consider that investability should form part of the regulatory framework for all networks.

decarbonised future. As a result, networks face stiff competition globally for that capital from a raft of competing projects in service of each country's own decarbonisation programmes.

4 Investability can complement debt financeability (but is not a substitute for it) at this critical time, serving the equity investor in the same way that the concept of debt financeability serves the debt investor.

5 But importantly, the concept of investability must apply equally to **all equity**, old and new, across all networks equally, both electricity and gas. As a simple matter of principle, if a certain level of cost of equity is required to attract new equity investment, then this is also the rate that is required to retain existing equity. This immediately implies that investability should apply equally as a concept to all equity investments, including past equity investments, and equally across all networks. It is not possible to partition business risk across different tranches of equity, and investors would not be likely to accept a structure where different tranches of equity receive different returns. As such, setting allowed returns at the correct level, uniformly across all equity, is critical to upholding the principle of investability.

How to test investability

6 Ensuring investability requires 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. 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.

7 Given the large gap in relative risk between senior conventional debt and equity, the unadjusted yield on senior debt provides only a very weak cross-check on required equity returns. A meaningful cross-check must reflect the incremental return that equity requires over debt.

8 This logic leads us to consider two candidate investability checks:

(a) a cross check derived from hybrid bonds, which as far as we are aware have not been discussed hitherto in the context of regulated infrastructure price controls; and

(b) the ARP-DRP cross check developed by Oxera.

9 Alternatively, investability can be tested by considering the 'inferred' cost of equity from cross-checks. We consider tests of this second kind follow in the footsteps of the set of cross checks Ofgem considered at RIIO-2. Given this, even at this stage we would sound a note of caution over how robust and effective such tests may prove to be. Ofgem's RIIO-2 cross-checks were considered controversial and subject to much debate. To a degree however, we think this is to be expected. Prima facie, tests of this second kind are inevitably harder to develop, as available equity returns are by their nature unobservable. In this regard, we consider that our Long Term Profitability cross-check may have a more important role to play, since this cross-check focuses directly on the profitability of competing equity investment opportunities, and hence provides a benchmark that is entirely in line with investability.

10 Notwithstanding their potential limitations, given the weight placed on such cross-checks in the past, there is merit in considering what equity cross-checks now show, and whether they now support moving allowed returns back up. While these cross-checks cannot provide a highly reliable estimate of the actual cost of equity of GB regulated energy networks, they can inform on the overall trends in equity returns.

Results

11 We have tested two candidate COE ranges.

12 On behalf of the ENA, **Oxera has proposed a COE range of 5.08% – 6.48%, with a midpoint of 5.78%.**[4] We note that consideration of sector-specific risks was outside the scope of Oxera's work. Oxera describes its estimate as a "*baseline*"[5], and as a result, it is likely that this range does not capture in full the set of risks that energy networks will face going forward.

13 Oxera's report also provides an estimate of the likely range for allowed COE at RIIO-3 if Ofgem were to simply roll forward its RIIO-2 CAPM methodology. Oxera estimates that the resulting range would be 4.75% – 5.77%, with a midpoint of 5.26%.[6]

14 We compare both of these ranges to a suite of cross-check evidence. We place particular focus on the evidence inferred from debt. Evidence from hybrid bonds indicates that the cost of equity should fall in the range 5.8% to 8.5%, with a central estimate of 6.7%. This finding is closely corroborated by Oxera's ARP-DRP cross check, which we understand supports a COE point estimate that is close to the top

4 Oxera (2024), RIIO-3 Cost of Equity – Prepared for ENA. Table 2.15.

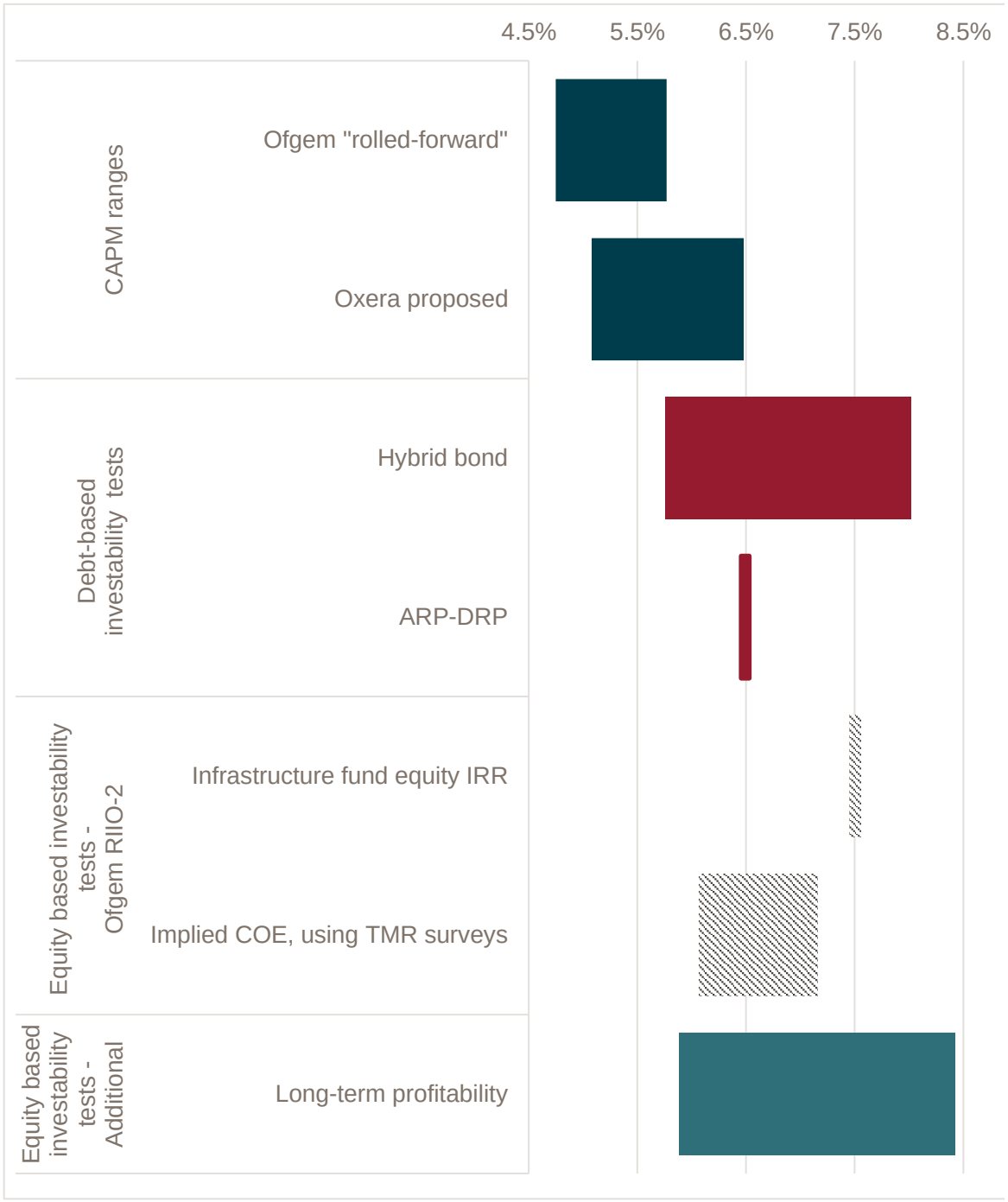
5 Oxera (2024), RIIO-3 Cost of Equity – Prepared for ENA. P. 4.

6 Oxera (2024), RIIO-3 Cost of Equity – Prepared for ENA. Table 2.15

end of Oxera's recommended CAPM range (6.48%). We also present the results of the three equity cross checks that we have been able to update.

15 Our findings are illustrated in the Figure 4.

Figure 1 Investability tests of two candidate COE ranges



Source: *Frontier Economics and Oxera*

Note: *All estimates are in CPIH-real terms*
The range corresponding to "Implied COE using TMR surveys" cover Ofgem's investment managers TMR cross-check and additional evidence from the Fernandez TMR survey.
[Insert Notes]

16 The outcome of these investability tests is clear.

17 First, a COE range derived from a simple roll forward of Ofgem's RIIO-2 method (4.75% – 5.77%) fails all of these candidate investability tests.

(a) This would be the case even if Ofgem were to pick a number from the top of such a range, as this would still sit below the bottom of the range of COE inferred from any of the investability tests.

(b) A number selected from the centre of this range would fail all these investability tests by a considerable margin.

18 Second, the suite of investability tests show that an appropriate allowed CoE is likely to be at least in line with the top end of Oxera's estimated RIIO-3 range (i.e. 6.48%) – and if anything higher than this (i.e. 6.48% tends to be the lower end of the range implied by our suite of tests). This is consistent with Oxera's view that the approach it has adopted may not yet capture all relevant risks, and that some further uplift to beta may be necessary.[7]

19 Despite the fact these candidate investability tests are very different in nature, the results from them line up well and are mutually supportive.

Consequences for RIIO-3

20 The investability checks we have presented confirm that changes are needed to the RIIO-2 methodology. On the basis of the evidence presented above, it would be wrong and irrational for Ofgem to simply roll RIIO-2 forward, updating it only for the latest information on gilt yields. A price control so calibrated would not be investable. It would fail to reflect profound changes in capital markets since RIIO-2 and heightened risk.

21 The current UKRN guidance asks regulators to ensure that their determinations recognise the principle that TMR is "stable but not fixed". Ofgem will need to take a view on the extent to which it needs to increase its RIIO-2 estimate of TMR, in the light of the circa 3.5% increase in gilt yields since that decision was taken. Investability tests simply confirm what is obvious, i.e. that the size of this increase needs to be material.

22 In its SSMC, Ofgem has indicated that it might ask investors to "look through the cycle". Taken at face value, it seems that Ofgem may be signalling an intent to not adapt its RIIO-2 COE model, even if it is clear this would offer returns at RIIO-3 that are insufficient given current capital market conditions. Instead, Ofgem would invite investors to deploy capital anyway, in anticipation that any shortfall would be made up during "the good times" in a future price control. But Ofgem cannot fetter its discretion at future controls, so it is hard to see how an investor could attach weight to such a package. Investors simply need to take a decision now on whether to make, or retain, an investment, based on concrete actions.

[7] See for example paragraph 12, and discussed in full in: Oxera (2024), RIIO-3 Cost of Equity – Prepared for ENA

23 We recognise that we remain at an early stage of the price control process. Business plans have not been finalised and are not yet available to Ofgem. There is extensive further design work needed before the RIIO-3 price control is finalised. Some aspects of that design may address the general supply chain/cost pressure risk and/or sector specific risk we outlined in Section 3. We are many months away from being able to see whether and how everything fits together.

24 The consequences of getting it wrong are however clear, the literature on "aiming up" having been reviewed extensively at recent price controls. Put bluntly, if the allowed rate of return is insufficient, then there is a clear risk that companies may simply be unable to raise equity capital needed to finance the investment required, or retain existing capital. If fresh equity capital cannot be raised, or existing equity retained, then this will immediately hamper the ability of any company to deliver required investment programmes and ensure resilience. Capital cannot be transformed into assets in the ground if investors will not willingly provide that capital in the first place.

25 Active engagement is needed. All the available evidence needs to be examined, and more collected over months ahead. The concept of investability needs to be developed further so that it can act in service of the RIIO-3 price control. Ofgem, the networks and the wider stakeholder community must work together over the months ahead to arrive at a price control calibration that reflects the evidence and strikes an appropriate balance between the consumer and the investor. An open approach to engagement has the potential to buttress investor confidence, by making it clear what investors can expect, and in particular signalling that "stable but not fixed" is not a rule that applies only when interest rates fall.

1 Introduction

26 Frontier Economics has been commissioned by the ENA to prepare a report that investigates a concept that Ofgem has introduced as part of its SSMC for RIIO-2, i.e. investability.[8]

27 This report sets out our work on this topic so far, including the framework that we propose around this concept, and how it might be operationalised through the use of specific empirical measures. We also present the results of applying these tests.

1.1 Investability

28 The energy system is undergoing a period of significant transformation as it supports the changes needed to achieve net zero. Existing energy vectors will change markedly over the coming decades, some expanding rapidly, others managing falling demand and potentially wholescale transformation to support new and emerging vectors.

29 Energy networks are at the centre of this transformation. Over coming decades networks will need to navigate the uncertain pathway to 2050, managing the full set of long held risks while also meeting a wealth of new and emerging challenges.

30 In its SSMC, Ofgem said *"the energy networks remain at the heart of this transition. Building new network capacity and capabilities, in the right place, at the right time is the key to getting to net zero. A tremendous expansion of the electricity infrastructure is already underway with the most radical transformation of the grid seen since the 1950s ... 'While demand for electricity is likely to grow, there remains strategic uncertainties around the future of gas […] Decarbonising heat whilst continuing to enable safe, secure and reliable supplies for households and businesses remains our priority for the next funding period"*.[9] We agree entirely.

31 The success of the energy networks in 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 maintain a resilient network or to deliver the large scale investment needed to expand, transform and potentially decommission existing networks, while meeting the required standards of financial resilience set out by Ofgem.

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8 Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation, Finance Annex. See for example FQ14. "*What evidence, if any, should Ofgem consider in relation to expanding its assessment of financeability to account for 'investability'?*"

9 Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation: Overview, p. 6.

32 Ofgem has recognised this. In its Sector Specific Methodology Consultation Ofgem sets out its intention to develop the notion of **investability** – a concept that was foreshadowed in the Future Systems and Network Regulation Framework Decision[10] – in order to "*better understand whether the allowed return on equity is sufficient to retain and attract the equity capital that the sector requires*".[11]

33 In our view, investability is a concept that should be considered relevant for all energy networks (both electricity and gas) and for both debt and equity investors. However, there is already in place a framework for assessing the quality of the proposition available to the debt investor, both in general and in respect of overall price control calibration. This is provided by the credit metrics and wider rating methodologies developed by the ratings agencies. While this framework exists, and Ofgem has adopted this approach to the quantification in its own assessments of debt financeability, it must be applied at RIIO-3 with care and rigour, and to a wide range of potential outturn scenarios, to test whether its price control package will allow a licensee to service reasonable debt costs and maintain financial metrics consistent with an appropriate credit rating with a reasonable degree of comfort. Indeed, the need to ensure overall investability should inform the calibration of the entire price control.

34 Investability can complement debt financeability at this critical time, serving the equity investor in the same way that the concept of debt financeability serves the debt investor.

1.2 Developing the concept of investability into a useful tool

35 Ofgem has asked stakeholders to provide views on "*how investability should be used and assessed*".[12] We provide some introductory views on this question below.

1.2.1 Overall purpose of an investability test

36 Ofgem's stated purpose is that investability should test whether it is possible to **attract and retain equity** given the calibration of the price control.[13]

37 It then follows that investability[14] – must focus on assessing whether the equity return on offer is competitive versus the set of other opportunities that exist in the

10 Ofgem (2023), Future Systems and Network Regulation: Framework Decision Overview, para 7.11.

11 Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation: Finance Annex, para 1.6.

12 Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation: Finance Annex, para 1.6.

13 Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation: Finance Annex, para 1.6.

14 Where we refer to 'investability' in this report we are specifically referring to equity investability, which we understand (like debt financeability) to be fully grounded in Ofgem's statutory duties.

wider capital market. If tests of this property are failed, then it is hard to see why one would rationally expect an equity investor to deploy capital in a proposition that has been shown to be unattractive versus readily available competing opportunities.

1.2.2 Investability tested against what?

38 While the concept is clear, to make investability practical it is necessary to identify empirical measures or metrics against which proposed levels of allowed equity return can be tested. We see two main types of candidate measure that could be developed.

39 First, tests can be developed based on returns available to **different classes of investment within energy networks**. In particular, we consider it important to test investability versus the returns required by debt investors. Required debt returns are readily observable, and hence provide a concrete anchor from which to begin assessment. If the wedge between debt and equity returns shrinks to the point where it becomes irrational for an investor to be willing to invest in equity, which is by its nature higher risk, this must indicate that equity returns are insufficient. While it may be possible for companies to continue to raise debt under such circumstances (although this would need to be tested using debt financeability metrics, and it may be that the outcome of debt financeability and investability tests are reasonably highly correlated), it will not be possible to raise equity, and the price control would not be investable.[15]

40 Second, tests can be developed based on **returns to competing equity investments elsewhere in the wider market** and/or by reference to wider market cross checks, suitably adjusted for risk. Again, if such a test is failed, it would not be rational for an investor to be willing to sink capital into energy networks when that investor has access to superior competing offers.

41 We consider tests of this second kind follow in the footsteps of the set of cross checks Ofgem considered at RIIO-2. Given this, even at this stage we would sound a note of caution over how robust and effective such tests may prove to be. Ofgem's RIIO-2 cross-checks were considered controversial and subject to much debate. To a degree however, we think this is to be expected. Prima facie, tests of this second kind are inevitably harder to develop, as available equity returns are by their nature unobservable.

[15] A price control that was debt financeable but not investable would create an incentive for companies to increase gearing, which may bring concerns around longer term financial resilience.

1.2.3 The importance of retain, not just attract

42 The concept of investability must apply equally to **all equity**, old and new, across all networks (both gas and electricity) equally. As a simple matter of principle, if a certain level of cost of equity is required to attract new equity investment, then this is also the rate that is required to retain existing equity. This immediately implies that investability should apply equally as a concept to all equity investments, including past equity investments, and equally across all networks.

43 In essence, the appropriate rate of allowed return must apply to all equity, and it would be irrational and wrong to try to set differential rates of return on equity, under the pretence that new investors require higher returns while existing investors do not. We expand further on the logical foundation for this observation in Section 3.2 .

1.2.4 Why now?

44 If the RIIO system has operated hitherto without active consideration of investability, what now makes an investability concept necessary? First, debt financeability tests in past reviews have tended to focus on debt investors without paying much regard to equity investors - and so as a simple improvement to the RIIO framework, it makes sense to add the discipline of also applying an investability test. But in addition, two critical contextual developments make this improvement particularly important for RIIO-3.

45 First, very material changes in capital market conditions have occurred since the RIIO-2 price controls, in particular the T2/GD2 price controls, were set. The RIIO-T2/GD2 price controls were set at a time of ultra-low interest rates and were intended to serve that low interest rate environment. But in response to a variety of global shocks, the period of ultra loose 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, and regulatory models that served the era of cheap money must be adapted to reflect these new conditions.

46 Second, as noted above, networks are entering into a phase of their development that is far from “business as usual”, as they strive to support decarbonisation, and are facing heightened risk in the process. Miscalibration of allowed returns now would fatally undermine the ability of the networks to meet the challenges of net zero, as it would undermine their ability to raise and retain capital.

1.3 Purpose and structure of this report

47 This report aims to build on the notion of investability, to start developing a framework for assessing how investability might be tested and measured using

current market evidence. While an important part of the overall attraction and retention of capital, debt financeability is not the focus of this report.

48 The remainder of this report is structured in three parts.

49 Part 1 focuses on the motivation for an investability test, developing a framework through which investability might be tested, and the result of applying those tests.

- In Section 2 of this we outline the key changes to circumstances that now require the development of an investability test. These include:
  - significant changes to macroeconomic conditions that have occurred since the RIIO-2 final determination; and
  - the heightened risk facing energy networks given the challenges arising from decarbonisation.
- In Section 3 we build on the concept of investability by outlining a framework for assessing investability using market evidence.
- In Section 4 we summarise the results of applying these tests to the cost of equity ranges developed by Oxera for the ENA.
  - Oxera has provided its estimated cost of equity range for RIIO-3, as well as an estimate of the result of Ofgem's RIIO-2 CAPM approach 'rolled forward'. Oxera has also conducted the ARP-DRP cross check.
  - We apply our framework to assess the investability of both of these estimates.

50 Part 2 (Section 5) details how we have made use of market evidence on hybrid bonds to develop what we consider to be an important investability test.

51 Part 3 (Section 6) explores other equity cross-checks, building on the cross-checks developed by Ofgem at RIIO-2 using updated evidence, albeit noting the imperfections and limitations of these tests.

Part I:

Investability as a concept and the applicable assessment framework

2 The context for RIIO-3 – why investability matters now

52 We discuss in turn below two key changes since the RIIO-2 price control was finalised, namely:

(a) the dramatic change in the macroeconomic environment and impact on financial markets; and

(b) the increase in energy network risks going into RIIO-3.

53 Both create a strong impetus for the creation of an investability test.

2.1 Macroeconomic context

2.1.1 The process that led to lower allowances for TMR

54 Looking back at past regulatory determinations up to the early 2010s, regulators generally followed established practice (at the time) for determining TMR. This involved placing almost all weight on long-run historical ex post equity market returns, with other approaches mentioned almost as an aside. At that time, historical equity market returns sourced from the Dimson, Marsh and Staunton (DMS) Credit Suisse Global Investment Returns Yearbook dataset supported estimates of TMR above 7% (adjusted for inflation).[16] This focus on a long history of evidence was aimed at promoting a stable framework for remunerating invested equity capital. Most regulators followed broadly this approach and the approach was well understood.

55 However, following the Global Financial Crisis (GFC) , yields on ILGs started to fall as central banks changed policy to protect their economies, and they kept falling. Regulators in other geographies that adopt a fixed equity risk premium (ERP) model saw their cost of equity allowances decrease automatically as interest rates fell.[17] But in the UK, with its hitherto 'fixed' TMR model, there was no similar automatic lowering of TMR and/or cost of equity, just a distinctly second order effect arising from the decrease of RFR. Regulators needed to find other ways to lower TMR.

56 The consensus approach to TMR which had previously prevailed was therefore tested, arguably to the point where in the last round of price controls, it broke. As interest rates continued to fall regulators responded by placing greater weight on approaches that had previously played a much more limited role (or no role at all) in regulatory determinations. Historical ex post approaches to assessing market

16 It still does, although the inflation index DMS uses has evolved over time.

17 Many European regulators assume that the ERP is fixed, and then calculate TMR based on this fixed ERP plus a contemporaneous estimate of RFR based on a trailing average of government bond yields.

returns were revisited, and reasons were found to develop lower measures. Averaging methods for ex post returns were also revisited, and regulators started to place less weight on measures that were high, and more on those that were low.

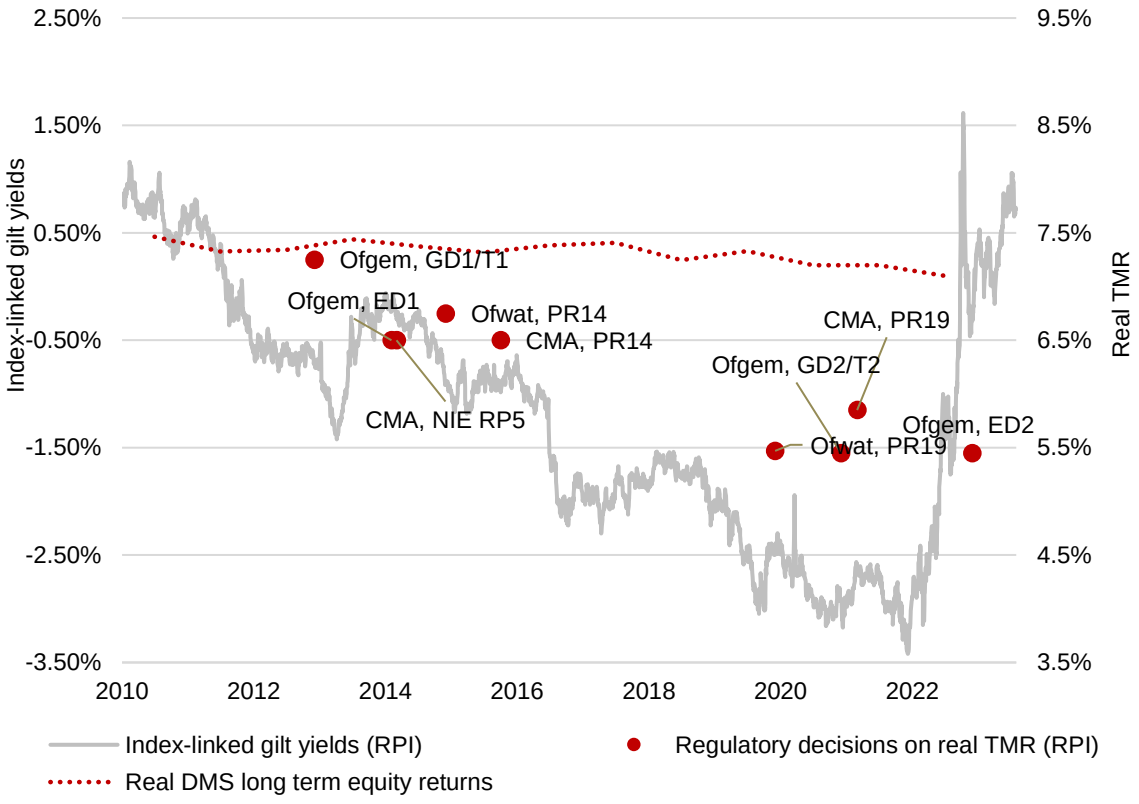
57 As part of this, fresh attention was paid to historical ex ante methods, for example by the CMA as part of its redetermination of PR19. These are expected to produce lower estimates of TMR than historical ex post methods, because they are based on subjective decompositions of historical returns, and a subjective assessment of which aspects of these decompositions are repeatable (and should be included in estimates of TMR) or likely to be one off (and should be excluded from estimates of TMR). By setting aside some proportion of achieved historical returns, it follows that a lower estimate of TMR will result.

58 The recent history of regulatory TMR decisions is illustrated alongside other key evidence in Figure 2 below.

- The dotted red line (right-hand scale) shows the underlying evidence on real long-term equity returns as published by DMS. The estimated long run level has fluctuated in a narrow range roughly between 7.1% and 7.3% (in real terms according to DMS's definition of inflation for the UK), i.e. it has barely changed.
- The grey line (left-hand scale) shows yields on 20 year government ILGs (an often used proxy for RFR), again RPI-real.
- The red dots show regulatory decisions on the estimated TMR (also right-hand scale) in the same period, all converted to RPI-real terms for comparison purposes.[18]

[18] We note that some of the TMR decisions were expressed in CPI or CPIH-real (PR19 Ofwat, PR19 CMA, GD2/T2 Ofgem, and ED2 Ofgem). Where this was the case, the UKRN expressed these in RPI-real terms using a RPI/CPI wedge of 1%. Please see: UKRN (2023) Cost of Capital – Annual Update Report, Table 7. Accessible here: https://ukrn.org.uk/app/uploads/2023/08/2023-UKRN-Annual-Cost-of-Capital-Report_080823_minor-editorial-corrections-1.pdf

Figure 2 Long run TMR as estimated by DMS, Regulatory decisions on TMR and yields on 20 year ILGs



Source: Bank of England, DMS, Frontier Economics, UKRN

59 We consider it self-evident from this chart that regulators have lowered their estimate of TMR over time in response to the fall in gilt yields. In fact, regulators were explicit that they lowered TMR *because* of their perception of wider market evidence, in particular the change in interest rates.

60 The process of lowering returns began with the Competition Commission's redetermination of NIE Networks RP5 price control. The CC lowered its prior standing assumption that TMR was 7% (RPI-real) to an allowance of 6.5% (RPI-real) for RP5. The CC could not have been clearer *why* it was lowering its expectation of TMR – no material changes have occurred to the long run evidence at the time of its decision compared to a similar decision on Bristol Water[19] a few years back, but its assessment of prevailing wider market conditions had.

19 CC (2010). Bristol Water plc, Appendix N.

> *"A forward-looking expectation of a return on the market of 7 per cent does not appear credible to us, **given economic conditions** observed since the credit crunch in 2008 and lowered expectations of returns."*[20] [emphasis added]

61 Ofgem then followed suit. First, in response to the emerging findings of the CC in respect of NIE, Ofgem issued a stand-alone consultation to revisit how it would set the cost of equity for RIIO-ED1. This led to Ofgem following the CC down, for the same reason.

> *"We therefore consider that there are a number of factors pointing towards a lower cost of equity for DNOs, in large part **reflecting current market conditions** as analysed by the CC. Our analysis and advice highlight alternative **interpretations of current market conditions**, although they point our assessment of the cost of equity in the same downwards direction."* [emphasis added]

> *As a result, we are changing our methodology **to give greater weight to the influence of current market conditions** in relation to the equity market return, specifically in relation to our assessment of its separate components."*[21]

62 Around the same time as Ofgem's consultation on equity market returns, Ofwat released its 'risk and reward guidance' for its upcoming PR14 price control, within which Ofwat estimated a TMR range of 6.25% to 6.75% (RPI terms). This *was* a large reduction from the 7.4% TMR that featured in its PR09 decision. A key reason Ofwat selected this new range was that:

> *"monetary policy and investor appetite have significantly reduced Government and corporate bond yields and put downward pressure on returns across most asset classes"* [22]

63 This reasoning continued through to RIIO-2, when Ofgem again lowered its estimate of TMR. Ofgem's new estimate was 6.5% but this was on a CPI-real basis – equivalent to approximately 5.5% on an RPI-real basis. Ofgem's decision was prompted by the recommendations of the controversial and much debated 2018 UKRN paper on cost of capital, but also resulted from Ofgem's assessment of then-prevailing wider capital market conditions. For example, Ofgem relied on information from investment managers' forecasts at the time, and other forward-looking measures, to lower its TMR estimate.

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20 CC (2014), Northern Ireland Electricity Limited price determination, para. 13.146.

21 Ofgem (2014), Decision on our methodology for assessing the equity market return for the purpose of setting RIIO-ED1 price controls, p. 4.

22 Ofwat (2014), Setting price controls for 2015-20 – risk and reward guidance, p.14

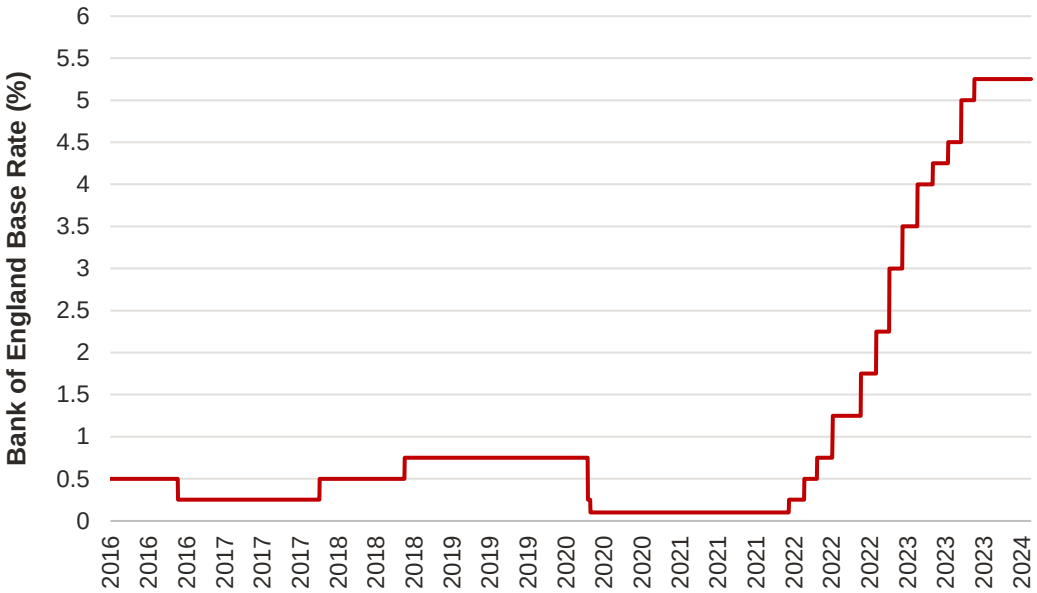
> *"We note that each of these [investment managers] forecasts is significantly lower than the 8-9% nominal TMR range we derive from inflating the UKRN Study by forecast CPI. These are in line with lower forward-looking measures and further reinforce the recommendation to reduce the long-term TMR range."*[23]

64 As such, while the basis for the downward shift in TMR allowances has sometimes appeared subjective or opaque, it is evident that regulators have lowered TMR explicitly *because* of their assessment of wider market evidence, including in particular falls in interest rates and reductions in yields on ILGs.

2.1.2 The abrupt end of the era of cheap money

65 The final determination for RIIO-T2/GD2 was published in December 2020. At the time, there had been a prolonged period of extremely accommodative monetary policy since the GFC, as illustrated in Figure 3 below. Yields on ILGs were also extremely low following a prolonged decline (as illustrated by the grey line in Figure 2 above).

Figure 3 Bank of England base rate



Source: Bank of England

[23] Ofgem (2018), RIIO-2 Sector Specific Methodology Consultation: Finance Annex, para 3.78.

66 Market expectations at the time were that the Bank of England base rate would remain low (close to zero) for several years ahead.[24] As such, at the time of the RIIO-2 decision, there was no expectation of any imminent departure from the era of 'cheap money'.

67 All network companies appealed the allowed COE at RIIO-GD2/T2 to the CMA and the CMA found that Ofgem's decision was not wrong. But this conclusion was reached during 2021 – as is clear from Figure 2 and Figure 3, the CMA was assessing essentially the same set of wider market conditions during 2021 as Ofgem had been in 2020 (i.e. no material shift in ILGs, BoE base rate close to zero). Markets had started to price in the possibility of only a small increase in interest rates.[25]

68 Since then, however, 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. There is no indication that a return to the period of ultra-loose monetary policy is remotely likely.[26] And as illustrated in Figure 2 above, since RIIO-2 yields on ILGs have increased by c.3.5% - a huge increase over a relatively short period of time.

2.1.3 Implications for regulators when setting TMR

69 UK regulatory practice has over the past decade or more been, de facto, to move TMR down to reflect prevailing market conditions. As interest rates and yields on government bonds fell over much of the last decade, UK regulators responded by lowering their estimates of TMR used to determine the allowed cost of equity. This movement was not one-for-one, i.e. they moved TMR by a proportion of the fall in yields on the government bonds. This "stable but not fixed" policy has been explicitly endorsed by the UKRN.[27]

> *"There is significant alignment amongst regulators in the overall approach to the TMR/ERP, namely that in recent determinations UK regulators assume greater stability in the TMR and therefore estimate it directly from*

24 See, for example, Table 1.A and Chart 2.6 in the BoE Monetary Policy Report November 2020 here: https://www.bankofengland.co.uk/-/media/boe/files/monetary-policy-report/2020/november/monetary-policy-report-nov-2020.pdf. The MPC stated "Market-implied paths for policy rates in advanced economies have been broadly unchanged since the August Report, suggesting policy rates will remain at very low levels for several years."

25 See, for example, Table 1.A and Chart 2.7 in the BoE Monetary Policy Report August 2021 here: https://www.bankofengland.co.uk/-/media/boe/files/monetary-policy-report/2021/august/monetary-policy-report-august-2021.pdf .

26 See, for example, Table 1.A and Chart 2.6 in the BoE Monetary Policy Report February 2024 here https://www.bankofengland.co.uk/-/media/boe/files/monetary-policy-report/2024/february/monetary-policy-report-february-2024.pdf

27 UKRN (2023), UKRN guidance for regulators on the methodology for setting the cost of capital, p. 19.

> *historical equity returns data. In the interests of maintaining consistency across sectors and also across time, continuing with this approach remains preferable. This approach does not imply that regulators should simply pick the same fixed value for the TMR in each decision for all time, but that the TMR would be relatively less variable than the underlying RFR. This would support greater stability in the cost of equity allowances over time. This policy choice seems appropriate in the wider context of the aspiration for greater predictability and transparency in the regulators' methodologies for estimating the allowed rate of return, and one that is fair to investors and customers over time."*

70 Interest rates have now reversed. The ultra-low, deeply negative real interest rates that caused regulators to lower their estimates of TMR over the last decade are no longer observed. On the contrary, interest rates are now materially positive. All available evidence points to materially positive rates persisting. There is no evidence to suggest negative rates are likely to return.

71 By the same logic that caused estimates of TMR to fall, it is now time for regulators to increase TMR. Investability tests can be expected to confirm this.

2.2 Heightened risk at RIIO-3

72 In addition to the change in wider capital market conditions, there is a widely held view that the risks faced by energy networks are increasing. All energy networks are facing all of their old challenges, plus a raft of new challenges stemming from the net zero transition.

73 Some of these challenges are common, such as the macroeconomic environment outlined above which is driving up the cost of capital and the cost of investment. In addition to these, tight supply chains and inflationary pressures will bring heightened cost volatility and delivery risks. Ofgem's SSMC has recognised the supply chain constraints facing energy networks - both electricity networks looking to deliver large investment in network capacity/capability; and gas networks undertaking works needed to maintain a resilient, reliable network. These challenges must be met in the context of an acknowledged shortage of STEM students able to join the workforce.

> *"Global supply chain constraints currently being experienced by the energy industry are another key aspect that will shape our approach to setting the regulatory framework for future price controls. This has been caused by a multitude of factors including the war in Ukraine, the COVID-19 pandemic and the global push towards net zero which has increased demand for equipment and skilled labour."*[28]

[28] Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation: Overview, para 2.13.

74 In addition to these common challenges, some challenges are more sector specific.

75 Electricity networks are facing investment programmes of an unprecedented scale, to unlock the renewable generation and sector electrification required to achieve net zero. This step change in investment will exacerbate existing supply chain constraints and wider inflationary pressures. The electricity grid is also facing uncertainty over exactly what to deliver where, and over what timescale.[29] While the scale of the investment programme is known to be large, exactly how large, and the exact make up of it, may not be known in all cases until later. Networks will need to complete pre-development work on numerous projects so they are ready to go if/when needed; manage supply chains to deliver against that uncertain scope of work; and then, once final investment decisions are taken, deliver those projects on time and at cost. In this regard, TOs are facing tough delivery targets and additional risks of licence breach under the ASTI framework. While TOs are used to managing the delivery of very large projects, ASTI has introduced new risks and the sheer scale of delivery during RIIO-3 will be unprecedented. It will accordingly bring unprecedented challenges.

76 Electricity network investors will require sufficient compensation for bearing these risks. And the consequences of getting it wrong are potentially dire. One only has to look at the recent challenges in securing investment in UK energy assets, such as the failed offshore wind auction in 2023, to see risks of this kind crystalising.

77 Gas networks face their own set of parallel sector risks. Gas networks must continue to invest in order to maintain a resilient and reliable gas supply while customers remain on the network – and under all of the current FES scenarios gas networks continue to play a pivotal role for decades. Yet there is also substantial uncertainty over future gas demand trajectories and supply patterns, and where and when parts of the grid will need to be decommissioned. The prospect of a declining customer base could mean that any ongoing fixed costs to run and maintain the network may need to be spread over a smaller number of customers in future, and at some point there may not be a sufficient number of customers left to pay down all of the remaining RAV. The risk of asset stranding has been recognised in Ofgem's SSMC which acknowledges that *"if material, this perceived risk could result in investors seeking compensation via the cost of capital for the gas networks."*[30] While Ofgem is exploring options for reducing stranding risk, such as adjustments to asset lives and depreciation profiles, it has acknowledged that it does not have the tools necessary to provide complete comfort to investors.

29 Ofgem has indicated that the ASTI investments on the Electricity Transmission network should aim to conclude by 2030, but overall uncertainty for long-term net zero investment remains.

30 Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation: Finance Annex, para 8.12.

78 Clearly, Ofgem could in theory seek to mitigate this risk by substantially accelerating depreciation and aiming to reduce RAV in line with customer profiles. But such a policy must have limitations. Ofgem's duty to protect the interests of both current and future customers implies that Ofgem cannot accelerate RAV reduction very aggressively now, given the long-term scenario uncertainty that remains (and the associated risk that today's customers might substantially overpay relative to tomorrow's customers). Ofgem must therefore strike a balance, and the implication is that there will remain a real possibility of having leftover RAV. Only Government could fully offset this risk, if it were to offer to underwrite RAV under low gas scenarios - but no such offer to underwrite has been made yet.

79 Gas network investors therefore see a gap. Any money they invest (or have invested in the past) may not be fully recoverable, because some part of it may end up in this residual RAV at risk of under recovery.

80 Based on discussion with gas networks, debt investors are already moving to protect themselves from this risk using the levers they have readily available. For example, we understand that gas networks are seeing evidence of higher coupon rates being required on bonds they issue. Moreover, gas networks are increasingly seeing that debt investors are reluctant to lend over longer tenors, given this uncertainty – indeed, anecdotally some investors have signalled they may not lend to gas networks at all.[31] As contingent claimants on the same underlying asset, equity investors must see the same risk drivers as debt investors.

2.3 So what?

81 Such readily quantifiable movements in key capital market indicators cannot be ignored. Financial markets have changed profoundly since RIIO-2 was determined, and it is evident that models and assumptions for setting allowed returns that may have been deemed to work then, versus the contemporaneous wider market evidence based on deeply negative real interest rates, will not work now that the more usual positive real rates have returned.

82 Moreover, the heightened risks faced by energy networks at RIIO-3 must be recognised. Investors will require fair compensation for these risks, in order to continue to deploy capital in these sectors. Attracting and retaining capital will be critical for maintaining a resilient network and delivering the required decarbonisation and transition outcomes in RIIO-3 and beyond.

83 Ofgem was right to introduce the concept of investability in the SSMC, and this principle must be the cornerstone on which RIIO-3 is designed. This concept must be used to robustly test existing approaches to setting allowed return, and these

31 We understand that gas networks intend to submit specific evidence to Ofgem to confirm this.

approaches must be adapted as necessary to ensure the investability test is passed.

3 A framework for assessing investability at RIIO-3

84 In this section we expand on our ideas around how an investability test might be designed and applied to all energy networks. We explore further how tests might be developed versus observable debt rates, and versus competing equity/market offers. We also explain further why Ofgem was right to frame investability as a test of not only whether allowed returns would support **new equity raise**, but also whether they support the **retention of existing equity**.

3.1 Testing whether equity returns are sufficient

85 We consider that there are two types of investability tests that could be developed.

- Tests that consider whether the return on equity is sufficient given the return on debt, and the evident difference in risk between these two classes of investment.
- Tests that consider whether the return on equity is sufficient versus the equity return on offer from competing investment opportunity, and other wider cost of equity cross-checks, including those used by Ofgem at RIIO-2.

86 We discuss each of these below.

3.1.1 Testing whether equity is sufficient versus debt

87 Investability can be tested by considering the uplift above debt returns that would be required in order to attract equity investment to the same company.

88 One observable and important benchmark for investability is the relativity between debt and equity returns. Ensuring investability requires 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. Senior debt implies lower risk and better recovery prospects. It is paid first and it is paid a contractually stipulated sum. If that sum is not provided, then debt investors will be able to trigger covenants to take action against the defaulting company to seek recovery, and are typically able to recover a high proportion of what they are owed anyway. 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.

89 Because of this marked difference in risk, it would be irrational for investors to opt for equity if returns were sufficiently similar rates that could be earned from providing senior debt.

90 Then the pertinent 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 provides only a very weak cross-check on required equity returns. A meaningful cross-check must reflect the incremental return that equity requires over debt.

91 This logic leads us to consider two candidate investability checks:

- a cross check derived from hybrid bonds, which as far as we are aware have not been discussed hitherto in the context of regulated infrastructure price controls; and
- the ARP-DRP cross check developed by Oxera.

Hybrid bonds – an initial introduction

92 We have considered securities that are somewhat debt like, but more similar to equity, for which yield information is available. Specifically, we have analysed yields on hybrid debt to infer required equity returns.[32]

93 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 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.

94 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 the RIIO-3 package violates the principle of investability. Rational investors would therefore not invest equity capital.

95 Part 2 of our report provides extensive detail on how we have processed information from hybrid bonds to infer the required level of cost of equity.

ARP-DRP

96 The ARP-DRP cross-check developed by Oxera is based on a similar logic, as it involves comparing the difference between the ARP (the expected excess return

[32] 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.

from holding risky assets compared to riskless assets) and the debt risk premium (DRP, the expected excess return to holding risky debt relative to riskless assets).[33] Building on previous work, Oxera has developed this cross check further for use at RIIO-3. The write up of the latest development of ARP-DRP can be found in Oxera's report for the ENA on the COE for RIIO-3. We rely on Oxera's findings in our analysis.

3.1.2 Considering evidence from cost of equity cross-checks

97 Alternatively, investability can be tested by considering the 'inferred' cost of equity from other cross-checks, including those used by Ofgem at RIIO-2.

98 The ideal way of testing investability would be to derive a robust cost of equity estimate from relevant market data. This is in the spirit of what Ofgem has previously attempted to do with its cross-checks. But this is challenging. All such cross-checks come with imperfections and limitations. We highlighted this at RIIO-2, setting out our view that Ofgem's cross-checks were flawed, incomplete and biased to the downside.

99 While Ofgem has in the past argued that its cross-checks played no role in lowering its point estimate, cross-checks did play a role in reducing the allowed return on equity at RIIO-2, i.e. Ofgem tightened its CAPM range based on cross-check evidence, making a greater adjustment to the top end of the range. Ofgem then selected a cost of equity point estimate consistent with the midpoint of the (amended) CAPM range.

100 Given, this, there is merit in considering whether cross-checks now support moving the rate back up. While cross-checks cannot provide a reliable estimate of the actual cost of equity of GB regulated energy networks, they can inform on the overall trends in equity returns. We continue to hold the view that caution should be exercised in interpreting and using the results of these cross-checks. Nevertheless, we report the results of updating Ofgem's suite of RIIO-2 cross-checks alongside our other results.

3.2 The critical importance of retain, not just raise

101 We agree with Ofgem,[34] that a price control should be considered investable if the allowed rates of return are sufficient to **attract** and **retain** equity capital. Both the

33 This cross-check compared the difference between the asset risk premium (ARP, the expected excess return from holding risky assets compared to riskless assets) and the debt risk premium (DRP, the expected excess return to holding risky debt relative to riskless assets) implied by Ofgem's RIIO-2 determination with ARP-DRP differentials derived from a combination of regulatory precedent and market evidence.

34 Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation: Finance Annex, para 1.6

attract and retain legs of this definition are critical – indeed they are essentially two sides of the same coin.

102 Companies will need to attract fresh equity. Many energy networks will face large investment programmes over the RIIO-3 period and beyond. These large investment programmes will require the injection of a material quantum of new capital, raised from both debt and equity investors. New equity capital can only be raised if:

- the level of return on offer is competitive versus other competing opportunities in the wider market; and
- it is rational to prefer risky equity investment over safer debt investment given the wedge between allowed cost of debt and allowed cost of equity.

103 Absent these conditions, an investor with a free choice and competing offers will not choose to deploy capital into an inferior option. The price control will be investable for equity investors therefore only if these conditions hold.

104 But these considerations also apply equally to **existing** equity investment in order to **retain** existing equity.

105 First, as a simple matter of principle, if a certain level of cost of equity is required to attract new equity investment, then this is also the rate that is required to retain existing equity. There is no easy way to partition business risk between new and old equity. Absent the creation of an entirely different class of equity, all equity investors bear and share the same set of risks, regardless of the time when their investment was made. The appropriate rate of allowed return must therefore apply to all equity and it would be irrational and wrong to try to set differential rates of return on equity, under the pretence that new investors require higher returns while existing investors do not. Ofgem has acknowledged this in its Decision on Future Systems and Network Regulation.[35]

106 Second, even if one could put in place a higher level of return for new equity and a lower level of allowed return only for past investments, it is our view that investors would be highly sceptical of such a proposal. Such an act on the part of the regulator would, presumably, be premised on a position that:

- on the one hand, acknowledges that a higher rate of allowed return is currently required to meet the required rate of return of investors; but

35 Ofgem (2023), Future Systems and Network Regulation Decision, Core Document, para. 6.23

- on the other hand, does not provide this rate to existing equity investors, presumably because this capital is viewed somehow as "captive" and hence there is no need to compensate existing capital appropriately.

107 Investors are not myopic and would immediately see through this kind of structure. Today's "new" investor, will be tomorrow's "old" investor, with already sunk capital, captive in the business and then presumably slated to receive a lower rate of return offered to today's "old" investor. Any investor would rationally appraise the full set of signals sent by Ofgem regarding their future returns, and come to the conclusion that Ofgem's new policy was one where it offers attractive introductory rates, followed by a long period of lower rates – a regulatory policy of bait and switch. As a result, a policy that applied investability considerations only to new equity would not succeed in its stated aim of attracting fresh equity in the first place.

108 Moreover, we consider that it has the potential to be destructive to investor confidence. Unless this split set of returns was calibrated to somehow make investors whole, it would send a stark signal to equity investors that they should not expect to receive the required rate of return as soon as it was no longer necessary to raise fresh equity – and that time will eventually arrive for all the forms of investment regulated by Ofgem. Ofgem would undermine its reputation as a regulator that valued its credibility.

109 For these reasons, we consider that investability applies equally to all equity investors, old and new, and to all networks equally. This simplifies matters, as there now only needs to be one allowed cost of equity that must be tested to ensure it implies a price control that is both debt financeable and investable.

4 Assessment of investability at RIIO-3

110 In this section we put our proposed investability tests from Section 3 into practice. We show our results, and set out the consequences for allowed returns at RIIO-3.

4.1 Overview of findings

111 We have proposed that investability can be tested by comparing candidate allowed cost of equity ranges to measures of the required equity return inferred from debt products, and/or by reference to equity cross-checks of the kind employed by Ofgem at RIIO-2 (notwithstanding our concerns over their merits and robustness).

112 We test two candidate COE ranges.

- On behalf of the ENA, Oxera has estimated the appropriate cost of equity range for RIIO-3. Based on its analysis, **Oxera proposes a range of 5.08% – 6.48%, with a midpoint of 5.78%.**[36] We note that consideration of sector-specific risks was outside the scope of Oxera's work. Oxera describe its estimate as a "*baseline*"[37], and as a result, it is likely that this range does not capture in full the set of risks that energy networks will face going forward (see Section 2.2 of this report for our own discussion of those risks).

- Oxera's report also provides an estimate of the likely range for allowed COE at RIIO-3 if Ofgem were to simply roll forward its RIIO-2 CAPM methodology. Were Ofgem to roll forward in this way, Oxera estimates that the resulting range would be 4.75% – 5.77%, with a midpoint of 5.26%.[38]

113 We compare both of these ranges to a suite of cross-check evidence. We place particular focus on the evidence inferred from debt for the reasons already set out.

- Evidence from hybrid bonds indicates that the cost of equity should fall in the range 5.8% to 8.5%, with a central estimate of 6.7%. (See Part 2 of this report, Section 5 onwards.)

- This finding is closely corroborated by Oxera's ARP-DRP cross check, which we understand supports a COE point estimate that is close to the top end of Oxera's recommended CAPM range (6.48%).[39]

114 We also present the results of the three equity cross checks that we have been able to update (see Part 3 of our report). Two of these were relied on by Ofgem at

36 Oxera (2024), RIIO-3 Cost of Equity – Prepared for ENA, table 2.15

37 Oxera (2024), RIIO-3 Cost of Equity – Prepared for ENA. P.4.

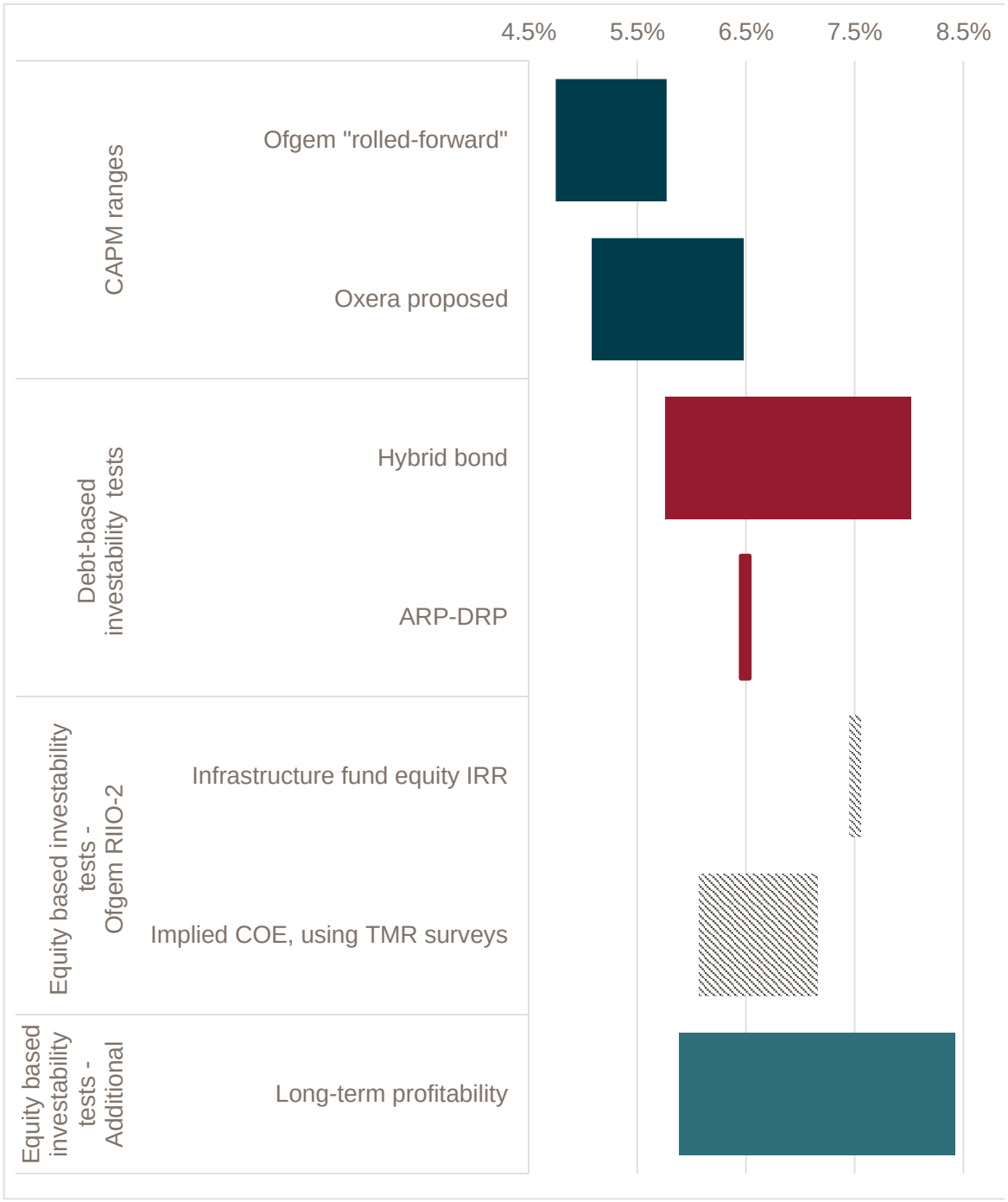
38 Oxera (2024), RIIO-3 Cost of Equity – Prepared for ENA, table 2.15

39 Oxera (2024), RIIO-3 Cost of Equity – Prepared for ENA, Section 3.3

RIIO-2 (Infrastructure fund IRR and COE inferred from investment manager forecasts of TMR, supplemented by the Fernandez survey) while one was not (the long term profitability benchmark proposed by Frontier). Our view is that the profitability benchmark is made more relevant when viewed through an investability lens, as it focuses on competing equity offers available to investors in the market.

115 Our findings are illustrated in Figure 4.

Figure 4 Investability tests of two candidate COE ranges



Source: *Frontier Economics and Oxera*

Note: *All estimates are in CPIH-real terms*
The range corresponding to "Implied COE using TMR surveys" cover Ofgem's investment managers TMR cross-check and additional evidence from the Fernandez TMR survey.

116 The outcome of these investability tests is clear.

117 First, a COE range derived from a simple roll forward of Ofgem's RIIO-2 method (4.75% – 5.77%) fails all of these candidate investability tests.

- This would be the case even if Ofgem were to pick a number from the top of such a range, as this would still sit below the bottom of the range of COE inferred from any of the investability tests.
- A number selected from the centre of this range would fail all these investability tests by a considerable margin.

118 In our view, this outcome is to be expected, given our observations on the basis for Ofgem's RIIO-2 COE methodology, in particular regarding TMR. It would be irrational to expect a c.3.5% increase in gilt yields to have had no effect on the appropriate level of TMR. It is also likely to reflect the concerns we, and separately Oxera, have expressed around risk at RIIO-3.

119 Second, the suite of investability tests show that an appropriate allowed CoE is likely to be at least in line with the top end of Oxera's estimated RIIO-3 range (i.e. 6.48%) – and if anything higher than this (i.e. 6.48% tends to be the lower end of the range implied by our suite of tests). This is consistent with Oxera's view that the approach it has adopted may not yet capture all relevant future risks, and that some further uplift to beta may be necessary.[40]

120 We also observe that, despite the fact these candidate investability tests are very different in nature, the results from them line up well and are mutually supportive.

4.2 Consequences for RIIO-3

121 On the basis of the evidence presented above, it would be wrong and irrational for Ofgem to simply adopt its RIIO-2 method to determine allowed equity returns, updating it only for the latest information on gilt yields. A price control so calibrated would not be investable. It would fail to reflect profound changes in capital markets since RIIO-2, and heightened risk.

122 The investability checks we have presented therefore confirm that changes are needed to the RIIO-2 methodology.

123 Ofgem will need to reflect on the evidence set out in this and other reports, in particular the Oxera report. Since the top end of the Oxera range passes our investability tests, the parameter choices that together make up this range provide a viable approach to delivering an investable price control, albeit that some further adjustment may be necessary to reflect growing sector specific risks.

124 We note again that the UKRN guidance asks regulators to ensure that their determinations recognise the principle that TMR is "stable but not fixed". Ofgem will need to take a view on the extent to which it needs to increase its RIIO-2

40 See for example paragraph 12, and discussed in full in: Oxera (2024), RIIO-3 Cost of Equity – Prepared for ENA

estimate of TMR, in the light of the circa 3.5% increase in gilt yields since that decision was taken. Investability tests simply confirm what is obvious, i.e. that the size of this increase needs to be material.

125 In its SSMC, Ofgem has indicated that it might ask investors to "look through the cycle". Taken at face value, it seems that Ofgem may be signalling an intent to not adapt its RIIO-2 COE model, even if it is clear this would offer returns at RIIO-3 that are insufficient given current capital market conditions. Instead, Ofgem would invite investors to deploy capital anyway, in anticipation that any shortfall would be made up during "the good times" in a future price control. But Ofgem cannot fetter its discretion at future controls, so it is hard to see how an investor could attach weight to such a suggestion, in particular since allowed returns (notably regulatory estimates of TMR) have consistently fallen with interest rates including at RIIO-2 where TMR was set at what proved to be the very bottom of the interest rate path. Investors simply need to take a decision now on whether to make, or retain, an investment, based on concrete actions.

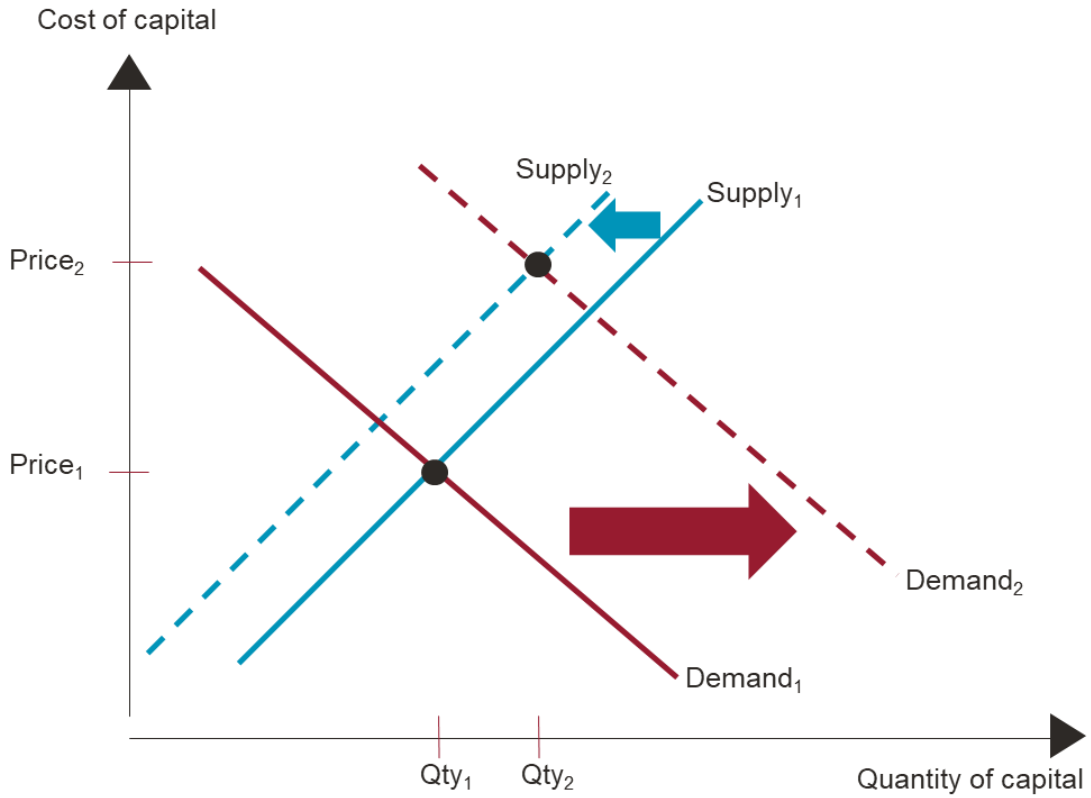
126 We recognise that we remain at an early stage of the price control process. Business plans have not been finalised and are not yet available to Ofgem. There is extensive further design work needed before the RIIO-3 price control is finalised. Some aspects of that design may address the general supply chain/cost pressure risk and/or sector specific risk we outlined in Section 3. We are many months away from being able to see whether and how everything fits together.

127 The pressures are clear however, and can be understood very simply through the lens of supply and demand.

- With the tightening of monetary policy by central banks around the world, there is generally a lower supply of capital available.
- At the same time, nations all across the world are embarking on huge infrastructure programmes in pursuit of net zero. Taken together, these programmes imply a marked increase in the demand for capital, in particular capital for infrastructure, when the overall aggregate supply of capital has reduced.
- For GB electricity networks, their large investment programmes are just one of many projects competing to attract capital, in a very crowded field of potential infrastructure investments, in the face of diminished supply.
- GB gas networks are seeking to retain existing capital, and refinance debt as it matures, at a time when investor perception of stranding risk is growing, and there are clear signals from the investor community that some will no longer consider investment in methane, exacerbating the reduced supply of capital.

128 All of these shifts in supply and demand point the same way. Given where supply of and demand for capital now intersect, the actual cost of capital is increasing and the allowed cost of capital must reflect that.

Figure 5 Illustration of evolution of the supply and demand for capital



Source: Frontier Economics

129 The consequences of getting it wrong are clear, the literature on "aiming up" having been reviewed extensively at recent price controls. Put bluntly, if the allowed rate of return is insufficient, then there is a clear risk that companies may simply be unable to raise equity capital needed to finance the investment required. If fresh equity capital cannot be raised, or existing equity retained, then this will immediately hamper the ability of any company to deliver required investment programmes and ensure resilience. Capital cannot be transformed into assets in the ground if investors will not willingly provide that capital in the first place.

130 Given the context we have explored in this report, the scope for error is currently magnified by capital market developments. Delivering a price control that is not investable will serve nobody well.

4.3 Next steps

131 Active engagement is needed. All the available evidence needs to be examined, and more collected over months ahead. The concept of investability needs to be developed further so that it can act in service of the RIIO-3 price control.

132 The current context, with material uncertainty affecting many aspects of future network demands and the wider geopolitical environment, does not lend itself to a regulator taking a decision now, creating the risk of a dynamic where that decision must then be defended come what may. Ofgem, the networks and the wider stakeholder community must work together over the months ahead to arrive at a price control calibration that reflects the evidence to strike an appropriate balance between the consumer and the investor. An open approach to engagement has the potential to buttress investor confidence, by making it clear what investors can expect, and in particular signalling that "stable but not fixed" is not a rule that applies only when interest rates fall.

Part II:

Hybrid bond cross-check

5 Hybrid bond cross-check

133 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;
- Sensitivity tests on the key assumptions, and
- Additional robustness tests supporting the methodology.

5.1 Context

134 Ensuring investability requires that the cost of equity lies sufficiently far above the long-term return on senior investment-grade debt. 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, in particular in times of financial distress. Because of this difference in risk, it would be irrational for investors to opt for equity if returns were similar to or below senior debt.

135 Then the pertinent 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 provides only a very weak cross-check on equity returns, i.e. a test that we would typically expect to be easily passed.

136 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 debt to infer required equity returns.

137 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 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.

138 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 equity capital.

5.1.1 Hybrid debt

139 Because hybrid debt offers diverse structures, custom-tailored to companies' specific needs, we target those designed for 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.

Table 1 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 (ISIN XS2195190876)	July 2020	Perpetual	£600m
SSE Plc (ISIN XS2195190520)	July 2020	Perpetual	€500m
SSE Plc (ISIN XS2439704318)	April 2022	Perpetual	€1,000m

Source: Fitch, Bloomberg
Note: Our analysis excludes SSE bonds that have been superseded by more recent hybrid bonds

140 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;
- 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; and
- 50% equity attributes: Rating agencies designate these hybrid bonds as 50% equity-like and 50% debt-like from an analytical standpoint.[41]

41 In practice, hybrid capital is designed to be called at first call date. A non-called hybrid would be classified entirely as debt. To avoid accounting for securities without equity content, we focus on the returns at issue. At this point, investors expect equity features at 50%. See: *Credit implications of hybrid noncall decisions.* (2022). S&P Global Ratings. https://www.spglobal.com/ratings/en/research/articles/221124-credit-implications-of-hybrid-noncall-decisions-12569768

- All the bonds listed above were issued during the period when the RIIO framework was operational and are currently traded.

5.1.2 Inferring the right level of equity returns from hybrid debt

141 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 investability of the allowed cost of equity.

5.2 Methodology

142 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.

143 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.[42]

5.2.1 Selection of hybrid bonds

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

- **We focus on the yield to next call date at issue.** A call date refers to the date when the issuer can repay the bond for a predetermined call price before its maturity.[43] 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

42 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.

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

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 reflecting the specific risks associated with GB energy networks. This is because the financial conditions of the hybrid bonds are tailored to meet the operational requirements of the companies issuing them. As a result, the returns from these bonds will accurately mirror the unique risks associated with companies of a similar nature. Table 2 provides a list of hybrid bonds issued by GB utilities, with the tenor to next call date at issue.

Table 2 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 (ISIN XS2195190876)	July 2020	Perpetual	16/04/2026	5.8
SSE Plc (ISIN XS2195190520)	July 2020	Perpetual	14/07/2026	6.8
SSE Plc (ISIN XS2439704318)	Apr 2022	Perpetual	21/01/2028	5.8

Source: National Grid, SSE, Bloomberg
Note: The next call dates listed are all first call dates

145 Among the options, we examine the evidence from the **NGG June 2073 hybrid** (NGG 2073 hybrid). This choice is driven by its longest years to call at issue date, extending beyond a decade. 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.

146 In Section 5.5.1, we validate our findings by comparing them with results from other bonds. We find similar outcomes, strengthening the reliability of our analysis.

5.2.2 Measuring the spread of expected returns relative to senior debt

147 We assess the hybrid bond yield spread against Ofgem's regulatory benchmark, the iBoxx Utilities indices. We compare against the iBoxx £ Utilities 10-15 index, which provides comparable maturity times regarding the NGG 2073 hybrid.[44] [45] **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**.

148 This spread could be applied to the current iBoxx value, providing an estimate for the yield on a long-tenor hybrid bond in today's market. 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.[46] By estimating expected return on the bond, the outputs are more consistent with the expected cost of equity that the spread will imply.[47]

149 We follow the methodology outlined in the UKRN cost of equity study (2018)[48] 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.[49]

150 Table 3 displays the results. The spread between the expected return on the NGG 2073 hybrid (5.41%) and the corresponding iBoxx £ Utilities index at the time of issue (4.14%) is estimated at 136bps.[50] This figure is estimated using expected returns to avoid capturing the default risk premium in the yield.

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44 The NGG 2073 hybrid has a tenor of 12.3 years to the first call at issue, which is consistent with an average 12-year time to maturity of the selected iBoxx index.

45 In this first step, we have not opted for the same iBoxx index as Ofgem in the RIIO2-ET decision (iBoxx £ Utilities 10+) because of its longer average maturity. That is 19.7 years recently.

46 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 utilities. 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.

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

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

49 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.

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

Table 3 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%	5.41%	iBoxx £ Utilities 10-15	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

151 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 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 complex product 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.

5.2.3 Estimating the implied cost of equity

152 Hybrid bonds exhibit characteristics that fall between traditional equity and debt instruments, 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.

153 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:

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

154 Where:

- The 'iBoxx £ Utilities yield' represents the average yield of the iBoxx £ Utilities 10Y+ 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 £ Utilities 10-15 yield on the issue date; and
- The '% equity-like' stands for the percentage of equity-like characteristics, assumed at 50%.

155 We estimate the expected long-term returns on senior debt by taking the average of the iBoxx £ Utilities 10Y+ over the last recent year.[51] This index aligns with Ofgem's choice in cost of debt benchmarking analysis. We take the yields from the latest calendar year (that is, 2023), facilitating comparability and replicability of our analysis, and average them to obtain a robust estimate. A year timeframe allows us to reflect the near-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.

5.3 Results of the hybrid bond cross-check

156 This Section outlines the results of the cross-check using hybrid debt.

157 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 8.7% in nominal terms (6.7% in real terms).**

Table 4 Results of the cost of equity cross-check

Value	Estimate
Hybrid bond spread to iBoxx (adjusted for default risk, at issue)	136bps
iBoxx £ Utilities 10Y+ (2023 average)	6.0%
Higher returns on equity (based on 50% equity-like)	2.7%
Nominal cost of equity	**8.7%**
Real cost of equity (CPIH deflated)	**6.7%**

Source: *Frontier calculations*
Note: *Analysis as of 29 December 2023. We consider a 2% inflation assumption to derive CPIH-real cost of equity.*

158 To validate these results, we have undertaken a set of sensitivity tests on the key assumptions of the analysis (Section 5.4) and have gathered additional evidence on hybrid debt (Section 5.5).

51 As of 29 December 2023.

5.4 Sensitivity checks on key assumptions

159 In this Section, we evaluate the robustness of our approach in calculating the hybrid bond cross-check by conducting sensitivities on our main assumptions. This allows us to construct a range around our cost of equity estimate.

5.4.1 Sensitivity test on historical hybrid/iBoxx spread

160 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.

161 We measure the spread over time, allowing for comparisons as maturity approaches.

- **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 5 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 from -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.

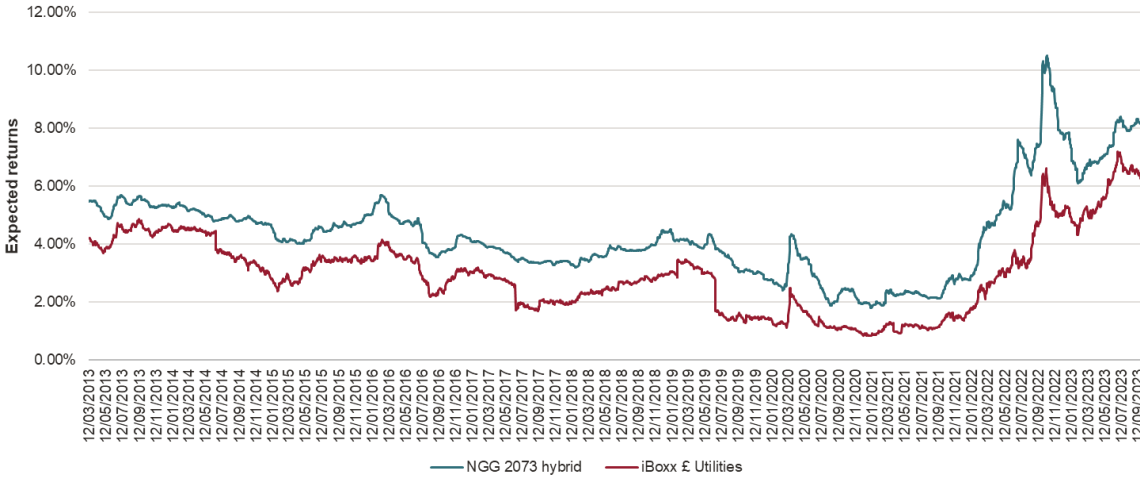
Table 5 Default risk adjustments for BBB- and BB+ credit rating

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.

- Next, we establish a new iBoxx £ Utilities benchmark. For each day, we match the bond's expected returns with the corresponding iBoxx £ Utilities indices according to its maturity to next call (July 2025).[52]
- Having constructed these two measures, we observe the series over time. Figure 6 illustrates that the iBoxx benchmark and the hybrid's expected returns have exhibited similar movements over time, with a reasonable spread between them.

Figure 6 iBoxx £ Utilities benchmark and hybrid bond historic expected returns



Source: Frontier calculations

- Finally, we calculate the daily spread as the difference between the two measures.

162 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 89 and 202bps, resulting in nominal equity returns between 7.8% and 10.0% (Table 6).** Applying the CPIH assumption of 2.0% produces a **CPIH deflated range of 5.8% to 8.0%.** Using the spread at issue at 136bps results in a cost of equity that lies at the lower end of the range. This value is also close to average of the historical spreads at 139bps.

52 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.

Table 6 Sensitivity test on historical hybrid/iBoxx spreads

Cost of equity	Low	High
Historical hybrid bond spread to iBoxx	89bps	202bps
iBoxx £ Utilities 10Y+ (2023 average)	6.0%	6.0%
Higher returns on equity (based on 50% equity-like)	1.8%	4.0%
Nominal cost of equity	**7.8%**	**10.0%**
Real cost of equity (CPIH deflated)	**5.8%**	**8.0%**

Source: Frontier calculations

Note: Analysis as of 29 December 2023. We consider a 2% inflation assumption to derive CPIH-real cost of equity.

163 Based on this analysis, we conclude that the spread at issue on our chosen NG 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, and potentially conservative.

5.4.2 Sensitivity test on the percentage of equity-like

164 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. Hybrid capital is expected to be redeemed at first call date. When this isn't the case, securities will lose some of their equity features.[53] We have used the yield at issue to ensure the 50% assumption remains valid. However, we test some sensitivities, ranging from 75% to 25%.

165 Table 7 presents a **span of nominal equity returns from 7.8% to 11.4% (equivalent to 5.8% to 9.4% 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.

53 See: S&P Global Ratings (2022), 'Credit implications of hybrid noncall decisions'. https://www.spglobal.com/ratings/en/research/articles/221124-credit-implications-of-hybrid-noncall-decisions-12569768

Table 7 Sensitivity test on the percentage of equity-like

Cost of equity	Low	High
Spread to iBoxx at issue	136bps	136bps
iBoxx £ Utilities 10Y+ (2023 average)	6.0%	6.0%
Higher returns on equity (based on 75-25% equity-like)	1.8%	5.4%
Nominal cost of equity	**7.8%**	**11.4%**
Real cost of equity (CPIH deflated)	**5.8%**	**9.4%**

Source: Frontier calculations
Note: Analysis as of 29 December 2023. We consider a 2% inflation assumption to derive CPIH-real cost of equity.

5.4.3 Sensitivity test on iBoxx averaging

166 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.[54] 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.

167 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 to the end of 2023 captures this transitional period and reflects a reasonable low bound we could expect in the medium term future 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,

54 As of 29 December 2023.

which could be interpreted as a representation of the "high interest environment period to date".

168 Figure 7 provides an overview of the iBoxx £ Utilities 10Y+ evolution since 2013, indicating these key moments.

Figure 7 Evolution of the iBoxx £ Utilities 10Y+, 2013 to 2024

Source: Markit

169 When we average across these periods, we find that the iBoxx values range from 5.2% to 7.4%. Consequently, the nominal cost of equity falls between 7.9% to 10.1%, which translates to 5.9% to 8.1% in real terms. This aligns with the sensitivities observed in the previous sections.

Table 8 Sensitivity test on iBoxx averaging

Nominal equity returns	Transition	Settlement	Maximum
Spread to iBoxx at issue	136bps	136bps	136bps
iBoxx £ Utilities 10Y+	5.2%	5.9%	7.4%
Higher returns on equity (based on 50% equity-like)	2.7%	2.7%	2.7%
Nominal cost of equity	**7.9%**	**8.7%**	**10.1%**
Real cost of equity (CPIH deflated)	**5.9%**	**6.7%**	**8.1%**

Source: Frontier calculations

Note: Data as of 29 December 2023. We consider a 2% inflation assumption to derive CPIH-real cost of equity.

170 The hybrid bond implied cost of equity from our point estimate, based on the latest year average iBoxx yield, stands at 6.7% in CPIH real terms, which compares with the middle scenario in our sensitivity test (settlement period).

171 Furthermore, if one took the latest monthly average of iBoxx yield as of the time of writing of this report (January 2024), the resulting implied cost of equity would be 6.5% in CPIH-real terms.

172 Overall, we consider our point estimate of 6.7% 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.

5.4.4 Summary of sensitivity checks on key assumptions

173 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 **7.8% to 10.5% in nominal terms (5.8% to 8.5% in CPIH-real terms).** Our point estimate of 6.7% CPIH-real falls within this range, leaning towards the conservative side as it is closer to the lower bound.

Table 9 Summary of sensitivity checks on key assumptions

Summary results	Low	High
Sensitivity on historical hybrid/iBoxx spread	7.8%	10.0%
Sensitivity on the percentage of equity-like	7.8%	11.4%
Sensitivity on iBoxx averaging	7.9%	10.1%
Nominal cost of equity	7.8%	10.5%
Real cost of equity (CPIH deflated)	**5.8%**	**8.5%**
Real cost of equity (CPIH deflated) – point estimate		**6.7%**

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.

5.5 Additional robustness checks

174 In this Section, 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.

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

175 We obtained a spread of 136bps between the NGG 2073 hybrid and the iBoxx 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 10.

Table 10 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 XS2195190876)	3.51%	3.41%	iBoxx £ Utilities 5-7	1.29%	2.22%	2.13%
SSE Plc (ISIN XS2195190520)	3.00%	2.90%	iBoxx € Utilities	0.79%	2.21%	2.11%
SSE Plc (ISIN XS2439704318)	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

176 We obtain similar results using NGG Finance's Euro denominated bonds.[55] **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

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

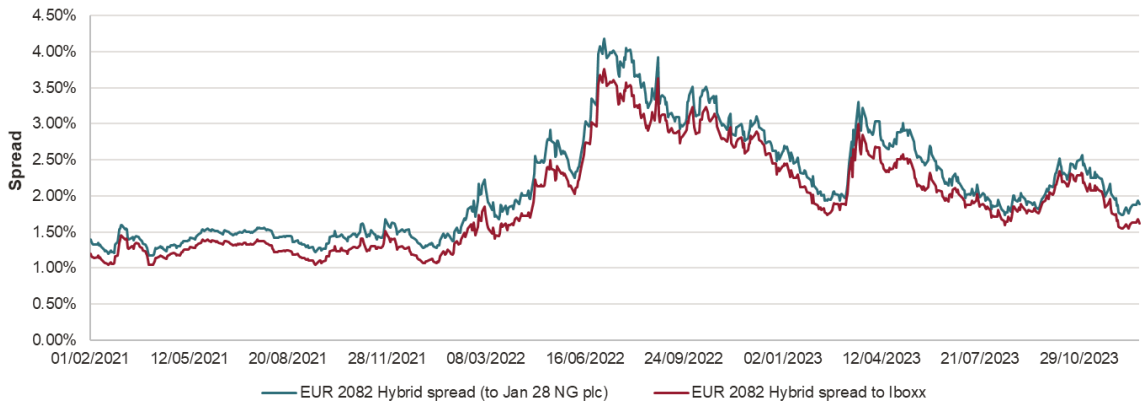
approximately matches to the tenors-to-next-call of 5.0 and 7.8 years of the 2079 and 2082 hybrid bonds, respectively.[56]

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

5.5.2 Comparison between hybrid/iBoxx and bond/iBoxx spreads

178 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 issued in the same currency.

Figure 8 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

179 The result shows that the spread between NG hybrid and NG senior debt follows similar pattern as the spread over iBoxx in our main analysis. We note that the spread to NG senior debt is almost always higher than the € iBoxx utilities index. 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.

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

5.5.3 Comparison of National Grid's gearing from FY2023

180 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 Ofgem's allowed equity return based on a 60% notional gearing assumption, we have checked if National Grid's GB network gearing from the same time period which underpins the hybrid bond has roughly the same level of gearing.

181 In the table below we set out 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 comparable with the gearing assumption applied of 60% when calculating the cost of equity – both on a network specific basis, and in total.

182 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 was extremely close to notional gearing 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 11 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*

5.6 Conclusion on hybrid bond cross-check

183 In conclusion, we found that our hybrid bond analysis suggests a point estimate for the implied cost of equity for National Grid of 6.7% CPIH-real, within a range of 5.8% - 8.5% CPIH-real.

184 The point estimate is based on the hybrid/iBoxx spread at issuance, adjusted for expected loss of default, an assumed 50% equity like proportion, added on to a one-year average yield of the iBoxx10+ year Utilities index.

185 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.

Part III:

Equity-based cross-checks

6 Equity-based cross-checks for RIIO-3

6.1 Overview

186 Ofgem introduced cross-checks at RIIO-2, as a second step in the estimation of allowed equity returns. The intention was for the CAPM evidence that emerged from Step 1 of its process to be tested against the wider market evidence available from cross-checks (Step 2).

187 The set of cross-checks Ofgem relied on at RIIO-2 were:

- Market to Asset Ratios (MARs) and evidence from transaction premia;
- Evidence on required equity returns from OFTO bids;
- Investment manager assessments of TMR, including CAPM estimates derived from those assessments;
- Infrastructure fund implied equity IRR; and
- Inference drawn from Modigliani-Miller.

188 On the basis of this cross-check evidence, Ofgem adjusted its CAPM range from Step 1, decreasing both the lower and upper bound, but the upper bound more materially. Ultimately, Ofgem selected the mid-point from its Step 1 range.

189 The development of cross-checks at RIIO-2 might be seen as foreshadowing the development of the concept of investability, essentially asking the question of whether a given calibration of CAPM has yielded a level of return that is sufficient when tested against wider current market evidence. Given this, it is natural to consider whether these cross-checks can now play a role in moving us towards an operational test for investability at RIIO-3.

6.2 The limitations of equity-based cross-checks

190 Ofgem's RIIO-2 cross-checks were subject to considerable debate. All of these cross-checks provide an indication of a short-term, forward-looking, market-implied cost of equity. Their use seemed incongruent with the understanding that Ofgem was intending to adopt a very long run approach to setting allowed returns that would look through this. But with the benefit of hindsight, it now seems clear that Ofgem, in line with other regulators, was intent on adopting a "stable but not fixed" approach to calibrating allowed returns that did lower long run averages to reflect short run wider market evidence. The emergence of short run cross-checks makes sense viewed in this context.

191 Still, Ofgem's cross-checks were heavily criticised during the RIIO-2 process and subsequent appeals. Our view can be summarised as follows:

- Three of Ofgem's cross-checks contained weaknesses and are subject to judgement in their inference of any implied COE. These were:
  - the MAR-implied cost of equity cross-check;
  - the OFTO-implied equity IRR cross-check; and
  - the investment manager forecasts of TMR cross-check (and associated CAPM with investment managers' TMR).
- Two of Ofgem's cross-checks contained critical errors and should not be relied upon. These are:
  - the Modigliani-Miller cost of equity inference cross-check; and
  - the infrastructure fund implied equity IRR cross-check.

192 We also considered that Ofgem's set of cross-checks was incomplete, bringing with it the danger of bias through selection. Consultants proposed additional cross-checks, such as Oxera's ARP-DRP already discussed above, and the long-term profitability benchmarking proposed by Frontier, but Ofgem chose not to place weight on these alternatives.

6.3 Updating Ofgem's cross-checks and the inclusion of an additional cross-check

193 Notwithstanding these reservations we have revisited Ofgem's RIIO-2 cross-checks to assess whether they can now play a practical role in testing investability. To that end we have, where it was possible, updated them to understand what they now tell us about capital market conditions.

194 We have been able to provide updated values for two of Ofgem's cross-checks: the investment manager forecasts of TMR cross-check (and associated CAPM with investment managers' TMR); and, the infrastructure fund implied equity IRR cross-check. Additionally, we include evidence from the Fernandez TMR survey to supplement the investment managers' TMR (and associated CAPM estimate).

195 We are unable to provide updated values for Ofgem's cross-checks listed below. Our high level reasoning is set out below and in more detail in the respective sub-sections discussing each of Ofgem's cross-checks:

(a) MAR-implied cost of equity cross-check. Notwithstanding the general difficulty of drawing CoE inference from this cross-check, we note that MAR ratios are time sensitive and will reflect investor expectations of the RIIO-3 settlement. Given that we are at a very early point in this process, we consider that this cross-check cannot be operationalised at this stage.

(b) OFTO-implied equity IRR cross-check. We are unable to provide updated values for this cross-check as the underlying bid data is confidential.

(c) Modigliani-Miller cost of equity inference cross-check. We consider that the way Ofgem's operationalises this cross-check is incorrect and therefore uninformative. In any case, a critical input to this cross-check is the baseline allowed return, which is not available at this stage.

196 Since the results of this process have already been discussed above in Section 4, we do not comment on those here, or on the conclusions we have drawn from them on what they imply for the appropriate level of allowed returns at RIIO-3. We instead focus on the detail of each cross-check, provide our summary assessment, and set out whether and how it has been updated.

197 In the following subsections, we discuss each of Ofgem's RIIO-2 cross-checks. For the reasons set out above, we only provide updated values for two of Ofgem's cross-checks. We also provide an update on the long run profitability cross-check proposed by Frontier.

6.4 Ofgem's cross-checks

6.4.1 MARs

Ofgem's application at RIIO-2

198 At RIIO-T2/GD2, Ofgem referred to market-to-asset ratios (MARs) as one of three cross-checks that implied equity returns at or below 4.2%. In its T2/GD2 DD, Ofgem considered how the share prices of three water utilities (SVT, UU and PNN) responded to Ofwat's PR19 FD in December 2019, observing that their increase in value provided an indication that the decision, particularly the allowed returns on equity (4.19%), was more generous than the market expected.[57]

- Analysis undertaken by CEPA for Ofgem derived MARs for SVT, UU and PNN following Ofwat's FD, and suggested premiums to RAV of between 20% - 40%.[58]
- Ofgem took the assumption that observed premia are primarily driven by a combination of outperformance (e.g. on totex, outputs or debt) and Ofwat's allowed return on equity being above the true cost of equity. Using a stylised inference model it calculated a "true cost of equity" for a given MAR and expected out(under)performance.

57 Ofgem (2020), RIIO-2 Final Determinations - Finance Annex, para. 3.116.

58 T2/GD2 Figure 9 and T2/GD2 FD 3.116-3.117. We have attempted to replicate CEPA's analysis but were unable to do so as there is insufficient detail set out in CEPA's report that Ofgem relies on at DD (CEPA (2020) RIIO-2: Use of Market Evidence), particularly on the adjustments conducted on the value of debt. Our analysis does not consider such adjustments, although the conclusions should still be valid given that the water sector comparators are essentially pure play regulated networks.

- Ofgem used this model to infer that, for a 4.20% cost of equity (in line with Ofwat's FD of 4.19%), outperformance of 3.7% for 20 years was required to explain observed premiums. Ofgem drew on this to infer that an equity return of 4.2% was an upper limit for the water sector.
- Finally, Ofgem then assumed that water and energy are of approximately equal risk, and hence Ofgem uses ≤4.2% as a point of comparison for energy networks from this cross-check.[59]

199 At T2/GD2 FD, Ofgem maintained its position at DD and continued to rely on a ≤4.2% COE inference. However, Ofgem also set out new analysis, which considered the uptick in value of listed energy companies (NG and SSE) upon the announcement of the CMA PR19 PFs in September. Again, this was taken as evidence that the CMA's findings were a '*positive, and unexpected, signal for higher returns*'.[60]

200 Ofgem also considered premia for NG and SSE in addition to the two "pure-play" water companies (SVT and UU) as at 30 October 2020 to infer that the market then believed:

- that the cost of equity for these companies was below recent cost estimates (by Ofwat, Ofgem and/or CMA); or
- that companies would outperform; or
- some combination of the above.

201 Ofgem did not comment on which of the above it believed was actually embedded in observed MARs. However, we can infer that Ofgem then considered this further analysis corroborated its DD analysis, as it did not modify its CAPM estimate for this cross-check.

202 Ofgem's T2/GD2 FD position was based on analysis of "traded" MARs, i.e. the ratio of Enterprise Value to RAV for regulated utilities that are publicly traded. Ofgem's conclusions from the traded MAR evidence were largely upheld at the ELMA 2021 and was therefore carried forward to the ED2 Draft and Final Determinations.

203 Ofgem additionally relied on further evidence on MARs during ELMA 2021 i.e. evidence of transaction MARs which are essentially the observed transaction premia in the GB regulated sector. In ELMA 2021 and ED2, Ofgem quoted transaction MARs of c. 30% - 60% for transactions in regulated energy networks occurring between 2021 and 2022.[61] Ofgem inferred from these transaction MARs

59 Ofgem (2020), RIIO-2 Draft Determination – Finance Annex, para. 3.83.

60 Ofgem (2020), RIIO-2 Final Determinations - Finance Annex, para. 3.117-3.119.

61 Ofgem (2022), RIIO-ED2 Draft Determinations – Finance Annex, Table 15

that the required CoE was then lower than 4.75%.[62] However, in the same vein as its analysis in T2/GD2, Ofgem's inference model did not indicate whether MARs could be attributed to some difference in the true cost of equity vs expected outperformance, and/or growth (or other factors that might drive investor valuation).

Critique of Ofgem's application of this cross-check at RIIO-2

204 There is an element of circularity involved in attempting to infer the allowed CoE from MARs. Market valuations of regulated entities are inherently related, and therefore will respond to, regulatory policy and decisions. As a result it is impossible to fully attribute MAR levels to fundamental factors e.g. growth or outperformance.

205 Ofgem's MAR inference essentially assumes that investors have an expectation that future returns will be allowed at some level, and then the MAR can be used to assess whether that level of return is "enough" or not. But we cannot know investor expectations. For example, even after a regulator has published a minded too position, it may be that there is an expectation that this may change down the line, and/or that it may be amended on appeal. It also follows that MARs are time sensitive; Ofgem itself noted this when it noted the change in regulated utilities' stock prices in response to the PR19 PFs.

206 Transaction MARs are even more challenging to interpret. While these data points are subject to the circularity issue set out above, the final bid price offered will depend on a raft of wider judgements (in addition to judgements about future performance), including potential synergy benefits, winner's curse etc. It is not possible to untangle these factors.

Updated evidence

207 We have undertaken an exercise to estimate MARs for the three UK listed water companies (UU, PNN and SVT) and also for NG, based on the latest data available as at 31 December 2023. We also take account of the recent transaction regarding SES Water, which completed at a MAR of 1.06x.[63] We consider this in the round of the latest traded MAR evidence, discussed in the following section.

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62 Ofgem (2022), RIIO-ED2 Draft Determinations – Finance Annex, 3.65

63 https://www.pennon-group.co.uk/investor-information/acquisition-of-sutton-and-east-surrey-water. We also note that in July 2023, National Grid sold a further 20% stake of National Gas to the same consortium that acquired a majority stake in the gas transmission and metering business earlier in 2023. We do not consider this transaction explicitly because it relates to the exercise of an option which was negotiated in the original transaction in March 2022. The conditions of the option state that further stakes in National Gas could be sold to the consortium on similar terms as the original transaction. As such, we consider that this transaction does not represent any recent market information and should not be considered in our analysis here.

208 However, at this stage we have not used these MARs to make inferences around the implied COE from these MARs. This is not solely because we consider inferring a required CoE from MARs to be an exercise that is fraught with difficulty. It is also because we remain at an early stage in the development of the latest round of infrastructure price controls. In respect of RIIO-3, Ofgem has not yet published any minded too position in respect of allowed COE. While Ofwat has published a methodology for estimating COE with a numerical estimate, Ofwat has not yet published its DD or FD, and we consider it likely that Ofwat's methodology may change. At this point in time, we take the view that there is simply no way of estimating what investors may believe baseline returns will be for either RIIO-3 or PR24, and hence no way of even beginning a MAR inference exercise.

209 To estimate MAR, consistent with Ofgem and CEPA's approach in the T2/GD2 DD, we have derived a ratio of the 'regulated' enterprise value (EV) and the regulated asset base (RAB) of each company. There are a few estimation steps taken to arrive at a meaningful estimate for each of these, and we describe these steps below.

210 To estimate regulated EVs for comparator firms:

- Consistent with CEPA's approach, we derive EVs on the basis of reported market capitalisation and both the book value and market value of debt.[64] This provides estimates of comparators' Group EVs.[65]
- These Group-level EVs reflect the total value of comparators' regulated and non-regulated businesses, and therefore it is necessary to adjust these to reflect the regulated business, only. To do this, we rely on Sum of the Parts (SOTP) valuations produced by equity analysts.[66] We consider a SOTP valuations conducted by a range of analysts in 2023, and take the average regulated proportion implied by each of these and apply this to the EVs on the dates of interest. This allows us to derive the regulated EV for our comparator set on the valuation date.
- Estimating the EVs for NG's regulated business is relatively more complex compared to the other comparators, given the diverse nature of NG's business relative to the listed water networks. The SOTP valuations do not provide a fully accurate view of the proportion of the business which is regulated; this is

64 We have collected information on the value of debt from comparators' accounts. We consider that statutory accounts provide the most complete view of comparators' outstanding debt. However, statutory accounts are not available on a daily basis. As such, we consider the latest accounts which are the half-year results reported at September 2023. We do not expect a material movement in debt values over Q4 2023 such that it would drastically skew our results.

65 CEPA (2020), RIIO-2: Use of Market Evidence.

66 These are valuation analyses produced by equity analysts. SOTP valuation usually involves the analyst taking a forward looking view of inflows and liabilities available to each segment of the business to derive a fundamental value for each business segment. The sum of these represents a fundamental valuation for the Group.

subject to the judgement of equity analysts. In reality, the investor community rarely considers the value of regulated segments in isolation, and usually take a more holistic view of the overall business and associated synergies. For this reason, we consider that the NG MARs are likely to be less robustly estimated and less informative than those derived for the water networks.

211 In respect of RAB values, we rely on publicly available information on historical and forecast (nominal) RABs. Reported RAB values for the relevant comparators are only available up to the end of financial year 2023. To derive a RAV value at 31st December 2023, we relied on forecast RAV values. For energy networks, these can be found in, for example, Ofgem's accompanying model to its Call for Input on Inflation.[67] For Water networks, these can be found in water networks' business plans, which were published in the Summer of 2023: these provide RAV values at the start of the next AMP. We then conduct linear interpolation to derive a RAV value relevant to the end of last calendar year.

212 The table below shows there has been a significant reduction in MARs since Ofgem's assessments in RIIO-2. Ofgem's RIIO-2 analysis suggested a range of 20% - 60%, but current market data suggests that MARs have fallen substantially to 10% - 15%.

Table 12 Market-to-asset ratios at 31st December 2023

As of:	MARs estimated using book value of debt	MARs estimated using market value of debt
National Grid	1.37	1.26
United Utilities	1.11	1.09
Pennon	0.87	0.82
Severn Trent	1.23	1.17
Overall average	**1.15**	**1.09**

Source: Frontier calculations using data from Bloomberg and company annual reports. Pennon includes SES Water

Note: Value of debt is as of 30th September, 2023 – latest update from company reports. We source this information from annual reports as we consider annual reports to be the most comprehensive record of net debt outstanding. For the avoidance of doubt, the National Grid MAR shown above relates only to the UK regulated entity.

213 For the reasons set out above, we do not seek to draw strong inferences from these MAR. However, it is clear that all MAR have fallen significantly since RIIO-

67 Ofgem (2023), Call for input – Impact of high inflation on the network price control operation. Available: https://www.ofgem.gov.uk/publications/call-input-impact-high-inflation-network-price-control-operation

2, and one could no longer support the positions that Ofgem adopted then on the basis of this current information.

6.4.2 OFTOs

Ofgem's application at RIIO-2

214 Since 2011, Ofgem has managed a competitive tender process for offshore electricity transmission licences. At RIIO-2, Ofgem drew on information from this process to provide weighted average post-tax equity IRRs for sets of winning OFTO bids.[68] It then combined IRRs with gearing levels (80%-90%) and assumptions for TMR, RFR and debt beta to infer that OFTO tender rounds three to six reflected asset betas between 0.20 and 0.30.[69] Ofgem then took the IRR of 7.0% nominal from what was then the most recent set of OFTO projects, and used this as the basis of estimating a return of 4.9% CPIH-real for this cross-check.[70]

215 Ofgem recognised that OFTO gearing levels are higher than RIIO notional gearing levels, and that the risk profile of OFTOs is lower than energy networks. However, Ofgem was of the view that the gearing effect could overshadow the underlying risk difference.[71] Consequently, it considered the OFTO implied equity IRR to be a reasonable comparator for energy networks.

Critique of Ofgem's application of this cross-check

216 There are a number of weaknesses with this cross-check, and it should not be relied on to inform the allowed return on equity.

217 OFTO required return estimates are derived from investor bids. Logically, these bids may incorporate other value drivers to the bidder which are unrelated to the cost of equity, such as tax and financing structures.

218 We understand that Ofgem assumed a terminal value of zero for each OFTO in its inference. However, bidders may have rationally priced in additional upside if they anticipate revenues after the contracted period.

219 It is not possible to untangle these elements and Ofgem has not in the past presented any analysis attempting to do so. In this sense this cross-check suffers from the same issues as the MAR cross-check. Historically, there has been no

68 Ofgem (2020), RIIO-2 Draft Determinations - Finance Annex, para 3.86-3.89.

69 Ofgem (2020), RIIO-2 Draft Determinations – Finance Annex, para 3.86-3.89.

70 Ofgem (2020), RIIO-2 Draft Determinations - Finance Annex, table 24.

71 Ofgem (2020), RIIO-2 Final Determinations - Finance Annex, para 3.115.

information in the public domain, so it is not possible to validate or otherwise analyse these returns.

220 Also, OFTOs operate at a much lower risk profile than regulated utilities as they do not bear most of the risks that regulated utilities bear.[72] Their operational risk is highly limited. All OFTOs created so far have been run under the "late" model, hence OFTOs have no construction risk. OFTOs are let for 20 to 25-year fixed term windows that provide for the full recovery of sums invested with certainty, subject to limited incentive exposure. There is no wider regulatory/political risk as OFTOs do not have price controls.

221 We recognise that OFTOs typically have higher gearing level, which would mean that the cost of equity implied would be lower if re-geared to 60%. However, Ofgem did not carry out any robust analysis to show the size of this effect, compared to the significantly lower risk profiles; Ofgem effectively assumes that these two opposing factors 'cancel each other out', but this is not possible to verify.

222 For these reasons we consider that the cross-check has very limited value.

Updated evidence

223 We have not been able to update evidence for Ofgem's OFTO cross-check as IRR data on winning bids for OFTOs is not publicly available.

6.4.3 Investment manager forecasts of TMR

Ofgem's application at RIIO-2

224 At RIIO-2, Ofgem took a sample of forecasts of UK TMR made by investment managers and financial organisations, comprising nine forecasts by investment managers, one forecast by the Financial Conduct Authority, and one redacted forecast.[73] Ofgem took a simple average across nine forecasts (two forecasts, by Willis T W and Vanguard, were excluded) to derive a point estimate of 5.0% CPIH-real.[74]

225 Ofgem further applied the TMR in a simple CAPM-style calculation with an equity beta of 0.9 to derive a cost of equity estimate of 4.3% CPIH-real.[75]

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72 For example see: Oxera (2020), The cost of equity for RIIO-2 Q3 2020 update, Section A2.1.

73 Ofgem's sample evolved over the RIIO-2 process. Ofgem started with a set of 10 forecasts at SSMC, At SSMD Ofgem added an unidentified (redacted) forecast. However it also removed two forecasts from its average. Ofgem also changed the forecast horizon and jurisdiction for two forecasts (Schroders and Blackrock) between SSMD and DD.

74 Ofgem (2020), RIIO-2 Draft Determinations - Finance Annex, para 3.90-3.92.

75 Calculated using risk-free rate of -1.48%.

Critique of Ofgem's application of this cross-check at RIIO-2

226 Conceptually this is a cross-check of TMR, not the appropriate cost of equity for energy networks. As a potential cross-check for the TMR, we consider that there are several potential weaknesses that this evidence suffers from.

- These forecasts are subjective opinions, the stated preference of fund managers. This is not traded market evidence. They should be regarded as no more reliable than other survey evidence, about which the CMA and other regulators has traditionally been sceptical. Accordingly, the basis of these forecasts could vary which makes comparison challenging.[76]
- This cross-check is likely to be downwards biased given the basis on which these forecasts are generated and provided by investment managers. Primarily their purpose is to provide prudent estimates of future returns to existing or prospective clients. Consequently, these forecasts reflect the framework under which investment managers are regulated, which stipulates that they must avoid the danger of overpromising on future returns and mis-selling.
- Investment manager forecasts are also likely to reflect short run market sentiment which, similar to all the other short-term estimates, are likely to give more volatile results from one price control to the next.

227 In its redetermination of PR19 the CMA considered that 'caution is warranted when interpreting broker forecasts of the cost of equity in relation to utility companies' and that they "*may also prove to be no more accurate than [the CMA's] own assessment, or may be specifically tailored to particular investors or house views rather than representing the cost of capital demanded by the average or marginal investor in the sector*".[77] We agree with these concerns, which reflect our own assessment, and consider they apply with equal force to this cross-check.

228 In addition to the more fundamental weaknesses of this cross-check outlined above, the data set used changes over time as funds are discontinued, or fund managers are acquired for example. As such, it is difficult to develop a data set of these which is continuous over time. Moreover, it is not guaranteed that investment managers will publish the same forecasts periodically, and they are also not obligated to disclose their assumptions or underlying methodology. Overall, we consider there are a number of reliability concerns with the source data.

229 In conclusion, we consider the investment manager cross-check at best a short-term survey-based cross-check on the TMR, and its likely volatility is incompatible with a stable returns regime.

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76 Ofgem (2019), RIIO-2 Sector Specific Methodology Decision – Finance Annex, para 3.90

77 CMA (2021), PR19 Aiming Up Working Paper, para. 93.

Updated evidence

230 Nevertheless, we have collected updated data on TMR forecasts for the discount rates for 7 of the 11 institutions that Ofgem considered at RIIO-2.[78] The table below compares the TMR estimates presented by Ofgem in its draft determinations in July 2020 against the latest TMR forecasts.[79]

Figure 9 Change in investment manager TMR forecasts since 2020

	Ofgem RIIO-2 Draft Determinations (Published Jul 2020)				Updated data as at 31 Dec 2023				Change
Author	Date	Scope	Horizon	Nominal	Date	Scope	Horizon	Nominal	
Schroders [1]	Dec-19	UK	10	4.90%	Dec-23	UK	10	10.30%	5.4%
Blackrock [2]	Dec-19	UK	10	5.70%	Sep-23	UK	10	7.70%	2.0%
Quilter [3]	Dec-19	UK	L Term	7.52%	Dec-23	UK	10	10.11%	2.6%
Aon Hewitt [4]	Sep-19	UK	10	7.70%	Sep-22	UK	10	8.60%	0.9%
JP Morgan [5]	Sep-19	UK	L Term	6.90%	Sep-23	UK	10 to 15	8.00%	1.1%
Aberdeen [6]	Dec-19	UK	10	8.60%	Jun-23	UK	10	7.30%	-1.3%
Nutmeg [7]	Sep-17	UK	10+	7.80%	*Not available*				n/a
FCA [9]	Sep-17	UK	10 to 15	7.60%	*Not available*				n/a
Redacted author [9]	Nov-18	UK	10	7.19%	*Not available*				n/a
Willis T W [10]	Dec-18	UK	10	5.24%	*Not available*				n/a
Vanguard [11]	Dec-19	UK	10	5.00%	Dec-23	UK	10	5.70%	0.7%
Mean across [1] - [9]				7.1%				n/a	n/a
Mean across [1] - [6]				6.9%				8.7%	1.8%

Source: *Published forecasts of each author, Ofgem's RIIO-2 Draft Determinations Finance Annex*

Note: *Quilter is formerly known as Old Mutual. The values we show are in arithmetic averages, adjusted according to the approach Ofgem set out in RIIO-2.*

231 The figure above shows that:

- The average across all forecasts (i.e. the metric used by Ofgem to inform its RIIO-2 cross-check estimate) has increased from 6.9% in July 2020 to 8.7% in December 2023 (i.e. an increase of 1.8%).
- Almost all forecasts (6 of the 7 forecasts) have increased between 2020 and 2023 – some substantially. Across these 6 forecasts, the TMR has increased by 0.7% at a minimum and 5.4% at a maximum.

232 At RIIO-2, Ofgem's translated these forecasts of TMR into a COE cross-check. Again, if we simply adopt Ofgem's methodology and combine the average reported TMR with a beta of 0.9 and a risk-free rate of 1.84%, we derive an implied cost of equity of 6.04% CPIH-real.[80]

78 Of the remaining four authors that Ofgem considered at RIIO-T2, we have not found updated forecasts for three authors (Nutmeg, the FCA and Willis Towers Watson). The fourth author is listed as "redacted author" in Ofgem's draft determination and so we are unable to identify the relevant institution to provide an updated forecast.

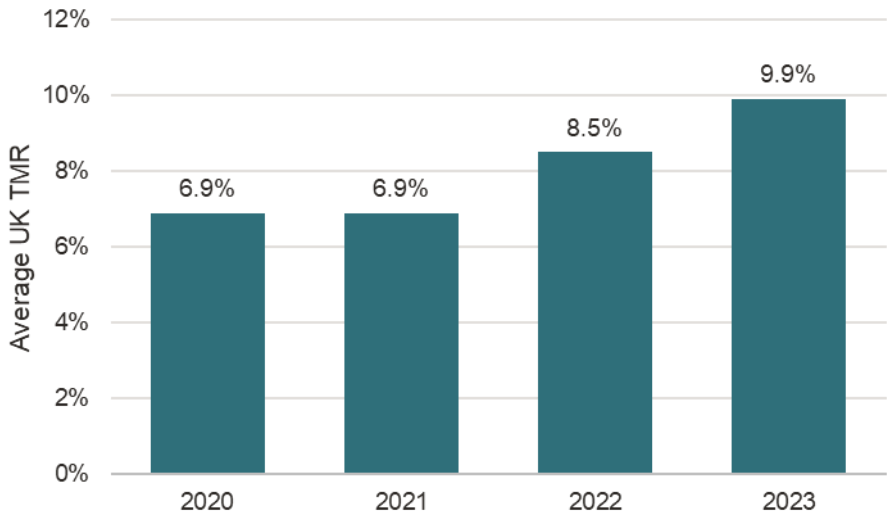
79 These forecasts include a 1% uplift from geometric average to arithmetic average to put them on a comparable basis to Ofgem's TMR forecasts, which also include the 1% uplift (as discussed in RIIO-T2/GD2 SSMD (May 2019)).

80 Consistent with the other cross-checks we consider a CPIH assumption of 2% to derive CPIH-real figures.

233 To supplement this cross-check, we consider the results from the annual survey of risk-free rates and market risk premium (MRP) conducted by Fernandez *et al*. The survey asks academics, analysts and managers of companies across 80 countries about the risk-free rate and MRP used 'to calculate the required return to equity in different countries'.[81]

234 The figure below shows the average TMR estimates for the UK derived from the survey results. The evidence from the Fernandez survey points to a significant increase in the TMR between 2020 and 2023 – an increase of c. 3 percentage points from 6.9% in 2020 to 9.9% in 2023.

Figure 10 Average UK TMR estimates as per Fernandez et al.



Source: Fernandez, Pablo and García de la Garza, Diego and Fernández Acín, Javier (2023), Survey: Market Risk Premium and Risk-Free Rate used for 80 countries in 2023, Tables 5 and 6

235 Using a 2% CPIH assumption, the TMR evidence from the Fernandez survey suggests a CPIH-real TMR of 7.7% in 2023.

236 Applying Ofgem's approach of inferring a CoE from this evidence, which involves combining the TMR survey evidence with an appropriate RFR (1.84%) and equity beta of 0.9, the survey evidence suggests a CoE of 7.2%.

81 Fernandez, Pablo and García de la Garza, Diego and Fernández Acín, Javier (2023), Survey: Market Risk Premium and Risk-Free Rate used for 80 countries in 2023 , p. 2.

6.4.4 Infrastructure fund implied equity IRR

Ofgem's application at RIIO-2

237 At RIIO-2, Ofgem obtained discount rates for a set of 13 infrastructure funds that invest in private finance initiatives and private utility assets.[82] It then inferred an IRR for each fund by deflating the discount rates by the premium-to-net asset value (NAV) for each fund to account for outperformance of the underlying assets. Ofgem then took a simple average across the funds to derive a point estimate of 4.20%.[83] We observe that this cross-check does not make any adjustments to reflect the riskiness of different funds.

Critique of Ofgem's application of this cross-check at RIIO-2

238 A number of objections were raised to this cross-check.

239 Network companies pointed out that the asset composition of infrastructure funds means that they are less risky than GB energy networks.[84] For example, our analysis at the time showed that some of these funds appear to hold a mix of equity and debt instruments from infrastructure assets, which would clearly not provide a foundation for a like-for-like cross check with equity.

240 Companies also criticised the NAV premium adjustment carried out by Ofgem to reduce the estimates. In a report for the ENA Oxera highlighted how this adjustment assumes that any premium above NAV means that the fund is overestimating the cost of capital, whereas there are many potential drivers of premia, a factor that Ofgem did not appear to have considered.[85]

241 We also raised concerns over the basis and interpretation of the evidence that was being collected, and whether it could be understood to represent the funds view of their cost of equity capital.

242 We consider that these criticisms of this cross-check remain valid concerns.

Updated evidence

243 Nevertheless, we have collected updated data on the discount rates for 10 of the 13 infrastructure funds considered by Ofgem in the RIIO-2 DD over the period July 2019 to December 2023 and carried out the same NAV premium adjustment, in

82 Ofgem included 14 funds in its review, but excluded one fund (3i Infrastructure) from its calculation of the average IRR. This means that 3i infrastructure as not included in Ofgem's cross-check point estimate.

83 Ofgem (2020), RIIO-2 Draft Determinations - Finance Annex, para 3.93-3.96.

84 For example see Oxera's report for the Energy Networks Association: –Oxera (2020), The cost of equity for RIIO-2 – Q3 2020 update, section A2.2.

85 Oxera (2020), The cost of equity for RIIO-2 – Q3 2020 update, section A2.2.

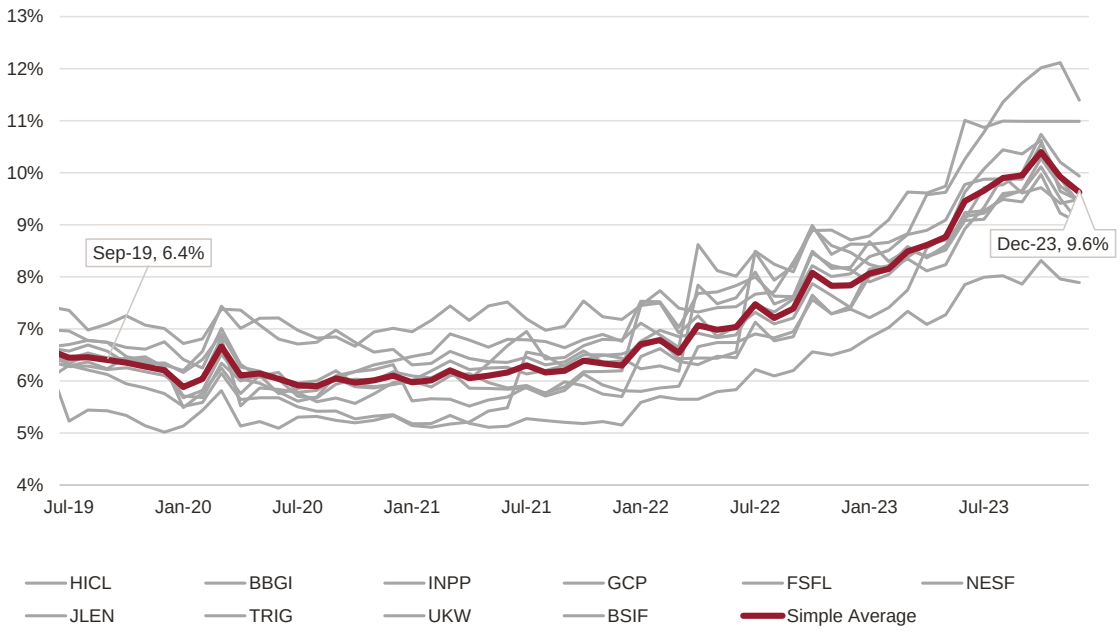
order to present in as far as possible a like-for-like comparison with the outcome of Ofgem's own RIIO-2 analysis. We have been unable to source updated information for the remaining three funds considered by Ofgem at RIIO-2.[86]

244 For all funds, we focus on the weighted average discount rate. Data on discount rates is not always available through to December 2023. We therefore rely on data from the half-year reports where available for the financial year 2023-2024. Where more recent data was not available, we have assumed that discount rates remained at the latest available level through to July 2023.

245 The monthly equity implied IRR for these 10 funds is shown in the figure below. The graph shows that the average equity implied IRR has increased from c. 5.9% in July 2020 to c. 9.6% in December 2023 (i.e. an increase of approx. 3.8% over this time). We adopt this as our headline figure for this cross-check. This is approximately 7.5% in CPIH-real terms.[87]

246 For the individual funds, all showed an increase in implied IRR, with the smallest increase being 2.4% (BBGI) and the largest increase being 5.7% (JLEN).[88]

Figure 11 Infrastructure fund implied equity IRR



Source: Frontier Economics analysis on Bloomberg data and published reports

86 For GRP, we have not been able to find the updated net asset value data throughout the period. JLIF and JLG were sold to investment firms in September 2018 and 2021 respectively.

87 Using a CPIH inflation assumption of 2%.

88 The decrease which is observable from October 2023 for the majority of funds can be explained by an increase in the prices per share.

Note: In order to obtain the implied equity IRR, a NAV premium adjustment has been applied as carried out by Ofgem in the RIIO-2 DD.

6.4.5 Modigliani-Miller cost of equity inference

Ofgem's application at RIIO-2

247 At RIIO-2, Ofgem used the so-called Modigliani-Miller cost of equity inference as a cross-check. This cross-check is based on the assumption established by the Modigliani-Miler theory that the WACC should be independent of the gearing level.[89] To carry out its cross-check, Ofgem calculated the WACC at the observed actual gearing level of the GB listed utilities (NG, UU, SVT, PNN, and SSE), using its assumptions for parameters such as TMR, RFR, beta and cost of debt. Ofgem then changed the gearing level to 60%, solving for the cost of equity while holding the cost of debt and the WACC constant. This yielded a cost of equity range between 3.2% - 4.1% (CPIH-real) and Ofgem inferred that this cross-check implied returns at or below 4.2%.

Issues with this cross-check

248 At RIIO-2, we pointed out a range of concerns with this cross-check to Ofgem. These centred on an in principle concern, i.e. that the Modigliani-Miller gearing indifference finding is only found to hold when there is no default premium on debt (i.e. no bankruptcy). However, Ofgem's cross-check calculation used a cost of debt measure that most definitely did contain a default premium, in addition to an allowance for transaction costs. As a result, our view was that the failure of MM condition, given Ofgem's inputs to it, was inevitable, and no inferences could or should be drawn from it.

249 At this stage, we have not updated this cross-check.

6.5 An additional equity cross-check

6.5.1 Long-term profitability benchmarking

250 At RIIO-2 Frontier proposed that Ofgem should consider a further cross check, based on long term profitability measures. We note that Ofgem did not place any weight on this cross-check but given the proposed focus on investability at RIIO-3, we review and present this evidence again here. Investors will form their expectations of required returns based on returns achieved in other comparable sectors and markets. We consider that the long-term profitability benchmarking is

89 Ofgem (2020), RIIO-2 Final Determinations Finance Annex, para 3.117-3.119.

a useful piece of evidence to consider alongside the concrete reference points which can be drawn from debt markets, as described elsewhere in this report.

Overview of cross-check

251 Most of the cross-checks that have been considered by Ofgem and other parties are in one form or another measuring shareholder returns. This is appropriate as the most relevant form of return is the economic return based on market valuation. However, accounting information on companies' profitability can provide useful evidence as a cross-check.

252 Ofgem does not set the outturn total return that shareholders realise from holding an equity stake in a regulated business. This will depend on:

- the average price for which shares were bought;
- the average price for which shares were sold; and
- the dividends paid while the shares were owned.

253 The first two elements depend on the valuation of the regulated business. Regulatory decisions will influence valuation to degree, but wider capital market conditions will also exert considerable influence. The regulator's task is to set an appropriate profitability for the regulated companies, instead of calibrating the price control to deliver certain levels of investor valuation (which is the primary concern of short-term valuation based cross-checks such as MAR).

254 Out of the three elements listed above, Ofgem only has a strong influence over third element. This is because Ofgem is effectively setting the allowed level of profitability when it sets the cost of equity allowance. Assuming companies achieve the level of efficiency expected by Ofgem on all fronts of the price control, the cost of equity allowance implies a specific outturn return on equity (i.e. profitability).

255 It is therefore reasonable to assess how the allowed equity return compares to the outturn level of profitability for comparable businesses (i.e. businesses with a similar aggregate risk profile as energy networks). This provides a useful real-world check on whether or not the allowed return for regulated companies is reasonable (or potentially too high or too low).

Methodology

256 The long-term profitability cross-check is reasonably straightforward to implement. There are four key considerations:

(a) Choice of profitability measure. We have implemented the cross-check by using the return on common equity (as reported by Bloomberg). This is a post-tax, nominal measure of profitability, derived from statutory financial statements. It is a well-established and well-understood accounting profitability

metric, which measures the accounting profit of a company to its equity holders on an annual basis. It is widely published for all publicly listed companies, with a set of standard accounting rules on how this can be calculated.

(b) **Comparability of profitability measure with Ofgem's cost of equity allowance.** Both return on common equity and Ofgem's cost of equity allowance are post-tax metrics. We recognise that the regulated equity is distinct from the book value equity in statutory balance sheet, and so comparing the cost of regulatory equity with the return on equity of benchmarks measured by book value is not strictly like for like. However, we do not consider this discrepancy invalidates the cross-check.

(c) **Set of comparator businesses.** For the cross-check to be useful, we must consider long-term profitability for a suitable set of comparator companies. According to the fundamentals of finance theory, companies with similar systematic risk profiles should have similar expected returns. We therefore look at the return on common equity for utility sector indices and a set of four EU and five US comparator utilities.[90]

(d) **Timeframe of analysis.** Given that profitability varies year-to-year due to, among other causes, the business cycle, profitability measures should be considered over the long-term (i.e. over one or more business cycles). We calculate the (arithmetic) mean return on common equity for these utilities and indices over a period of 22 years (2002 to 2023), which is the period that the annual data is available from Bloomberg.

257 There are limitations to the analysis of profitability metrics – i.e. the effect of financial leverage is not considered, and the question of comparability of the benchmarks (discussed above). However, attempting to correct for these limitations would bring the analysis back into the realm of CAPM. This would defy the point of the cross-check in providing a useful real-world check on whether or not the allowed return for regulated companies is reasonable.

Results

258 Table 17 below shows the smallest, largest and median CPI-real return on common equity achieved by comparable investment opportunities averaged over 2002 to 2023 (nominal returns are converted to real terms using outturn CPI inflation figures).

Table 13 Real return on common equity for comparable sector indices and comparable utilities in EU and US

	Average 2002-2023
Low	5.9%
Median	8.4%
High	17.5%

Source: Frontier Economics analysis of Bloomberg data. Comparators include the Utility indices from FTSE and S&P. Utilities include four EU regulated energy network utilities and five US regulated energy network utilities

259 The range in values of the return on common equity is relatively large, and appears to be positively skewed. On this basis, we focus on a range implied by the low and median estimates which we consider provides a good coverage of the sample we considered. On this basis we consider a reasonable range for this cross check is 5.9% - 8.4%.