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1 Introduction

Following the publication of the Sector Specific Methodology Consultation (SSMC) for the RIIO-3 price controls, SSE asked Oxera to investigate and update two of the cross-checks used by Ofgem to determine the allowed return on equity in the RIIO-2 period: the infrastructure funds cross-check, and the investment manager forecasts cross-check.

In our previous work, we have critiqued these cross-checks in detail and have explained why their results should be interpreted with caution when determining the CoE allowance.¹ Nevertheless, Ofgem has relied on them to cross-check the CAPM results in RIIO-2.² Therefore, while our criticism of the infrastructure funds cross-check and the investment manager forecasts cross-check stands, we have updated them for the RIIO-3 price controls. This note sets out the results of our analysis.

The remainder of this note is structured as follows.

- In section 2, we present and critically assess the infrastructure funds cross-check.
- In section 3, we discuss the investment manager forecasts cross-check.
- In section 4, we present our conclusions.

¹ Oxera (2019), 'The cost of equity for RIIO-2', 29 November, pp. 26 and 55, <https://www.oxera.com/wp-content/uploads/2018/01/Cost-of-equity-for-RIIO-2-Q4-2019-update.pdf> (last accessed 21 February 2024).

² Ofgem (2019), 'RIIO-2 Sector Specific Methodology – Core document', 24 May, para. 12.44, https://www.ofgem.gov.uk/sites/default/files/docs/2019/05/riio-2_sector_specific_methodology_decision_-_core_30.5.19.pdf (last accessed 21 February).

2 Infrastructure funds cross-check

For RIIO-GD&T2, Ofgem analysed the discount rate and net asset value (NAV) premium of 13 infrastructure funds as a cross-check to the cost of equity (CoE) allowance.³ It found that the average adjusted discount rate was 6.3% in nominal terms and 4.2% in CPIH-real terms.⁴ Ofgem's methodology for the infrastructure funds cross-check consisted of deflating each fund's discount rate by the market premium to the latest NAV to derive an adjusted IRR. This adjusted IRR was then used as a cross-check to support Ofgem's CoE assessment. The intuition provided by Ofgem for the application of this cross-check is that any premium above the NAV means that the fund is overestimating its own cost of capital, and hence that the discount rate needs to be 'corrected' to account for that overstatement.

To adjust the fund discount rate, Ofgem assumed that each fund's discount rate and the investors' discount rate is derived by a simple perpetuity as expressed in the two equations below:⁵

$$NAV \text{ per share} = \text{Cash flow} / \text{Discount rate}_{fund}$$

$$\text{Fund share price} = \text{Cash flow} / \text{Discount rate}_{investor}$$

By taking the ratio of the two equations and rearranging it to solve for the investor's discount rate, we get the following simplified equation for the NAV-adjusted discount rate, which Ofgem assessed:

$$\text{Discount rate}_{NAV-adjusted} = \frac{\text{Discount rate}_{fund}}{\text{Fund share price} / \text{Fund NAV per share}}$$

Note that this equation assumes that investors and fund managers have the same cash flow expectations, and that the difference in asset valuation is only attributed to the discount rate. However, there could be multiple explanations for a market premium that do not rely on the overestimation of the CoE. For example, the NAV reported by each fund

³ Ofgem (2020), 'RIIO-2 Draft Determinations – Finance Annex', 9 July, https://www.ofgem.gov.uk/sites/default/files/docs/2020/07/draft_determinations_-_finance.pdf (last accessed on 16 February 2024).

⁴ Ibid., para. 3.98.

The CPIH-real CoE allowance in the RIIO-2 Final Determinations was 4.55%. Ofgem (2021), 'RIIO-2 Final Determinations – Finance Annex', 3 February, p.24, https://www.ofgem.gov.uk/sites/default/files/docs/2021/02/final_determinations_-_finance_annex_revised_002.pdf (last accessed on 29 February 2024).

⁵ Ofgem (2020), 'RIIO-2 Draft Determinations – Finance Annex', 9 July, pp. 62–63.

may take a more prudent view of future cash flows relative to market expectations. Therefore, in this note, we present an updated version of the infrastructure funds cross-check both with and without the NAV adjustment.

Furthermore, as previously noted by Oxera, the funds' asset compositions differ significantly from those of a pure-play energy network, which undermines the use of this cross-check to set the allowed CoE for energy networks.⁶

Before presenting the results of our analysis in relation to the infrastructure funds cross-check, we provide a brief overview of the portfolio composition of the funds in Table 2.1 below.

⁶ Oxera (2019), 'Infrastructure Funds Discount Rates', March.

Table 2.1 Portfolios of infrastructure funds

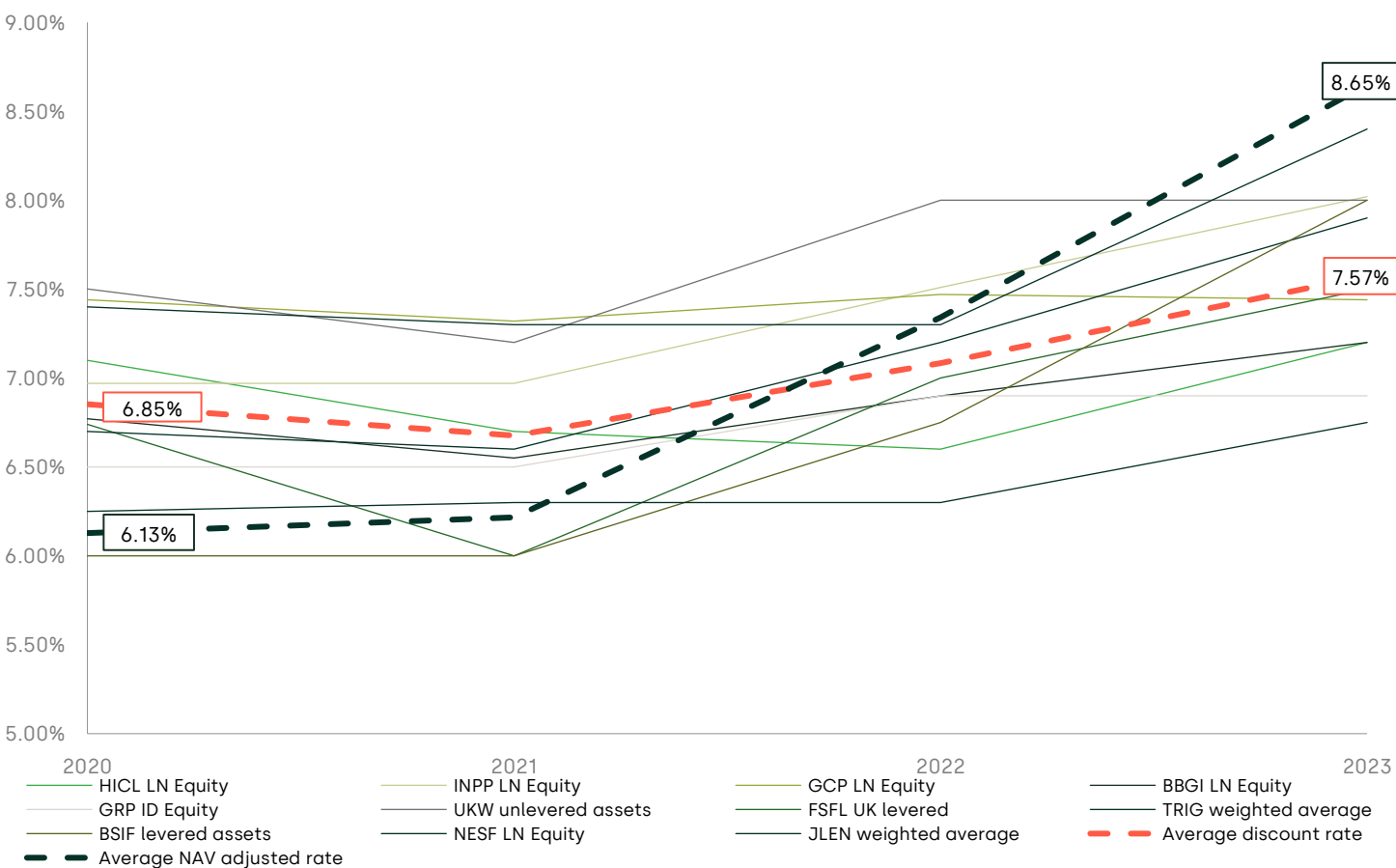
Company	Portfolio
BBGI	100% long-term availability-based public-private partnership
HICL	60% in public-private partnership, 19% in demand-based assets, and the remainder in regulated assets
GCP	65% in renewable energy, 24% in Private Finance Initiative, and 11% in social housing
INPP	50% in regulated investments, 29% in availability-based public-private partnerships, 11% in public-private partnerships with revenue risk mechanisms, and 10% in other rolling stock and digital infrastructure
GRP	100% in renewable energy technologies within the eurozone
UKW	100% operating in UK windfarms
FSFL	100% operating in ground-based solar power plants across the UK, Australia and Spain
TRIG	50% in onshore wind, 33% in offshore wind, 13% in Solar PV, and 4% flexible capacity
BSIF	100% operating in UK solar energy
NESF	100% operating in solar photovoltaic assets
JLEN	100% in environmental infrastructure including wind, waste and bioenergy, anaerobic digestion, solar, low-carbon solutions, controlled environment and hydro
Excluded from the analysis	
JLIF	Inactive since 25 May 2018
JLG	Acquired by KKR in 2021

Source: Oxera analysis based on each fund's website.

Consistent with our 2019 findings,⁷ we observe that the asset classes and the risk of the diversified portfolios differ significantly from those of a pure-play energy network business. For example, the BBGI portfolio is invested entirely in long-term, availability-based public-private partnerships. Therefore, we continue to consider that the infrastructure funds' discount rates are not an appropriate benchmark for the CoE of regulated utilities. In spite of this conclusion, in Figure 2.1 below we present an update of the infrastructure funds analysis based on Ofgem's methodology.

⁷ Oxera (2019), 'The cost of equity for RIIO-2', prepared for Heathrow Airport Limited, 2 August.

Figure 2.1 Infrastructure funds' discount rates (nominal)



Note: Where the annual reports do not publish share prices, we take the closing share price on the date of publication from Refinitiv. Averages are calculated as simple averages across the sample.

Source: Infrastructure funds' annual reports. For 2023, we used the interim results publication (half-year results), as the annual reports have not yet been published.

Figure 2.1 shows two important trends in the data. First, a clear upward trend is observable, where the average discount rates have increased by approximately 0.7% since 2020, and the NAV-adjusted rates have increased by approximately 2.5%.⁸

Second, we observe that the average NAV-adjusted rates based on Ofgem’s methodology have increased more than the unadjusted rates. Furthermore, their average is approximately 1% greater than the average unadjusted rate, which does not rely on such strong

⁸ All averages are calculated as simple averages across the sample.

assumptions. This trend is a reflection of a decrease in the average NAV premium which turns negative in 2022, suggesting that the discount rate applied by the funds may be lower than the discount rate applied by the market.⁹ In other words, under Ofgem's assumption that the discount rate reflects all the difference in asset valuation, the returns demanded by investors are higher than the cost of capital assumed by the infrastructure funds.

Concluding the infrastructure fund cross-check, we find that the NAV-adjusted IRR in 2023 ranges from 7.2% to 9.8%, with an average of 8.6%. With a stylised inflation assumption of 2% this cross-check points to a cost of equity of 6.5% CPIH-real compared with a CPIH-real CoE allowance in the RIIO-ED2 final determination of 5.23%.

3 Investment manager forecast cross-check

In the RIIO-2 Sector Specific Methodology Decision, Ofgem provided an analysis based on forecasts of the UK TMR made by investment managers and financial organisations, which supported an average TMR of 7.65% (nominal).¹⁰ One year later, at the stage of the Draft Determinations, Ofgem found that the average observed TMR had decreased to 7.10% for the same sample of forecasts (excluding Willis TW and Vanguard because they were considered outliers by Ofgem due to very low forecasts of 5.00–5.24%).¹¹

We have updated Ofgem's analysis by looking at the most recent publications of investment managers. For comparability reasons, to account for the difference between the geometric and arithmetic mean, we apply the same uplift (i.e. 1%) used by Ofgem in the RIIO-T2 and GD2 Draft Determinations.¹² We understand that this uplift was based on the number reported by one of the managers (JP Morgan) at the time.

Therefore, we provide a sensitivity based on a more up to date and detailed assessment of the difference between the geometric mean and

⁹ There was a gradual decrease in the simple average NAV premium until it turned negative. For example, we observe that the NAV premium of some funds (FSFL and GCP) had already turned negative in 2021.

¹⁰ Ofgem (2019), 'RIIO-2 Sector Specific Methodology Consultation – Finance', 24 May, Figure 6.

¹¹ Ofgem (2020), 'RIIO-2 Draft Determinations – Finance Annex', 9 July, Table 23.

¹² Ofgem (2020), 'RIIO-2 Draft Determinations – Finance Annex', 9 July, Table 23.

the arithmetic mean. Our findings based on Ofgem's methodology are summarised in Table 3.1 below.

Table 3.1 Investment manager forecasts based on Ofgem's uplift

Author	Horizon	Ofgem DD (July 2020)			Oxera Update (December 2023)		
		Geometric forecast	Uplift	Arithmetic forecast	Geometric forecast	Uplift	Arithmetic forecast
Schroders	10	3.90%	1.00%	4.90%	10.90%	1.00%	11.90%
Blackrock	10	4.70%	1.00%	5.70%	6.70%	1.00%	7.70%
Quilter	L Term	6.52%	1.00%	7.52%	9.51%	1.00%	10.51%
Aon Hewitt	10	6.70%	1.00%	7.70%	7.60%	1.00%	8.60%
JP Morgan	L Term	5.90%	1.00%	6.90%	7.00%	1.00%	8.00%
Aberdeen	10	7.60%	1.00%	8.60%			
Nutmeg	10+	6.80%	1.00%	7.80%			
FCA	10 to 15	6.60%	1.00%	7.60%			
Redacted Author	10	6.19%	1.00%	7.19%			
Willis T W	10	4.24%	1.00%	5.24%			
Vanguard	10	4.00%	1.00%	5.00%	5.50%	1.00%	6.50%
Average		5.74%		6.74%	7.87%		8.87%
Average (excl. WTW and Vanguard)		6.10%		7.10%	8.34%		9.34%

Note: All values are nominal. The assumed uplift that is used in this table is based on Ofgem's RIIO-2 Draft determination.

Source: Ofgem (2020), 'RIIO-2 Draft Determinations – Finance Annex', 9 July. Schroders (2023), 'June 2023 10-year return forecasts',

<https://mybrand.schroders.com/m/210cbeadc516de22/original/June-2023-10-year-return-forecasts.pdf> (accessed 11 December 2023). Blackrock (2023), 'Capital Markets Assumptions', <https://www.blackrock.com/institutions/en-us/insights/charts/capital-market-assumptions#assumptions> (accessed 11 December 2023). Quilter (2023), 'Asset allocation process and assumptions', https://www.quilter.com/investments/platform-funds/portfolio-construction/strategic-asset-allocations/asset-allocation-process-and-assumptions/?concertinaId=concertina__link--126982-3 (accessed 11 December 2023). Aon Hewitt (2023), 'Capital Market Assumptions', <https://insights-north-america.aon.com/report/aon-capital-market-assumptions-report> (accessed 11 December 2023). JP Morgan (2023), '2024 Long-term Capital Markets Assumptions' <https://am.jpmorgan.com/content/dam/jpm-am-aem/global/en/insights/portfolio-insights/lcma/noindex/lcma-full-report.pdf> (accessed 11 December 2023). Vanguard (2023), 'Vanguard economic and market outlook' <https://www.vanguard.co.uk/professional/vanguard-economic-and-market-outlook> (accessed 11 December 2023).

Compared with the July 2020 numbers, the overall sample average increased by approximately 2.1%. The average excluding WTW and Vanguard increased by approximately 2.2% from 7.10% to 9.34% (in arithmetic nominal terms).¹³ Once again, using a stylised inflation assumption of 2%, the average excluding WTW and Vanguard increased from 5.0% to 7.2% CPIH-real by approximately 2.2%. If this increase was directly rolled forward to the CoE allowance, the allowance would need to be raised from the 5.23% set for RIIO-ED2 to 7.43% for RIIO-3.¹⁴

Although Ofgem conducted the investment managers research two years prior to RIIO-ED2 as part of the RIIO-T2 and GD2 Determinations, the TMR assumption was not updated in RIIO-ED2, and it is therefore an appropriate comparison to calculate what the full change in TMR would have been on the ED2 CoE allowance.

The approximate 2.2% increase in the average TMR assumption is likely to be an underestimate of the increase. We have not been able to source updated assumptions for four of the investment managers previously included by Ofgem in the average excluding WTW and Vanguard. These managers previously had TMR assumptions higher than the average, and if they were to be removed then the previous average would decrease, and the difference with the sample average of updated TMR assumptions would increase.

These figures are based on a 1% uplift to convert the geometric to an arithmetic forecast applied by Ofgem in 2021, which was derived from the JP Morgan publication at the time.¹⁵ However, the UKRN states that the approximate difference between the arithmetic and geometric means for a lognormally distributed series is half the variance of log returns.¹⁶ Using the DMS dataset,¹⁷ we estimate this difference to be 1.66%. Table 3.2 shows the results of the investment managers forecasts using an uplift of 1.66%.

¹³ We compare the averages excluding WTW and Vanguard as per Ofgem's methodology.

¹⁴ We note, however, that this is not a like-for-like comparison with the Draft Determination analysis due to the missing forecasts.

¹⁵ Ofgem (2019), 'RIIO-2 Sector Specific Methodology Decision', May, p. 39.

¹⁶ UKRN (2022), 'UKRN guidance for regulators on the methodology for setting the cost of capital', p. 18, https://ukrn.org.uk/app/uploads/2023/03/CoC-guidance_22.03.23.pdf (last accessed on 16 February 2024).

¹⁷ Dimson, E., Marsh, P. and Staunton, M. (2023), 'Credit Suisse Global Investment Returns Yearbook 2023'.

Table 3.2 Uplift sensitivity: investment manager forecasts

Author	Horizon	Geometric forecast	Uplift	Arithmetic forecast
Schroders	10	10.90%	1.66%	12.56%
Blackrock	10	6.70%	1.66%	8.36%
Quilter	L Term	9.51%	1.66%	11.17%
Aon Hewitt	10	7.60%	1.66%	9.26%
JP Morgan	L Term	7.00%	1.66%	8.66%
Vanguard	10	5.50%	1.66%	7.16%
Average		7.87%		9.53%
Average (excl. WTW and Vanguard)		8.34%		10.00%

Note: This table uses the investment manager forecasts based on the December 2023 update. The uplift is calculated as half the variance of log returns in line with the UKRN guidance. All values are nominal.

Source: Ofgem (2020), 'RIIO-2 Draft Determinations – Finance Annex', 9 July. Schroders (2023), 'June 2023 10-year return forecasts',

<https://mybrand.schroders.com/m/210cbeadc516de22/original/June-2023-10-year-return-forecasts.pdf> (accessed 11 December 2023). Blackrock (2023), 'Capital Markets Assumptions', <https://www.blackrock.com/institutions/en-us/insights/charts/capital-market-assumptions#assumptions> (accessed 11 December 2023). Quilter (2023), 'Asset allocation process and assumptions', https://www.quilter.com/investments/platform-funds/portfolio-construction/strategic-asset-allocations/asset-allocation-process-and-assumptions/?concertinald=concertina__link--126982-3 (accessed 11 December 2023). Aon Hewitt (2023), 'Capital Market Assumptions', <https://insights-north-america.aon.com/report/aon-capital-market-assumptions-report> (accessed 11 December 2023). JP Morgan (2023), '2024 Long-term Capital Markets Assumptions' <https://am.jpmorgan.com/content/dam/jpm-am-aem/global/en/insights/portfolio-insights/lcma/noindex/lcma-full-report.pdf> (accessed 11 December 2023). Vanguard (2023), 'Vanguard economic and market outlook' <https://www.vanguard.co.uk/professional/vanguard-economic-and-market-outlook> (accessed 11 December 2023).

Based on an estimation of the difference between the geometric and arithmetic average of one half the variance of log returns, the overall average nominal forecast provided by investment managers is 9.5%, which is 2.8% higher than the average reported by Ofgem in 2020—albeit with a smaller sample. This is approximately a 7.5% TMR, assuming 2% CPIH inflation.

In spite of which uplift is used, we note that there is a large variance in the forecasts, both across investment managers and over time. This instability of estimates does not provide a reliable average return to be benchmarked with the ex post TMR estimate. Furthermore, in reaching conclusions about these estimates, it is important to note that TMR estimates produced by investment managers have the primary purpose

of providing prudent estimates of future returns to clients. This is mainly a function of the regulatory framework, namely the FCA Conduct of Business Sourcebook, which states the maximum rates of return that financial services companies must use in their calculations when providing retail customers with projections of future benefits (i.e. it creates a ceiling).¹⁸ Therefore, the results of this analysis should be interpreted with caution.

4 Conclusions

This note provides an update of the infrastructure funds and investment manager cross-checks analysis. Those cross-checks were used by Ofgem in 2021 to determine the CoE allowance for the RIIO-2 control period. We reiterate our criticism of both cross-checks, and recommend not placing much weight on either of them. Hence, the presented results should be interpreted with caution.

The updated infrastructure funds analysis shows that:

- the discount rates applied by the funds have increased by approximately 0.7% since 2020;
- the average NAV premium has decreased since 2020 and is now negative—an application of Ofgem's methodology would therefore suggest that investors are using a higher discount rate than the one reported by the funds.

The infrastructure funds analysis suggests that funds and investors are demanding a higher rate of return than in the RIIO-2 figures. Using Ofgem's methodology to adjust the funds' reported discount rates—which we consider to be oversimplified—the increase in the rate of return demanded by investors is approximately 2.5%, where 0.7% can be attributed to higher discount rates and 1.8% to the decrease in NAV premium, resulting in a total equity return of 8.6% in nominal terms.

¹⁸ Financial Conduct Authority (2024), 'Conduct of Business Sourcebook', February, Annex 2, para. 2.3, <https://www.handbook.fca.org.uk/handbook/COBS.pdf> (last accessed 27 February 2024).

The investment managers forecast analysis shows that:

- managers expect an increase of approximately 2.1% in the nominal UK TMR relative to the RIIO-2 figures, albeit with a smaller sample of forecasts;
- accounting for the difference between geometric and arithmetic returns using the uplift applied by Ofgem (1%), the total expected nominal TMR is approximately 8.9% for the overall sample and 9.3% when Vanguard is excluded;
- there is a large cross-sectional and time series variance in the forecasts.

The investment managers forecast analysis suggests that there is an expected increase in the UK TMR of approximately 2.1%, which results in an 8.9% TMR expressed in arithmetic nominal terms using Ofgem's methodology. Calculating the arithmetic average uplift using the variance in the return series as proposed by the UKRN (2022),¹⁹ the nominal arithmetic forecasted TMR is higher at 9.5%.

The translation of the nominal returns into CPIH-real returns requires an inflation assumption. Using a 2% stylised inflation assumption for illustrative purposes, the infrastructure fund managers analysis indicates a required return on equity of 6.5%, CPIH-real. This compares with a range of 5.1–6.5% estimated by Oxera for a 60% geared energy network as at 20 December 2023. It is consistent with our finding that the ARP–DRP cross-check indicates the cost of equity is towards the upper end of the Oxera range.

The average of the investment managers forecasts of TMR implies a CPIH-real TMR of 7.2% based on the relatively low 100bp adjustment from geometric to arithmetic mean. Using a 166bp adjustment instead, based on half of the variance of log annual equity returns in line with UKRN guidance, results in a CPIH-real TMR estimate of 7.4%. This compares with a TMR range of 6.5–7.5% estimated by Oxera.²⁰

¹⁹ UKRN (2022), 'UKRN guidance for regulators on the methodology for setting the cost of capital', p. 18, https://ukrn.org.uk/app/uploads/2023/03/CoC-guidance_22.03.23.pdf (last accessed on 16 February 2024).

²⁰ Oxera (2024), 'RIIO-3 cost of equity', prepared for Energy Networks Association, 23 February, p. 8.