Full Response to Financial Question 6: Evidence of Systematic Risk Differential From RIIO-1 and Between Energy Sectors

September 2020

Highly confidential

SGN

Your gas. Our network.

FQ6. Is there evidence of a material difference in systematic risk between:

a. RIIO-1 and RIIO-2,
b. distribution and transmission networks,
c. gas transmission and electricity transmission,
d. gas and electricity?

In its RIIO-2 draft determinations, Ofgem uses the same set of beta comparators to obtain beta estimates for use across all the energy networks. It then reviews evidence for differences in risk across sectors and concludes that each faces the same level of systematic risk (and therefore the same asset beta). In this question response we set out our view of the differences across the energy networks i.e. gas distribution, gas transmission, electricity distribution and electricity transmission.

SGN considers it is instructive to analyse the underlying drivers of potential differences in the systematic risk across sectors, and between RIIO-1 and RIIO-2. We have reviewed the following drivers which we perceive to have the greatest impact on systematic risk across the networks.

1. Longer-term network use risk - Networks more exposed to longer-term network use risks will have a higher risk profile.

2. Operational gearing - Networks with higher operational gearing as a consequence of lower capital intensity are more exposed to demand and cost shocks.

3. Scale of capital investment - Ofgem suggested in RIIO-1 that larger investment programmes (relative to the rest of the business) can add to systematic risk.

4. Complexity of capital investment - Ofgem suggested in RIIO-1 that more complex investment programmes can add to systematic risk.

5. Regulatory regime - The regulatory regime has the potential to both increase and decrease exposure to systematic risk, through cost sharing, incentive setting and use of reopeners etc.

The remainder of this question response provides our assessment of differences in these drivers of systematic across sectors;

1. Longer-term network use risk

While at RIIO-1 uncertainties around long-term network use were somewhat distant, the net zero policy agenda is now far more urgent and takes a high priority in Ofgem's refreshed strategy. This means that exposure to net zero is a key determining risk factor for companies in general, and energy networks in particular.

Whilst we remain confident that gas networks have a significant role to play in the UK's energy system, one distinguishing feature of gas distribution networks is their exposure to uncertainty around the long-term use of the network as a consequence of the transition to net zero. This means there is an elevated exposure to policy uncertainty and significant risk of asset stranding. In contrast electricity transmission and distribution companies have an easier path to net zero through investing to support low carbon generation sources and enabling more efficient local electricity system development.

This greater uncertainty for GDNs is highlighted by the fact that the latest Future Energy Scenarios report[1] shows that demand for gas (methane, hydrogen, blended and biomethane combined) falls in three out of the four scenarios, and does not increase in the fourth. And there is also significant variance in the demand outcomes, highlighting the asymmetric downside risk faced by GDN investors. In contrast electricity demand increases in all four scenarios.

The long-term demand/structural risk facing GDNs has also been identified in recent infrastructure and project finance credit rating opinions as a source of cashflow risk. Specifically, Moody's Investors Service[2] highlights the historical reductions in gas consumption in Great Britain of 14.0% during the period 2010-18 and goes on to highlight future expected reductions (primarily driven by the adoption of hybrid heating). Moreover, Moody's also emphasise that, in

[1] NG ESO (2020), 'Future Energy Scenarios' report: https://www.nationalgrideso.com/document/173821/download
[2] Moody's Investors Service, Credit Opinion: Wales & West Utilities Finance plc, update to credit analysis, 6 December 2019. Cadent Gas Limited, annual update, 13 August 2018.

consideration of Ofgem's statutory obligation to 'secure' that gas transportation companies are 'able to finance the provision of gas supply services', the continued decline in demand for 'core service' could create challenges for the GDNs. Moody's credit opinions, as of yet, do not appear to adjust credit rating for these issues. However, the comment constitutes an important signal to investors that Moody's could in future reduce their view of credit quality of the sector. If so, both debt and equity pricing would be affected by the long-term downside risk in natural gas demand for GDNs.

This is consistent with Standard & Poor's (S&P) view[3];

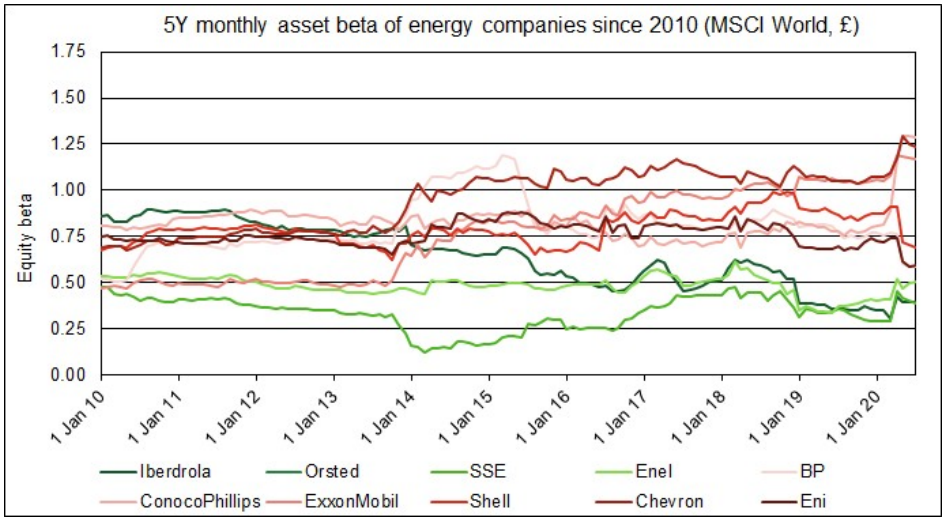
"For GDNs, energy transition represents a long-term risk, but also an opportunity. We are starting to see increasing differentiation across network types in terms of energy transition, and in our view gas networks may come under increasing pressure. While GDNs benefit from a supportive regulatory framework in the UK, uncertainty about the long-term future role of gas in the UK fuel mix may pose a risk for gas infrastructure, which could become stranded assets over time. We believe this may well start weighing on regulatory returns and investments in gas over future regulatory periods, more so than electricity. We recognize that the networks are reacting to the challenge as they try to adjust to the new environment. Hydrogen or biogas could help reposition gas infrastructure in the long term, given their more environmentally friendly footprint, but the technology is not yet sufficiently mature to bring down costs. We cannot say today if these future promising developments will fully offset the risks in the coming decade. Although the RIIO-2 methodology includes initial guidance for companies, this risk is not yet fully reflected in regulatory framework and in our ratings, and we view it as a rising risk for the sector."

In order to test the impact of exposure to net zero risks, we have conducted a beta analysis of large 'low carbon' energy companies compared to large 'high carbon' companies[4]. Our classifications are based on each companies' actual portfolio focus rather than aspired or announced net zero strategies. This analysis looks wider than networks to increase the sample of companies with very different exposure net zero risks.

For our 'low carbon' companies, Orsted is 100% renewable and Enel, Iberdrola and SSE are among the largest renewable generators and have invested in a number of energy transition businesses. These companies already have relatively low exposure to legacy high carbon activities. Our 'high carbon' companies include BP, ConocoPhillips, ExxonMobil, Shell, Chevron and Eni and are primarily large integrated utilities, all with significant oil and gas related exposure.

We have analysed the 10Y rolling equity betas of these companies using both 2Y weekly and 5Y monthly calibrations as shown below. Given the global nature and size of the companies, we have estimated betas using the MSCI world index which includes approximately 77% of the world's equity market.[5] We then adjusted for financial leverage in order to estimate asset betas as shown below.

Figure 1: 5-year monthly asset betas of energy companies



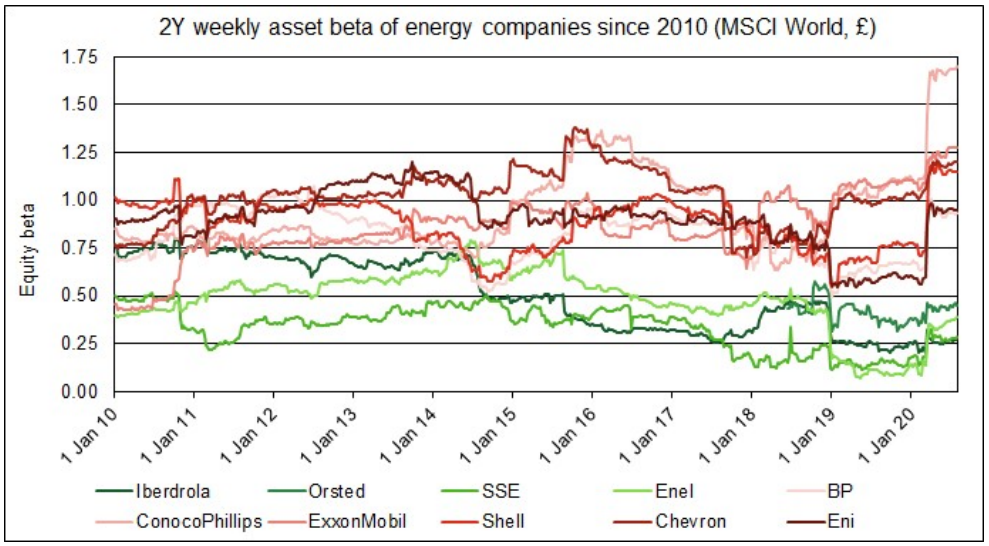
Source: Analysis using Refinitiv data

[3] S&P Global, Various Rating Actions Taken on U.K. Gas Networks Amid Upcoming Regulatory Review and Tougher Operating Conditions, 30 April 2020

[4] Based upon UK listed energy companies (utilities, power, oil and gas).

[5] The index comprises 23 developed economies and constituents that exceed a market cap of $1.09b.

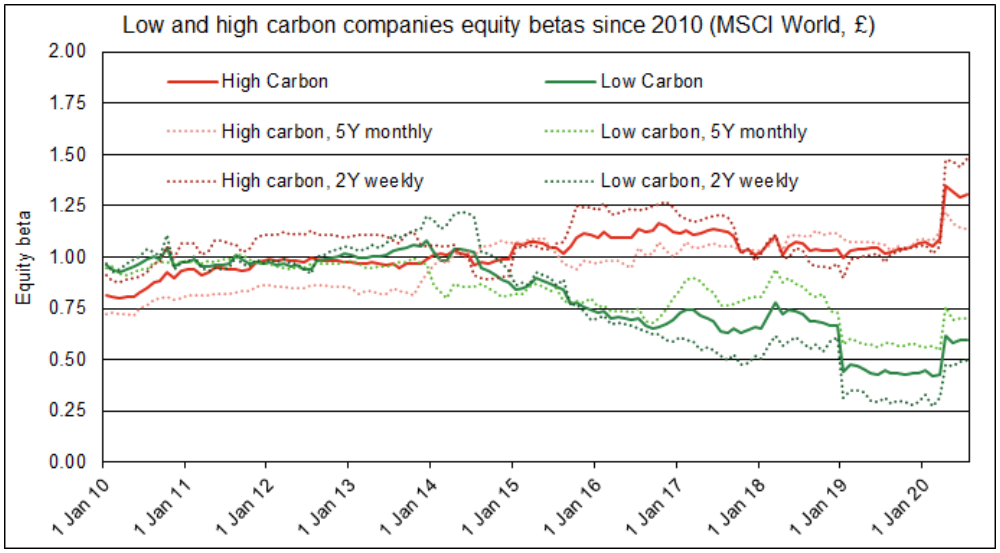
Figure 2: 2-year weekly asset betas of energy companies



Source: Analysis using Refinitiv data

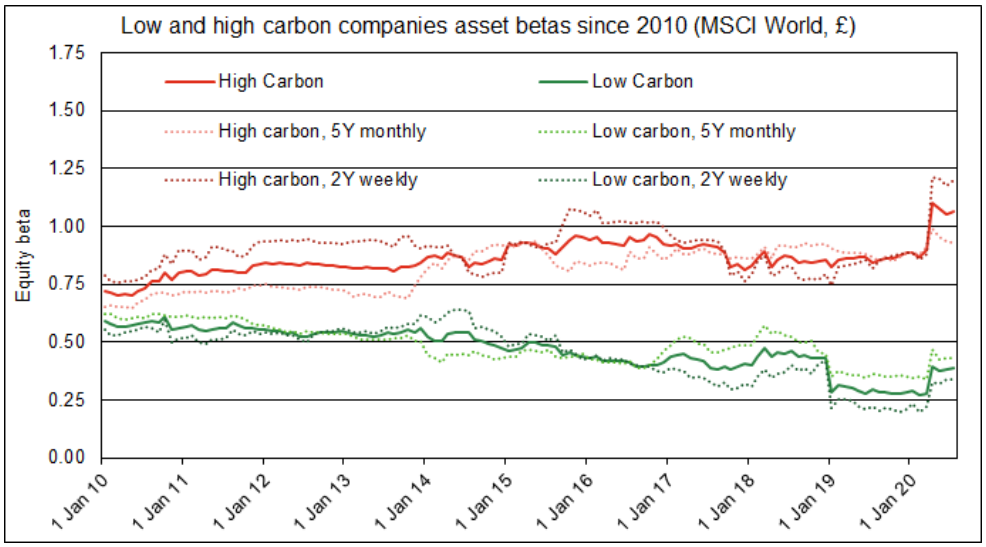
The charts above show clear evidence that companies with more advanced zero carbon businesses have lower asset betas than those that primarily operate in higher carbon market segments (such as the oil and gas industry). Simplifying these charts by grouping the companies into low carbon and high carbon reveals the extent of this emerging difference. We present both the equity betas and asset betas over the last 10 years.

Figure 3: Low and high carbon company equity betas



Source: Analysis using Refinitiv data

Figure 4: Low and high carbon company asset betas

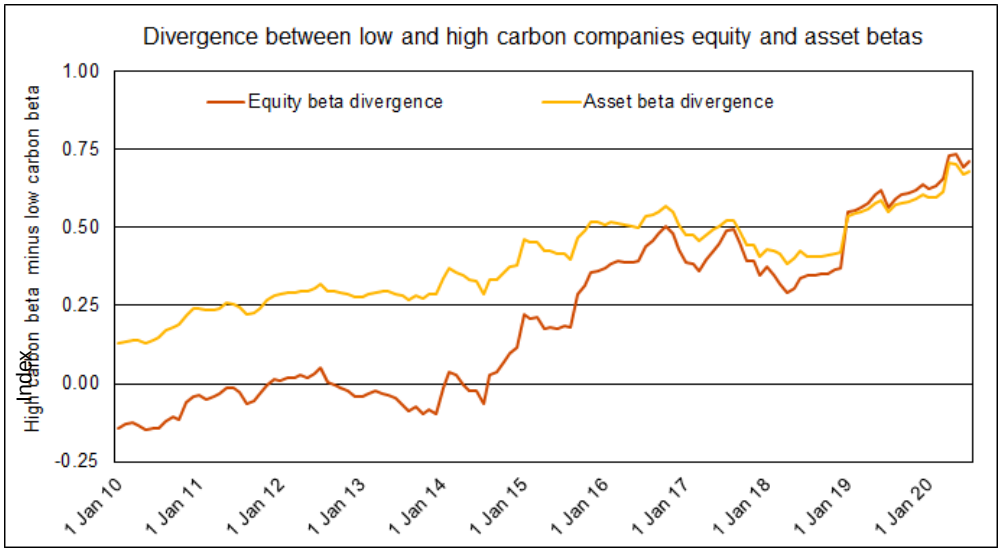


Source: Analysis using Refinitiv data

It is noticeable that the gap between high carbon and low carbon equity betas began to diverge from around mid-2014, which is shortly before the 2015 Paris Agreement, the landmark environmental accord that was adopted by nearly every nation to address climate change and its negative impacts. Our conclusions are much the same for the asset betas, except that the difference began pre 2010.

However, we are less interested in the levels of asset beta per se, rather the trend in the difference between these two groups. To easily understand how these gaps have changed under time, we plot the divergence between low carbon and high carbon equity betas and asset betas below, where the zero line on the y-axis indicates no divergence.

Figure 5: Divergence between low and high carbon company equity and asset betas



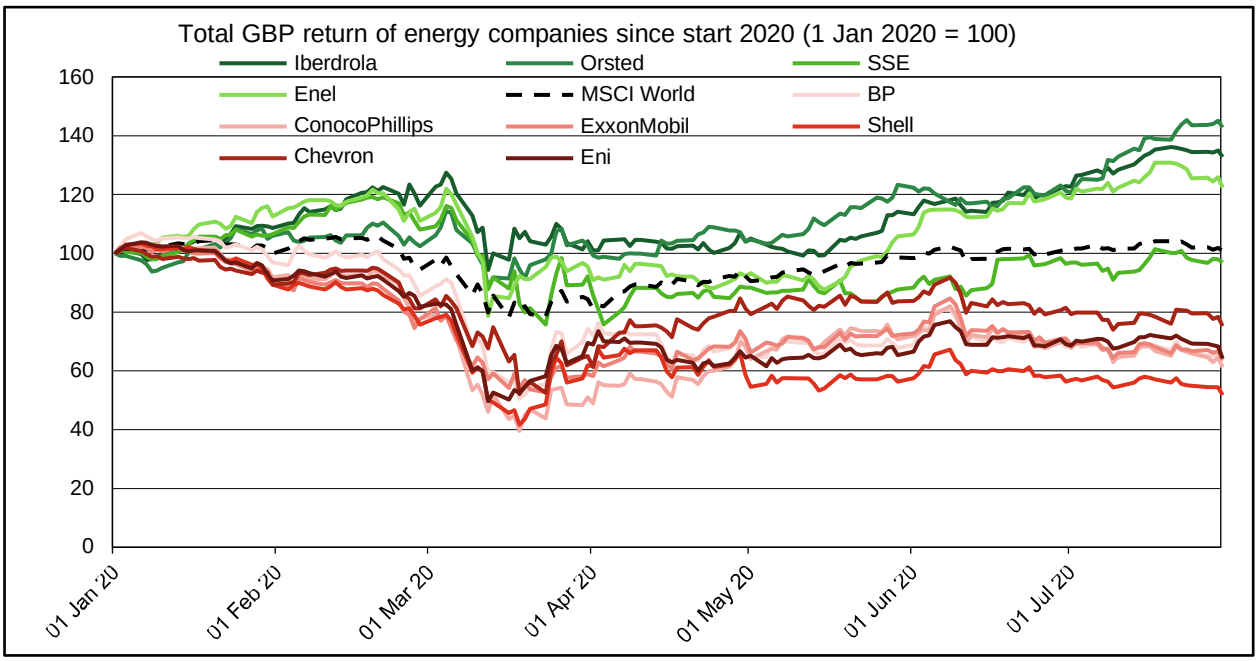
Source: Analysis using Refinitiv data

As shown in the chart, since mid-2014, the difference in equity betas of 'high carbon' energy companies and 'low carbon' energy companies have increased from around zero to 0.71 as of 29 July 2020. Over the same period, the difference in asset betas of 'high carbon' energy companies compared to 'low carbon' energy companies have increased from about 0.29 to 0.68. This analysis reveals a clear growing additional systemic risk for 'high carbon' companies compared to 'low carbon' companies.

We suggest this is because market preference has moved away from traditional energy companies and towards low carbon companies. The risk to traditional energy companies is greater as they are more exposed to long term risks,

which are integrated with wider economic and market movements. By way of illustration, during the Covid-19 crisis, low carbon companies have fared much better than high carbon companies, as the policy and customer expectation is that Covid-19 will enable a greener economic recovery.

Figure 6: Total GBP return of energy companies since 2020



Source: Analysis using Refinitiv data

To estimate the lower bound of a reasonable asset beta uplift for GDNs we use the following approach. We note that high carbon asset betas have increased by 0.18 percentage points from 0.88 to 1.06, from 2014 when the two groups started to diverge to our latest estimate as of 29 July 2020. This is a percentage increase of 20.5%. Applying the same percentage increase to Ofgem's asset beta estimate midpoint (0.365) indicates that an **upward adjustment of 0.075 to the asset beta (to 0.44) is appropriate**[6]. It is worth noting that we believe it is difficult for regulatory regime to properly insulate businesses from long-term demand risks and provide firm commitment to RAV, noting there is no regulatory or legislative guarantee of this, as detailed in the operational gearing section below.

Furthermore, we note there is regulatory precedent on adjusting the costs of capital in the presence of asymmetric risks. In Northern Ireland, the Utility Regulator has recognised that uncertainty around recovery of gas network investments warrants the inclusion of a premium in the cost of capital[7]. We note that in Austria an additional premium of 3.5% is added to the CAPM return to reflect the capacity risk borne by the gas TSO[8].

Elsewhere in the UK, economic regulators have in several cases recognised the impact of the potential relationship between large investments, asymmetric risks and beta. For example, the CAA considered downside asymmetric risk when assessing BAA's Cost of Capital allowance and impact for Terminal 5: "Large investment projects tend to be risky in a number of ways. The scale of Terminal 5 will increase BAA's risks, not only with respect to construction risk but also risks of uncertain demand and risks associated with the Terminal 5 triggers as pointed out by the Competition Commission. Regulatory commitment is another issue influencing risk".[9] The CC then allowed 25 bps to the BAA WACC to account for asymmetric downside risk for Terminal 5[10]. The CMA more recently appeared to take a similar position in the SONI case.

2. Operational gearing

A firm with higher operational gearing faces higher opex and revenue risks as a proportion of its regulated asset value (RAV). Compared to a company with lower operational gearing, a company will face a larger shock to its return on

[6] This uplift is based upon Ofgem's mid-point assessment. We provide our views on the estimation of Ofgem's asset beta estimation in response to FQ5
[7] Utility Regulator (2016), Price control for Northern Ireland's gas distribution networks GD17: draft determination, pp.228 to 230.
[8] Methodology pursuant to section 82 Gaswirtschaftsgesetz (Natural Gas Act, GWG) 2011 for transmission systems of Austrian Gas Transmission System Operators, p. 6,7
[9] See (February 2003) CAA: Economic Regulation of BAA London Airports, p.44.
[10] Competition Commission (November 2002), BAA plc: a report on the economic regulation of the London airports companies (Heathrow Airport Ltd, Gatwick Airport Ltd and Stansted Airport Ltd), Chapter 4 Financial Performance and Cost of Capital, para 4.71 – 4.72.

capital (and therefore return on equity). The CMA has previously allowed an asset beta uplift to compensate companies for this higher systematic risk (see Bristol Water PR09 and PR14 appeals).

There are also a number of academic papers which examine the impact of operational gearing on systematic risk. For example, Lord (1996)[11] finds there is a positive relationship in the industries it studies (electricity utilities, car manufacturers, and airlines).

Operational gearing is also considered by CEPA[12] in its relative risk assessment on behalf of Ofgem. Specifically, CEPA looks at 'firm structure risk', which they define as the mix of fixed and variable costs and the scale of a firm's tangible assets. CEPA suggests that firm structure risk "relates to inherent features of a firm that magnify other risks" (i.e. market risk and building blocks risk). CEPA concludes that "We do not consider operational gearing to be relevant to a consideration of systematic risk exposure in regulated energy or water networks. Both sectors operate under a revenue cap with no material exposure to demand risk that a large fixed cost base might otherwise magnify." However, SGN notes that while it is correct that gas utilities have minimal short-term material exposure to demand risk:

(i) operational gearing still has an impact if magnifying the impact of systematic cost shocks; and

(ii) it is difficult for the regulatory regime to properly insulate businesses from long-term demand risks, so, in this case, operational gearing is still a relevant consideration. For example, while Ofgem[13] points towards its commitment to RAV recovery and frequent price control resets (which provide an opportunity to consider the appropriate RAV recovery speed), there is no regulatory or legislative guarantee of this, and the current RAV based price controls have not been tested in periods of a significantly declining demand, with fixed costs of operating the network being be spread across fewer customers / units of gas consumed, leading to higher unit costs per customer (and therefore higher customer bills). This, in turn, would lead to alternatives appearing more competitive, which then might lead to a downward spiral of demand and risk of the network becoming obsolete, as the level of prices becomes unsustainable and uncompetitive.

CEPA also assesses 'price control building block risk', which focuses on the extent to which price regulated companies may be exposed to a mismatch between revenue and costs that is related to systematic factors. Under this assessment they analyse totex to RAV ratios (which can also be used to assess operational gearing) across different regulated sectors, noting that "Where a company faces exposure to performance on totex, an extra pound of totex under the same regulatory arrangements creates a risk in the near term." Within the energy sector for RIIO-2 (aside from the ESO), CEPA finds that the GDNs have the highest totex to RAV ratios.

To build on CEPA's work, we undertake further analysis to assess how companies across the different energy sectors compare based on additional measures of operating gearing. Specifically, we focus on the measures calculated by the CMA in the Bristol Water (2015) appeal of Ofwat's AMP6 determination. These include:

- Totex to Closing RAV (5 Year Average);
- Total 5 Year Totex to average RAV;
- Total 5 Year Revenue to average RAV; and
- Total 5 Year Operating cash flow as % Total 5 Year revenue.

We observe that the CMA pays particular attention to the operating cash flow as % revenue measure. Indeed, the CMA estimates that Bristol Water's operating cash flow was 45% of revenue, while the comparators had a 51% ratio. The CMA used this difference to estimate an approximate uplift to asset beta of around 13% [(51 / 45) – 1].

Figure 7 below provides a comparison between energy networks based on the 5 year average of the Totex to closing RAV ratio[14]. Figure 8 uses a slightly different calculation, which takes the ratio between 5 year total Totex and the 5 year average of the average RAV[15]. Both measures give the same conclusion: GDNs are higher risk than both the electricity and gas transmission networks.

[11] Lord (1996), 'The impact of operating and financial risk on equity risk', Journal of Economics and Finance
[12] CEPA (2020), RIIO-2: Beta estimation issues
[13] Ofgem (2020), Finance Annex, paragraph 10.6
[14] All data are taken from Ofgem's published RIIO-2 licence model for each company.
[15] 'Average RAV' is calculated by taking the average of the opening RAV and the closing RAV.

Figure 7: Totex to closing RAV (5 year average)

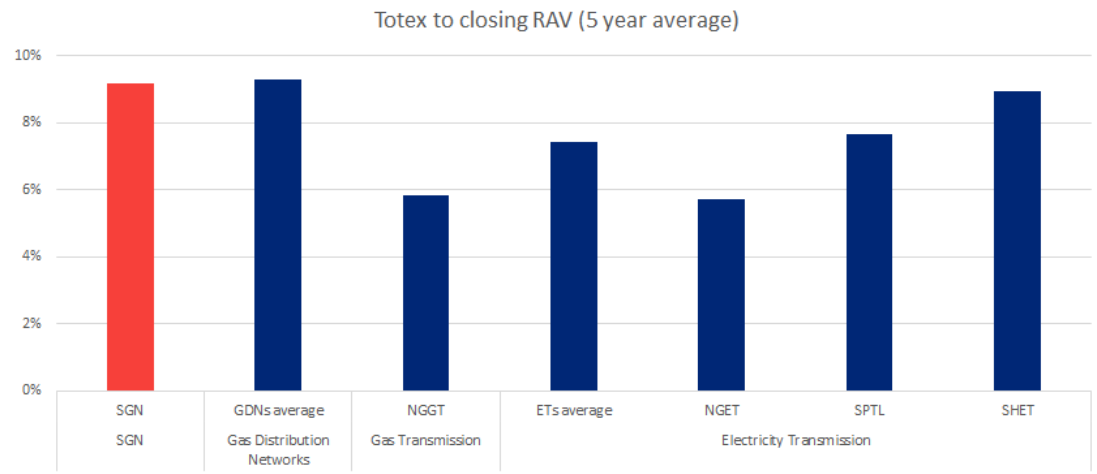
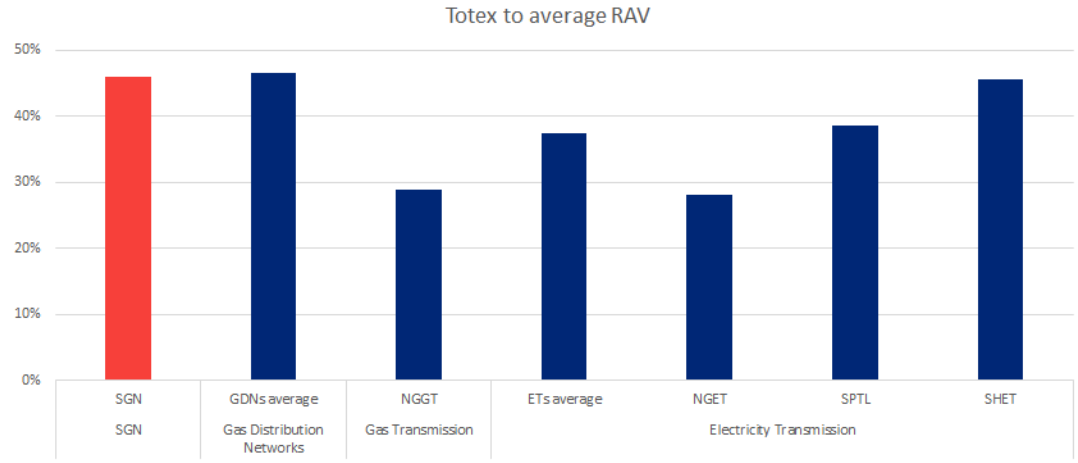


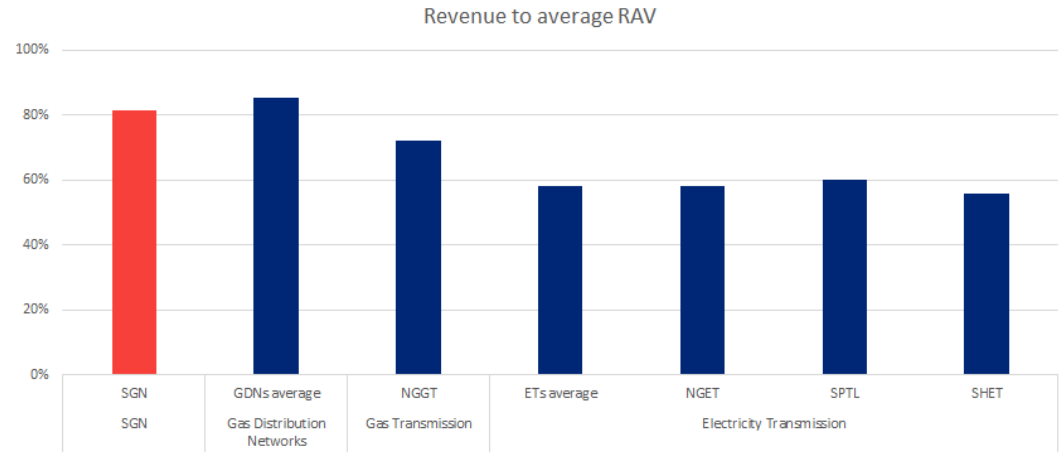
Figure 8: Total 5 Year Totex to average RAV



Source: Ofgem financial model

We also consider the revenue to average RAV measure in Figure 9 below. Again, smaller values indicate lower risk. It shows that GDNs are higher risk than both the electricity and gas transmission networks under this measure.

Figure 9: Total 5 Year Revenue to average RAV

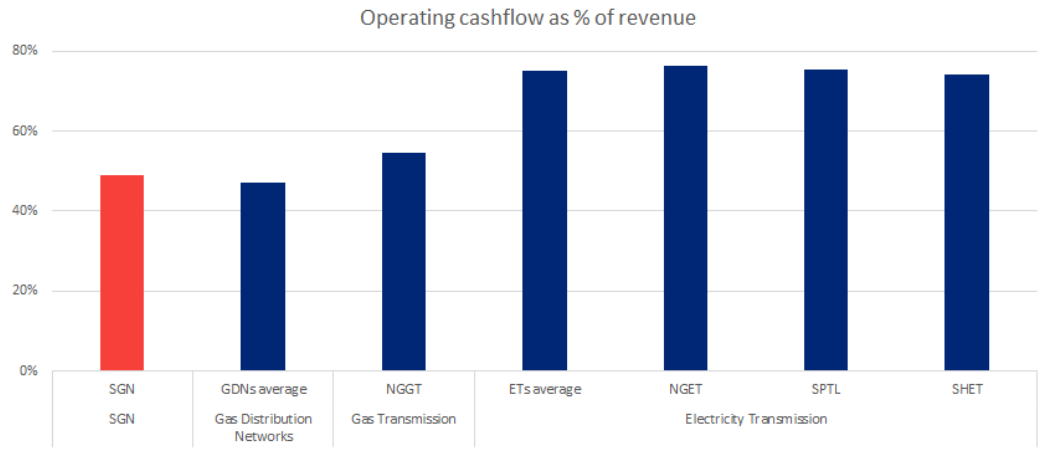


Source: Ofgem financial model

Finally, we apply the measure of Operating cash flow to revenue in Figure 10, which is the main ratio considered by the CMA. 'Operating cash flow' is made up of return on capital and RCV run-off. A higher operating cash flow to revenue implies a lower operational gearing. This measure shows that Electricity transmissions companies have significantly lower levels of operational gearing compared to the GDNs; gas distribution is also marginally higher than the gas

transmission.

Figure 10: Total 5 Year Operating cash flow as % Total 5 Year revenue



Source: Ofgem financial model

All of these comparisons show that SGN has a higher operational gearing than each of the transmission companies. Unsurprisingly, SGN's operational gearing is similar to the average of other gas distribution companies. Overall, this evidence shows that GDNs face amplified risk from other sources compared to other energy sectors.

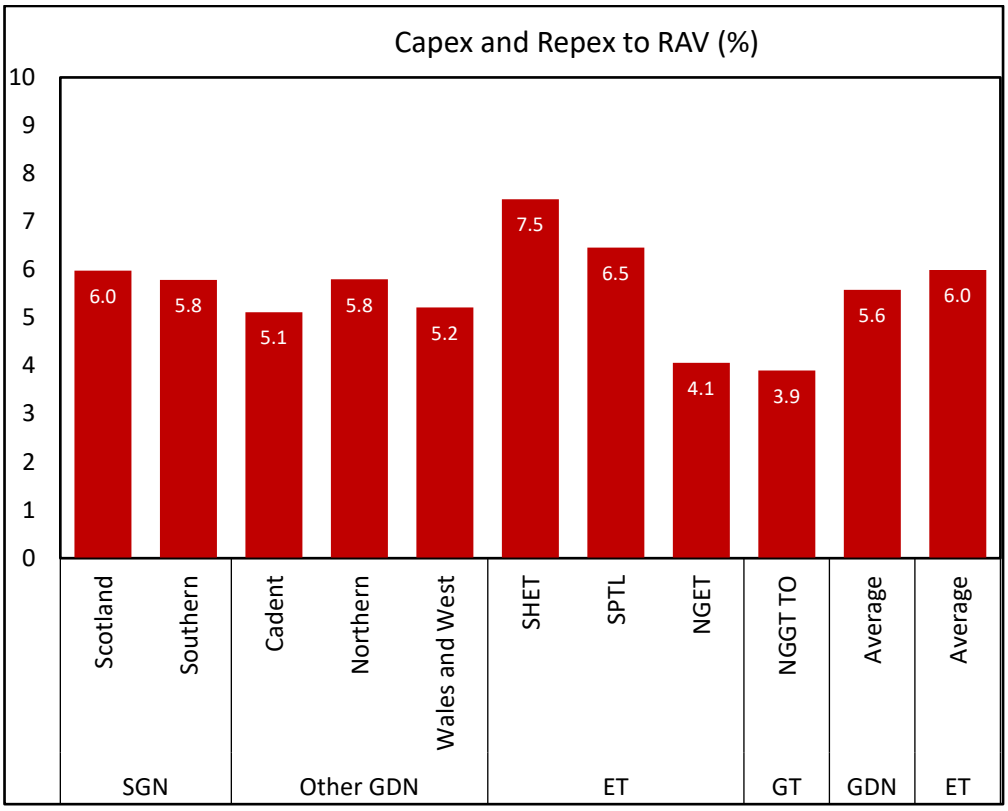
Based on this evidence, we consider that GDNs require an uplift to asset beta relative to gas and electricity transmission to compensate investors for the amplified exposure to systematic risk faced by these companies.

3. Scale of capital investment

Ofgem suggested in RIIO-1 that larger investment programmes can add to systematic risk. As such, we have assessed the scale of investment by examining the average Capex expenditure relative to average RAV for RIIO-2[16] below. We include GDN Repex which is 100% capitalised. The Capex and Repex to RAV chart suggest broadly comparable investment programmes relative to the size of assets across sectors.

[16] Our figures are from the Draft Determination - RIIO Licence Models for GD2, ET2 and GT2. We estimate RAV for each company by summing all annual Opening RAV (before transfers) and Closing RAV for RIIO-2 separately and divide by 2. We estimate Capex for Cadent, Northern, Scotland, Southern and Wales and West by summing all Allowed load related capex; Allowed non-load related capex - other, and Allowed replacement expenditure for RIIO-2 separately. For SHET, SPTL, NGET and NGGT TO, we estimate capex by summing all Allowed load related capex expenditure; Allowed asset replacement capex expenditure; Allowed other capex expenditure; and Allowed non-operational capex for RIIO-2 separately. For each company, we divide RIIO-2 values of capex by the values for RAV.

Figure 11: Capex / RAV (%)



Source: Ofgem financial model

We do not consider the scale of capital investment to be a relevant driver for the purpose of assessing differences in risk across sectors. This is because the scale of capital investment defines the asset base upon which returns are earned, rather than the risk to that investment.

Capital investment in regulated utilities is added to the regulatory asset value, and subsequently recovered over time, whilst earning an allowed return. Therefore, the scale of capital investment dictates the amount of growth in the regulatory asset value and regulated companies benefit from this growth, through larger amounts of future allowed returns.

The scale of capital investment is therefore not relevant to the assessment of relative risk; rather capital investment is beneficial to the regulated firm and should not be compensated through additional risk premia.

It would be inappropriate for Ofgem to further compensate companies for the scale of their capital investment. Moreover, it its beta estimation paper, CEPA[17] (on behalf of Ofgem) observes that

"In its RIIO-T1 determination Ofgem adopted a slightly higher asset beta estimates for some transmission companies reflecting the scale and complexity of the capital investment programme. While we do not consider this additional risk to be an inherent feature of transmission networks it does appear to have been a feature at the time of the RIIO-T1 price control."

This suggests that additional compensation for this perceived driver of risk is not appropriate. Similarly, in their review of financeability in RIIO-1, Imrecon and Economic Consulting Associates (ECA) observe that[18], "

"While Ofgem provides for a larger beta allowance for sectors with higher levels of capex and higher proportions of large projects, it is not clear to us that these factors would necessarily lead to greater exposure to systematic risk than one might estimate from the RoRE analysis (i.e. The analysis that Ofgem conducts of the companies' returns on regulatory equity to inform its financeability assessments)."

[17] CEPA (2020), RIIO-2: Beta estimation issues
[18] Imrecon working with Economic Consulting Associates (2020), Review reviews Financeability study, p12

4. Complexity of capital investment

Ofgem suggested in RIIO-1 that more complex investment programmes can add to systematic risk. In this element of its RIIO-1 relative risk assessment Ofgem determined that electricity activities were generally higher risk than gas activities. We do not agree with this view and consider there is complexity across all the energy networks. Below are just a few examples of why GDNs have high relative risk compared to other energy networks.

1. **Explosion risk**: SGN manages 3100km of high-pressure pipes, as well as our network of distribution post pressure reduction stations. We continually monitor our network to ensure safety and have a continual programme of pipeline improvement to minimise explosion risk. However, while the frequency is low, the impact of any explosion is large both in terms of safety and reputation, and larger than an adverse electricity network event.

2. **Gas is an essential service**. As such, our engineers consider each customer as unique and determine the right course of action based on what they find and individual circumstances, particularly in the case of vulnerable customers. This necessary approach for our customers reduces standardisation and increases the complexity of our network.

We believe complexity is largely captured in the allowances permitted by Ofgem in each sector. For example, more complex projects and programmes are invariably permitted higher allowances by the regulator to compensate companies appropriately. While there are different activities conducted by the gas and electric networks, fundamentally, many of the processes are similar in nature. Ultimately, many of the risks associated with these operational processes are comparable across sectors and therefore do not feed through into materially different risks to investors.

In conclusion, SGN considers that complexity is difficult to define and that the relative risk between GDNs and other regulated energy companies is at least no less due to complexity.

5. Regulatory regime

There are many features of the regulatory regime which are consistent across the energy sectors. All will operate through 5 year revenue controls (from RIIO-2), all use a Totex and incentives regime with a focus on outputs and price control deliverables. All sectors are set allowed returns using the same approach, with the same debt indexation used for setting allowed debt finance costs and the same total market return and risk- free rate assumptions used in setting the allowed equity return. The mechanics of the operation of the revenue control are broadly consistent across sectors with the annual iteration process used to make revenue adjustments.

On this basis SGN concludes that Ofgem's regulatory regime does not introduce substantive differences in risk across the sectors. Where there are differences, they may act as a risk dampener rather than a risk amplifier.

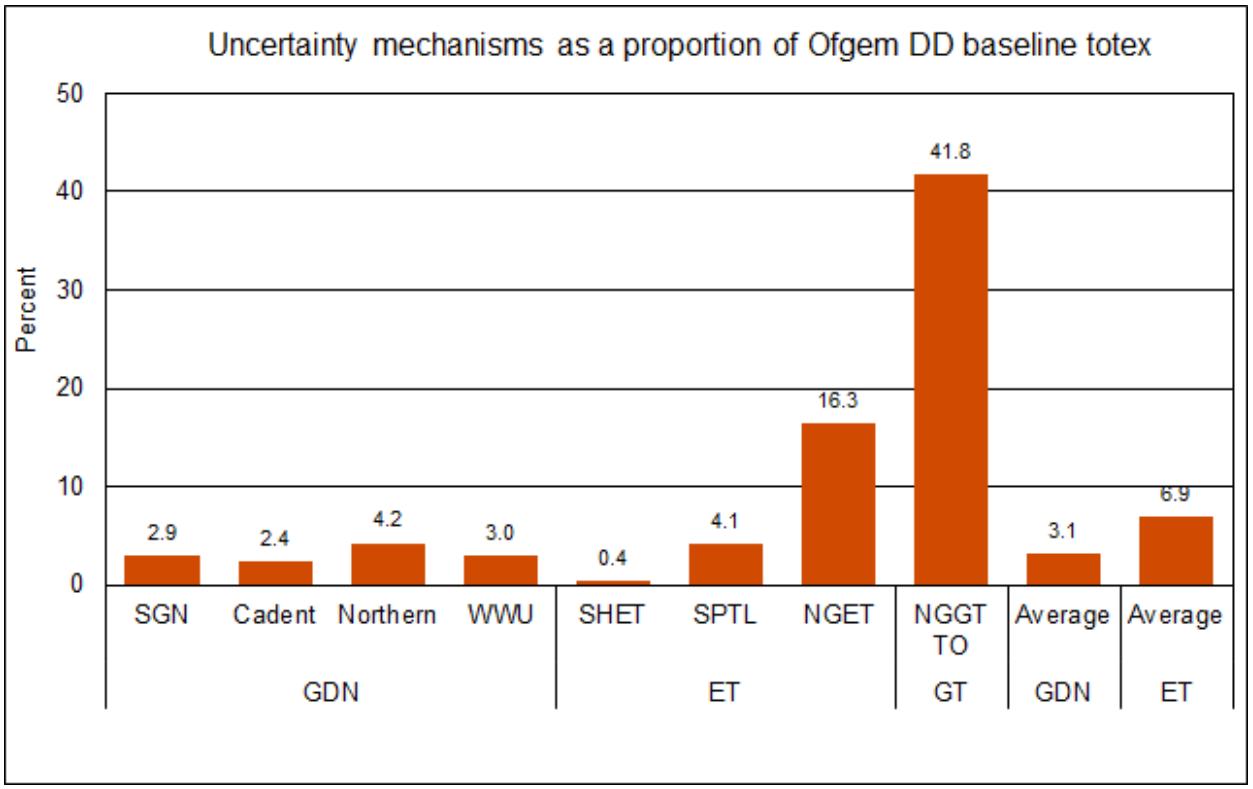
However, there are two areas where the level of risk does differ across sectors: Uncertainty Mechanisms and Totex incentives.

Ofgem has increased the use of UMs in RIIO-2, relative to RIIO-1. UMs are not an underlying source of risk, rather they help to mitigate risks if implemented correctly. *Ceteris Paribus*, a sector with more UMs will have greater risk reduction than a sector with less UMs.

Below we show the uncertainty mechanisms as a percentage of Ofgem's baseline Totex over RIIO-2.[19]

[19] Our figures are from the Ofgem's Summary charts of baseline Totex adjustments https://www.ofgem.gov.uk/system/files/docs/2020/07/summary_charts_of_baseline_totex_adjustments.pdfWe took the ratio of the Volume cut with UMs over Ofgem's DD view for each company. We note that this analysis does not capture possible 'reopener' that are difficult to reliably predict, but do not deem this to impact our overall conclusions.

Figure 12: Uncertainty mechanisms as a proportion of Ofgem DD baseline Totex



As shown in the chart, Gas Transmission has 13.3x the proportion of UMs to Totex as GDNs and Electricity Transmission has 2.2x the proportion as GDNs.

UMs reduce the risk by allowing higher revenue when required in certain scenarios. The large disparity in allowed UMs means that GDNs are at significant risk disadvantage being unable to utilise these mechanisms.

Ofgem has set draft incentive rates in its draft determination, as shown in Table 1.

Table 1: TIM incentive rates

TIM incentive rate	GD2
Gas Distribution	49.7%
Gas Transmission	36.3%
Electricity Transmission	36.4%

Source: RIIO-2 Draft Determinations - Core Document

Gas distribution has a higher TIM incentive rate and therefore higher exposure to all Totex risks (including systematic risks).

RIIO-1 vs RIIO-2 Relative Risk

Ofgem believe that mechanisms such as the indexation of RPEs and cost of equity, and reducing potential RORE ranges through RAMs, has reduced the level of risk since RIIO-1. SGN fundamentally disagree with this as Ofgem's Draft Determination for RIIO-GD2 has introduced significant asymmetric downside risk across many aspects of the regulatory framework.

- Allowed returns are at all-time record lows and have been reduced significantly from GD-1, based on multiple fundamental changes in regulatory precedent
- Companies have limited (if any) headroom on the financial ratios used to assess financeability (SGN's draft determination only reached above the 1.4x BBB+/Baa1 threshold with inclusion of the outperformance wedge).
- New mechanisms such as the outperformance wedge reduce opportunities for outperformance gains.
- Ofgem's productivity challenge of 1.2% for capex and repex, and 1.4% for opex is higher than all recent regulatory precedents.
- Ofgem has set the efficient company benchmark at the 85th percentile for GD companies, a change from RIIO-1 (and other regulatory norms) where it was set at the 75th percentile.
- The cost allowance for GDNs is around 20% less than they requested in their business plan submissions (with considerable variation).
- Ofgem's methodology for indexing RPEs has increased risk compared to Vs RIIO-1 as Ofgem's methodology uses an inappropriate index (see response to Core Questions Q10)
- PCDs are downside risk only i.e. SGN will have to give back a significant amount if they don't deliver, which could happen due to typical capital projects delays.
- Companies also face financial output delivery incentives (ODIs) which are asymmetrically skewed towards downside risk.
- long-term asset use risk has increased significantly (particularly impacting gas networks) with the emergence of net zero.

PwC Report 1 investigates the balance of risk in SGN's GD2 DD and finds a heavy skew to the downside and limited potential for achieving the allowed returns expected by Ofgem.

Indeed, the investor interview programme conducted by PwC last year[20] (and submitted alongside our business plan) indicated that most financial stakeholders consider that the risk of investing in energy networks since RIIO-1 has increased. Interviewees generally agreed that the proposed changes in the regulatory environment are the most important factor behind the higher levels of risk.

We therefore conclude that despite the introduction of some new mechanisms that will reduce risk in certain areas, overall, the RIIO-2 package is riskier than RIIO-1, leaving companies exposed to higher level of systematic risk.

Quantitative analysis of systematic risk

In addition to the analysis of systematic risk drivers outlined above, we also consider quantitative analysis of assets betas for question A (RIIO-1 vs RIIO-2) and D (Gas vs Electric).

While we disagree with many aspects of the approach used by Ofgem to estimate asset betas, we seek to replicate their approach by using the same debt beta of 0.125 and the same comparator set to ensure our work is comparable. We refer Ofgem to Oxera report 1 for our latest thinking on the approach that Ofgem should be using to derive beta estimates.

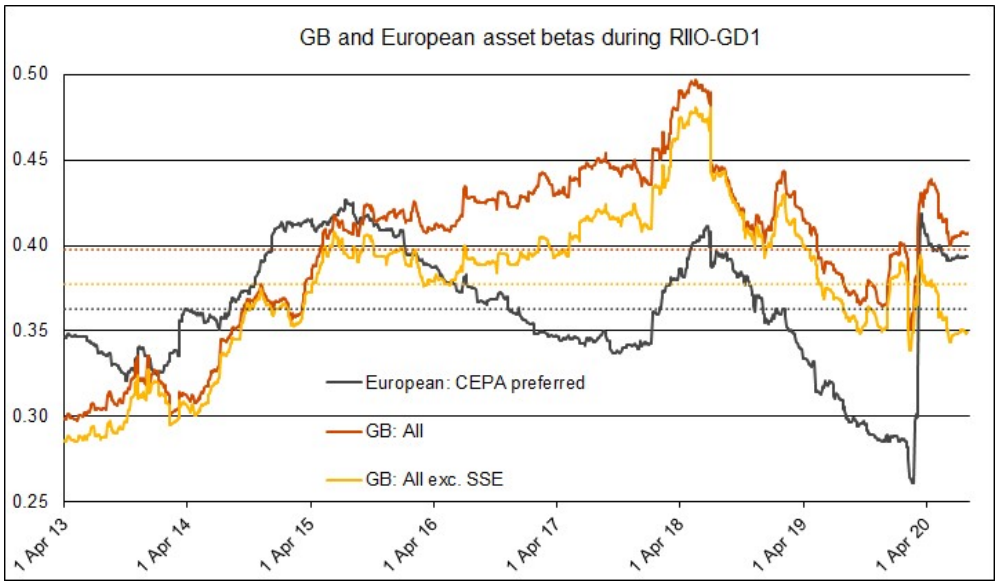
A. RIIO-1 vs RIIO-2

We find evidence that systemic risk has increased during RIIO-GD1. Since commencement of RIIO-GD1 on 1 April 2013, asset betas have increased by 0.05 to 0.11 percentage points. We illustrate this below by presenting evidence from both GB comparators (NG, SVT, UU and PNN, both with and without SSE) and CEPA's preferred sample of 6 European comparators (Engas, Snam, Red Electrica, Terna Rete, Ren Redes, Elia and Endesa).[21] We also note that since the commencement of RIIO-GD1, average RIIO-GD1 asset betas have been 0.02 to 0.10 higher.

[20] https://www.sgnfuture.co.uk/wp-content/uploads/2020/01/SGN-004-Fin-Supinfo-Financial-stakeholder-engagement.pdf

[21] The asset betas shown are both simple averages of 5Y monthly, 2Y weekly and 2Y daily OLS regression outputs using the MSCI Europe exc. UK index as the market index.

Figure 13: GB and European asset betas during GD1



Source: Analysis using Refinitiv data

Table 2 below summarises our findings. The average of the increase over the period and average since the commencement of RIIO-GD1 suggests that **asset betas have increased by 0.07 percentage points**.

Table 2: Asset beta estimates for GB and European comparators

Asset betas	GB: All	GB: All exc. SSE	European: CEPA preferred
01 April 2013	0.30	0.29	0.35
05 August 2020	0.41	0.35	0.39
Period average	0.40	0.38	0.36
Increase	**0.11**	**0.06**	**0.05**
Average above commencement	**0.10**	**0.09**	**0.02**

Source: Analysis using Refinitiv data

We therefore conclude that there has been an overall increase in risk from RIIO-1 to RIIO-2.

D. Gas vs electric networks analysis

Taking CEPA's European preferred sample (the only dataset with GDNs and electric networks), GDNs have an average asset beta of 0.42 compared to 0.31 for electric networks[22]. Our estimate of 0.42 for GDNs using CEPAs own preferred sample for a debt beta of 0.125 is **0.055 higher than the midpoint of Ofgem's range[23].**

We also observe that Professor Aswath Damodaran (leading corporate finance practitioner) produces betas for European utilities. His analysis shows that the unlevered beta in Western Europe for gas/oil distribution is 0.74, while for power and utilities (general) the betas are lower at 0.57 and 0.41 respectively.

For comparison, we find electric networks to have an asset beta only 70% that of GDNs. Damodaran finds power and utilities (general) to have an asset beta that is 55% and 77% of gas/oil distribution respectively.

Furthermore, Italgas is an Italian GDN not included in CEPAs European comparator analysis. It has a higher asset beta of 0.41 (with debt beta of 0.125) that is **0.045 higher than the midpoint of Ofgem's range**. We note that CEPA may have excluded Italgas as it was only listed on the stock exchange in the last 4 years.

[22] This assumes GDN weights of 100% for Enagas and Snam and 41% for Ren Redes based on the amount of Gas activities that contribute to Ren Redes 2019 end of period RAB. This categorisation of GDN vs Electric is necessarily qualitative given that the businesses are involved in multiple activities. As such, our categorisation relies on their principal activities

[23] This uplift is based upon Ofgem's mid-point assessment. We provide our views on the estimation of Ofgem's asset beta estimation in response to FQ5

Overall conclusion on relative risk

In this section we provide our conclusion for the four sub questions asked by Ofgem. This comprises of both the qualitative and quantitative assessments.

A. RIIO-1 vs RIIO-2

Across the drivers of systematic risk in the regulatory regime that we have reviewed, several have experienced only minor changes. We suggest long-term asset use risk has increased significantly (particularly impacting gas networks), and that the regulatory regime has introduced some new features which have reduced risks but leaves other new and emerging uncertainties. Moreover, we note that Ofgem's Draft Determination for RIIO- GD2 has introduced significant downside risk across many aspects of the regulatory framework compared to RIIO-1, which exposes companies to greater levels of systematic risk.

In addition, our empirical analysis shows that on average (across different estimation approaches) **asset betas have increased by 0.07 percentage points since the commencement of RIIO-GD1**.

Therefore, overall, we conclude that there is strong evidence of higher systematic risk in RIIO-2 than in RIIO-1.

B. Distribution vs Transmission

Across the measures of systematic risk, distribution has higher operational gearing than transmission. Likewise, transmission companies also benefit from greater uncertainty mechanisms, which reduce their exposure to systematic risk. Gas distribution also has a higher TIM incentive rate of 50% compared to 36% for gas and electricity transmission, and therefore GDNs face higher exposure to all totex risks (including systematic risks).

We therefore conclude that distribution faces higher relative risk.

C. Gas Transmission vs Electricity Transmission

As a gas distribution company, SGN does not have firm views on the difference across gas transmission and electricity transmission.

Across our risk measures, Gas Transmission has higher long-term asset use risk, but benefits from more Uncertainty Mechanisms.

SGN considers the energy transported by the networks is a more important driver of risk than the stage in the value chain. This is addressed in part D below.

D. Gas vs electric networks analysis

Across our relative risk measures, Gas has higher long-term asset use risk and higher operational gearing, as well as lower potential use of Uncertainty Mechanisms and higher TIM incentives rates.

This is supported by empirical evidence that GDNs have higher asset betas than other energy networks.

Therefore, on the basis of our drivers of relative risk and empirical analysis, we consider gas networks require an uplift to their asset beta to account for the relative risk across energy network sectors.

<u>Gas Distribution versus Transmission Risk</u>

One comparison not specifically requested in this question is between gas transmission and gas distribution activities. Both sectors face the risks relating to decarbonisation, but the precise way in which decarbonisation places different challenges on the two systems is difficult to judge at this stage.

From our analysis above, this means observations around operational leverage and the regulatory regime are therefore most instructive to compare the sectors. Based on the detailed analysis above our conclusion is that distribution activities are higher risk through higher operational leverage, higher TIM cost sharing rates and less comparative use of Uncertainty Mechanisms. We therefore conclude that gas distribution has higher risk than gas transmission activities.