NERA
ECONOMIC CONSULTING

ADDITIONAL COSTS OF BORROWING AND SMALL COMPANY PREMIUM AT RIIO-ED2

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Insight in Economics™

Contents

Summary: Drawing on earlier studies for ENA, we update estimates for additional costs of borrowing and small company premium. We also address issues raised by Ofgem at RIIO-GD/T2 FD

- **Section 1:** Present updated evidence for halo effect based on a comparison of companies' bonds with the Utilities iBoxx index using a duration adjusted measure of spread. Also address Ofgem's technical criticisms.
  - *Updated analysis suggests a negative halo of between 6 and 8 bps based on a sample including all recent bond issues, consistent with our earlier studies examining network bond spreads.*
- **Section 2:** Provide further evidence on additional costs associated with issuing CPI index-linked debt, and address Ofgem's comment at FD.
  - *We find evidence supporting a CPI indexation costs of 6 bps.*
- ***Section 3:*** Review Ofgem's estimate of transaction cost, liquidity cost, and its use of RFPR and group cash data. Update our cost-of-carry estimates using latest market data.
  - *We find that Ofgem's use of RFPR and Group cash holdings is unreliable and understates networks' cash requirement. We update our approach to estimate cash holding cost of 9-19 bps.*
  - *We summarise additional costs of borrowing: 38- 48 bps (mid-point of 43 bps) compared to Ofgem's FD of 25 bps.*
- **Section 4:** Consider the small company premium for licensees expected to issue smaller size or less frequently than other networks due to their lower RAV size and RAV growth for RIIO-2.
  - *We find all DNO licensees incur infrequent issuing costs for which they should be compensated (using Ofgem's framework), and we estimate an infrequent issuer premium to be 9-17.5 bps.*

Conclusions: We estimate additional cost of borrowing of 43 bps, with a range of 38 to 48 bps, compared to Ofgem's FD of 25 bps. In addition, we estimate a small company premia of 9-17.5 bps, compared to Ofgem's FD of 6 bps

	Ofgem DD (Jul 2020)	Ofgem FD (Dec 2020)	NERA (Aug 2020)	NERA (Apr 2021)	Comment
Transaction Costs	6 bps	6 bps	7 bps	7 bps	Ofgem draws on company data but excludes outlier; NERAs analysis includes all companies within sample.
Liquidity/RCF cost	3 - 5.5 bps	4 bps	4.5 bps	9 bps	Both Ofgem and NERA draw on companies' assumptions on RCF size and cost, but NERA assumes RCF half-drawn.
Cost of carry	1.5 – 11 bps	10 bps	11 - 23 bps	9 - 19 bps	Ofgem assumptions on cash at OpCo and Group unreliable; NERA approach assumes 12-24 mth pre-financing, half met by RCF.
New issue premium (NIP)	0	0	9 bps	7 bps	Ofgem's analysis does not draw on precise measures of spread, includes callable bonds; NERAs spreads calculation duration matched and support 7 bps.
CPI indexation costs	0	5 bps	15 bps	6 bps	Ofgem recognises CPI switching costs of 5bps; NERA's estimate based on a higher RPI-CPI switching cost estimate.
Additional Cost of Borrowing	**17 bps**	**25 bps**	**47 – 59 bps (53bps)**	**38 – 48 bps (43 bps)**	mid-point of the range
Small company/infrequent issuer Premia		**6 bps**		**9-17.5 bps**	
Total		**31 bps**		**47- 65.5 (56 bps)**	mid-point of the range

Sources: Ofgem (July 2020) Consultation – RIIO-2 Draft Determination – Finance Annex, p. 14, Ofgem (December 2020), RIIO-2 Final Determinations – Finance Annex, p.14. NERA (September 2019) Halo effect and additional costs of borrowing at RIIO-2, A report for ENA, p. 18

Summary of Ofgem's GD2/T2 FD comments and our response: Halo effect and new issue premium

Category	Ofgem's point raised	NERA's response
Issuance date vs. pricing date	NERA compares yields on the issuance (settlement) date rather than pricing date. For bond issues, pricing date is typically 4-5 business days earlier than the settlement date, although it can be longer. It is the pricing date that matters (and is available from Bloomberg). Comparing yields for dates other than the pricing date is unreliable.	We disagree. In theory, even though the bond price is calculated prior to the issue date, the pricing of the security will take into account the expected yield movement between the pricing date and issue date, such that the bond price when it is offered to the market is fairly valued. We also see this in practice: the indication of yield written in the final terms of bonds is always represented to investors as the yield at the issue date on the basis of the issue price, rather than the pricing date.
SSE bonds	NERA includes SSE plc bond issues - SSE plc is not a network company.	We disagree. The purpose of these SSE plc bonds is to finance the corporate activities of the three energy networks owned by SSE which mainly rely on intercompany loans from SSE plc for their financing. SEPD/SHEPD/SHET's intercompany loans from SSE plc broadly match the SSE plc's public bond included in our sample, implying that these SSE plc bonds are used as source of funding for the intercompany loans. Therefore, the SSE plc bonds should be considered as proxies of SEPD/SHEPD/SHET's external debt financing cost, and should be included in the sample for energy networks' bonds.
Callable bonds	NERA excludes a number of more recent issues, possibly because they are marked by data systems as "callable" because they technically have a call date. However, when looking at the final terms' details, these call dates are only 3 months ahead of maturity on very long dated bonds. This is a recent market development driven by bank regulatory requirements with the structure also adopted by corporates (as it may partly mitigate cost of carry for refinancing ahead of legal maturity), however these are not considered or traded as callable bonds in the traditional sense and should be included.	We disagree. While all these bonds have the standard par call options within 3 months of the maturity date, they also have other call provisions that allow the issuer to call the bond early such as make-whole call options. Therefore, we exclude these callable bonds from assessment.
Tab issuances	NERA excludes tap (follow on) issuances	We now include the small number of tap issues.

Sources: Ofgem (December 2020) Decision - RIIO-2 Final Determinations – Finance Annex (REVISED), p. 173-174

Summary of Ofgem's GD2/T2 FD comments and our response: CPI Indexation Costs

Category	Ofgem's point raised	NERA's response
Orsted and Cambridge bonds	Secondary market for CPI-linkers is illiquid and therefore CPI premium implied over time from Orsted and Cambridge is not reliable. Only premium at issue is relevant	CPI-linked debt may be less liquid which may explain part of the observed premium (of 50 bps), as Ofgem claims. However, we consider that current secondary market evidence – as opposed to the premium at issuance – provides best estimate of the illiquidity/ CPI premium that networks will face at RIIO-2 when issuing CPI debt.
Bank swap costs	NERA's evidence (nominal-RPI cost) is irrelevant because RPI-CPI switch involves lower payment differential and therefore lower credit intensity, resulting in lower swap costs	we have adopted Ofgem's RPI-CPI swap cost of 12.5 bps to mitigate basis risk for embedded RPI debt.

Sources: Ofgem (December 2020) Decision - RIIO-2 Final Determinations – Finance Annex (REVISED), p. 174

Summary of Ofgem's GD2/T2 FD comments and our response: Transaction cost, RCF/liquidity cost

Category	Ofgem's approach	NERA's response
Transaction cost	Ofgem's transaction cost allowance is 6 bps, drawing on our data set but excludes one company as it considers it to be an outlier	Our transaction cost estimate draws on the full set of company data. Updated evidence on transaction costs support 7 bps as per our previous report, marginally higher than Ofgem's allowance of 6 bps.
RCF/Liquidity cost	At GD2/T2 FD, Ofgem determined liquidity/RCF costs of 4bps (of notional debt) but does not allow for any draw-down.	Ofgem's approach ignores other potential costs, and potential draw-down costs. Companies will in practice draw down facilities to manage volatility in cash-flow requirements. Drawing on company's latest RCF/liquidity cost evidence, we estimate the average liquidity cost to be at 9bps of notional debt, assuming half drawn, consistent with cost of carry assumption.
Cost of Carry	Ofgem determined a cost of carry midpoint of 10 bps. While it retained its DD range, it adjusted its range to the top end based on NG submitted analysis of group level cash balances and net debt.	We assume 50% of RCF can meet pre-financing needs, implying cost of carry of 14 bps, based on range of 9-19 bps: i) pre-financing period 12 to 24 months and debt tenor of 15 years, based on average tenor, ii) net carry cost of iBoxx Utilities index less overnight LIBOR on cash-deposits.

Sources: Ofgem (December 2020) Decision - RIIO-2 Final Determinations – Finance Annex (REVISED), p. 174

Conclusions on Small Company Premium: We find all DNO licensees incur infrequent issuer costs using Ofgem's GD2/T2 methodology. We estimate an infrequent issuer premium to be 9-17.5 bps compared to Ofgem's 6 bps

- Our analysis shows that all DNO licensees incur infrequent issuer costs, based on the criterion of issuing less than £150m p.a. on average on notional basis
- We consider the threshold for infrequent issuer should be higher than £150 million:
  - Ofgem's assumption that the minimum size is £250m of which £100 million can be issued as a second tranche is not widely adopted in practice, as 80% of networks' bond issued at or above £250m.
  - Evidence suggests using tap issues may lead to higher illiquidity premia.
- Ofgem has underestimated infrequent issuer cost at GD2/T2 using constant maturity swap (CMS) and illiquidity premium:
  - The CMS hedges only interest rate risk and does not hedge credit risk. Therefore, CMS only provides a lower bound value of the infrequent issuer premium.
  - As a better measure of the illiquidity premium, average bid-ask spread of bonds with issuance sizes smaller than £250m is ca 50 bps higher than bonds issued at or above £250m, suggesting illiquidity premium could be ca 50 bps.
- Based on new evidence, we consider the infrequent issuer premium should be in the range of 9 bps to 17.5 bps:
  - lower bound of 9 bps (26bps*35% new debt/total debt in ED2) based on the CMS-implied premium, since CMS does not provide risk hedging for credit risk and should be used as lower bound;
  - Upper bound of 17.5 bps (50bps*35% new debt/total debt in ED2) based on the bid-ask spread differential between the sub-benchmark sized issues and issues at and above £250m.

1 Updated evidence on the halo effect and new issue premium

In its GD2/T2 FD, Ofgem concludes there is a small positive halo, but decides not to deduct this from Utilities iBoxx. Ofgem criticises our negative halo (NIP) of 9bps in NERA previous ENA study

- At GD2/T2 DD[1], Ofgem estimated a halo effect of 4 bps by comparing company spreads relative to the iBoxx Utilities index, i.e.:

  Halo effect = iBoxx index spread – company's bond spread

- In our previous reports for ENA, we noted Ofgem's spreads do not control for tenor precisely:
  - Ofgem calculates the spread for the iBoxx index and company bond relative to a specific benchmark gilt, but there may not be a benchmark gilt that exactly matches the tenor of the bond issue, particularly for long-dated gilts.
  - Therefore, Ofgem's supposed halo also reflects the tenor mismatch between the network bonds/iBoxx index and the relevant benchmark gilt.
- We have calculated credit spreads that match more precisely the tenor of the iBoxx and company bond using the Bank of England yield curve. We also calculated duration-matching spreads to allow for the fact that companies' bonds pay coupons:
  - Using a more precise measure of the spread, we calculated a negative halo (or in other words a new issue premium, NIP) of 9 bps.
  - We noted that a negative halo is not surprising: it reflects the cost of incentivising investors in the primary market relative to the secondary traded market yields. Indeed, our estimate of NIP is in line with other recent studies of the costs of issuing corporate bonds.[2]
- In its GD2/T2 FD, Ofgem concludes that there is a small positive halo (i.e. an outperformance of the index rather than an issuance premium), but decides not to deduct the estimated halo from the Utilities iBoxx yields for the amount was small, and considers it is reasonable not to assume future outperformance of the Utilities index.[3]
- Ofgem also identifies technical criticisms of our approach to calculating the NIP, which include:
  - use of yields on the issuance (settlement) date rather than the pricing date
  - inclusion of SSE plc bond issues
  - exclusion of a number of more recent issues
  - exclusion of tap (follow on) issuances.
- In its FD, Ofgem also considered our approach by using the duration-adjusted spreads against the duration matched zero coupon BoE curve, but found 4bps halo effect on a weighted average basis, or 8bps on a simple average basis.
  - In contrast to our sample, Ofgem's sample excluded SSE plc issuance, but included more recent issuances with 3 months prior to maturity par calls and tap issuances.

Sources: 1. Ofgem (July 2020) Consultation – RIIO-2 Draft Determination – Finance Annex, p. 14; 2. Our estimate is in line with recent studies: Maitra and Salt (2018) estimates an average NIP of 14bps for European corporate bond since 2009; Rischen and Theissen (2018) estimates the NIP to be 10bps, measured as the under-pricing in the primary issues of European corporate bonds. Maitra and Salt (May 2018) New issuance premium in European corporate bonds, Lombard Odier Asset Management; Rischen and Theissen (2018), Underpricing in the euro area corporate bond market: New evidence from post-crisis regulation and quantitative easing, CFR Working Paper, No. 18-03. 3.Ofgem (Dec 2020) Decision - RIIO-2 Final Determinations – Finance Annex (REVISED), p. 14

We have updated the spreads based on duration matching. We find a negative halo of between negative 6-8 bps if including recent bond issues, or negative 10-12 bps if excluding recent bond issues over Covid-19 period

- To respond to Ofgem, we have updated our halo analysis to include most recent network company issues, and to address Ofgem's comments on our study at GD2/T2 FD.
- We calculate a negative halo of -6 bps based on the iBoxx Utilities spread less company bond spread on a simple average basis, and -8 bps on a weighted average basis. That is, we identify a new issue premium (NIP):
  - By contrast, Ofgem in its FD calculates a positive halo of +8 and +4 respectively.
  - However, Ofgem's estimate is not reliable, as its sample excludes relevant bonds issued by SSE, and includes callable bonds (see next slide).
- By contrast, our sample includes all outstanding energy network nominal bonds, and excludes callable bonds (see next slide):
  - We also include all recent bond issues, although we note that recent spreads are volatile, reflecting Covid related market volatility.

We find negative halo of 6 bps (simple average) and 8 bps (weighted average) using iBoxx Utilities spreads

	Halo effect (negative value = underperformance or new issue premium)	
	Ofgem	**NERA**
Simple average	+8 bps	-6 (-12) bps
Weighted average	+4 bps	-8 (-10) bps

Notes: 1. Estimates in parentheses exclude bonds issued during COVID-19 period (post- March 2020). However, given market volatility and the substantive variation in spreads relative to benchmark spread, we consider it reasonable to exclude these recent issues.
Source: NERA analysis; Ofgem (December 2020) Decision - RIIO-2 Final Determinations – Finance Annex (REVISED), p. 174

- As shown above, if we were to exclude all recent bond issues, halo effect/NIP would increase to -10 to -12bps:
  - Recent regulated network issues generally outperformed index during the Covid-19 period. Explained by the fact that around half of the constituents in the iBoxx Utilities index are non-regulated utilities, e.g. energy suppliers, which are more impacted by Covid-19 and had higher spreads than regulated networks.
  - As the Covid-19 crisis ends, the variations observed during this period are unlikely to continue over RIIO-ED2.

Our halo analysis excludes callable bonds, which would otherwise lead to imprecise duration-matching and inaccurate halo estimate. Ofgem includes callable bonds in its sample based on wrong premise

- In our analysis, we have excluded bonds with embedded call options, since the optionality of the callable bonds would lead to imprecise duration matching with the benchmark spot curve, and would result in inaccurate halo estimate.
- In its FD, Ofgem argues that the bonds labelled as "callable" should be included, because these bonds have call dates that are only 3 months ahead of maturity on very long dated bonds, and this feature is not considered or traded as callable bonds in the traditional sense.
  - Ofgem explains that this is a recent market development driven by bank regulatory requirements with the structure also adopted by corporates.[1]
- However, Ofgem's assessment is incorrect. In contrast to Ofgem's consideration, the final terms of companies' callable bonds show that while all these bonds do have the standard par call options within 3 months of the maturity date, they also have other call provisions that allow the issuer to call the bond early.
  - For example, the callable bonds we exclude from our sample have make-whole call options[2] applicable throughout the life of the bond, and some have additional special call options.
  - Therefore, these callable bonds should be excluded from the halo assessment.

Note: (1) Ofgem (December 2020) RIIO-2 FD Finance Annex (REVISED), p. 173. (2) A make-whole call provision is a clause in a bond's contract that allows the issuer to retire the bond early by paying off the remaining debt on the bond.

The following bonds have both issuer maturity par calls and also make-whole call options. Therefore, these bonds should qualify as callable bonds and excluded

Ticker	Cpn	Maturity	Type	Issuer Maturity Par Call	Make-Whole Call Options	Conditional Redemption/ Special Call Options
SSELN	1.5	24/03/2028	Callable	Yes	Yes	Clean-Up Call
SSELN	2.125	24/03/2036	Callable	Yes	Yes	Clean-Up Call
NGGLN	1.125	14/01/2033	Callable	Yes	Yes	Taxation Trigger Call
NGGLN	1.625	14/01/2043	Callable	Yes	Yes	Taxation Trigger Call
SGN	1.25	02/12/2031	Callable	Yes	Yes	Taxation Trigger Call
PPL	1.625	07/10/2035	Callable	Yes	Yes	Taxation Trigger Call
NGGLN	1.125	07/07/2028	Callable	Yes	Yes	N/A
NGGLN	1.375	07/02/2031	Callable	Yes	Yes	Taxation Trigger Call
IBESM	2	13/11/2031	Callable	Yes	Yes	Taxation Trigger Call
BRKHEC	2.25	09/10/2059	Callable	Yes	Yes	Taxation Trigger Call
SSELN	2.25	27/09/2035	Callable	Yes	Yes	Clean-Up Call, Taxation Trigger Call
NGGLN	1.375	16/09/2026	Callable	Yes	Yes	Taxation Trigger Call
NGGLN	2	16/09/2038	Callable	Yes	Yes	Taxation Trigger Call
PPL	1.75	09/09/2031	Callable	Yes	Yes	N/A
BRKHEC	2.75	24/05/2049	Callable	Yes	Yes	Taxation Trigger Call
NGGLN	2.75	06/02/2035	Callable	Yes	Yes	Taxation Trigger Call
PPL	3.5	16/10/2026	Callable	Yes	Yes	N/A
SGN	3.1	15/09/2036	Callable	Yes	Yes	Taxation Trigger Call

Note: NERA analysis of bond final terms

We address Ofgem's other technical criticisms of our approach

- **We include SSE plc bonds as debt raised at plc for regulated networks**
- In its FD[1], Ofgem argues that SSE plc bonds should be excluded because SSE plc is not a network company.
- We disagree. Our analysis shows that the purpose of these SSE plc bonds is to finance the corporate activities of the three energy networks owned by SSE (SEPD, SHEPD, SHET), which mainly rely on intercompany loans from SSE plc for their financing. SEPD/SHEPD/SHET's intercompany loans from SSE plc broadly match the SSE plc's public bond included in our sample, implying that these SSE plc bonds are used as source of funding for the intercompany loans.[2] Therefore, the SSE plc bonds should be considered as proxies of SEPD/SHEPD/SHET's external debt financing cost, and be included in the sample for energy networks' bonds.
- **Issue date should be used to compare yields**
- In its FD[1], Ofgem argues that for bond issues, the pricing date (4-5 days before the issue date) should be used, rather than the date of issue, so comparing yields for dates other than the pricing date is unreliable.
- We disagree. In theory, even though the bond price is calculated prior to the issue date, the pricing of the security will take into account the expected yield movement between the pricing date and issue date, such that the bond price when it is offered to the market is fairly valued. We also see this in practice: the indication of yield written in the final terms of bonds is always represented to investors as the yield at the issue date on the basis of the issue price, rather than the pricing date. Therefore, in contrast to Ofgem's assessment, we consider it is the issue date that matters to investors.
- **We now include tap (or follow on) issuances**
- We have now included the small number of tap issues in our halo analysis bond sample, as Ofgem suggests.

Sources: 1. Ofgem (December 2020) Decision - RIIO-2 Final Determinations – Finance Annex (REVISED), p. 173, 2. Note: SEPD, SHEPD, and SHET have a combined ca £2000m outstanding intercompany loans from SSE plc, which is greater than the combined issued amount of £1650m of SSE plc bonds included in the sample. Therefore, it highly likely that the SSE plc bonds included in the sample are used as the source of funding for the intercompany loans to SEPD, SHEPD, and SHET.

Conclusion: We find evidence of a NIP of between 6 and 8 bps (average 7bps) consistent with other empirical studies

- In our earlier report for ENA, comparing the relative spreads of network bonds to iBoxx A/BBB index, we found a negative halo of 9 bps – consistent with the existence of a NIP for primary issuances relative to benchmark secondary yields.[1]
- In its FD, Ofgem identifies technical criticisms of our approach to calculating the NIP, and Ofgem found a positive halo estimate of 4bps on a weighted average basis, or 8bps on a simple average basis by using the duration-adjusted spreads against the duration matched zero coupon BoE curve. In contrast to our sample, Ofgem's sample excluded SSE plc issuance, but included more recent issuances with 3 months prior to maturity par calls and tap issuances.
- We have updated the spreads based on duration matching and find a negative halo of between 6 and 8 bps based on a sample including all recent bond issues. We address Ofgem's technical criticisms of our approach:
  - We exclude callable bonds, which could lead to imprecise duration-matching and inaccurate halo estimate. We believe Ofgem is wrong to interpret these as non-callable bonds.
  - We include SSE plc's bonds as these are associated with energy networks owned by SSE (SEPD, SHEPD, SHET).
  - We compare company's bond yields and iBoxx yields on issue date, rather than pricing date, since conceptually the pricing should reflect the expected movement between the pricing date and issued date. Final terms of bonds represent the yield at issue at the issue date.
- As we have set out in previous studies for ENA[1], a negative halo is not surprising: it reflects the cost of incentivising investors in the primary market relative to the secondary traded market yields. Indeed, our estimate of NIP is in line with other recent studies of the costs of issuing corporate bonds, which estimate a NIP estimate of 10-14 bps.
  - The implication is that Ofgem should include an NIP of 7 bps (mid-point estimate) in its additional cost of borrowing.

Sources: 1. NERA (September 2019) Halo effect and additional costs of borrowing at RIIO-2, A report for ENA; 2.

2 Inflation linked debt costs

Ofgem recognises CPI switching costs of 5bps in its additional costs of borrowing at GD2/T2, but disagrees with the upper end of our inflation linked debt costs estimate

Ofgem assumes switching costs of 5bps accounting for both new CPI/CPIH debt and managing basis risk

- For the GD&T networks, Ofgem included an additional allowance relating to i) new CPI/CPIH debt and ii) managing basis risk between CPI and RPI.
- For new CPI/CPIH, Ofgem assumes a 30bps cost as per the lower end of NERA's range (reflecting CPI premium at issue). Ofgem then multiplies the 30bps by 30% (assumed ILD debt issuance) and by the average proportion of new debt over RIIO-2[1].
- For managing basis risk, Ofgem assumes a 10 to 15bps cost based on swap charges. Ofgem then multiplies this cost by 30% (assumed ILD debt issuance) and by the average proportion of embedded debt[2].
- Combining these two costs, Ofgem determines a 5bps CPIH issuance/basis mitigation allowance[3]. Ofgem relies on the same assumption in its ED SSMD.

Ofgem disagrees with the evidence we submitted on Oersted/Cambridge bonds and swap costs

- In our September 2020 report for ENA, we estimated a 15bps premium to compensate CPI switching costs, based on Cambridge/Oersted bonds, CPI-RPI swaps and bank swap costs, under Ofgem's 30% ILD assumption[4].
- Ofgem disagrees with both our Oersted/Cambridge bond analysis and the use of bank swap costs:[5]
  - On the CPI premium implied from Oersted and Cambridge bonds, Ofgem disagrees with the use of the CPI premium over time due to secondary market illiquidity. Ofgem considers only the premium at issue is a relevant indicator.
  - Ofgem also disagrees with our use of bank swap costs as these are related to swapping nominal to CPI, while the relevant cost would be swapping RPI to CPI, which would be much lower.

Sources:

1. *Ofgem (Feb 21), RIIO-2 Final Determinations – Finance Annex (REVISED), pp.13-14*
2. *Ofgem (Feb 21), RIIO-2 Final Determinations – Finance Annex (REVISED), p.14*
3. *Ofgem (Feb 21), RIIO-2 Final Determinations – Finance Annex (REVISED), pp.14-15*
4. *NERA (Sep 20), Review of Ofgem's DD additional costs of borrowing, and deflating nominal iBoxx*
5. *Ofgem (Feb 21), RIIO-2 Final Determinations – Finance Annex (REVISED), p.174*

Updating Ofgem's CPI switching costs for GD&T using forecasted new debt issuance over ED2 and ILD working assumptions at ED2 results in the same allowance of 5bps CPI switching cost allowance

Ofgem concludes on switching costs of 5bps for GD&T based on a new debt proportion of c.24 per cent

- As explained in the previous slide, Ofgem calculates CPI switching costs of 5bps drawing on:
  - New CPI/CPIH debt issuance costs (or CPI premium)
  - Basis risk mitigation costs.
- While Ofgem does not state average proportion of new debt, Ofgem's 5bps estimate implies that the new debt proportion of 24 per cent over RIIO-2 for GD&T.

Updating new debt % as per our modelling results in additional cost of borrowing for CPI switch of 5bps

- Our modelling results indicate that the companies' new debt proportion is expected to be ca 35 per cent over RIIO-ED2.
- Ofgem's ED SSMD also indicates a 25 per cent ILD assumption
- Replacing Ofgem's GD&T new debt assumption of 24 per cent by 35 per cent and ILD assumption of 30 per cent by 25 per cent results in the same CPI switching costs allowance as Ofgem's ED SSMD working assumption of 5bps, keeping all other Ofgem assumptions constant.

		Ofgem GD&T FD	Ofgem Approach Updated for ED2
Average proportion of new debt	A	24%	35%
ILD debt assumption	B	30%	25%
New CPI/CPIH debt allowance	C	30bps	30bps
Managing basis risk allowance	D	12.5bps	12.5bps
Total allowance (CPI switch)	E = A*B*C+(1-A)*B*D	5bps	5bps

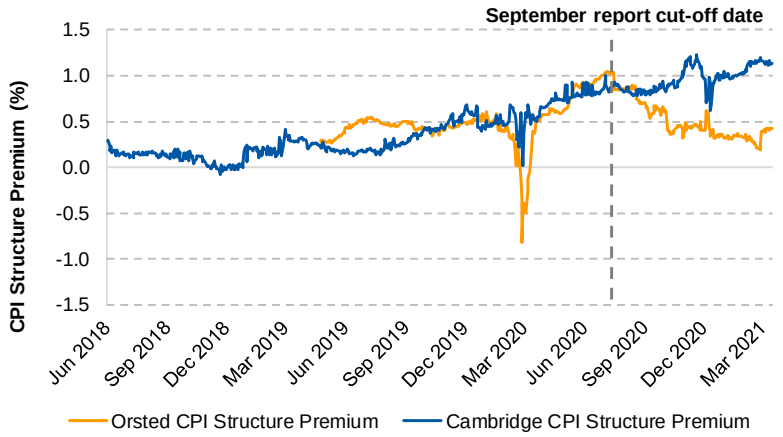
Source: NERA analysis based on Ofgem and company provided data

Updating Oersted and Cambridge bond evidence still supports our estimate of a 50bps CPI premium

Updating evidence to more recent market data does not support changing our 50bps assumption

- In our September 2020 report we showed evidence from Oersted and Cambridge bonds supporting a CPI premium of 26-30bps at issuance, increasing to 90-100bps, where we conclude on a 50bps premium:
  - Updating the evidence shows that the CPI premium for Oersted has declined, while Cambridge's premium has increased slightly.
  - We consider 50bps remains appropriate as the approximate mid-point between premium at issuance and more recent premium from secondary yields

Oersted and Cambridge CPI Structure Premium



Source: NERA analysis

Ofgem's states CPI-linked issues affected by illiquidity, but this provides up-to-date evidence for CPI premium

- In its FD for GD&T, Ofgem considers premium at issue is relevant, but premium over time is not reliable as the secondary market is illiquid.
- However, this does not change our view that the secondary market traded yield provides relevant evidence for estimating the risk premia related to CPI-linked debt:
  - the fact that CPI-linked debts are less liquid means that investors require a compensation for holding CPI-linked debt, and the networks will incur such additional costs when issuing CPI-linked debt
  - We consider evidence at issuance and most recent secondary market yields provides relevant evidence for the CPI premium over RIIO-ED2
    - Taking approximate mid-point, market evidence still supports a 50 bps.

Conclusion: we estimate a CPI switching costs of 6bps, compared to Ofgem's 5bps updated for ED2

- In our September 2020 report we concluded on an additional cost of 15bps for the CPI switch.
- As explained in the previous slides, Ofgem concludes on CPI switching costs of 5bps for GD&T and at the ED SSMD. Updating this assumption for new debt and ILD assumptions over ED2 results in CPI switching costs of 5bps keeping Ofgem's other assumptions unchanged.
- After updating our analysis and taking into account Ofgem's comments, we estimate a CPI premium of 6bps:
  - On the new CPI/CPIH debt allowance (or CPI premium), we consider that both premium at issuance and up-to-date evidence on secondary yields provides relevant evidence for CPI debt yields at ED2 – supports our earlier assumption of 50 bps (relative to Ofgem's 30 bps); and
  - On managing basis risk for embedded RPI debt, we have adopted Ofgem's assumption of RPI-CPI swap cost of 12.5 bps rather than using our assumed CPI debt premium of 50 bps, as per our earlier report.

		Ofgem Approach Updated for ED2	**NERA Estimate**
Average proportion of new debt	A	35%	35%
ILD debt assumption	B	25%	25%
New CPI/CPIH debt allowance	C	30bps	50bps
Managing basis risk allowance	D	12.5bps	12.5bps
Total allowance	E = A*B*C+(1-A)*B*D	**5bps**	**6bps**

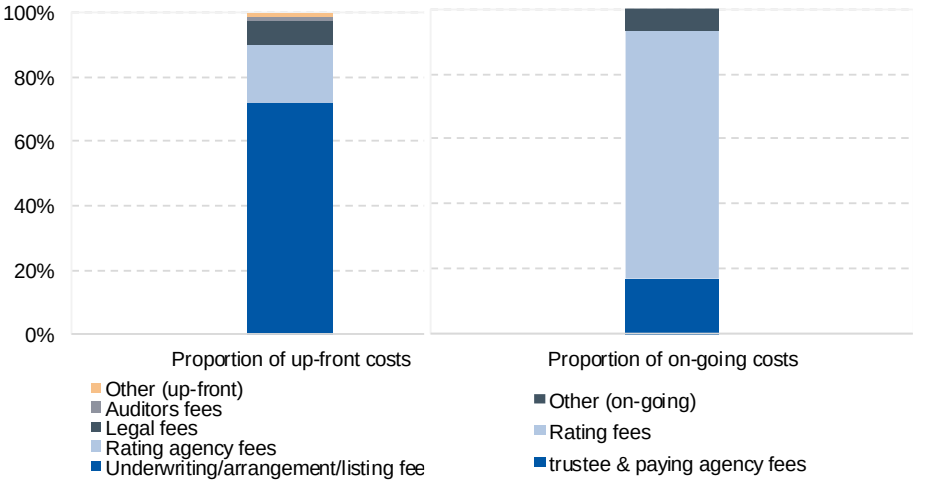
3 Updated evidence on transaction costs, liquidity cost and cost of carry

Updated evidence on transaction costs support 7bps as per our previous report, marginally higher than Ofgem's allowance of 6bps

- As per our previous report, we collected updated evidence from company submissions on transaction costs associated with public bond issuance distinguishing between:
  - Underwriting fees, Bond advisory fees, Arrangement fees, Rating agency fees, Legal fees, Auditors fees, Listing fees etc.
  - We also asked companies to distinguish between up-front costs and on-going/annual costs.
- We estimate network debt transaction costs to be 7 bps, in line with our previous report.
- Ofgem's transaction cost allowance is 6 bps, drawing on our data set but excludes one company as it considers it to be an outlier.[1]
  - Our transaction cost estimate draws on the full set of company data.

- In line with our previous report, companies' report that ca 50% of annualised costs are up-front. Of these up-front fees:
  - Underwriting fees and/or arrangement fees make up around 70 per cent of up-front costs.
  - Rating agency fees and legal fees providing the other material components.
- On-going costs are mainly rating fees, followed by trustee & paying agency fees.

Break-down of up-front and on-going trans. costs



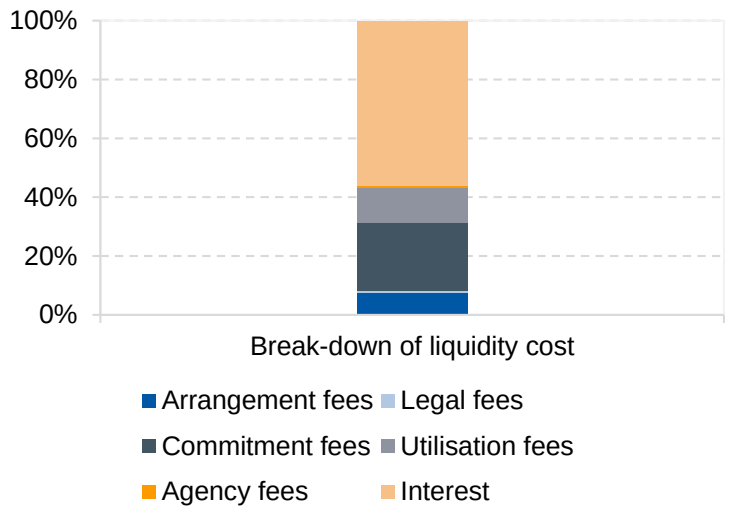
Source: 1. Ofgem (December 2020), RIIO-2 Final Determinations – Finance Annex, p.14.

At GD2/T2 FD, Ofgem determined liquidity/RCF costs of 4bps (of notional debt) but does not allow for any draw-down. Assuming facilities half-drawn, we estimate costs of 9bps

- At GD2/T2, Ofgem cites evidence of liquidity cost of 3-5.5 bps based on:
  - RFPR and group account data about RCF holdings, and
  - The costs associated with commitment fees on revolving credit facilities of 35-45 bps, and assuming facilities cover 10 per cent of companies' debt[1]
- Ofgem ignores potential draw-down costs. Companies will in practice draw down facilities to manage volatility in cash-flow requirements
  - Ofgem also wrongly states "*one should not include the utilisation fee in the liquidity cost, because this is when the debt is drawn down and is covered by the cost of debt allowance in any event*"[2]
  - companies will draw down facilities to meet operational cash-flow requirements and incur utilisation and interest fee
    - As shown in our earlier report, liquidity cost/RCF cost = 9bps if facility half-drawn
  - Draw-down RCF meets operational needs – it is not remunerated through RAV*WACC
- In our previous report, our 4.5 bps liquidity cost assumed no draw-down of RCF – a conservative assumption
  - However, we halve cost-of-carry estimate on basis that RCF is used to meet pre-financing (see next slide)
  - More reasonably, we assume 50% of RCF is drawn to meet cost of carry, as well as working capital requirement and pre-funding investment

- Drawing on company's latest RCF/liquidity cost evidence, we estimate the average liquidity cost to be at 9bps of notional debt, based on these further assumptions (in addition to commitment fee and facility size):
  - Assumes RCF are on average half drawn
  - Annual utilisation fee: 20bps of drawn credit facility amount
  - Interest on the liquidity facility: LIBOR + 35 bps

Break-down of NERA estimate of 9 bps liquidity cost (assuming facility half-drawn)

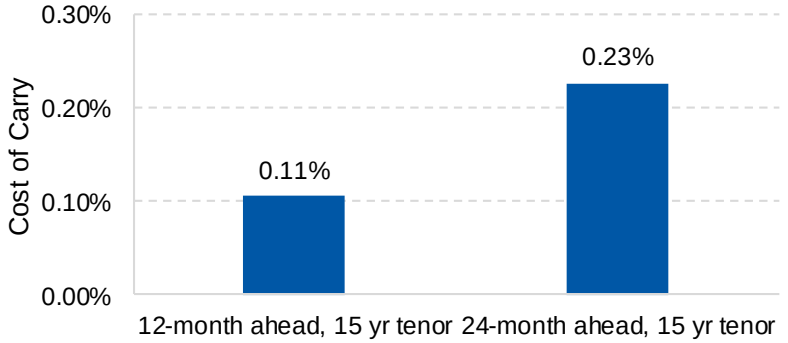


Source: 1. Ofgem (December 2020), RIIO-2 Final Determinations – Finance Annex, p.14. 2.Ofgem RIIO-2 Draft Determinations – Finance Annex, page 181

At GD2/T2 FD, Ofgem determined cost of carry of 10 bps from a range of 1.5-11 bps, compared to our earlier estimate of 11-23 bps

- Cost-of-carry is defined as the requirement to issue debt ahead of maturity to meet sufficiency of resources requirement, rating agency and debt covenant requirements etc.
- In our earlier report for ENA[1], we calculated cost-of-carry range from 11 to 23 bps, assuming:
  - RCF could in part meet pre-financing needs, but also required to meet working capital requirement and pre-funding investment.
  - pre-financing period between 12 to 24 months in line with licence requirement and rating criteria.
  - debt tenor of 15 years (refinancing 1/15 of debt each year).
  - Net carry cost of iBoxx A/BBB less Libor on cash-deposits, based on 5-year average interest rate differentials.

Cost of carry of 11-23 bps based on 12 to 24 months pre-financing and 15-year debt tenor

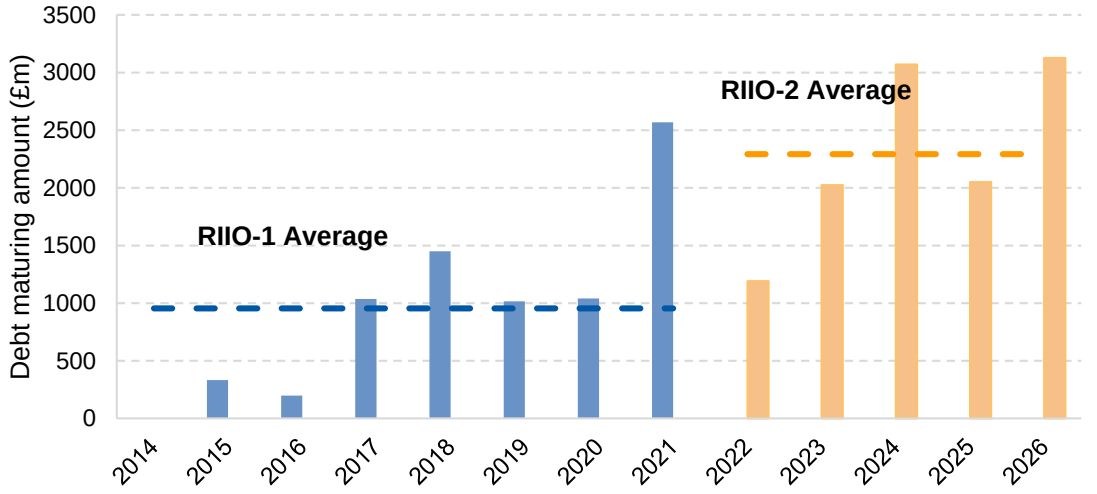


- At DD, Ofgem estimated a cost of carry range of 1.5-11 bps, based on a range of 0.6-4.1% cash on balance sheet (RFPR data), and a differential between iBoxx and 3-month deposit rates.[2]
- In our previous report, we noted that Ofgem's analysis of cash holdings at OpCo and Group level is unreliable, because Ofgem's analysis does not reflect divergent approaches taken by companies to location of Treasury functions.
  - We showed that some companies undertake Treasury functions entirely at Group, and others conduct Treasury functions at the OpCo level.
  - Ofgem's RFPR cash data only provides end-year snapshot where the cash positions are managed down, whereas within year average far higher.
- At FD, Ofgem argued that it recognised that corporate Treasury functions can be located at different levels, and it used group accounts where licensee level accounts showed no cash
  - Ofgem determines a cost of carry of 10 bps. While it retained its DD range (1.5 to 11 bps), it adjusted its point estimate towards the top end based on further evidence from NG's group level cash balances and net debt.[3]
  - Even if we accept Ofgem's analysis of companies cash reserves (which we do not), it has not considered greater cash requirement at RIIO-2 relative to RIIO-1, as we explain in next slide.

Sources: 1. NERA (September 2020), Review of Ofgem's DD Additional costs of borrowing, and deflating nominal iboxx, section 3; 2. Ofgem examined network RFPR/BPDT and group accounts for actual cash holdings, based on i) 0.6% RAV cash-holdings based on median of network/OpCo data, ii) 4.1% based on mean of cash held on balance sheet, with 75% weighting on OpCo and 25% weighting on group. Ofgem (July 2020), RIIO-2 Draft Determinations – Finance Annex, p.182; 3. Ofgem (December 2020), Ofgem (December 2020), RIIO-2 Final Determinations – Finance Annex, p.14.

Companies have higher cash requirement in RIIO-2 than in RIIO-1, due to higher amount of debt maturing and greater use of uncertainty mechanisms, hence requiring higher cost of carry

- Ofgem's use of historical cash-reserves over RIIO-1 likely to understate cash requirements at RIIO-2.
- We show that the level of GD/T/ED debt maturing at RIIO-2 will be more than double compared to RIIO-1 (below):
  - Ofgem's mid-point 2.5% RAV RIIO-1 cash-requirement (i.e. mid-point 0.6-4.1%) should therefore be at least 5%, which corresponds to at least **12 bps**
  - This is consistent with our notional analysis of cost of carry (see next slide)
  - In RIIO-2, greater use of uncertainty mechanisms also increases need for operational cash.

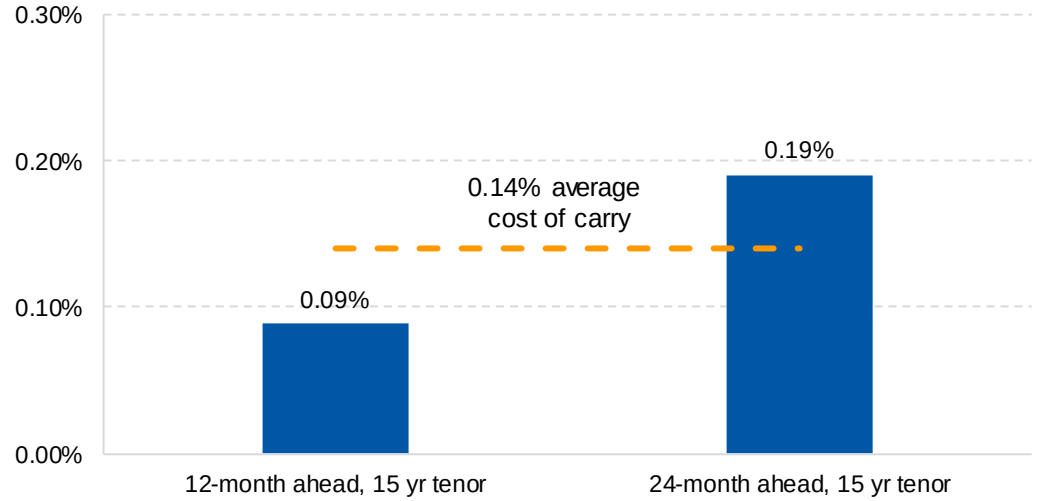


NERA analysis of GD/T/ED companies RFPR data

Similar to our previous report, assuming that RCF is partially used to meet pre-financing requirement results in cost of carry of 14 bps (range: 9-19 bps)

- We assume 50% of RCF can meet pre-financing needs, implying cost of carry of 14 bps, based on range of 9-19 bps:
  - pre-financing period 12 to 24 months and debt tenor of 15 years, based on average tenor
  - Net carry cost of iBoxx Utilities index less overnight LIBOR on cash-deposits.
    - Companies confirmed that reasonable assumption as focus is on providing liquidity rather than investing.

We estimate cost of carry assuming half pre-financing requirement met by RCF



Note: We assume that carry costs are amortised over the tenor of the bond as opposed to expensed as cash cost within period, as per Ofgem/ regulators' approaches to other costs.

Conclusions: We estimate additional cost of borrowing of 43 bps, with a range of 38 to 48 bps, compared to Ofgem's FD of 25 bps

	Ofgem DD	Ofgem FD	NERA (Aug 2020)	NERA (Apr 2021)	Comment
Transaction Costs	6 bps	6 bps	7 bps	7 bps	Ofgem draws on company data but excludes outlier NERAs analysis includes all companies within sample
Liquidity/RCF cost	3 - 5.5 bps	4 bps	4.5 bps	9 bps	Both Ofgem and NERA draw on companies' assumptions on RCF size and cost
Cost of carry	1.5 – 11 bps	10 bps	11 - 23 bps	9 - 19 bps	Ofgem assumptions on cash at OpCo and Group unreliable NERA approach assumes 12-24 mth pre-financing, half met by RCF
New issue premium (NIP)	0	0	9 bps	7 bps	Ofgem's analysis does not draw on precise measures of spread, includes callable bonds; NERAs spreads calculation duration matched and support 7 bps
CPI indexation costs	0	5 bps	15 bps	6 bps	Ofgem recognises CPI switching costs of 5bps; NERA's estimate based on a higher RPI-CPI switching cost estimate
Total	**17 bps**	**25 bps**	**47 – 59 bps (53bps)**	**38 – 48 bps (43 bps)**	mid-point of its range

Sources:
Ofgem (July 2020) Consultation – RIIO-2 Draft Determination – Finance Annex, p. 14
Ofgem (December 2020), RIIO-2 Final Determinations – Finance Annex, p.14.
NERA (September 2019) Halo effect and additional costs of borrowing at RIIO-2, A report for ENA, p. 18

4 Small Company Premia

At GD2/T2, Ofgem allowed 6 bps additional provision for notional licensees expected to issue smaller size or less frequently

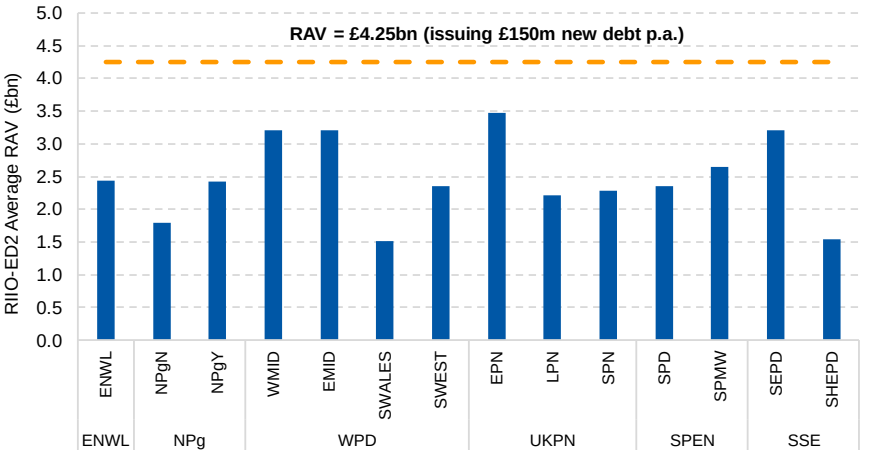
- In its FD for GD2/T2, Ofgem allowed 6 bps additional provision for notional licensees expected to issue smaller size or less frequently than other networks due to their lower RAV size and RAV growth for RIIO-2.[1]
- Ofgem defined less frequently issuing notional networks as those that are expected to issue less than £150 million p.a. on average, lower than the assumed £250 million minimum efficient size as Ofgem considered that it was possible to issue £250 million face value but then retain up to £100 million for sale at a later date.
- Ofgem's allowance is designed to address the cost or risk associated with infrequent issuance, which exposes companies to risk that their debt will deviate from the allowance.
  - At GD2/T2, network companies noted that in the past they were able to mitigate the risk of infrequent issuance by issuing EIB debt – where the lower notional principal amounts and shorter tenors allowed more frequent issuance. However, EIB would no longer be available at RIIO-2.
- Ofgem's 6 bps allowance based on two main sources:
  - i) **Evidence from constant maturity swaps (CMS)**: under CMS, the issuing party receives a fixed iBoxx rate (on the date of issuance) and pays a rate that is reset daily based on the swap rates matching the duration of the debt issuance.
    - In the case of GD2/T2, the assumed maturity was 15 years. Evidence from banks on the price of the CMS was around 26 bps. SGN Scotland assumes Ofgem calibrates the allowance for cost of embedded debt appropriately hence the premia only applies to new debt, hence the premia is ca 6 bps for Scotland.
  - ii) **Liquidity premium for smaller debt issuance**: an alternative is to assume companies issue lower value nominal debt on an annual basis yet at a higher cost, reflecting the reduced liquidity of lower face value debt.
    - At GD2/T2, NGN estimated the liquidity premium at around 15 bps, and assumes that this only applies to its new debt issuance over RIIO-2 of ca 40 per cent, which translated into a 6 bps uplift.
- Whilst SGN Scotland and NGN provided estimates of these costs on two different bases, they led to the same additional allowance of 6bps, which Ofgem considered reasonable.

Sources: 1. Ofgem (2020) Decision - RIIO-2 Final Determinations – Finance Annex (REVISED) para 2.62 p. 23.

We find that all DNO licensees would qualify Ofgem's GD2/T2 definition of less frequently issuing notional networks

- Ofgem defined less frequently issuing notional networks as those that are expected to issue less than £150 million p.a. on average.
- We identify the networks that qualify for the premium based on Ofgem's GD2/T2 approach using a notional approach, by comparing:
  - i) RAV implied by the minimum new debt issuance, calculated as £150m*17/60%, i.e. assuming that 1/17th of debt RAV is refinanced each year, and that annual RAV growth is funded 60% by debt each year.
  - ii) company's expected RAV in RIIO-ED2, based on PCFM's ED1 RAV extrapolated using 5% annual growth.
  - We identify that all DNOs qualify for the premium based on Ofgem's GD2/T2 approach.
- For those who have provided us with company's expected new debt issuance in ED2, we find that some licensees expect to issue more than Ofgem's average £150m new debt p.a. threshold.
  - However, Ofgem stated in GD2/T2 FD that it would consider qualification for the infrequent issuer on a notional basis.
  - Also, all companies expect to issue less than £250 million minimum efficient size.

- Figure below shows that all DNO licensees qualify Ofgem's definition of non-frequent issuing notional networks, based on the criterion of issuing less than £150m p.a. on average.



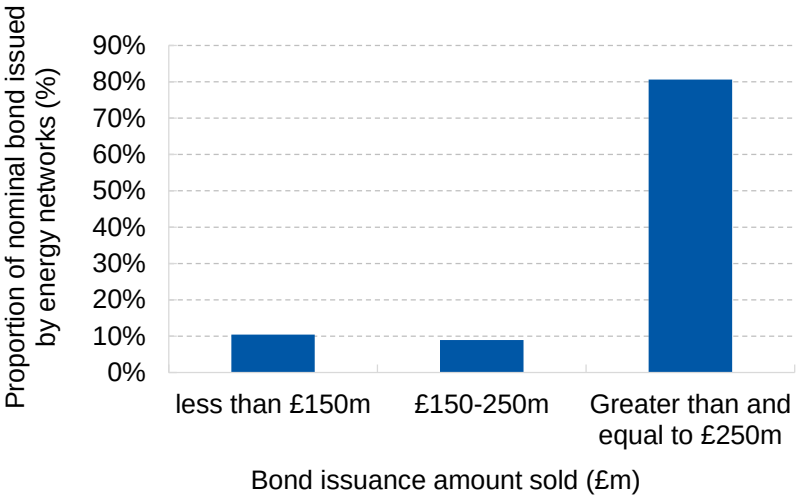
Sources: NERA analysis of PCFM data

Ofgem defines infrequent issuer as those expected to issue less than £150m p.a., lower than the assumed minimum of £250m, as Ofgem assumes companies use tap issues. However, in practice, most companies issue greater than or equal to £250m, and rarely use tap issues

Around 80% of debt are issued at or above £250m

- In its GD2/T2 FD, Ofgem defined less frequently issuing notional networks as those that are expected to issue less than £150 million p.a. on average, lower than the assumed £250 million minimum efficient size.
  - Ofgem argued that it was possible to issue £250 million face value, but then retain up to £100 million for sale at a later date (aka tap issue).
- We have examined market evidence on the prevalence of debt issuance by size, which we summarise in figure below.
- In practice, we observe the vast majority of companies debt issuance sizes are greater than or equal to the benchmark size of £250m, which accounts for 80% of all networks' bond issuances.
- Hence, Ofgem's assumption that the minimum size is £250m of which £100 million can be issued as a second tranche is not widely adopted in practice.
  - As we show in the next slide, evidence suggests tap issues may face higher illiquidity premia for their smaller sizes.

The majority of network bond issuance by size is greater than or equal to the £250m benchmark size



Median network bond issue size is at £300m, and the LQ size is at £250m

	Bond issuance size (£m)
Average	319
Median	300
lower quartile	250
upper quartile	350

Sources: NERA analysis of networks' bond data

Ofgem underestimated the infrequent issuer cost at GD2/T2 using CMS, as CMS does not hedge credit risk. Evidence from bid-ask spread suggests that bonds smaller than £250m may face ca 50 bps higher bid-ask spread

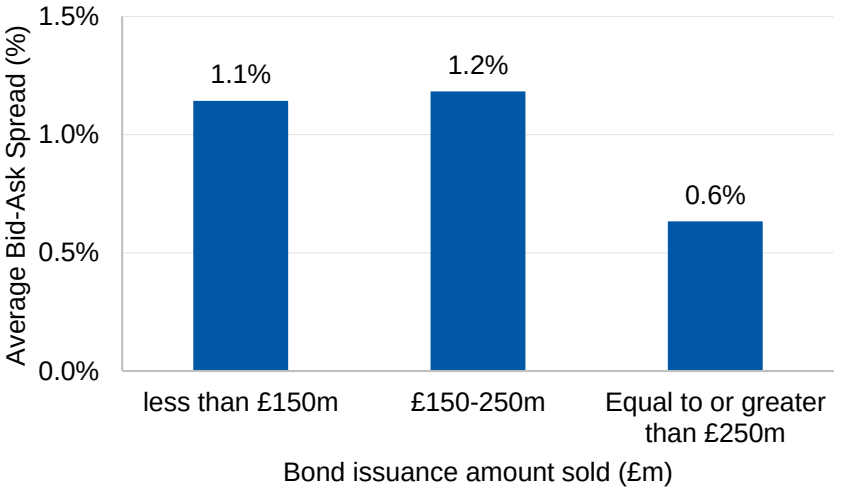
Ofgem underestimated the infrequent issuer cost at GD2/T2 using CMS, as CMS does not hedge credit risk

- At GD2/T2, Ofgem used CMS to estimate the interest rate risk at 26 bps. However, the CMS should only provide for a lower bound value of the infrequent issuer premium:
  - a CMS only covers the interest rate risk, but credit spread risk is not hedged, hence an infrequent issuer still carries disproportionate financial risk exposure.
  - As shown below, the historical credit spread of iBoxx Utilities index shows that infrequent issuers may face substantial credit risk when it attempts to raise debt financing.

Sources: NERA analysis of networks' bond data

Bid-ask spreads of bonds smaller than 250m benchmark size have ca 50 bps higher bid-ask spread

- We estimate the bid-ask spreads for bonds by size of issuance.
  - Data shows that average bid-ask spread for bonds smaller than £250m is ca 50 bps higher than bonds issued at or above £250m.
- This suggests that if companies were to issue £250 million face value, but then retain up to £100 million for sale at a later date, the tap issue may face higher illiquidity premia.



Sources: NERA analysis of networks' bond data

Conclusion: We find all DNO licensees would qualify Ofgem's definition of non-frequent issuing notional networks, and we estimate an infrequent issuer premium to be 9-17.5 bps

- We find that all DNO licensees would qualify Ofgem's definition of non-frequent issuing notional networks, based on the criterion of issuing less than £150m p.a. on average.
- We consider the threshold for infrequent issuer should be higher than £150 million:
  - Ofgem's assumption that the minimum size is £250m of which £100 million can be issued as a second tranche is not widely adopted in practice, as 80% of networks' bond issued at or above £250m.
  - Evidence suggests using tap issues may lead to higher illiquidity premia.
- Ofgem have underestimated the infrequent issuer cost at GD2/T2 using CMS and illiquidity premium:
  - The CMS only hedges the interest rate risk and does not hedge credit risk. Therefore, the CMS should only provide for a lower bound value of the infrequent issuer premium.
  - As a better measure of the illiquidity premium, average bid-ask spread of bond issues smaller than £250m is ca 50 bps higher than bonds issued at or above £250m, suggesting illiquidity premium could be ca 50 bps.
- Therefore, we consider the infrequent issuer premium should be in the range of 9 bps to 17.5 bps:
  - lower bound of 9 bps (26bps*35% new debt/total debt in ED2) based on the CMS-implied premium, since CMS does not provide risk hedging for credit risk.
  - Upper bound of 17.5 bps (50bps*35% new debt/total debt in ED2) based on the bid-ask spread differential between the sub-benchmark sized issues and issues at and above £250m.

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