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Consultation

Electricity Transmission Network Output Measures Rebasing Consultation

Publication date:	26 August 2020	**Contact:**	Leyun Kong
		Team:	Network Output Measures
Response deadline:	24 September 2020	**Tel:**	020 7901 7000
		Email:	Leyun.Kong@ofgem.gov.uk

We are consulting on our intention to approve the rebased Network Replacement Outputs for Electricity Transmission. We would like views from people with an interest in Electricity Transmission Network Output Measures, in particular from licensees and electricity network customers. We also welcome responses from other stakeholders and the public.

This document outlines the scope, purpose and questions of the consultation and how you can get involved. Once the consultation is closed, we will consider all responses. We want to be transparent in our consultations. We will publish the non-confidential responses we receive alongside a decision on next steps on our website at **Ofgem.gov.uk/consultations**. If you want your response – in whole or in part – to be considered confidential, please tell us in your response and explain why. Please clearly mark the parts of your response that you consider to be confidential, and if possible, put the confidential material in separate appendices to your response.

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1. Introduction

Network Output Measures (NOMs)

1.1. RIIO (Revenue = Incentives + Innovation + Outputs) introduced in October 2010 by Ofgem is an outputs-led price control framework. The RIIO price control for the electricity transmission sector (RIIO-ET1) runs from 1 April 2013 until 31 March 2021. It is important that, throughout the RIIO-ET1 period, the network companies understand what they are expected to deliver, and are held to account for delivery. One of the key areas in this respect are the Network Output Measures (NOMs), which help to quantify the impact of the companies' asset management work, and enable Ofgem and stakeholders to see what the network companies have done in respect of the work they have been funded to deliver.

Network Replacement Outputs

1.2. We[1] have set out the arrangements relating to NOMs[2] in the licences of all gas and electricity networks. As part of these arrangements, licensees have been set targets that set out the network risk outcomes they are required to deliver by the end of RIIO-1 through their asset management activities. For Electricity Transmission Operators (also referred as ETOs[3]), these targets are called Network Replacement Outputs (NROs) and are set out in Special Condition 2M (SpC 2M)[4] of their electricity transmission licences[5]. Each ETO is required to deliver its own NROs by the end of RIIO-ET1. These NROs reflect the impact of the asset intervention workload (usually replacement or refurbishment) that each ETO has been funded to deliver in RIIO-ET1, and they represent replacement priority targets[6] to be delivered through interventions on seven NOMs lead asset categories across three voltage levels[7]. The

[1] The Gas and Electricity Markets Authority. Ofgem is the office of the Authority. The terms "Ofgem", "the Authority," "we" and "us" are used interchangeably in this document.
[2] NOMs are mechanisms that provide a means to monitor and assess the network asset management outcomes that network companies deliver.
[3] The terms "ETO" and "licensee" are used interchangeably in this document. They refer to the onshore electricity transmission network operators (National Grid Electricity Transmission plc (NGET), Scottish Hydro Electric Transmission plc (SHET), SP Transmission plc (SPT)).
[4] Special Licence Condition 2M. Part A: Specification of Network Replacement Outputs.
[5] Table 1: Network Replacement Outputs set the replacement priority (RP) expected to be reached by 31 March 2021. The RP is based on the asset volumes distributed, based on their health and criticality, onto 5x4 tables. For each asset category, the licensees have stated their price control start position (2013) and their view of the price control end position (2021) for both with and without intervention scenarios.
[6] Replacement priority targets is the expected position ETOs are targeted to meet through their intervention plan for RIIO-ET1.
[7] These are: Circuit Breaker, Transformer, Reactor, Underground Cable, OHL (overhead line) Conductor, OHL fittings, and Towers (SHET and SPT only), across three voltage levels: 400KV, 275KV and 132KV.

NROs are based on ETOs' own methodologies for assessing the health and criticality of their network assets and the impact of their asset interventions on these parameters.

Development of the ETOs' NOMs Methodologies

1.3. The NOMs mechanism provides a means to monitor and assess the network asset management outcomes that network companies deliver. They represent the service delivery resulting from companies' asset interventions, and can be considered a forward-looking indicator of network performance.

1.4. Each of the ETOs had their own methodology on which their NRO targets (we refer to these as "Original Targets") were based at the beginning of the RIIO-ET1 price control for the purpose of prioritising network assets for replacement or refurbishment. However, because these methodologies were volume based, they did not allow for robust like-for-like comparisons across different asset categories. On 7 August 2018, the Authority published its decision to not reject the modified electricity transmission NOMs Methodology Issue 18 (the "NOMs Methodology")[8], which utilised a monetised risk approach[9] to help address these comparability issues. As part of that decision, we noted the following:

> *The licence requires that the targets should reflect any changes as a result of modifications to the NOMs methodology. As part of this process, the Licensees need to convert these targets into equivalent monetised targets. The rebased targets shall be the basis against which Licensee performance shall be measured and shall also allow for the implementation of the RIIO-T1 incentive mechanism.*

1.5. The exercise of translating existing asset volume targets into monetised targets is called "rebasing". We refer to these equivalent monetised risk targets as the "Rebased Targets".

[8] https://www.ofgem.gov.uk/publications-and-updates/decision-not-reject-modified-electricity-transmission-network-output-measures-noms-methodology-issue-18

[9] Under this approach, risk values are represented in monetary terms as a 'common currency' to enable like-for-like comparison between assets and asset groups. Please refer to the methodology linked in footnote 8 for further details.

NOMs Incentive Methodology and Rebasing

1.6. On 6 December 2018, the Authority published its decision on a common approach to implementing the NOMs Incentive Methodology[10]. This decision set out the requirement for each sector to implement specific aspects of this agreed methodology. As part of the close-out of RIIO-ET1, we will need to assess the ETOs' performances against their Original Targets and calculate the value of any revenue adjustments that might be due under the NOMs Incentive Mechanism. In order to allow us to carry out this assessment, we need to ensure that both the NOMs target data and the reported actual delivery data are derived on the same basis (i.e. according to the same methodology) and are expressed in the same terms. ETOs' actual deliveries at the end of RIIO-ET1 will be reported in accordance with the NOMs Methodology. As discussed above, the ETOs are expected to rebase their Original Targets into equivalent monetised risk targets to enable like-for-like comparison between asset categories.

1.7. Appendix 3 to our August 2018 decision not to reject the NOMs Methodology[8] set out that when completing the rebasing exercise, we expect the ETOs to adhere to the following principles (the "Rebasing Principles"):

1) Rebased targets shall be as equally challenging as the original ones for each licensee to meet or outperform,

2) The same principles shall be applied as those used in each respective licensee's RIIO-T1 Business Plan, and

3) Direct translation of the original investment plan shall be made wherever appropriate.

1.8. NGET and SHET submitted an initial set of Rebased Targets to Ofgem on 31 July 2019, and SPT submitted its targets in December 2019. Since then, we have worked with the companies to finalise their rebasing methodologies and to agree on a standard data reporting format that allows us to compare their Rebased Targets against their Original Targets. The

[10] https://www.ofgem.gov.uk/publications-and-updates/decision-network-output-measures-noms-incentive-methodology

three ETOs submitted their final Rebased Targets for Authority approval between December 2019 and July 2020.[11]

1.9. The ETOs have absolute network risk targets for RIIO-ET1. This means that each ETO is required to keep the risk on its network under a specified level at the end of the price control period (31 March 2021).[12] The total network monetised risk (R£) values submitted by the ETOs as their Rebased Targets for the end of RIIO-ET1 are shown in Table 1. **Appendix 1** provides a breakdown of the target position into the asset categories used in the Original Targets. The ETOs are permitted to trade risk across these categories in order to deliver their own total risk target. The equivalent 'without intervention' position (i.e. the level of risk on their networks if the ETOs did not carry out any work during RIIO-ET1) is also detailed in the table.

Table 1: Summary of ETOs' Rebased Targets and equivalent 'without intervention' position

ETO	Rebased Target (R£m)*	Equivalent 'without intervention' position (R£m)*
NGET	1,030.211	1,672.317
SHET	1,166.555	1,367.542
SPT	4,972.194	6,027.223

*Please note that due to methodological and other differences, absolute values are not comparable across companies.

1.10. Having assessed the Rebased Targets, we are satisfied that these targets and the equivalent 'without intervention' position have been derived in accordance with the Rebasing Principles. We are also satisfied that the monetised risk values submitted as the Rebased Targets are suitable for relative comparison and risk trading amongst the original NRO categories[13] for the purposes of assessing each ETO's performance under the NOMs incentive mechanism at the end of RIIO-ET1, and for making any consequential adjustments to its allowed revenue.

[11] SPT submitted its final Rebased Targets on 6 December 2019, NGET submitted its final Rebased Targets on 3 July 2020, and SHET submitted its final Rebased Targets on 29 July 2020.
[12] This is different to the Electricity Distribution (ED) and Gas Distribution (GD) targets, which are based on removal of relative risk from the network.
[13] Risk trading in the context of NROs refers to when a licensee delivers a materially equivalent NRO, in place of another NRO they set out to deliver, as set out in paragraph 2M.3 of SpC 2M.

Our minded-to decision

1.11. Our minded-to decision is to approve the Rebased Targets for all three ETOs.

What we are consulting on

1.12. This consultation seeks views on the following questions:

- Do you agree with our rebasing assessment methodology? (Section 3)
- Do you agree with our view that the Rebased Targets satisfy the Rebasing Principles? (Section 4)
- Do you agree with our minded-to decision to approve the ETOs' Rebased Targets and to modify their licences in order to substitute them for the Original Targets? (Section 5)

1.13. Where you disagree, please clearly set out your reasoning and specify any other considerations/factors we should take into account.

1.14. Alongside this consultation document, we have published a notice of statutory consultation on a proposal to modify SpC 2M of the ETOs' licences in order to implement our minded-to decision.

1.15. If we decide to make the proposed licence modification, it will take effect no less than 56 days after the decision is published.

How to respond

1.16. We want to hear from anyone interested in this consultation. Please send your response to the person or team named on this document's front page.

1.17. We've asked for your feedback in each of the questions throughout. Please respond to each one as fully as you can.

1.18. We will publish non-confidential responses on our website at www.ofgem.gov.uk/consultations.

Your response, data and confidentiality

1.19. You can ask us to keep your response, or parts of your response, confidential. We'll respect this, subject to obligations to disclose information, for example, under the Freedom of Information Act 2000, the Environmental Information Regulations 2004, statutory directions, court orders, government regulations or where you give us explicit permission to disclose. If you do want us to keep your response confidential, please clearly mark this on your response and explain why.

1.20. If you wish us to keep part of your response confidential, please clearly mark those parts of your response that you *do* wish to be kept confidential and those that you *do not* wish to be kept confidential. Please put the confidential material in a separate appendix to your response. If necessary, we will get in touch with you to discuss which parts of the information in your response should be kept confidential, and which can be published. We might ask for reasons why.

1.21. If the information you give in your response contains personal data under the General Data Protection Regulation 2016/379 (GDPR) and domestic legislation on data protection, the Gas and Electricity Markets Authority will be the data controller for the purposes of GDPR. Ofgem uses the information in responses in performing its statutory functions and in accordance with section 105 of the Utilities Act 2000. Please refer to our Privacy Notice on consultations, see Appendix 6.

1.22. If you wish to respond confidentially, we'll keep your response itself confidential, but we will publish the number (but not the names) of confidential responses we receive. We won't link responses to respondents if we publish a summary of responses, and we will evaluate each response on its own merits without undermining your right to confidentiality.

General feedback

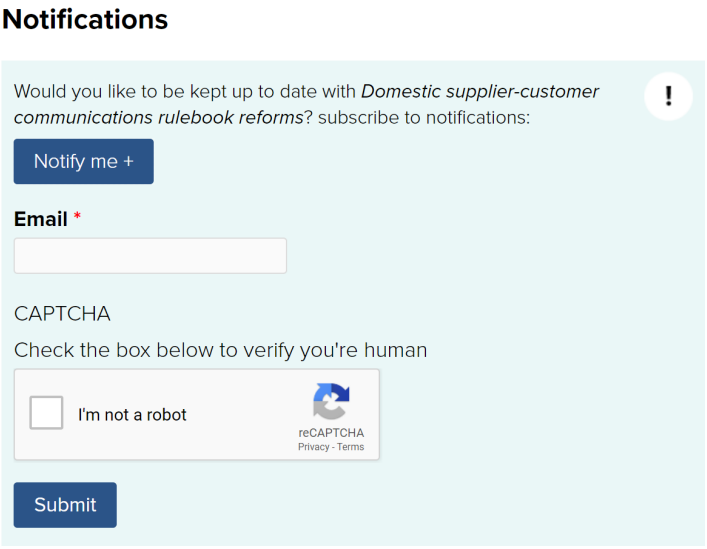
1.23. We believe that consultation is at the heart of good policy development. We welcome any comments about how we've run this consultation. We'd also like to get your answers to these questions:

1. Do you have any comments about the overall process of this consultation?
2. Do you have any comments about its tone and content?
3. Was it easy to read and understand? Or could it have been better written?
4. Were its conclusions balanced?
5. Did it make reasoned recommendations for improvement?
6. Any further comments?

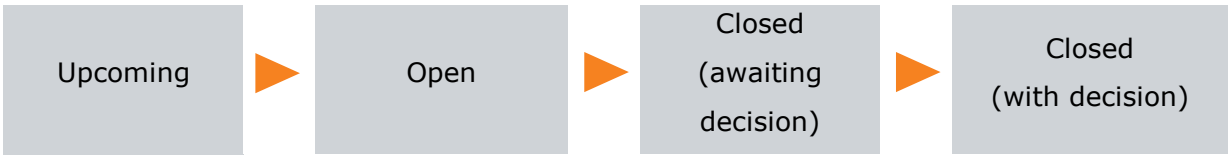
Please send any general feedback comments to stakeholders@ofgem.gov.uk

How to track the progress of the consultation

You can track the progress of a consultation from upcoming to decision status using the 'notify me' function on a consultation page when published on our website. Ofgem.gov.uk/consultations.



Once subscribed to the notifications for a particular consultation, you will receive an email to notify you when it has changed status. Our consultation stages are:



2. Overview of the ETOs' validation of the NOMs Methodology and of the rebasing methodologies

Section summary

This section presents an overview of the approach taken by the ETOs to validate the NOMs Methodology, the processes they followed in developing their rebasing methodologies, and our views on these.

ETOs' approaches to validating the NOMs Methodology

2.1. In our August 2018 decision on the NOMs Methodology[14], we said that we expect the ETOs to run a process of Calibration, Testing and Validation (CTV) of the NOMs Methodology. This is the process by which the application of the NOMs Methodology is checked and verified as far as possible against real business scenarios and asset failures, which enables the licensees and Ofgem to confirm the extent to which the methodology's outputs can be relied upon as an input when making investment decisions. The ETOs submitted a CTV Plan to Ofgem in 2017[15], and each submitted a number of reports in 2018 and 2019 in relation to their validation of the NOMs Methodology[16].

2.2. As part of these validation exercises, the ETOs calibrated and tested their NOMs model input values. They were also required to investigate and ensure model outputs are consistent and comparable[17]. The ETOs' validation prioritised the most critical items in the CTV Plan. We agreed that by focusing on these prioritised elements, the validation could give suitably robust results to allow us to form views on the fitness for purpose of the NOMs Methodology outputs.

[14] https://www.ofgem.gov.uk/publications-and-updates/decision-not-reject-modified-electricity-transmission-network-output-measures-noms-methodology-issue-18
[15] https://www.ofgem.gov.uk/system/files/docs/2017/05/c.1_calibration_testing_validation.pdf
[16] These were not a single submission from the ETOs but an iterative series of submitted validation cases. NGET also submitted an overall technical report as a summary of the validation cases.
[17] As set out in our further instructions to ETOs on modifications to their NOMs Methodology: https://www.ofgem.gov.uk/system/files/docs/2017/06/et_noms_instructions_for_further_development_final_2.pdf

2.3. During this validation process (but prior to the submission of the Rebased Targets), two errors in the equations for the system consequences and improvements in NGET's OHL conductors and fittings scoring methods in the NOMs Methodology were identified. The Rebased Targets have corrected for these errors and implemented the improvements; however, in order to reflect these corrections and improvements into the NOMs Methodology, the ETOs have recently published a consultation on modifying that methodology to update the two equations for system consequences and NGET's OHL conductors and fittings scoring methods.[18] Stakeholders can provide their views on the proposed corrections directly to each ETO.

2.4. We are satisfied with the ETOs' proposed amendments to the NOMs Methodology and that the errors identified have been corrected in the Rebased Targets, however, we will take responses to that consultation into account in our decision on the targets.

2.5. A detailed analysis of the validation exercises and future improvements in CTV can be found in **Appendix 2.**

Our views on the ETOs' validation exercises

2.6. Following review of the ETOs' validation exercises, we are satisfied that, if applied correctly, the ETOs' NOMs Methodology is suitable for rebasing the Original Targets and to enable end-of-period assessment of their performances against the Rebased Targets. We expect the ETOs to continue to improve the NOMs Methodology throughout RIIO-2, which should include a process of continued CTV.

ETOs' rebasing methodologies

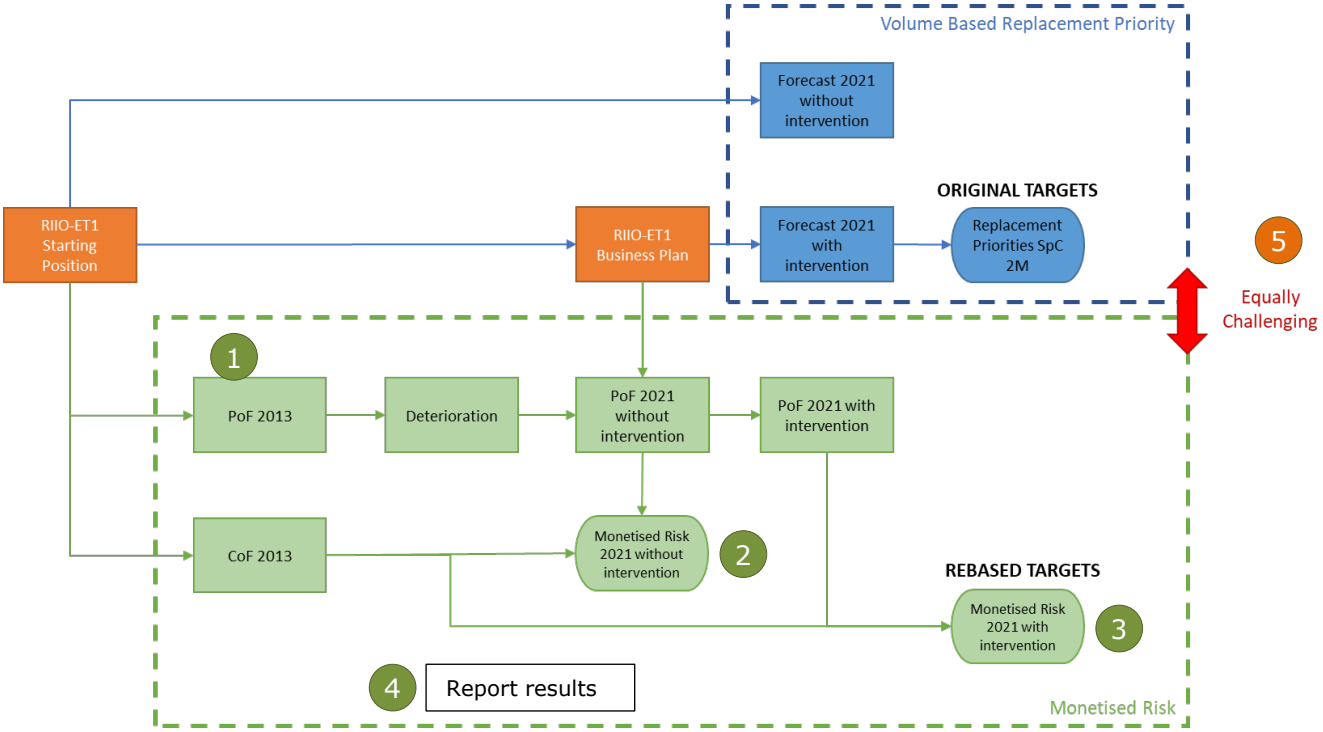
2.7. Each of the ETOs submitted a document detailing the methodology it used to produce its Rebased Targets. Overall, the ETOs adopted an approach that calculates the monetised

[18] Links to the consultation:
http://www.nationalgrid.com/NARA;
https://www.ssen-transmission.co.uk/information-centre/industry-and-regulation/network-output-measures/;
https://www.spenergynetworks.co.uk/pages/transmission_network_outputs_methodology_consultation.aspx

risk at the start of RIIO-ET1 and forecasts the monetised risk target at the end of RIIO-ET1, based on the NOMs Methodology and on their original asset intervention plans[19].

2.8. Figure 1 below illustrates the ETOs' overall rebasing process.

Figure 1: ETOs' rebasing process overview



2.9. **Appendix 3** provides a high-level summary of each ETO's rebasing methodology. Further details are available in the ETOs' rebasing methodology documents, which are published alongside this consultation.

Our views on the ETOs' rebasing methodologies

2.10. We have reviewed the ETOs' rebasing methodologies and supporting evidence. We are satisfied that their approaches to deriving the network risk position at the start of RIIO-T1 are appropriate and utilised the most complete and robust data available to them. We are also satisfied that the rebasing approach followed by each of the ETOs properly represents their

[19] The original asset intervention plan was used as the input to forecast the Original Targets based on the old NOMs methodologies.

network risk positions at end of RIIO-T1 for both 'with intervention' and 'without intervention' scenarios using the NOMs Methodology. Therefore, we are of the view that the ETOs' rebasing methodologies are suitable approaches for deriving each of their Rebased Targets.

2.11. In the next section, we explain how we have assessed the ETOs' submitted Rebased Targets against the Rebasing Principles.

3. Our Rebasing Assessment Methodology

Section summary

This section discusses our rebasing assessment methodology and seeks views on it.

Question 1: Do you agree with our rebasing assessment methodology?

Relationship between Original Targets and Rebased Targets

3.1. As discussed above, our August 2018 decision on the NOMs Methodology set out the Rebasing Principles that the ETOs were expected to adhere to when doing the rebasing exercise. These are that:

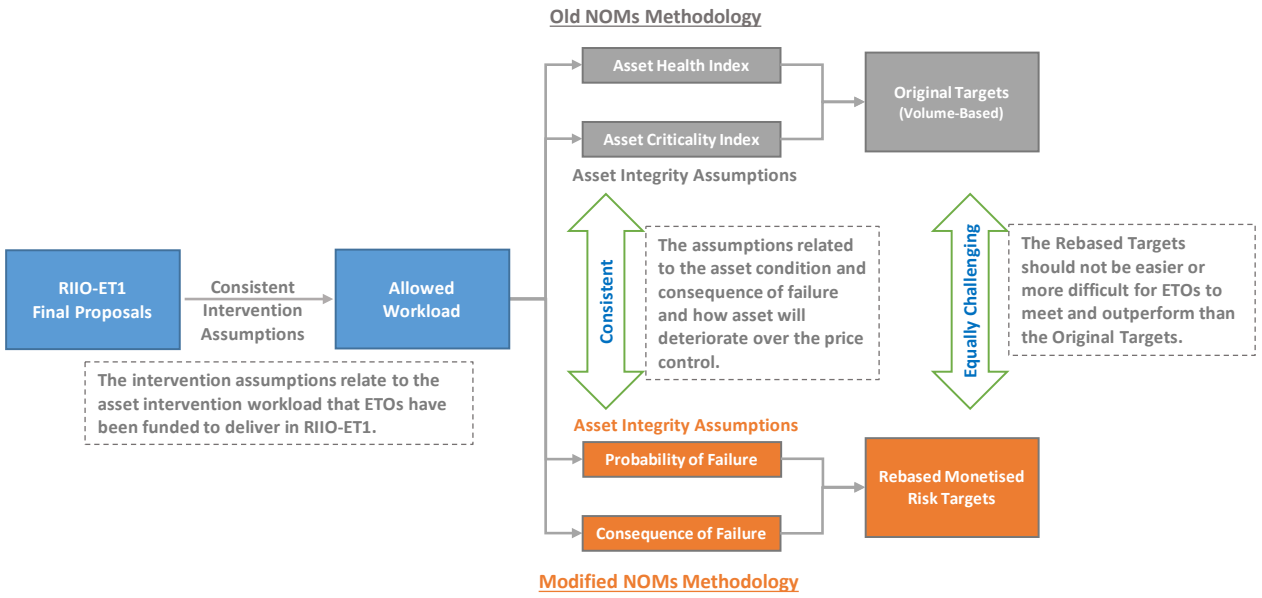
1. Rebased targets shall be as equally challenging as the original ones for each licensee to meet and outperform,
2. The same principles shall be applied as those used in each respective licensee's RIIO-T1 Business Plan, and
3. Direct translation of the original investment plan shall be made wherever appropriate

3.2. Our assessment considers if the submitted Rebased Targets meet each of these principles.

3.3. The relationship between the Original Targets and the Rebased Targets is illustrated in Figure 2. The Original Targets were volume-based outputs[20], while the Rebased Targets use a monetised risk approach. Fundamentally, both sets of targets are based on consistent asset integrity assumptions and the same allowed workload the ETOs were funded to deliver in RIIO-ET1.

[20] This is because the methodology in accordance with which those targets were derived was volume-based.

Figure 2: Relationship between Original and Rebased Targets



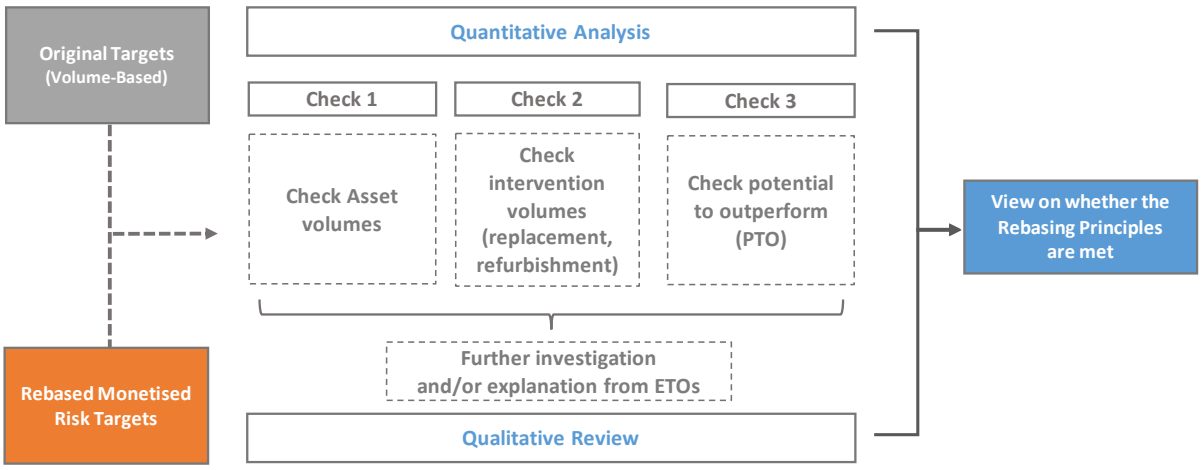
Our rebasing assessment[21]

3.4. No single test can by itself confirm that the Rebased Targets satisfy all three Rebasing Principles. We have, therefore, adopted a two-stage assessment to confirm whether the submitted Rebased Targets meet all three principles. Stage 1 (Quantitative Analysis) involved running a series of mathematical indicative comparisons between the Original and Rebased Targets. Stage 2 (Qualitative Analysis) involved interpreting and understanding any anomalous results from Stage 1. The assessment approaches we applied to the ETOs' Rebased Targets are consistent with the assessments we applied for electricity distribution, gas distribution, and gas transmission companies, but they have been modified where appropriate to take into account differences in target specifications and differences in available data.

3.5. An overview of our rebasing assessment approach is illustrated in Figure 3.

[21] The approach we have taken in our rebasing assessment is consistent with that taken in gas distribution and gas transmission rebasing exercises, with references below:
https://www.ofgem.gov.uk/publications-and-updates/decision-approve-and-direct-rebased-network-outputs-gas-distribution-network-operators
https://www.ofgem.gov.uk/publications-and-updates/decision-approve-rebased-network-replacement-outputs-and-modify-special-condition-7e-gas-transporter-licence-held-national-grid-gas-plc

Figure 3: Overview for ET rebasing assessment approach



Stage 1: Quantitative Analysis

3.6. We developed three quantitative checks to allow us to form an initial view on the Rebased Targets compared with the Original Targets. Failure of a quantitative check does not necessarily mean that the Rebasing Principles have not been met. This is because the two sets of targets are based on two different methodologies. A failure, therefore, simply indicates to us that further investigation is required in order to determine whether the Rebasing Principles have been met.

3.7. We cannot directly assess the monetised risk in the Rebased Targets against the volume outputs in the Original Targets. In order to carry out meaningful like-for-like comparison between both sets of targets, it was necessary to consider the asset and intervention volumes that underpin the monetised risk Rebased Targets and compare these volumes with the Original Target volumes.

3.8. The three quantitative checks we performed are explained below.

Check 1: The volume of assets

3.9. This check examined whether the volume of assets in each NOMs asset category within the Rebased Targets is consistent with the Original Targets. Check 1 is passed when the volumes of assets between the Original and Rebased Targets are equal, for both start, end of the RIIO-ET1 and both with and without intervention scenarios.

Check 2: Intervention volumes

3.10. The ETOs also submitted intervention volumes for each asset category. Those volumes are split by replacements and refurbishments. Check 2 is passed when the volumes of interventions between the Original and Rebased Targets are equal, for all intervention types.

Check 3: The potential to outperform (PTO)

3.11. Neither Check 1 nor Check 2 considers the health and criticality of the asset base and the relative risk or health/criticality of the assets being intervened on. For Check 3, we calculated a numerical PTO score for each individual asset category. The PTO score indicates the extent to which the ETOs could potentially outperform (i.e. deliver more risk benefit) by intervening on either higher criticality assets or those in worse health.

3.12. As we need to consider both the health and criticality dimensions, we broke this into: Check 3.1, which considers the Rebased Targets from an asset criticality perspective, and Check 3.2, which considers the Rebased Targets from an asset health perspective. We compared the PTO score for the Rebased Targets against the PTO score for the Original Targets. Check 3 is passed if the Rebased Target has a PTO score no higher than that of the Original Targets.[22]

3.13. Check 3 was carried out at both the individual asset category level and the total network level for each ETO.

Stage 2: Qualitative Review

3.14. Where indicative quantitative checks suggested that the Rebasing Principles had not been met, we then moved on to the qualitative phase of our assessment. This was a desktop review of whether the failed check was due to the assumptions adopted in our checking formulae (especially in Check 3), or whether it actually meant that the Rebased Targets were in practice less challenging.

3.15. It is important to note that the ETOs are over three quarters of the way through implementing their RIIO-ET1 investment plans. These investment plans were designed to

[22] We allowed 5% difference tolerance for the comparison results in Check 3.

deliver the Original Targets, therefore, even if Check 3 indicate that there is higher PTO on some asset categories, in practice the opportunity for an ETO to avail of this (higher PTO) may already have passed. Where an ETO has stated this to be the case and has provided evidence in support, then, in our view, it is appropriate to treat these as passed checks. However, at RIIO-ET1 close-out, we will verify that this treatment has been correct. Should we find that an ETO has in fact availed of the higher PTO then we may make appropriate adjustments to the ETO's delivery values to remove the effect of the relevant elements.

Summary

3.16. We consider our rebasing assessment methodology robustly analyses whether the submitted Rebased Targets meet the Rebasing Principles. A more detailed explanation of our quantitative analysis can be found at **Appendix 4.**

3.17. In the next section, we present the results of our rebasing assessment and set out the rationale for our minded-to decision.

4. Our Rebasing Assessment Results

Section summary

This section presents the results of our rebasing assessment, sets out the rationale for our minded-to decision to approve the ETOs' Rebased Targets and seeks views on it.

Question 2: Do you agree with our view that the Rebased Targets meet the Rebasing Principles? Where you disagree, please clearly set out your reasoning.

Quantitative Analysis Results

NEGT

4.1. NGET's Rebased Targets passed both Check 1 and Check 2. For Check 3, NGET's Rebased Targets passed at network level but failed at asset category level for 275kV underground cable and 132kV circuit breakers.

SHET

4.2. SHET's Rebased Targets passed both Check 1 and Check 2, but failed Check 3 at the network level. This failure was driven from the asset category level by 132kV transformers and 132kV overhead line (OHL) conductors.

SPT

4.3. SPT's Rebased Targets passed both Check 1 and Check 2. For Check 3, SPT's Rebased Targets passed at network level but failed at asset category level for 400kV circuit breakers and 132kV OHL conductors and fittings, as well as 132kV circuit breakers and transformers.

4.4. As explained above, as the Original and Rebased targets are based on two different methodologies, it would not be unexpected to see ETOs failing some of the quantitative checks and so this does not necessarily mean that the Rebasing Principles have not been met. Our qualitative review therefore focused on those asset categories that failed Check 3.

4.5. For more information of our quantitative checks, please see the Equally Challenging workbooks published alongside this document.

Qualitative Review Results

4.6. In some cases, the Check 3 formulae at the asset category level indicate a fail even though the PTO results at the network level are considered equally challenging. We reviewed all cases that have failed Check 3 and performed a desktop-based qualitative review.

4.7. We also issued questions to the ETOs regarding the Check 3 outcomes for those asset categories that could be explained by our desktop review. Based on discussions with ETOs, we are satisfied that these failures can be explained or justified at a high level as follows:

- Rebased Targets may be "less challenging" in one asset category, but are "more challenging" in another asset category, resulting in an overall "equally or more challenging" outcome; and/or

- In practice, the ETOs cannot benefit from a greater PTO as regards the Rebased Targets[23].

4.8. Therefore, after reviewing the responses from the ETOs, we are satisfied that all asset categories causing failures in quantitative Check 3 have passed our qualitative review.

4.9. **Appendix 5** provides a more detailed explanation of our assessment results.

[23] For instance, the intervention plan regarding the areas in question remains unchanged compared to that in the ETO's original RIIO-ET1 submission. Also, due to the long lead-time of the electricity transmission asset intervention plans, opportunities to benefit from higher PTO between now and the end of RIIO-ET1 in 2021 are minimal.

5. Conclusions and next steps

Section summary

This section sets out our conclusions from our rebasing assessment as well as the next steps.

Question 3: Do you agree with our intention to approve the ETOs' Rebased Targets and to modify their licences accordingly? Where you disagree, please clearly set out your reasoning.

Our View

5.1. As discussed in Section 4, we consider that the ETOs' Rebased Targets pass our assessment, and therefore satisfy the Rebasing Principles.

5.2. We therefore propose to modify SpC 2M of the ETOs' licences to replace in Table 1: Network Replacement Outputs the volume-based Original Targets with the monetised risk Rebased Targets.

Next Steps

5.3. We welcome views on the information presented. In particular, we welcome responses to the specific questions asked in sections 3, 4 and 5. Unless marked confidential, all responses will be published on our website.

5.4. We have separately published a notice of statutory consultation on a proposal to modify SpC 2M of the ETOs' licences in order to implement our minded-to decision.

5.5. Our decision on the Rebased Targets will be made following consideration of any representations received. Any associated licence modifications will take effect no less than 56 days after our decision on those modifications is published.

Appendices

Contents

Appendix 1 – Detailed breakdown of ETOs' Rebased Targets

Figure 4: Monetised Risk by Asset Category Replacement Priority - NGET

Asset Categories		Units	Distribution of risk remaining on the network based on Replacement Priority by 31 March 2021				Total
			Replacement Priority				
			RP1	RP2	RP3	RP4	
400kV Network							
1	Circuit Breaker	R£m	1.625	0.679	-	3.631	5.935
2	Transformer	R£m	15.759	7.964	5.838	74.947	104.508
3	Reactor	R£m	1.157	-	-	0.934	2.090
4	Underground Cable	R£m	11.640	0.886	0.634	1.293	14.454
5	OHL Conductor	R£m	225.100	141.836	0.526	10.625	378.087
6	OHL Fittings	R£m	75.314	66.250	-	10.248	151.812
7	OHL Tower (SHET & SPTL)	R£m					
275kV Network							
1	Circuit Breaker	R£m	22.557	2.570	-	7.706	32.833
2	Transformer	R£m	13.364	8.083	3.725	54.162	79.334
3	Reactor	R£m	4.256	0.514	-	1.616	6.387
4	Underground Cable	R£m	24.889	6.236	-	2.280	33.405
5	OHL Conductor	R£m	29.915	14.356	1.359	1.668	47.299
6	OHL Fittings	R£m	16.487	11.914	-	2.071	30.472
7	OHL Tower (SHET & SPTL)	R£m					
132kV Network							
1	Circuit Breaker	R£m	77.852	15.019	0.138	8.249	101.259
2	Transformer	R£m	1.139	5.243	-	1.172	7.555
3	Reactor	R£m	4.674	0.505	-	8.414	13.592
4	Underground Cable	R£m	-	-	-	0.075	0.075
5	OHL Conductor	R£m	5.632	2.606	-	0.151	8.389
6	OHL Fittings	R£m	2.879	9.768	-	0.080	12.727
7	OHL Tower (SHET & SPTL)	R£m					
	Total	R£m	534.238	294.431	12.219	189.323	1,030.211

Figure 5: Monetised Risk by Asset Category Replacement Priority - SHET

Asset Categories		Units	Distribution of risk remaining on the network based on Replacement Priority by 31 March 2021				Total
			Replacement Priority				
			RP1	RP2	RP3	RP4	
400kV Network							
1	Circuit Breaker	R£m	-	-	-	-	-
2	Transformer	R£m	-	-	-	-	-
3	Reactor	R£m	-	-	-	-	-
4	Underground Cable	R£m	-	-	-	-	-
5	OHL Conductor	R£m	-	-	-	-	-
6	OHL Fittings	R£m	-	-	-	-	-
7	OHL Tower (SHET & SPTL)	R£m	-	-	-	-	-
275kV Network							
1	Circuit Breaker	R£m	3.959	9.495	4.097	13.927	31.477
2	Transformer	R£m	-	2.094	0.632	7.552	10.279
3	Reactor	R£m	4.991	2.978	0.429	-	8.398
4	Underground Cable	R£m	-	-	-	0.076	0.076
5	OHL Conductor	R£m	-	0.118	0.383	9.088	9.589
6	OHL Fittings	R£m	-	-	-	13.388	13.388
7	OHL Tower (SHET & SPTL)	R£m	-	-	-	83.838	83.838
132kV Network							
1	Circuit Breaker	R£m	31.352	12.842	5.852	59.212	109.258
2	Transformer	R£m	17.944	4.110	1.602	29.172	52.828
3	Reactor	R£m	-	-	-	-	-
4	Underground Cable	R£m	-	7.549	-	3.127	10.676
5	OHL Conductor	R£m	54.764	1.278	15.418	94.648	166.108
6	OHL Fittings	R£m	-	0.842	1.316	271.164	273.322
7	OHL Tower (SHET & SPTL)	R£m	35.248	4.179	4.496	353.397	397.320
	Total	R£m	148.257	45.485	34.225	938.589	1,166.555

Figure 6: Monetised Risk by Asset Category Replacement Priority - SPT

Asset Categories		Units	Distribution of risk remaining on the network based on Replacement Priority by 31 March 2021				Total
			Replacement Priority				
			RP1	RP2	RP3	RP4	
400kV Network							
1	Circuit Breaker	R£m	12.209	0.682	0.943	3.330	17.165
2	Transformer	R£m	-	3.705	0.514	4.457	8.676
3	Reactor	R£m	-	0.453	-	0.259	0.712
4	Underground Cable	R£m	-	1.331	-	1.296	2.628
5	OHL Conductor	R£m	-	21.489	67.435	15.763	104.687
6	OHL Fittings	R£m	568.963	926.168	28.535	362.495	1,886.162
7	OHL Tower (SHET & SPTL)	R£m	-	55.485	3.743	21.699	80.926
275kV Network							
1	Circuit Breaker	R£m	5.914	2.266	0.035	4.980	13.195
2	Transformer	R£m	5.658	5.764	6.551	12.164	30.137
3	Reactor	R£m	-	0.177	0.235	0.350	0.762
4	Underground Cable	R£m	22.718	0.381	-	4.901	28.000
5	OHL Conductor	R£m	40.264	4.845	5.257	17.308	67.674
6	OHL Fittings	R£m	638.893	202.361	7.553	123.194	972.000
7	OHL Tower (SHET & SPTL)	R£m	79.630	1.806	0.107	62.136	143.680
132kV Network							
1	Circuit Breaker	R£m	5.538	1.495	-	9.840	16.872
2	Transformer	R£m	5.591	10.658	6.181	15.126	37.555
3	Reactor	R£m	-	-	0.304	0.198	0.502
4	Underground Cable	R£m	-	12.308	3.445	11.405	27.157
5	OHL Conductor	R£m	13.759	4.308	2.010	21.096	41.173
6	OHL Fittings	R£m	591.294	201.350	11.773	184.955	989.373
7	OHL Tower (SHET & SPTL)	R£m	113.128	7.955	1.340	380.736	503.159
Total		R£m	2,103.559	1,464.987	145.959	1,257.689	4,972.194

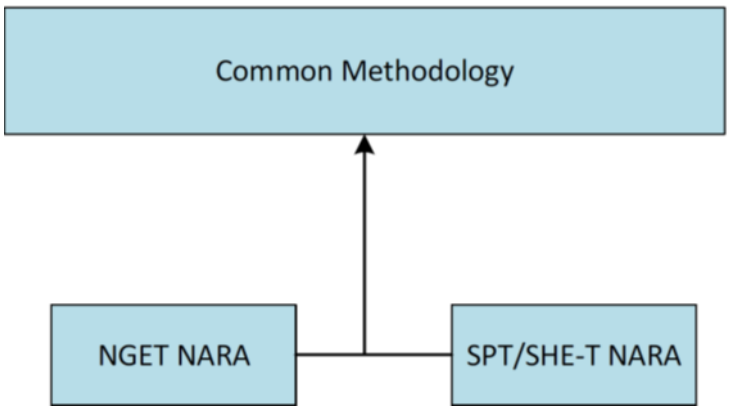
Appendix 2 – Overview of the ETOs' approaches to validating the NOMs Methodology

Introduction

1.1. As discussed in section 2 above, in 2017, the ETOs submitted a CTV Plan[24] for the NOMs Methodology and implemented that plan during 2017 and 2018. During 2018 and 2019, each ETO provided a number of updates in relation to their validation of the NOMs Methodology. The ETOs' validation processes prioritised the most critical items within the CTV Plan. We agreed that by focusing on the prioritised elements, the validation could give suitably robust results to allow us to form views on the fitness-for-purpose of the NOMs Methodology outputs. This appendix summarises how the validations were carried out by the ETOs.

1.2. The NOMs Methodology consists of a common methodology document and two Network Asset Risk Annex (NARA) documents as shown in Figure 7 below. The common methodology document provides an overview of all five network output measures, and the two NARA documents provide more detailed technical explanations of the methodology as it applies to each TO.

Figure 7: The Overall Structure of the NOMs Methodology[25]



[24] https://www.ofgem.gov.uk/system/files/docs/2017/05/c.1_calibration_testing_validation.pdf
[25] Please refer to the document below for details of the NOMs Methodology: https://www.ofgem.gov.uk/system/files/docs/2018/08/et_noms_methodology_issue_18_confirmation_letter_1.pdf

NGET

Summary of NGET NARA

1.3. NGET's quantitative asset failure analysis model adopts a failure mode and effect analysis (FMEA). This approach starts with identifying the asset failure modes and then categorises them as end of life failure (EoL) modes and non-end-of-life failure modes. The chance that EoL modes occur depends on the asset condition, represented by an EoL modifier, which is a function of a collection of asset condition information including age, location, duty, usage, as well as asset specific condition assessment data. The probability of failure (PoF) of EoL failure modes will increase with worsening asset condition. NGET also developed a forecast methodology by knowing how a standard asset deteriorates throughout its lifecycle. The non-EoL failure mode for NGET is not related to the asset condition, but the PoF of non-EoL modes will increase with time from the last intervention to address it.

1.4. Asset management interventions, including maintenance, refurbishment, repair, and replacements, are mapped to failure modes on a many-to-many basis: one intervention type will be able to mitigate the risk associated with one or more failure mode by resetting the PoF values associated with the failure mode. NGET did not model inspections explicitly and stated it will be part of future work. Only planned interventions have been modelled under this approach.

1.5. For each failure mode, there are a number of possible consequences associated with it such as alarm, circuit trip, damaging assets, fire, explosion, etc. NGET assigns a monetary value to those consequences as well as the (conditional) probability that the consequence will materialise in the event of the failure mode occurring. The failure mode to consequence is also a many-to-many mapping.

1.6. The cost of consequence considers the monetised value of environmental, safety, and system aspects if a given consequence occurs. The cost of recovering the asset is also considered as part of the consequence. The details of how those monetised consequences are calculated including the data used can be found in the NOMs Methodology NGET Network Asset Risk Annex.[26]

[26] https://www.ofgem.gov.uk/system/files/docs/2018/08/nget_network_asset_risk_annex.pdf

1.7. The monetised risk is then calculated, on an asset-by-asset basis, using the PoF, probability of consequence, and cost of consequence.

1.8. As part of the supporting evidence submitted to us in respect of our August 2018 decision on the NOMs Methodology[27], NGET had carried out a programme of CTV of the NOMs Methodology based on the CTV Plan. Specifically, NGET's CTV work was focused on the EoL modifiers, the PoF calculation and forecast, the monetised values, as well as the assumptions.

Summary of NGET's CTV

1.9. The EoL modifiers were validated against the asset health index, with the differences reviewed and explained. An expert review exercise was also carried out by NGET to validate the EoL modifier's formula(s). We are generally satisfied with this approach and understand that the asset health and EoL modifier may not in all cases be perfectly aligned but both are an indicator of the asset condition.

1.10. For the PoF values, the ETOs do not allow the asset to fail, as interventions will be planned before the actual failure happens. This makes it difficult to the directly calculate PoF values from failure data, as the actual failure before replacement only accounts for rare events (and failure modes).

1.11. For the non-EoL PoF, NGET considered the PoF to be a function of the time since last intervention. The best case and worst case were derived from experts within the business through the FMEA process, and a curve was formed showing how the PoF values evolve over time (since last intervention). The expected number of events were validated against defect, faults data, and expert reviews.

1.12. For the PoF of EoL modes, NGET adopted a method for calibrating the curve allowing a maximum value of the PoF when the EoL_{mod} reaches its maximum. It was then calibrated against asset life, which is a combination of data and engineering experience (noting there is not a lot of actual failure data). A sensitivity test was also carried out on the maximum PoF values.

[27]Subsidiary documents section in https://www.ofgem.gov.uk/publications-and-updates/decision-not-reject-modified-electricity-transmission-network-output-measures-noms-methodology-issue-18

1.13. For the consequence of failure values, NGET performed a systematic review of the process when introducing criticality (or any other asset specific information) into the cost of consequence. The inputs values were also reviewed by independent experts with the outcomes compared with the criticality bandings used to generate the Original Targets. Some historical cost of failures data was also used to benchmark the outcomes of the consequence of failure (CoF) methodology.

Our assessment of NGET's CTV

1.14. Overall, we are reasonably comfortable that NGET's methodology for deriving PoF values from EoL scores have been sufficiently validated under the CTV Plan. It should, however, be noted that these views are predicated on the assumption that individual assets have been correctly assessed and that their EoL scores properly reflect their condition and other relevant factors. We also believe that the PoF values can be improved for both EoL and non-EoL failure modes. This includes (but is not limited to):

- The actual shape of the PoF function, as both EoL and non-Eol modes can be validated against non-failure cases when there is lack of failure data.
- Further validation of the assumption that the PoF of the non-EoL failure mode is a function of time (since last intervention), using failure and non-failure data.
- Continual refinement of the model, for example, to better include the uncertainties and variabilities around future deterioration forecast model.

1.15. The models for calculating cost of consequences were shared and reviewed across the three ETOs. The inputs of those models were calibrated through publicly available and historical (e.g. outage) data. We are reasonably satisfied that the ETOs' cost of consequences model is appropriate for the monetised risk calculation.

SHET and SPT

Summary of SHET/SPT NARA

1.16. SHET and SPT adopted a third-party model called Condition Based Risk Management (CBRM) to calculate the asset condition using EoL modifiers. SHET and SPT adopted the same approach as NGET for deriving cost of consequences. One of the major differences when compared with NGET's approach is that the failure modes are not defined as asset specific, rather four categories are defined: defect, minor, significant, and major.

1.17. The EoL modifiers have similar components to NGET's. However, how the components are aggregated is quite different.

1.18. Unlike NGET, maintenance is not modelled explicitly by SHET and SPT; the model assumes routine maintenance activities are already carried out, and therefore that the monetised risk will not be affected by routine maintenance. Unplanned interventions and inspections are not modelled.

1.19. Unlike NGET, the PoF values for all failure modes are a function of the asset condition, which is measured by the EoL modifiers. As a result, the PoF curves for different failure modes for the same asset are basically following the same shape and can be modelled as a single curve multiplied by different scaling features.

Summary of SHET's and SPT's CTV

1.20. A calibration exercise was carried out by SHET and SPT using reviews from subject matter experts to check that the EoL models lead to the desired outcomes.

1.21. The PoF curve was modelled using a pre-defined function with two coefficients, which were then calibrated against the overall number of failures. The calibration is possible even when there is lack of EoL failure data, as there is a significant amount of non-EoL failure data such as defects and repairs.[28] Due to the assumption that the PoF curves for all failure modes follow the same shape, the issue of no EoL failure data is avoided.

1.22. SHET and SPT also adopted the same CoF methodology used by NGET. SHET and SPT carried out independent review, agreed jointly detailed rules of applying the CoF methodology, and worked together to ensure the outcomes from the CoF methodology were satisfactory.

Our assessment of SHET's and SPT's CTV

1.23. With the major elements (EoL_{mod}, PoF, CoF) being covered by the validation process, we are reasonably satisfied that the NOMs Methodology can be implemented to calculate the

[28] It should be noted that the CTV process did not audit the collection, processing and translation of this data into the model.

monetised risk and to rebase the Original Targets. We would like to see further validation, using failure and non-failure data, of the shape of the curve and of the assumption that all failure modes can be modelled using curves of the same shape.

1.24. We also expect all three ETOs to continue to refine the NOMs Methodology through targeted data collection and updates to the model, especially when large discrepancies are observed between forecast and actual asset conditions. We also expect the model to better include uncertainties and variabilities in forecasts.

Comparison across ETOs

1.25. Paragraph 2L.3(c)(ii) of Special Condition 2L (Methodology for Network Output Measures) of the ETOs' licences states that one of the NOMs Methodology Objectives is:

> *(c) the comparative analysis of performance over time between …*
>
> > *(ii) the licensee's Transmission System and other Transmission Systems forming part of the National Electricity Transmission System …"*

1.26. It is therefore important to ensure that the NOMs Methodology, as it applies to each TO, will lead to similar scoring of the condition of the same asset. The three ETOs shared templates for data collection, created a list of testing samples using representative anonymised assets for each asset category, and calculated the EoL_{mod} independently. Our assessment suggested that this comparison methodology is sufficiently robust to understand the value of EoL_{mod} for the same assets using different methods.

1.27. It is, however, worth noting that the comparison exercise was performed on a banding basis, i.e. the EoL_{mod} values are firstly categorised into five bands: as new, good, acceptable, poor, and very poor. If different methodologies give the same condition banding for the same asset, the comparison assessment will return a positive outcome. The comparison method does not capture the detailed differences within a condition banding and the desired granularity of using the EoL_{mod} has not been sufficiently compared. We expect the ETOs to work together in the future to share information and knowledge on how inspection and condition data can be used to more accurately estimate EoL_{mod} values and to improve comparability between them.

1.28. The ETOs did not carry out a direct comparison of their respective PoF values for a number of reasons:

- The failure modes are defined differently between the NGET and SHET/SPT methodologies, making granular comparison difficult;
- NGET's PoF values for non-EoL failure modes are not a function of EoL modifiers while SPT/SHET's are a function of EoL modifiers, making the aggregated comparison of PoF difficult;
- The PoF of linear assets (OHL conductors, fittings, and underground cables) are measured based on unit length for SHET/SPT (i.e. per kilometre), while they are often based on the total length of the circuit for NGET (i.e. per circuit/section);
- The ETOs were not able to share the values of their cost of consequences, making the overall comparison of monetised risk difficult.

1.29. One advantage of being able to implement a monetised risk measure is ability to compare between asset categories and to understand better the ETOs' investment plans, as well as incentivising the ETOs to collect more detailed asset condition data for more efficient asset management activities. However, our current view is that we are still not able to reliably compare the monetised risks between different ETOs. We therefore intend to work with the ETOs to understand the reasons for this and to continue to refine and converge the risk measures using different approaches in the NOMs Methodology.

Further development areas

1.30. Following review of the ETOs' validation exercises, we are generally satisfied that, if applied correctly, the NOMs Methodology is suitable for rebasing the Original Targets and for enabling the end-of-period assessment of performance against the Rebased Targets. However, we expect the ETOs to continue to develop and refine the NOMs Methodology in (but not limited to) the following areas:

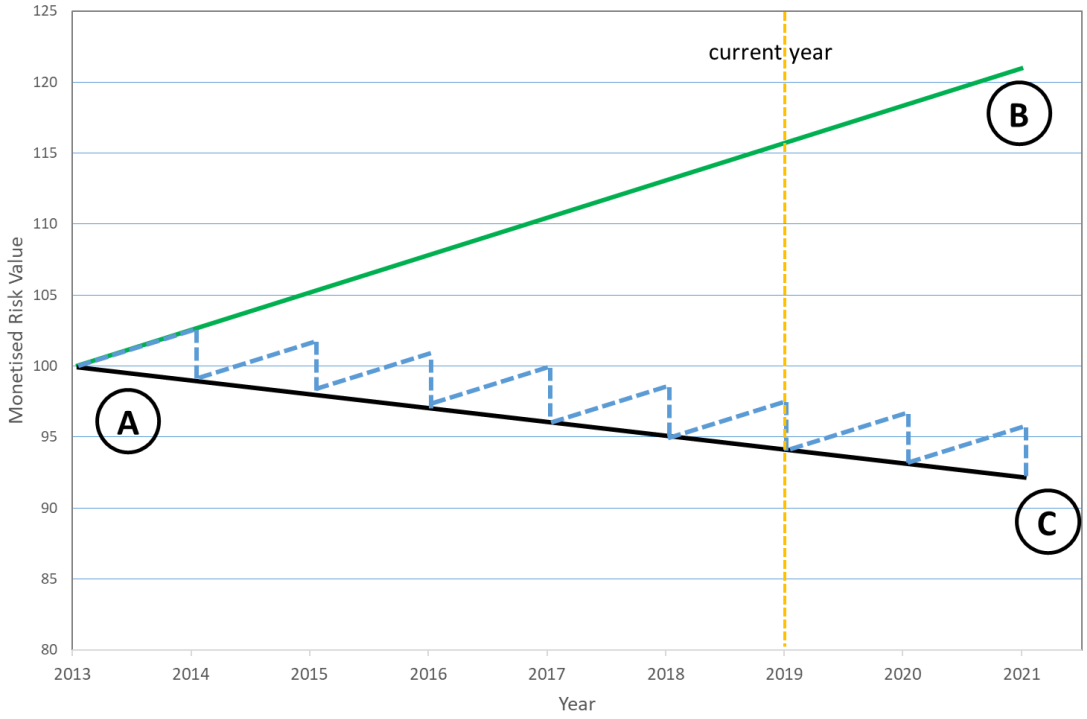
- Utilise additional failure and non-failure data to refine the PoF models and reduce the number of assumptions;
- Improve comparability of monetised risk values across ETOs, accounting for asset similarities and the relative risk between asset types;
- Improve the treatment of uncertainties within the model, through active collection and analysis of data, in particular through comparison of forecast and observed parameter values.

Appendix 3 – Overview of ETOs' rebasing methodologies

Summary of ETOs' Rebasing Processes

1.31. A high-level summary of the ETOs' rebasing processes is illustrated in Figure 8 below. The ETOs have an absolute target based on the level of risk on their networks after investment occurs (Point C). This is different to the Electricity Distribution (ED) and Gas Distribution (GD) targets, which are based on the relative risk removed from the network (the delta between Point B and Point C).

Figure 8: Derivation of the ETOs' Monetised Risk Targets



where:

Step 1_Starting Position of 2013 (Point A): Derive the monetised risk position at start of RIIO-ET1 (assuming the Monetised Risk Value 100 at the starting position).

Step 2_End Position of 2021 without Interventions (Point B): Derive the monetised risk position without interventions at end of RIIO-ET1 by applying expected asset deterioration.

Step 3_End Position of 2021 with Interventions (Point C): Derive the monetised risk position

with interventions at end of RIIO-ET1 by applying the impact of asset interventions required under RIIO-ET1 Final Proposals.

Rebasing Methodology

1.32. The purpose of rebasing is to translate the Network Replacement Outputs, which were defined using the old volumes-based NOMs Methodology, into equivalent monetised risk values using the NOMs Methodology. This process will allow for a like-for-like comparison between NOMs targets and actual delivery, which will be reported on a monetised risk basis in accordance with the NOMs Methodology.

1.33. The ETOs' approaches to rebasing followed the following four main steps:

- Address data gaps to determine the EoL modifiers in 2013 (start of RIIO-ET1)
- Calculate the PoF, CoF and monetised risk in 2013
- Forecast the monetised risk for the end of RIIO-ET1 (2021), for both with and without intervention scenarios
- Determine and apply bandings for monetised risk to enable like-for-like comparison between the asset health and criticality used by the Original Targets

Step 1: Address data gaps to determine the EoL modifiers in 2013 (start of RIIO-ET1)

1.34. NGET applied the NOMs Methodology by the respective EoL modifier models based upon the information available to them as at the start of the RIIO-ET1 (2013). The Original Targets were set based on the asset information (e.g. inventory, condition) known at November 2010. This information was frozen to set the Original Targets.

1.35. SHET and SPT adopted a roll-back method to determine the asset data corresponding to the starting point of the RIIO-T1 price control. This approach was necessary because for SHET and SPT, the NOMs Methodology utilises input data that was not collected at the start of RIIO-ET1.

Step 2: Calculate the PoF, CoF and monetised risk in 2013

1.36. Once the EoL modifiers were calculated for the starting position of RIIO-ET1, the PoF and CoF values can be calculated following the NOMs Methodology. CoFs fall into four categories: system, safety, environment and financial. These categories reflect the impact of

the various events specific to the asset and the consequences are consistent for each class of failure mode.

1.37. For NGET, safety, environment and system consequences are calculated based on 2017/18 values, whereas financial consequences are based on 2016/17 values. While for SHET and SPT, the CoF values have been fixed at the 2018/19 values.

Step 3: Forecast the monetised risk for end of RIIO-ET1 (2021)

1.38. After the monetised risk was calculated at the start of the RIIO-ET1, the ETOs then modelled the asset deterioration process as described in the NOMs Methodology. This gave forecast values for without-intervention asset risk representative of the end of the RIIO-ET1 period. Note that the ETOs have different forecast methodologies.

1.39. Then, the RIIO-ET1 business plan that was used to forecast the Original Target was applied to the monetised risk position at the start of the RIIO-ET1, to forecast the end of RIIO-ET1 monetised risk value. The monetised risk associated with the resulting distribution of assets became the rebased monetised risk targets.

Step 4: Determine and apply bandings for monetised risk

1.40. In order to compare the Original and Rebased Targets, the ETOs translated the rebased monetised risk into a 5x4 matrix, to divide the population of each asset category into five asset health bands and four criticality bands, representing their conditions and CoFs.

1.41. Based on criteria[29] we set for realistic representation of rebased targets, two different banding approaches were developed and used between NGET and SHET/SPT.[30]

1.42. We have accepted the asset health and criticality banding approaches developed separately by each ETO. We expect the ETOs to use the same bandings for RIIO-ET1 close-out assessments.

[29] The criteria were presented in the rebasing guidance "NOMs rebasing: Guidance on ETOs' rebasing submissions" that was emailed to ETOs on 17 December 2018.
[30] NGET's banding approach specifies a unique banding for asset health and criticality of each asset type across all voltages; SHET and SPT have adopted the same banding methodology for asset health and criticality, for which the threshold between each band is consistent across all asset types.

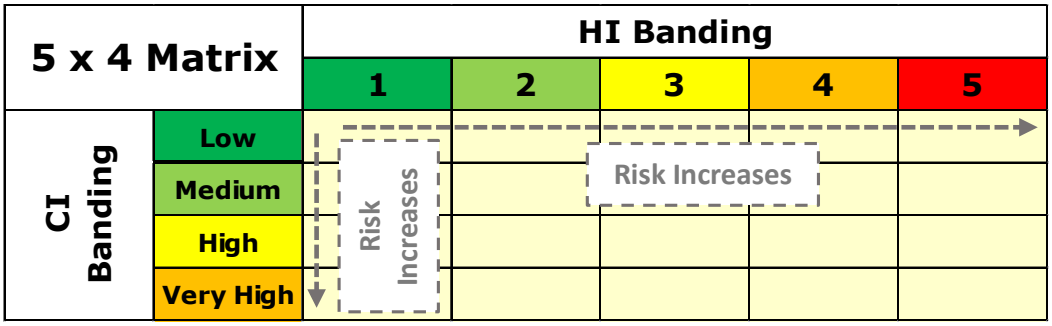
Appendix 4 – Our quantitative analysis

Standardised Rebasing Data Submission

1.43. In order to allow us to carry out the quantitative analysis in a consistent and transparent manner, we agreed with the ETOs a standard rebasing data template. The template is populated with the Rebased Targets (and supplementary data) in both the volume and monetary format as the 5x4 matrix of asset health/criticality indices (HI/CI)[31] used in the Original Targets.

1.44. The standard 5x4 matrix of HI/CI is illustrated in Figure 9 below, where the asset risk increases along both the asset health index (from HI1 to HI5) and criticality index (from Low to Very High).

Figure 9: The 5x4 Matrix for Original Targets and Rebased Targets



Quantitative Analysis Standardised Rebasing Data Submission

1.45. No single test can by itself confirm that the Rebased Targets satisfy the Rebasing Principles. We therefore adopted a two-stage assessment. First, we carried out quantitative analysis to form an initial view on the Rebased Targets; second, in cases where the Rebased Targets appear to not fully meet all the requirements, we conducted a qualitative review to allow us to understand whether the Rebased Targets do not in practice meet the rebasing requirements.

[31] HI and AH are used interchangeable to represent PoF within the 5x4 matrix.

1.46. The following paragraphs provide more detailed explanations of each of the checks in our quantitative analysis.

Check 1: The volume of assets

1.47. This check examined whether the total asset population in each NOMs asset category in the Rebased Targets is the same as the Original Targets. Check 1 is considered to be passed when the total population of assets is equal for RIIO-ET1 starting and end positions, for both with and without intervention scenarios.

Check 2: Impact of intervention

1.48. Check 2 scrutinised the volumes of intervention reported by the ETOs for the Original Targets and for the Rebased Targets. Check 2 is considered to be passed when the volumes of interventions are consistent between the Original and Rebased Targets, for all intervention types.

Check 3: The potential to outperform (PTO)

1.49. Neither Check 1 nor Check 2 considers the health and criticality of ETOs' asset bases and the relative risk or health/criticality of the assets being intervened on. For Check 3, we calculated a numerical PTO score for individual asset categories. The PTO score indicates the extent to which the ETOs could potentially outperform (i.e. deliver more risk benefit) by intervening on either higher criticality or worse health assets. We then compared the PTO score for the Rebased Targets against the PTO score for the Original Targets. Check 3 is considered to be passed if the Original Target has an equal or higher PTO score than the Rebased Targets.[32]

1.50. As we need to consider both the HI and CI dimensions in the matrix, this was divided into: Check 3.1, which compares three PTO metrics from an asset criticality perspective; and, Check 3.2, which compares three PTO metrics from an asset health perspective.

1.51. The mathematical formula used for PTO in asset criticality dimension in Check 3.1 is shown in Figure 10. The formula was the same to calculate the PTO in asset health dimension

[32] We allowed 5% difference tolerance for the comparison results in Check 3.

in Check 3.2 where criticality variables were replaced with corresponding asset health variables.

1.52. This PTO check examined two areas in the Original Targets and Rebased Targets respectively:

- First, it checked whether there are higher criticality or worse health assets that could have been intervened on but were not included in the targets.
- Second, it checked whether all interventions that were carried out were on the higher criticality or worse health assets in the targets.

Figure 10: Potential to Outperform (PT)) formula

$$PTO = \sqrt{\left[\frac{Vol_{C\#} + Imp_{C\#}}{Vol_{C\#}}\right] \times \left[\frac{Imp_{Tot} - Imp_{C\#}}{Imp_{Tot}}\right] \times Vo_{C\#}}$$

Part 1 Part 2 Part 3

Where:

$Vol_{C\#}$ (positive value) denotes the asset number without intervention in the relevant criticality band(s) analysed.

$Imp_{C\#}$ (negative value) denotes the change of asset number with intervention in the relevant criticality band(s) analysed.

Imp_{Tot} (negative value) denotes the change of asset number with intervention in the relevant criticality band(s) analysed.

Part 1 indicates whether there are higher criticality assets that could have been intervened on but were not in the targets.

Part 2 indicates whether all interventions that were carried out were on the higher criticality assets in the targets.

Part 3 scaled to give results that can compare Original Targets against Rebased Targets.

1.53. We note that Check 3 is designed to provide indicative PTO metrics, and the PTO check itself will not be able to explain any failures caused by NOMs methodological changes and asset characteristics. Where a check has highlighted by quantitative checks to not be equally challenging, we would require qualitative information to be supplied by the ETO.

Appendix 5 – Our rebasing assessment results

Qualitative review

1.54. As discussed in Section 4, all the ETOs passed Check 1 and Check 2.

1.55. For Check 3, Tables 2 to 3 below detail by ETO the asset categories failed in Check 3, our qualitative review and the results thereof, which are based on our desktop review and/or explanations from the ETOs.

Table 4: Asset categories failed at Check 3 and subsequent qualitative review - NGET

Asset category	Check Number	Qualitative review	Results
400kV Circuit Breaker	Check 3.1 criticality and Check 3.2 asset health	Detailed review suggested that this was due to three (out of a total of more than 1000) circuit breakers against poor asset health for the Original Target while relatively good asset health for the Rebased Target. Considering the small materiality, it passed our qualitative review.	Pass
400kV Underground Cable	check 3.1 criticality and Check 3.2 asset health	Detailed review suggested that this is due to 5km (out of a total of more than 200km) cable against poor asset health for the Original Target while relatively good asset health for the Rebased Target. Considering the small materiality, it passed our qualitative review.	Pass
275kV Circuit Breaker	Check 3.1 criticality	The asset health dimension is much more challenging, so overall it passed our qualitative review.	Pass
275kV OHL Conductor	Check 3.1 criticality	The asset health dimension is much more challenging, so overall it passed our qualitative review.	Pass

275kV Underground Cable	Check 3.1 criticality and Check 3.2 asset health	NGET confirmed that the original plan was used without altering interventions. It has therefore not benefited from this higher PTO.	Pass
132kV Circuit Breaker	Check 3.1 criticality and Check 3.2 asset health	NGET confirmed that the original plan was used without altering interventions. It has therefore not benefited from this higher PTO	Pass
132kV OHL Fittings	Check 3.2 asset health	The criticality dimension is more challenging, so overall it passed our qualitative review.	Pass

Table 5: Asset categories failed at Check 3 and subsequent qualitative review - SHET

Asset category	Check Number	Qualitative review	Results
132kV OHL Conductor	Check 3.1 criticality and Check 3.2 asset health	SHET confirmed that all of the 132kV OHL conductor plans are based against the Original Targets. Due to the long development lead time required for asset intervention works it would not have been possible to change asset intervention plans to outperform the Rebased Target.	Pass
132kV Transformer	Check 3.1 criticality and Check 3.2 asset health	SHET has confirmed a number of substitutions for 132kV transformers interventions in actual delivery. However, the change of work was based on the plan to deliver against the Original Targets. It has therefore not benefited from this higher PTO.	Pass

Table 6: Asset categories failed at Check 3 and subsequent qualitative review - SPT

Asset category	Check Number	Qualitative review	Results
400kV Circuit Breaker	Check 3.1 criticality	SPT has confirmed the original plan has mostly delivered for 400kV circuit breakers and those in-delivery are also part of the original plan. It has therefore not benefited from this higher PTO.	Pass
400kV OHL Conductor	Check 3.1 criticality and Check 3.2 asset health	Detailed review suggested that this is due to 1km (out of a total of more than 1000km) conductor against poor asset health for the Original Target while relatively good asset health for the Rebased Target. Considering the small materiality, it passed our qualitative review.	Pass
40kkV Towers	Check 3.1 criticality	Detailed review suggested that for criticality high, the Rebased Target is much more challenging, therefore overall this has passed the review.	Pass
275kV Transformers	Check 3.1 criticality and Check 3.2 asset health	Detailed review suggested that potentially SPT can potentially outperform by two (out of a total of more than 90) transformers for both asset health and criticality dimensions. Considering the small materiality, it passed our qualitative review.	Pass
132kV Circuit Breakers	Check 3.1 criticality	SPT has confirmed the original plan has mostly delivered for 132kV circuit breakers and transformers and the rest in-delivery is also part of the original plan. It has therefore not benefited from this higher PTO.	Pass
132kV Transformers	Check 3.1 criticality and Check 3.2 asset health		Pass
132kV OHL Conductors	Check 3.1 criticality and	SPT confirmed that the original plan of 132kV major overhead line programme (for both conductors and fittings) is unchanged.	Pass

	Check 3.2 asset health	It has therefore not benefited from this higher PTO.	
13kKV OHL Fittings	Check 3.1 criticality and Check 3.2 asset health		Pass
132kV Towers	Check 3.1 criticality	The asset health dimension is much more challenging, so overall it passed our qualitative review.	Pass

Assessment conclusion

1.56. We are satisfied with the ETOs' responses to the asset categories failed at Check 3. However, we will pay particular attentions at RIIO-ET1 close-out to the asset categories listed above that have higher PTO as indicated by the quantitative check results. Should we find that an ETO has in fact availed of the higher PTO then we may make appropriate adjustments to the ETO's delivery values to remove the effect of this.

1.57. In conclusion, we are of the view that the Rebased Targets developed by the ETOs have satisfied our assessment criteria, and are minded to approve them.

Appendix 6 – Privacy notice on consultations

Delete this box when producing your document.

Instructions: Please edit the content of the generic privacy notice provided below to take account of the specifics of your consultation.

Contact the Data Protection Officer dpo@ofgem.gov.uk if you are unsure about any of the information to be provided to those responding to your consultation.

Personal data

The following explains your rights and gives you the information you are entitled to under the General Data Protection Regulation (GDPR).

Note that this section only refers to your personal data (your name address and anything that could be used to identify you personally) not the content of your response to the consultation.

1. The identity of the controller and contact details of our Data Protection Officer

The Gas and Electricity Markets Authority is the controller, (for ease of reference, "Ofgem"). The Data Protection Officer can be contacted at dpo@ofgem.gov.uk

2. Why we are collecting your personal data

Your personal data is being collected as an essential part of the consultation process, so that we can contact you regarding your response and for statistical purposes. We may also use it to contact you about related matters.

3. Our legal basis for processing your personal data

As a public authority, the GDPR makes provision for Ofgem to process personal data as necessary for the effective performance of a task carried out in the public interest. i.e. a consultation.

3. With whom we will be sharing your personal data

(Include here all organisations outside Ofgem who will be given all or some of the data. There is no need to include organisations that will only receive anonymised data. If different organisations see different set of data then make this clear. Be a specific as possible.)

4. For how long we will keep your personal data, or criteria used to determine the retention period.

Your personal data will be held for ***(be as clear as possible but allow room for changes to programmes or policy. It is acceptable to give a relative time e.g. 'six months after the project is closed')***

5. Your rights

The data we are collecting is your personal data, and you have considerable say over what happens to it. You have the right to:

- know how we use your personal data
- access your personal data
- have personal data corrected if it is inaccurate or incomplete
- ask us to delete personal data when we no longer need it
- ask us to restrict how we process your data
- get your data from us and re-use it across other services
- object to certain ways we use your data
- be safeguarded against risks where decisions based on your data are taken entirely automatically
- tell us if we can share your information with 3rd parties
- tell us your preferred frequency, content and format of our communications with you
- to lodge a complaint with the independent Information Commissioner (ICO) if you think we are not handling your data fairly or in accordance with the law. You can contact the ICO at https://ico.org.uk/, or telephone 0303 123 1113.

6. Your personal data will not be sent overseas (Note that this cannot be claimed if using Survey Monkey for the consultation as their servers are in the US. In that case use "the Data you provide directly will be stored by Survey Monkey on their servers in the United States. We have taken all necessary precautions to ensure that your rights in term of data protection will not be compromised by this".

7. Your personal data will not be used for any automated decision making.

8. Your personal data will be stored in a secure government IT system. (If using a third party system such as Survey Monkey to gather the data, you will need to state clearly at which point the data will be moved from there to our internal systems.)

9. More information For more information on how Ofgem processes your data, click on the link to our "Ofgem privacy promise".