



# **T1 NOMs Closeout Report**

## **Stage 1/2 Submission Narrative**

July 2021

As a part of RIIO-1 Closeout Reporting

Strictly Confidential

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# T1 NOMs Closeout Report - Stage 1/2 Submission Narrative

## 1. Executive summary

This report provides an overview of NGET's results presented in the RIIO-1 Data Closeout Template, submitted to Ofgem on 31<sup>st</sup> July 2021. The report forms part of the Stage 1 & 2 close-out material following the process set out in the Network Output Measures (NOMs) Incentive Methodology.

NGET has delivered on the post-normalisation RIIO-T1 2M target, over delivering on the absolute risk target by 36% (R£247.3m). The over delivery has been achieved while also delivering cost efficiencies. All asset categories have over delivered except for OHL Fittings.

The over delivery against the 2M target is primarily driven by two factors:

1. Plan differences contribute R£39.1m to over delivery. NGET has deliberately targeted interventions during RIIO-T1 on the highest risk assets, those with emerging defects and faults; while leaving lower risk assets on the network. Some interventions originally included in the RIIO-T1 submitted plan, which was based on November 2010 2M data have been replaced by assets with greater risk.
2. Continuous improvements to the asset management framework. Condition monitoring, condition assessment and innovation projects, undertaken during T1 have allowed us to better understand the condition of our assets; leading to incremental improvements to the technical specifications and knowledge of assets. The benefits manifests as overall net slow deterioration. These factors are excluded from normalisation and apply to all lead asset categories. This accounts for R£215.9m of the over delivery against the 2M target. Contributions to the risk position include, but are not limited to refinements to refurbishment programmes, the introduction of condition monitoring into asset risk assessment, and innovation programmes targeting asset reliability & condition.

OHL Fittings under deliver by 20% (R£25.4m) compared to the RIIO-T1 2M target, with three main contributing factors:

1. In the RIIO-T1 business plan it was acknowledged that there would be significant quantities of load-related work in the period, which increased further over the RIIO-T1 period. Some previously Non-Load Related works changed to Load Related. The total network risk for fittings overall has reduced over the period, resulting in under delivery when the effects of the Load-Related works are normalised out of the 2M target.
2. The Covid-19 pandemic and associated working restrictions have led to delayed delivery of 15 fittings schemes in the final year of RIIO-T1, 2020-2021, leading to R£4.5m of under delivery. Targeted fittings replacement and our Covid-19 response are examples of where NGET has amended work programmes and made appropriate asset management decisions that are based on both the latest information and in the interest of consumers.
3. Targeted fittings projects have been carried out at a lower cost to consumers, replacing only the components in a state requiring intervention and retaining those in good condition. The risk reduction from these projects has not been as expected due to limitations of the current scoring methodology that needs addressing in RIIO-2.

Network risk serves as a leading indicator of network performance. Network performance metrics have remained reasonably consistent throughout T1. For example, the annual Average Circuit Unreliability (ACU) figure, which measures network unavailability resulting from asset unreliability, averaged 1.49% across the price control period. In addition, our performance as measured by Energy Not Supplied has been strong, with the 8-year average of incentivised events outturning at 32.64MWh against the incentive neutral point of

316MWh; this equates to an 8-year average network reliability of 99.99995%. NGET has therefore delivered both the NOMs incentive target and the continued high levels of network performance that our customers and stakeholders expected during RIIO-T1.

The following table summarises the NGET residual risk position against the Normalised 2M target by asset category:

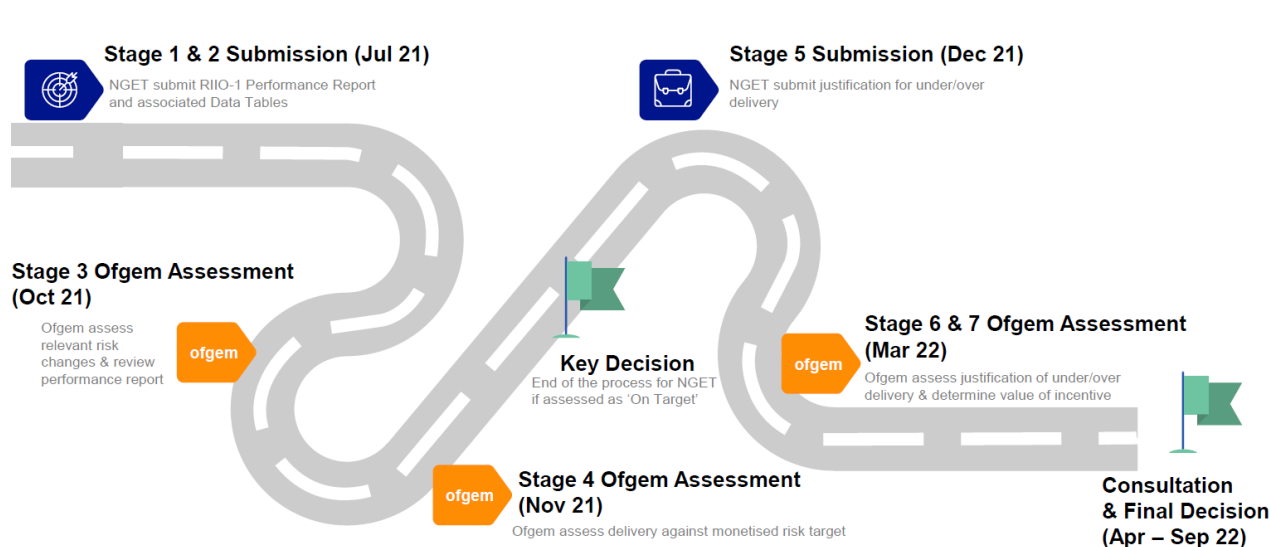
Lead asset category	Normalised 2M Target /R£m	Post Normalisation Residual Risk /R£m	Difference/R£m	Difference/%	Performance
OHL Conductor	166.4	64.6	101.8	61%	Target delivered
Circuit Breaker	138.4	57.8	80.6	58%	Target delivered
Transformers	193.0	107.9	85.1	44%	Target delivered
OHL Fittings	130.0	155.4	-25.4	-20%	Target not delivered
Reactors	19.9	17.5	2.4	12%	Target delivered
Cables	38.3	35.5	2.8	7%	Target delivered
Overall	686.0	438.7	247.3	36%	Target delivered

*Table 1: Residual risk position compared to Normalised 2M Targets*

## 2. Introduction

NGET have completed the data table template setting out the NOMs performance. This document provides a narrative describing NGET's overall asset risk performance during RIIO-1, which explains how NGET has delivered its target of monetised network risk.

The assessment process for the NOMs incentive follows the process outlined in Ofgem RIIO-1 NOMs Incentive v2.0 document<sup>1</sup> and is summarised in the diagram below. This report is NGET's Stage 1 & 2 report that forms our submission alongside the Closeout Data Template, providing the narrative covering relevant risk changes and impact on performance against targets (Stage 1) and RIIO-1 performance (Stage 2).



This report uses rounded numbers in the narrative and explanations of the overall behaviour of the asset populations for convenience. Precise values are recorded in the underlying data and are not rounded until the point they are populated in to the accompanying Closeout Data Template; per the submission Instructions and Guidance provided by Ofgem.

Sections 3 & 4 document the definitions and assumptions necessary to complete the Closeout Data Template.

Sections 5 to 7 offer commentary on relevant risk adjustments, normalised targets, and delivered risk at an asset category level; with attention & detail drawn to the highest impacting components.

Section 8 proposes a methodology for deriving associated costs. Examples of how a dead band may be applied with respect to the associated costs and under/over delivery scenarios are presented.

Section 9 provides a brief commentary on backward-looking network reliability measures, which offer corroboration of the effectiveness of interventions undertaken in RIIO-T1.

Supplementary data are provided in the T1 Closeout Data Template. Section 5.1 lists the assets included in the original 2M plan. Section 5.2 lists NLR only assets considered at T1 close. Sections 5.1 & 5.2 detail the risk output contributing to overall reporting. Section 5.3 lists the differences asset interventions from T1 close to the original 2M plan.

<sup>1</sup> Ofgem Network Output Measures (NOMs) Incentive Methodology Version 2.0 07 May 2021  
[https://www.ofgem.gov.uk/sites/default/files/docs/2021/05/riio-1\\_noms\\_incentive\\_-\\_version\\_2.0\\_clean\\_0.pdf](https://www.ofgem.gov.uk/sites/default/files/docs/2021/05/riio-1_noms_incentive_-_version_2.0_clean_0.pdf)

### 3. Asset definitions and intervention definitions

#### Definitions

1. For the purposes of T1 Closeout Data; the risk value reported is defined as the probability of End-of-Life failure modes per asset (PoF), multiplied by the Consequences-of-Failure (CoF) per asset.
2. Lead asset types include OHL Conductor; OHL Fittings, Cables, Transformers, Reactors and Circuit Breakers.
3. Linear assets are reported by specified voltage (132; 275 and 400kV assets). Reporting of Non-Linear assets is for 11-132; 275 and 400kV categories. This is required for consistency of reporting between RRP and the 2M target.
4. Replacement: An asset is removed, replaced by one or more assets. The asset removed is considered a volume off. The replacement(s) are considered volume on. In rare cases, a non-load related removal may be replaced by a load related replacement.
5. Disposal: An asset is removed without any replacement. The disposal is considered a volume off.
6. Targeted replacement: Within a given OHL routelet; rather than replacing all component fittings; replacement is concentrated on component parts where condition indicates necessity. From a Replacement Priority perspective, targeted works reduces the priority. From a risk perspective, the apparent benefit is not the same as total replacement. The consequence of this approach is discussed in section 6.4.
7. Refurbishment: An intervention that stops short of replacing an entire asset; but is more extensive than a maintenance activity. Refurbishment of breakers transfers the asset from a non-refurbished to a refurbished deterioration curve for the purposes of calculating risk.

#### Assumptions

1. Differences in reporting requirements between Regulatory Reporting and the T1 closeout data template mean that volume figures quoted in the respective reports will differ.
2. The template has been populated with pre-refurb and post refurb risk and volume numbers (section 3.2 delivery). The volumes for OHL Fittings refurbishment are not representative of the amount of the OHL routelet (i.e. NOMOH code) that has been refurbished. The full length of the routelet is used as per the NOMs methodology.
3. Volumes for the length of the OHL Conductor for replacement offs and pre-refurb (for OHL Fittings) uses lengths from the rebasing exercise (2M target). Replacement ons and post refurb uses lengths of the OHL Conductor from RRP21 data. The length of conductor may change due to aspects of the delivery e.g. new conductor length is different to the old one, or the length has been altered due to data cleansing. Data cleansing activities mean that volumes of work do not completely align throughout the T1 period.
4. Decommissioned assets, which have not yet been disposed of, have been counted as replacement offs. These are also included in section 3.2 of the Closeout Template. There remains a negligible risk associated with those assets awaiting disposal.
5. Section 3.2 includes data for Risk removed associated with replacement offs and refurbishments. The risk removed is calculated from the without intervention position.
6. Replacement ons and post refurbishment, in section 3.2, show the current risk position for the associated assets at the end of T1.
7. Replacement offs include disposals and old assets that are part of replacement schemes.
8. Replacement ons include additions and new assets that are part of replacement schemes.
9. Consistent with the regulatory and NOMs reporting throughout RIIO-1, quadrature booster (QB) transformers are reported as single units rather than separate Shunt and Series Tanks.



## 4. General assumptions

### 4.1 Rounding

The rounding of data contributes to minor discrepancies in the totals presented in the Closeout Data Template. For example, directed rounding means that where an individual line item is 1,449,999, this is rounded to 1.4m; losing effectively 49,999 from the reporting line. The use of rounding in the T1 closeout template accumulates to understate the normalised 2M target by R£1.061m and delivery by R£0.697m. This is not large enough to be material to the overall outcome nor would it move any category from over to under delivery (or vice versa).

	Normalised Target – Reported	Normalised Target (3 d.p.)	Difference	Normalised Residual Risk – Reported	Normalised Residual Risk (3d.p.)	Difference
Cables	38.3	38.397	+0.097	35.5	35.863	+0.363
Reactors	19.9	19.986	+0.086	17.5	17.528	+0.028
Transformers	193.0	193.208	+0.208	107.9	108.030	+0.130
Circuit Breakers	138.4	138.650	+0.250	57.8	58.028	+0.228
OHL Conductor	166.4	166.401	+0.001	64.6	64.557	-0.043
OHL Fittings	130.0	130.419	+0.419	155.4	155.391	-0.009
Total	686.0	687.061	+1.061	438.7	439.396	+0.697

Table 2: Impact of Directed Rounding on reporting

### 4.2 NOMs Modelling Assumptions

An essential characteristic of the transmission network is that it provides a high level of reliability. The End-of-Life of an asset is therefore not necessarily the point at which it fails. End-of-Life is defined as an asset reaching a state requiring replacement; that is, a 10% probability of failure in the next year.

The lead time for replacing any given asset family can vary significantly; 5 to 10 years is not unusual for major infrastructure projects. As such, to manage a reliable network, it is essential to plan the replacement of assets ahead of reaching a state requiring replacement. There is uncertainty in the precise timing required, the ongoing monitoring of asset condition can accelerate or defer decisions over relatively short timescales compared with that of the price control period.

Deterioration curves specific to asset families have been derived per the NGET NARA Licensee Specific Appendix 4.2. The method for evaluation of an asset's deterioration relative to that curve based upon its condition and performance history is given in the NARA in the form of End-of-Life modifiers.

End of Life scores do not smoothly increment over time in line with PoF forecasts. Step changes in response to condition drivers associated with specific symptoms of deterioration will be produced by following the NARA. Assets may therefore appear to suddenly deteriorate quickly if they suffer certain defects, or slower than the deterioration curve; and this has bearing on the out-turn risk figure.

The rebasing exercise translated the November 2010 asset data into monetised risk targets. Condition measures used today were not necessarily available in the 2010 dataset. This effect has resulted in adjustments to the 2M target through normalisation, discussed in section 7.

The forward forecast of Probability of Failure (PoF) advances the equivalent age by 10 years (i.e. 2010 to 2020). The assets which have remained in a similar condition will overall report less risk at the end of the period than the 2M target whilst those that have deteriorated faster will report more risk than forecast.

When taking a snapshot in time there is likely to be a natural skew towards overall slow deterioration as a result of proactive management of the highest risk assets, prioritising and intervening on those which are showing signs of distress or rapid deterioration. There can be exceptions to skew towards slow, for example the discovery of a design defect which is common to a large portion of the asset population would result overall in a higher risk than anticipated.

System Consequence data, including customer, boundary and reactive compensation impacts have been fixed at the levels used in the T2 Business plan (2018-19) for all risk modelling used in T1 closeout. This facilitates like-for-like comparison. System consequences can change over time; primarily because of change in the generation or demand background.

Safety and Environmental criticalities are modelled using the criticality data as of March 31<sup>st</sup>, 2021. These parameters rarely change. Wholesale asset intervention can potentially reduce a circuit or substation's criticality, e.g. replacing a fluid-filled cable with XLPE. Safety and Environmental consequences are a function of the criticality assigned.

Financial consequences have been modelled using the Electricity Transmission Capex Cost book 2018/19 assumptions.

An error in the calculation method for consequence of failure for OHL conductors, fittings and cables from the rebasing exercise was discovered whilst completing the close out table. The original 2M rebased target were inclusive of this error. The closeout risk and volume distribution, in section 3.2 in the template, are reflective of the corrected consequence of failure values. These corrections are included in data cleansing as follows:

Asset Category	Target Normalisation (R£m)
OHL Conductor	10.0
OHL Fittings	-2.1
Cable	-6.8
Overall	1.1

*Table 3: Data cleanse normalisation associated with errors in calculation of consequences of failure*

The 2M rebasing exercise assumed that refurbished breakers have their EoL set to zero, consistent with how they were modelled at the start of T1 & the submitted plan. The forecast of without intervention risk also uses this assumption. In practice, refurbished breakers may exhibit EoL greater than zero in the final closing position.



The data cleansing activity included several assumptions:

- Assets missing from the 2M inventory, during the rebasing exercise, used the 2020 risk score for the target.
- Assets which were planned to be removed in T1, but were not intervened on, took the risk value from 2020 without a plan, calculated during the rebasing exercise.
- Unlicensed assets, duplicates, transfer assets and <132kV linear assets were removed from the target.
- 2020 asset attributes were taken as the primary reference.

For life extended assets, the extended curve is applied to the deterioration profile only and not applied within the EOL scoring.

## 5. RIIO-1 Targets

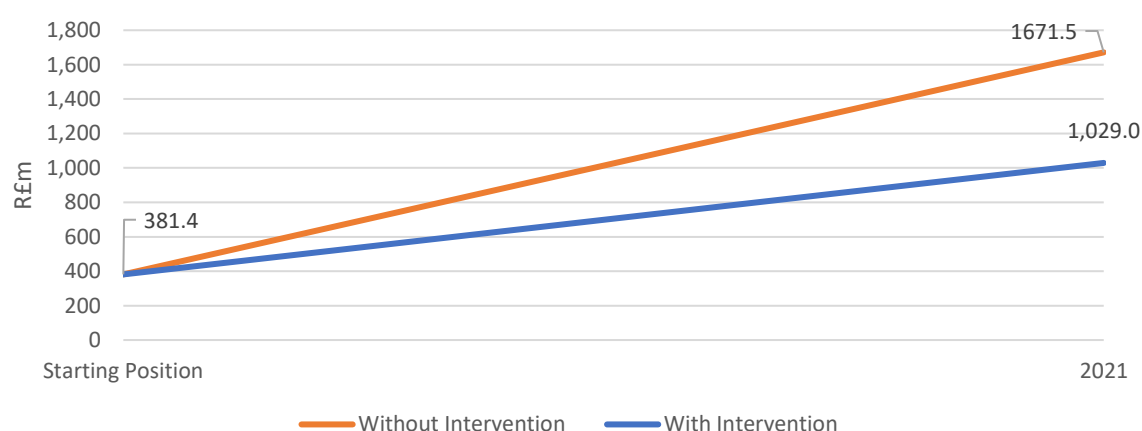
### With & Without Intervention Risk Summary

Tables 3.1& 3.1.1 indicate the pre-normalisation risk & volume, calculated for 31<sup>st</sup> March 2013.

Forecast pre-normalisation risk with 2M intervention plan, and with no interventions are calculated for 31<sup>st</sup> March 2021. This forward forecast assumes deterioration of Equivalent Age by one year, per calendar year.

The without intervention figures presented in the T1 Closeout Template worksheets 3.1, 3.2 and 3.3.1 are identical for target and delivery. These figures indicate where risk would have accumulated if no interventions were completed.

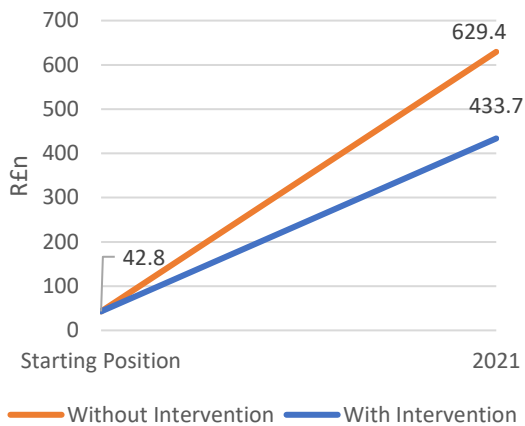
The pre-normalisation with and without intervention positions are shown in the chart below. The pre-normalised data is the same data set that were used in the 2M rebasing exercise.



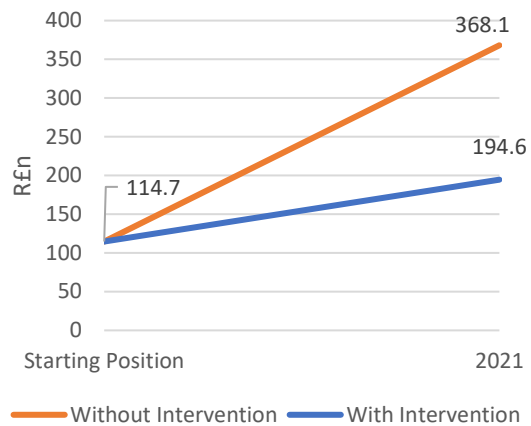
Normalised, without intervention risk values are calculated in Closeout Data Template 3.3.1 worksheet. The normalised targets and delivery figures are discussed in section 6.

## With & Without Intervention Risk by Asset Category

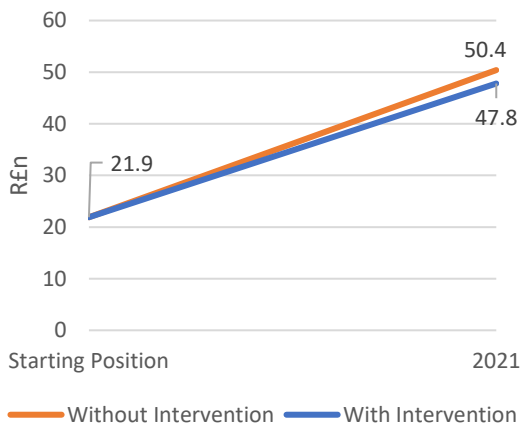
**OHL Conductor**



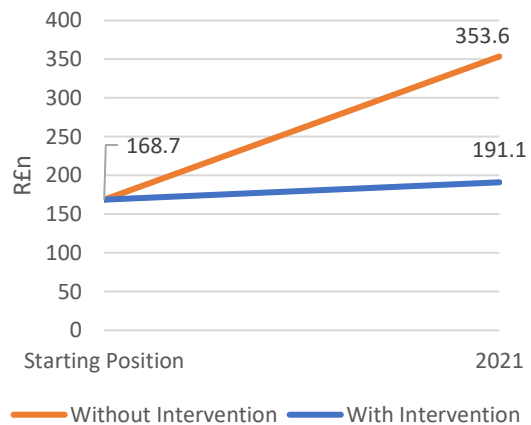
**OHL Fittings**



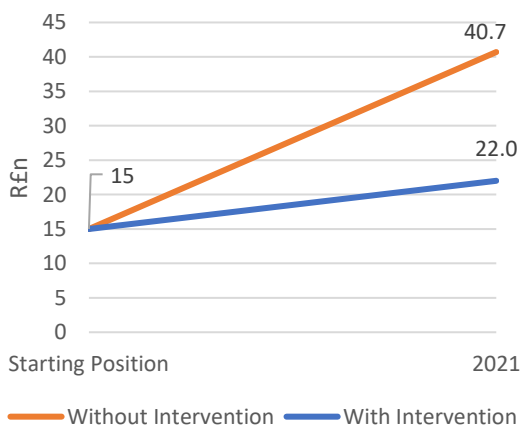
**Cables**



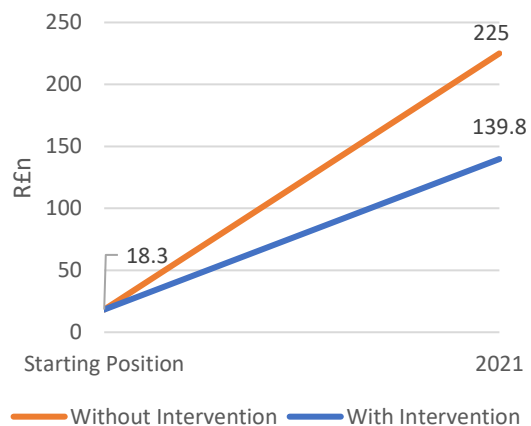
**Transformers**



**Reactors**



**Circuit Breakers**



## Intervention Volumes

Asset Category	Asset Replacement Offs	Asset Replacement Ons
OHL Conductor (km)	963.9	963.9
OHL Fittings (km)	2670.1	2670.1
Cables (km)	94.5	100.1
Transformers	139	142
Reactors	21	21
Circuit Breakers	290	335

*Table 4: Intervention volumes assumed at time of setting the 2M target*

## Assumptions, Variables & Constants

For consistency with how tables were completed in rebasing, table 3.1 specifies no target volume for refurbishments. Disposals are aggregated under Replacement Offs.

The Risk modelling is undertaken using the approach described in the NOMs methodology, Network Asset Risk Annex, and it's supporting Licensee Specific Appendices.

The licensee specific appendices define the method for obtaining System, Safety, Financial and Environmental consequences. These methods include variables concerning the cost of carbon, scrappage, customer, boundary and reactive compensation impacts. As noted in the assumptions, these elements have all been held constant for the purposes of the T1 Close Out Assessment.

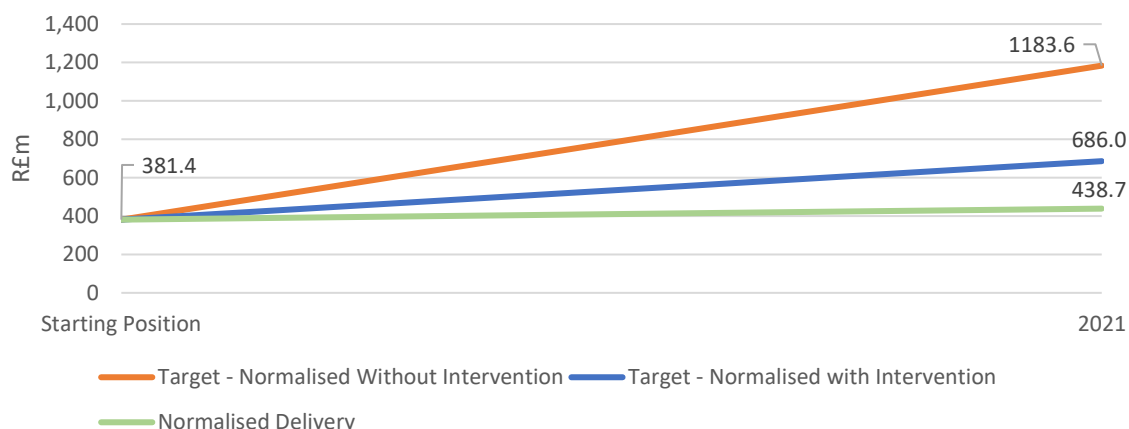
The NGET rebasing methodology originally adopted an approach to calculating risk for Load-related replacements, by holding the risk at the level on the date of replacement. It has subsequently been agreed with Ofgem that this is no longer necessary; Load related impacts on 2M are normalised from both the Target and Delivery figures.

## 6. RIIO-1 Delivery

### Overall

NGET has delivered on its post normalisation RIIO-T1 2M target (R£686.0m), with a residual risk of 438.7m; overdelivering by 36% (R£247.3m) overall. At an asset category level; NGET has delivered the target risk for five of the six lead asset categories, the exception being OHL Fittings.

Risk over T1 has remained broadly equal, rising from R£381.4 to R£438.7m; noting that significant load-related work (which are excluded from this analysis) have also been completed during the period.



Normalised Delivered Risk, compared to Normalised Without-intervention risk, and Normalised Targets.

Lead asset category	Normalised 2M Target /R£m	Post Normalisation Residual Risk /R£m	Difference/R£m	Difference/%	Performance
OHL Conductor	166.4	64.6	101.8	61%	Target delivered
Circuit Breaker	138.4	57.8	80.6	58%	Target delivered
Transformers	193.0	107.9	85.1	44%	Target delivered
OHL Fittings	130.0	155.4	-25.4	-20%	Target not delivered
Reactors	19.9	17.5	2.4	12%	Target delivered
Cables	38.3	35.5	2.8	7%	Target delivered
<b>Overall</b>	<b>686.0</b>	<b>438.7</b>	<b>247.3</b>	<b>36%</b>	<b>Target delivered</b>

Table 5: Residual risk position compared to Normalised 2M Targets

Facilitating risk trading was a deliberate objective of introducing monetised risk. The NOMs Incentive Methodology<sup>2</sup> notes that “*It is recognised that circumstances can change, and to reflect this Licensees can trade off monetised risk between types of intervention and asset categories in order to deliver an equivalent or better outcome to the NOMs target.*”

The General Principles also state “*A licensee should not be constrained to adhere to its initial RIIO-1 business plan, and should have discretion to revise its intervention plan to appropriately reflect most up-to-date information.*”

Special Licence Condition 2M.5 also acknowledges that a licensee may deliver an equivalent or better set of Risk Outputs than the original 2M target. The prioritisation of high risk assets has contributed to risk reduction of R£80.0m for OHL Conductor and Circuit Breakers performance.

<sup>2</sup> <https://www.ofgem.gov.uk/publications/decision-network-output-measures-noms-incentive-methodology>

The over delivery on risk is driven in two major areas.

- Improvements to asset management practices contribute to slower than expected deterioration relative to the 2M target, totalling a R£215.9m reduction in delivered residual risk. Discussion of these improvements is given in section 7.7.
- Plan differences contribute R£39.2m to the over delivery at overall level. The original 2M plan was created using Asset Health Indices in a Risk and Criticality model. The widespread use of pre-emptive condition monitoring into the evolving asset management framework directly facilitated changes in planning over the 11-year window.

The volume of individual scheme changes is extensive. Changes to plans have been reported annually via RRP Table 4.3.1. Supplementary data is presented in the T1 Closeout Template section 5.3. The following is a summary of the plan differences at an asset category level.

Asset category	Impact of Slow Deterioration R£m	Impact of Plan Differences R£m
<b>Reactors</b>	-6.8	4.3
<b>OHL Fittings</b>	-6.2	30.4
<b>OHL Conductors</b>	-58.5	-43.4
<b>Cables</b>	-5.2	2.7
<b>Transformers</b>	-88.6	3.4
<b>Switchgear</b>	-50.6	-36.6
<b>Overall</b>	<b>-215.9</b>	<b>-39.2</b>

*Table 6: Summary of slow deterioration & plan differences by category*

Decisions in T1 were initially made on a replacement priority (RP) basis rather than monetised risk. Rebasings the methodology to monetised risk looks retrospectively at decisions made during T1. Decisions that had been made under the RP framework may not directly translate to those under monetised risk.

The overall volume delivered is less than that anticipated in the original T1 business plan used to set the 2M target. Delivering upon the risk target suggests the interventions selected were an equivalent or better set of interventions.

No non-NOMs interventions, such as unlicensed work impact the T1 close out position.

Section 9 provides a brief analysis of Network Performance measures, which have remained broadly constant throughout RIIO-T1. This analysis shows that the net effect of NGET's T1 intervention decisions are balancing pre-emptive intervention with network reliability, delivering on stakeholder interests.

Through the normalisation process, relevant non-intervention risk changes are removed from the 2M target and delivery figures. Relevant risk changes are discussed in section 7. Normalisations have been made to all asset categories.



## Delivered Intervention Volumes

Asset Category	Asset Replacement Offs	Asset Replacement Ons	Asset Refurbs	Total Interventions
OHL Conductor (km)	1872.5	1876.7	0	1872.5
OHL Fittings (km)	1929.4	2027.4	1306.1	3283.4
Cables (km)	74.5	88.6	0	145.5
Transformers	111	69	0	118
Reactors	12	15	0	17
Circuit Breaker	329	341	340	759

Table 7: T1 Delivered intervention volumes, as of 31<sup>st</sup> March 2021

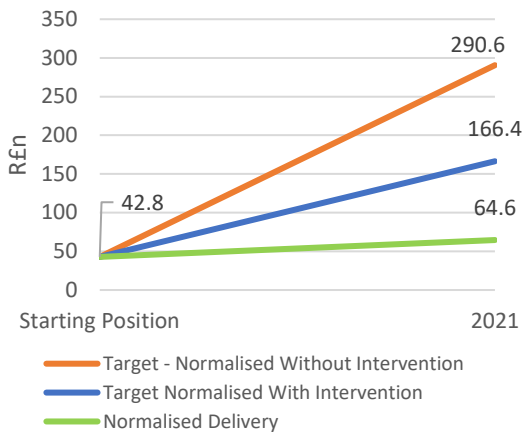
## By asset category

The effect of normalisation on the risk target for each lead asset category is summarised in the table below:

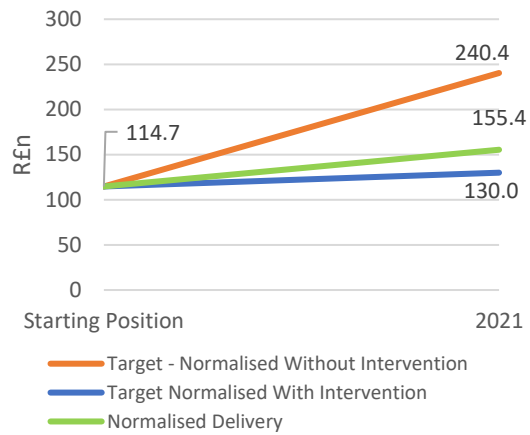
Asset category	Normalisation change /R£m	Normalisation change %
OHL Conductor	-267.3	62%
OHL Fittings	-64.6	33%
Underground Cable	-9.5	20%
Circuit Breaker	-1.4	1%
Transformer	1.9	-1%
Reactor	-2.1	1%
<b>Total</b>	<b>-343.0</b>	<b>33%</b>

Table 8: Changes to 2M target arising from Normalising 2M Targets

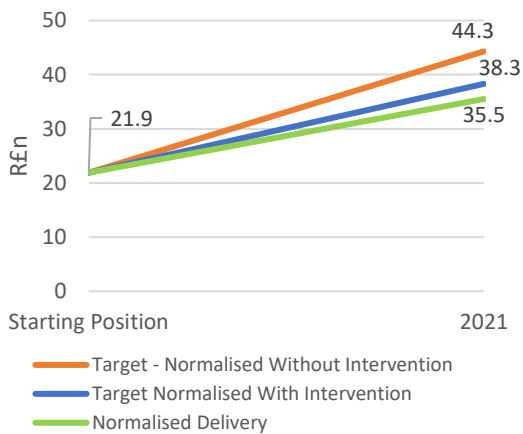
### OHL Conductor



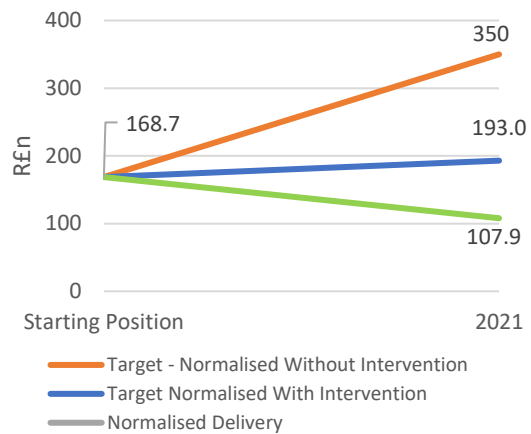
### OHL Fittings



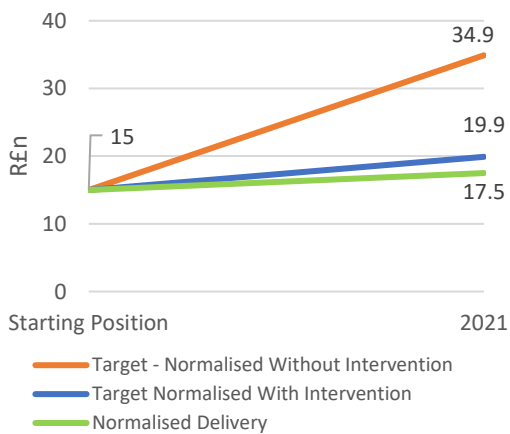
### Cables



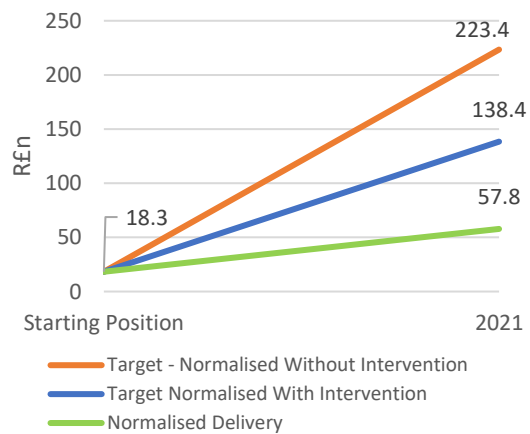
### Transformers



### Reactors

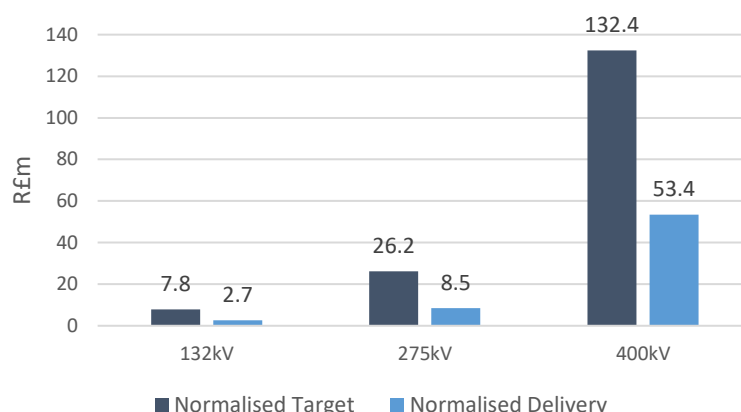


### Circuit Breakers



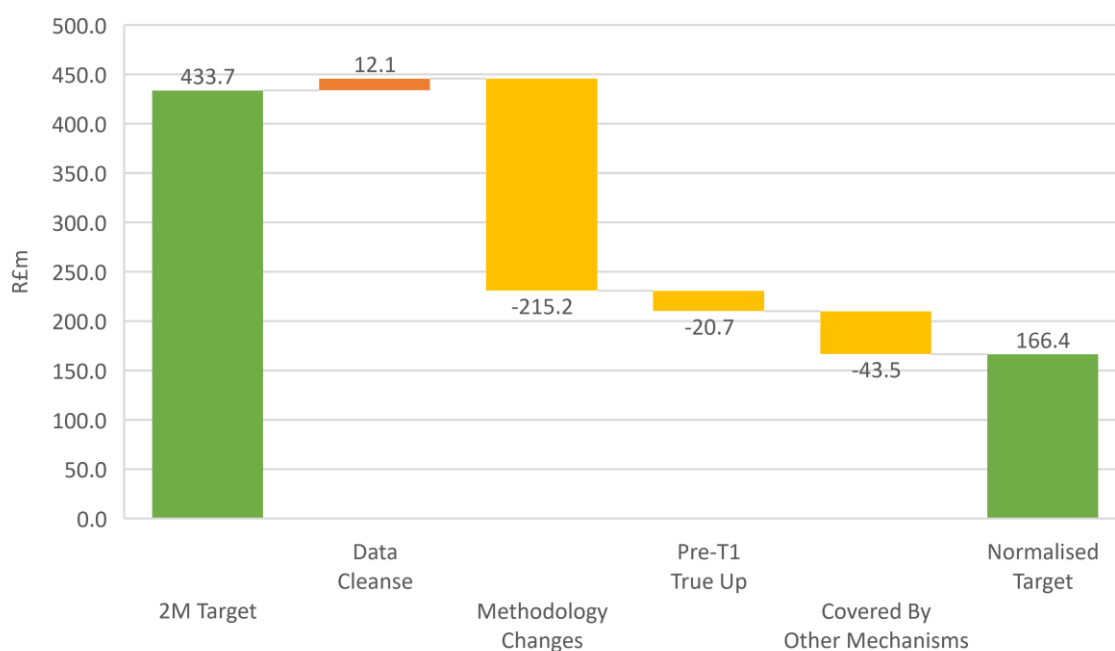
## 1. OHL Conductor

Normalised Target	R£166.4m
Normalised Delivery	R£64.6m
Performance	-R£101.8m below target
	61% Over Delivery



OHL Conductor over delivery has been achieved, post normalisation, across all voltages.

A normalisation of the target from R£433.7m to R£166.4m has been applied. Adjustments have been made for data cleansing, methodology change, pre-t1 true-up and load related activities.



The methodology changes reduce the target by R£215.2m. This is the single largest normalisation applied, arising from changes to OHL lifetime assessment during RIIO-T1. This includes both policy life extensions and changes to EoL modifier scoring facilitated by the introduction of forensic conductor sampling the risk assessment (phase conductor sample index & corrosion survey factors).

Load related interventions completed in place of non-load related activity reduce the risk target by R£43.5m.

Pre-T1 true-up further reduces the target by R£20.7m, applicable to conductor work carried between November 2010 and 31st March 2013.

Data cleansing normalises the original target by R£12.1m. A thorough review of this data in 2014 led to many corrections; including some circuits that had been overlooked or incorrectly included. These errors are present in the original 2M data and were reported at RRP in the RRP 2014-15 Commentary. Overhead

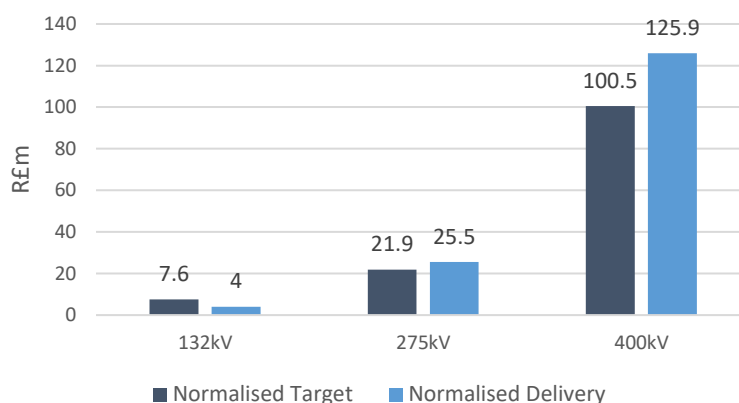
line route length is periodically refreshed by LIDAR survey data, leading to many smaller corrections reported in subsequent RRP.

Slow deterioration contributes R£58.5m to over delivery. A further R£43.4m is attributable to works completed that were not originally planned in 2M. NGET has prioritised interventions on the highest risk assets to produce this benefit.

Further details of condition assessments and life extensions can be found in the November 2017 'Cost Visit' document titled 'Asset Management of Transformers, OHL Conductor and Cable Tape Corrosion', SQ66 (2016/17), SQ37 (2017/18) and SQ107 (2017/18).

## 2. OHL Fittings

Normalised Target	R£130.0m
Normalised Delivery	R£155.4m
Performance	R£25.4m over target
	<b>20% under delivery</b>



OHL Fittings over delivery, post normalisation at 132kV. Under delivery at 275kV and 400kV. This is the only lead asset category exhibiting overall under delivery.

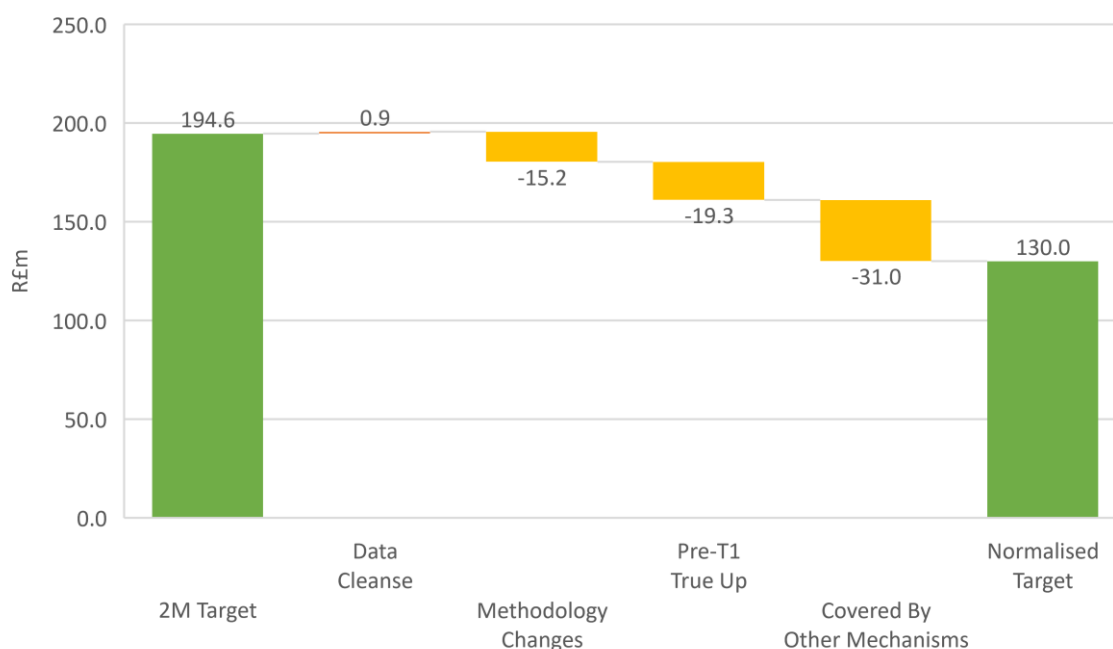
Of the fittings works planned for 2020-21, 119 km have been delayed to RIIO-T2 mostly due to the ongoing pandemic. Not all these items were in the original 2M plan. One item had delays to populating the asset register on commissioning. A breakdown of the delayed works is given in Appendix 1. If we assume the completion of these works had reduced the risk on these assets to zero, delivered risk would have improved by R£ 4.5m.

Section 3.2 of the T1 closeout data template includes pre-refurbishment and post-refurbishment risk and volume numbers. The volume displayed is that of the entire routelet (i.e. per NOMOH code). This is not representative of volume of intervention within the routelet, as the work have been conducted on a targeted basis. This is consistent with the original volume reported by RP concept in 2M; which would have also considered the targeted refurbishment of a routelet to improve the entire NOMOH code.

Slow deterioration contributes R£6.2m to delivery. R£30.4m of risk arises from the application of targeted interventions.

The targeted fittings approach, delivered in-house, has enabled £142m of cost savings within the-T1 period. The risk model does not fully reflect the benefits of the targeted fittings approach. The limitations in the treatment of targeted fittings in the End of Life scoring will be addressed in T2 as part of wider review of OHL Conductor and Fittings scoring review for implementation in a revised methodology in T3. A brief discussion of the limitations follows in section 6.2.1.

The pre-normalisation target of R£194.6m reduced to R£130.0m post normalisation. Adjustments to the target have been made for data cleansing, method change, pre-T1 true-up and load related activities.



Load related activities account for R£31.0m of this change; routes with planned NLR fittings replacements in 2M had their conductors changed for load-related reasons instead, thus reducing the NLR target to avoid the risk of double-accounting for these benefits under LR- and NLR mechanisms.

Method change reduces the target by R£15.2m, in a similar manner to conductors; the introduction of a 2-stage condition assessment process has refined our assessment of condition.

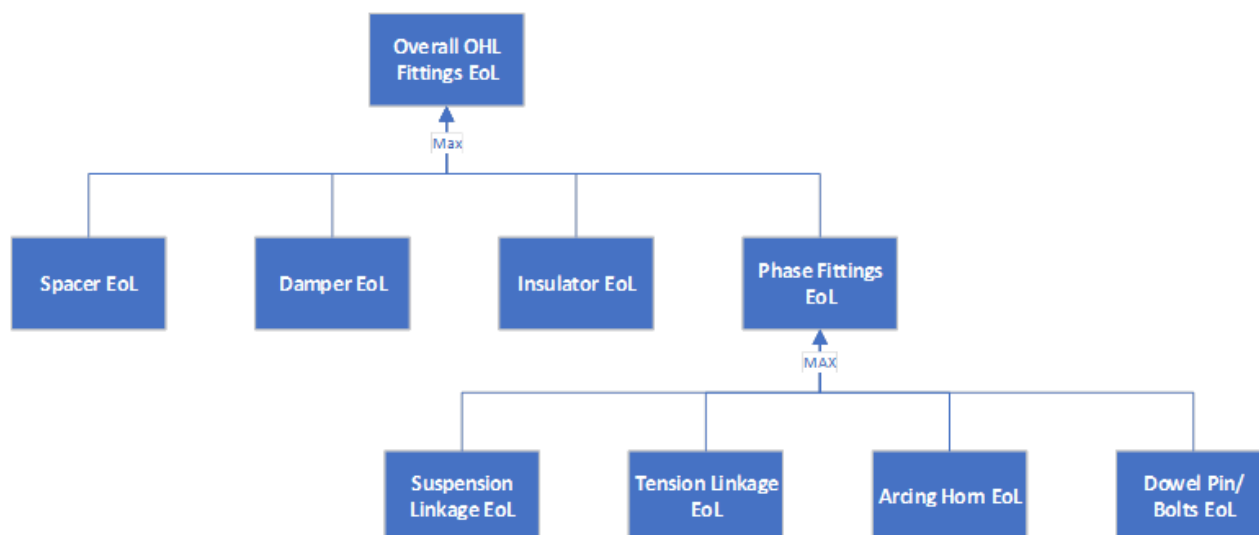
Pre-T1 true-up reduces the target by R£19.3m for work completed between 2M and March 31st, 2013.

Data cleansing results in a minor increase in the target of R£0.9m.



## 2.1 Why does a targeted OHL Fittings approach appear as under delivery?

Fittings EoL scores are made by assessing the individual scores of several subcomponents as per the following diagram:



The overall EoL is determined by the maximum EoL of the subcomponents (spacers, dampers, insulators, and phase fittings). The “phase fittings” subcomponent itself is determined by the maximum EoL of several further subcomponents.

Implicit in this is the assumption that arcing horns and tension linkages, for example, contribute in the same way to risk as insulators. However, the risk associated with an arcing horn in poor condition is significantly less than that of a deteriorated insulator string. In the risk model both are evaluated equally. While all these subcomponents need to be managed to maintain network integrity, the probability of failure and associated risk is not equal. The overall EoL score for a fitting can be unduly influenced (and thus the risk overstated) by the condition of a single subcomponent.

NGET's asset management approach to fittings replacement (targeted or otherwise) was to replace the components required to ensure that the conductor reaches its asset life (in many cases 1.5 times the life of the fittings) without over investing. As a result, when scoping a fittings replacement scheme an assessment is made as to precisely which fittings need to be replaced to achieve the circuit's remaining anticipated asset life. In the first instance this tends to focus on components that are directly clamped to the conductor (spacers and dampers), followed by insulators and phase fittings. Phase fitting scoring is currently driven primarily by the presence of heavy corrosion.

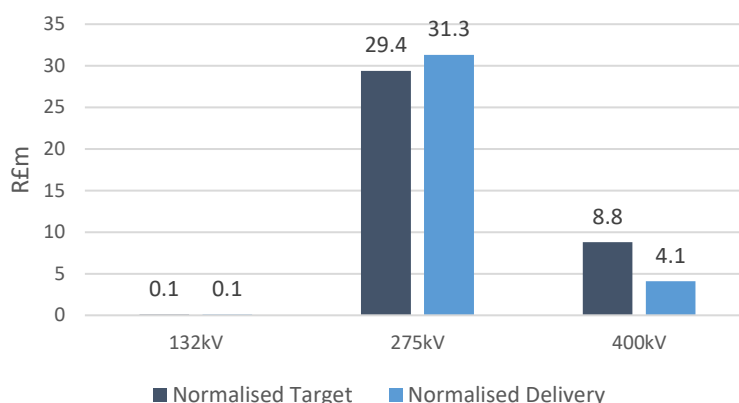
This approach replaces those components identified to be in worst condition whilst allowing the fittings in acceptable condition to remain. This has become NGET's default approach to OHL fittings intervention in T1.

Condition information was reviewed to assess which specific components (dampers, spacers, insulators, or linkages) should be targeted. We have therefore managed the components driving the high probability of failure, leaving assets with a lower probability of failure and thus less risk.

This has delivered the necessary asset condition improvement through targeted intervention, but the benefit is not captured in the risk methodology, leading to a justified underperformance against the 2M target.

### 3. Underground Cable

Normalised Target	R£38.3m
Normalised Delivery	R£35.5m
Performance	R£2.8m under target
	<b>7% Over delivery</b>



There is an under delivery at 132 and 275kV voltage levels. In absolute risk numbers, the difference at 132kV of <R£0.1m is negligible.

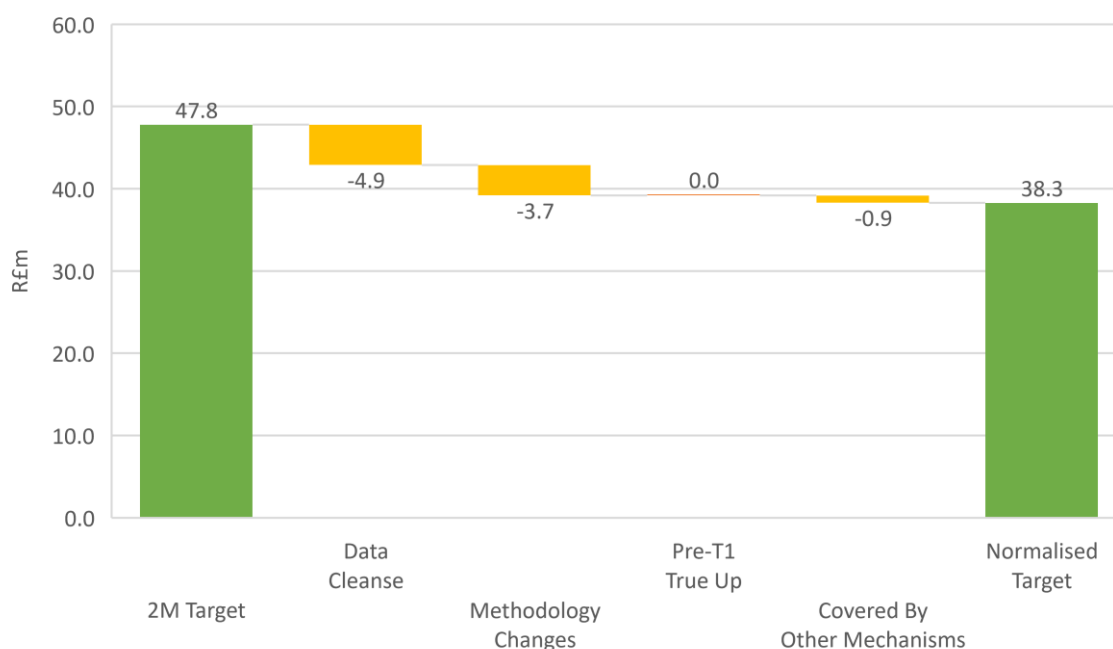
Bustleholm – Nechells 1 & 2 (275kV) were originally planned for replacement in 2020. This project required the in-situ replacement of the existing cable, and consequently a relatively long outage would be necessary. A combination of single circuit risk, long outage with no feasible restoration plan, and the risks associated with the pandemic meant that taking the necessary outage during T1 to complete these works would have been an unacceptable risk.

R£2.7m of risk was accumulated from assets that were proposed for replacement in the 2M plan but not completed.

While the new London Power Tunnels Phase 1 (LPT1) circuits have been completed and successfully commissioned, delayed decommissioning of assets reduces the delivery position. These assets will be decommissioned early in T2.

Ten assets reported in 2M had high severity scores in their EoL modifier, due to historic long repair times and their oil leak scores. The introduction of perfluorocarbon tracing (PFT) in the late 2000s and early 2010s dramatically improved the time and detectability of defects, reducing the quantity of oil leaks. Elements of EoL scoring are time-bound. Events of 2008 contribute to the scores in 2010, but not to scores in 2021. A cable with a steady stream of defects would continue to score highly. This means these assets are reported as having slower than expected deterioration, contributing R£5.2m to over delivery.

Pre-normalisation target of R£47.8m reduced to R£38.3m post normalisation. Adjustments have been made in the normalisation process for data cleansing, method change and load-related activities.



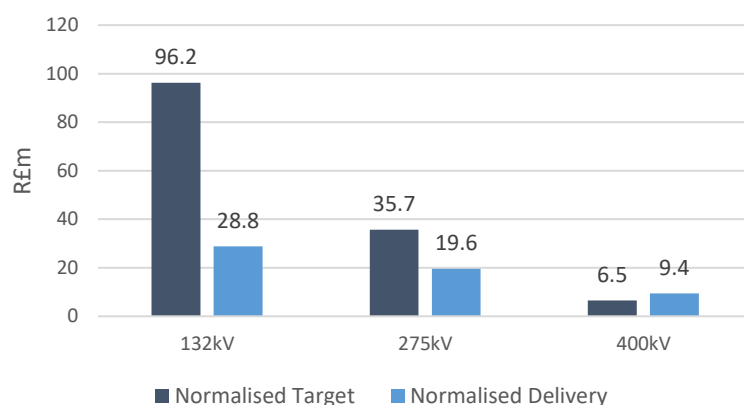
Data cleansing has resulted in a reduction in the target at R£4.9m.

Policy life extensions have been applied to Cable groups 2 and 5, reflecting the favourable performance of these asset families to date. Group 1's anticipated asset lifetime has increased; though the earliest and latest onset of significant unreliability were not changed. These changes normalise out of the target netting a change of R£3.7m.

A trivial adjustment for load-related activities replacing NLR activity was made for R£ 0.000582m.

## 4. Circuit Breaker

Normalised Target	R£138.4m
Normalised Delivery	R£57.8m
Performance	-R£80.6m below target
	58% Over Delivery



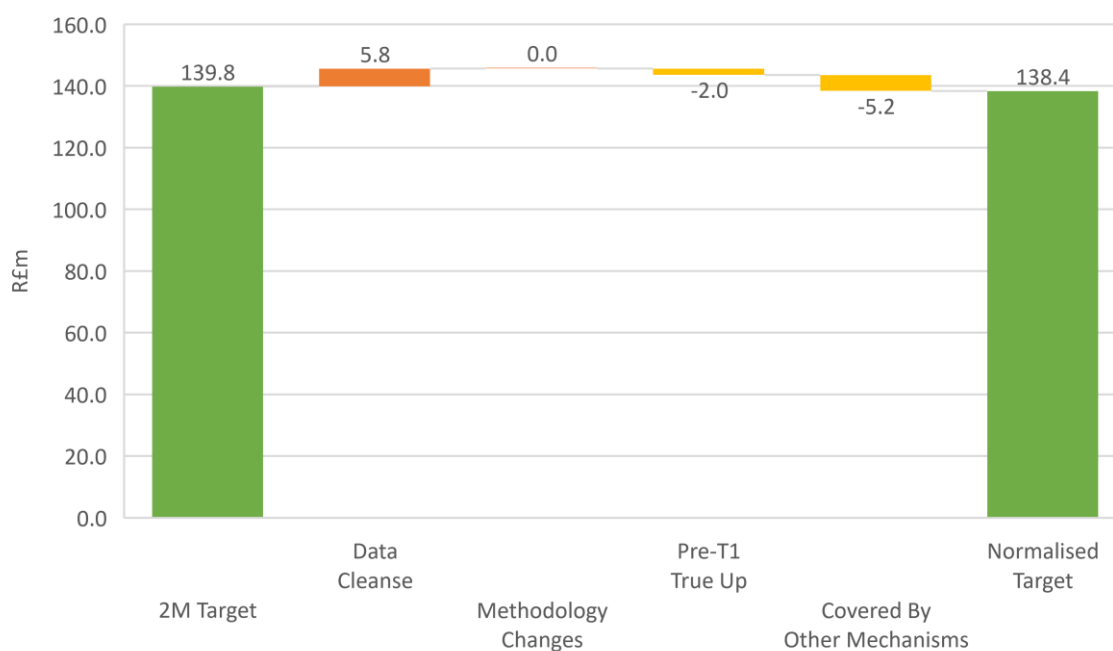
The majority of Circuit Breaker over delivery is at 132kV and slight under delivery at 400kV.

R£50.6m of the over delivery is attributable to slower than expected deterioration of assets, particularly those at 132kV. Refurbishment activities to maintain older types of breaker have generally proven a cost-effective method to manage risk throughout RIIO-T1 compared to replacement options.

A further R£36.6m is attributable to interventions undertaken on assets that were not in the original 2M plan. Individual breakers may have been identified in the 2M plan, but the decision to replace a single asset or consider a wider site rebuild may not have been fully scoped at that time. This leads to the extent of plan differences for Circuit Breakers being relatively large.

The delivery figures for Circuit Breakers include the effect of refurbishments. The 2M target assumes that the refurbishment reset the EoL modifier to zero for simplicity of modelling. However, as delivered, this is not necessarily the case. Delivered risk is therefore greater than assumed in the 2M target.

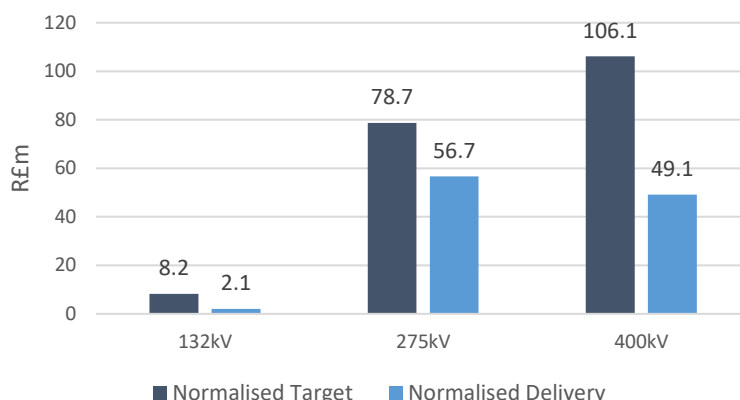
Normalisation generated a small change in the risk target of 1%.



The pre-normalisation target was R£139.8m compared with R£138.4m post normalisation. Adjustments have been made for data cleansing, pre-T1 true-up, and Load-related activities.

## 5. Transformer

Normalised Target	R£193.0m
Normalised Delivery	R£107.9m
Performance	R£85.1m under target
	<b>44% over delivery</b>



Transformer over delivery across all voltages.

Improvements to asset management techniques, particularly Dissolved Gas Analysis (DGA) assessment over the last 10 years have permitted the adoption of Condition Monitoring Surveys (CMS) as a primary input to condition-based scoring. This has manifested in significantly better than expected results compared to those produced by the Replacement Priority methodology used to populate the 2M plan. The effects of this manifest as slow deterioration, accounting for R£88.6m of outperformance.

During T1 the Anticipated Asset Life (AAL) of Transformers has been extended based on the favourable CMS performance of the mid-life asset population. The earliest- and latest- onset parameters are unchanged; as the upper and lower limit on asset failures are also unchanged. This means there is no normalisation applied for method change in this case.

The accumulation of knowledge from transformer scrapping reports, research projects, online and offline monitoring/condition assessment, and analysis of dissolved gas in oil means that we continue to build capability in characterising defect and failure mechanisms. In doing so, we continuously refine our understanding of the condition of individual transformers, families of transformers and the fleet.

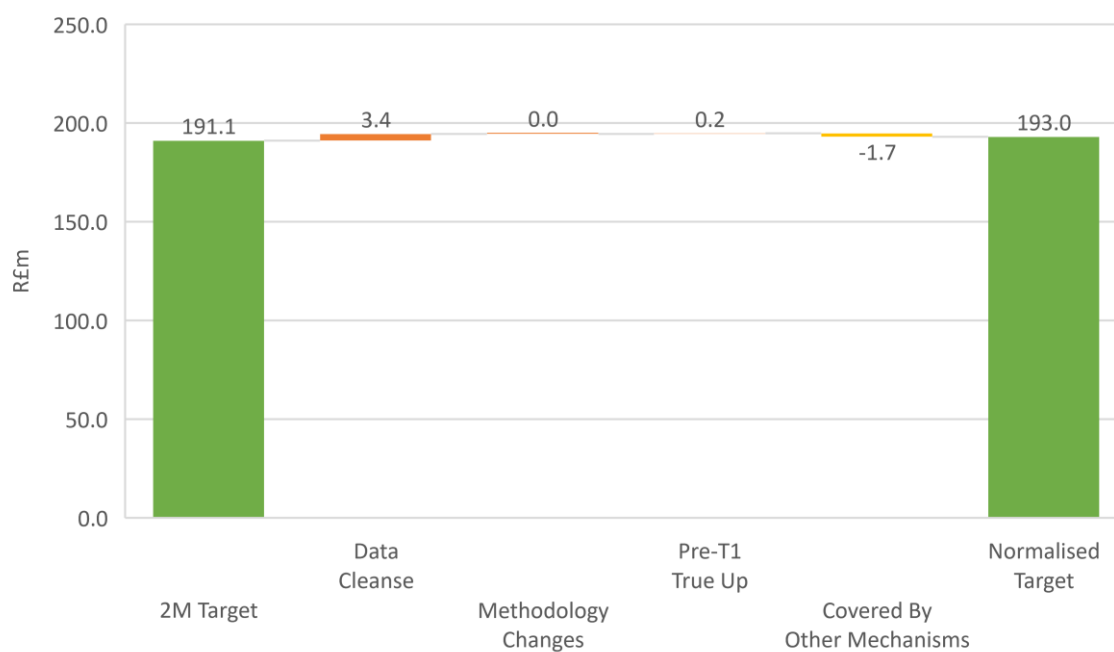
Further details of condition assessments and life extensions can be found in the November 2017 'Cost Visit' document titled 'Asset Management of Transformers, OHL Conductor and Cable Tape Corrosion', SQ66 (2016/17), SQ37 (2017/18) and SQ107 (2017/18).

As noted in the assumptions, the two major components of Quadrature Boosters (series and shunt) are separate units that may have different deterioration and risk. The original 2M target, the 2M rebasing exercise, RRP and T1 closeout all model these units as a single unit based on the EoL score of the series component. It is recommended that future risk reporting for RIIO-T2 considers both the series and shunt components.

The assessment of probability of failure using end of life modifiers derived from CMS reduces the reported asset risk at T1 close. The End of Life calculation used to populate the 2M risk position in 2010 lacks the information needed to retrospectively perform the same assessment. As part of the rebasing exercise EoL modifiers for the 2010 data therefore had to be extrapolated from both current data and expected deterioration to their starting point. Approximately 200 transformer assets benefit from reduced risk as a function of the CMS results.

Plan differences contribute R£3.4m to delivery risk.

Normalisation generated a small increase in the risk target of 1%.

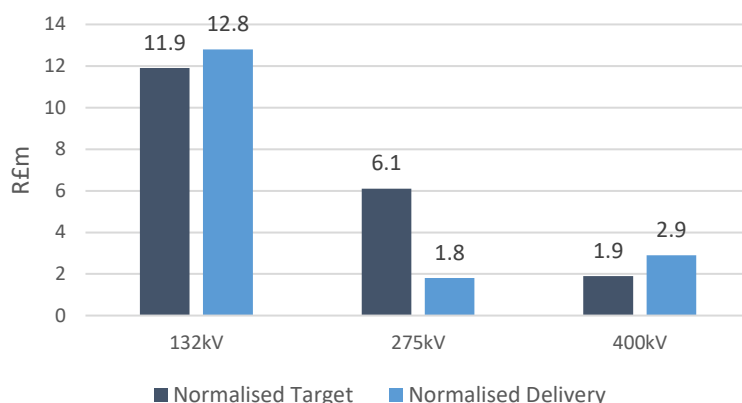


The pre-normalisation target was R£191.1m compared with R£193.0m post normalisation. Adjustments have been made in normalisation for Data Cleansing and load related activities.



## 6. Reactors

Normalised Target	R£19.9m
Normalised Delivery	R£17.5m
Performance	R£2.4m under target
	<b>12% over delivery</b>



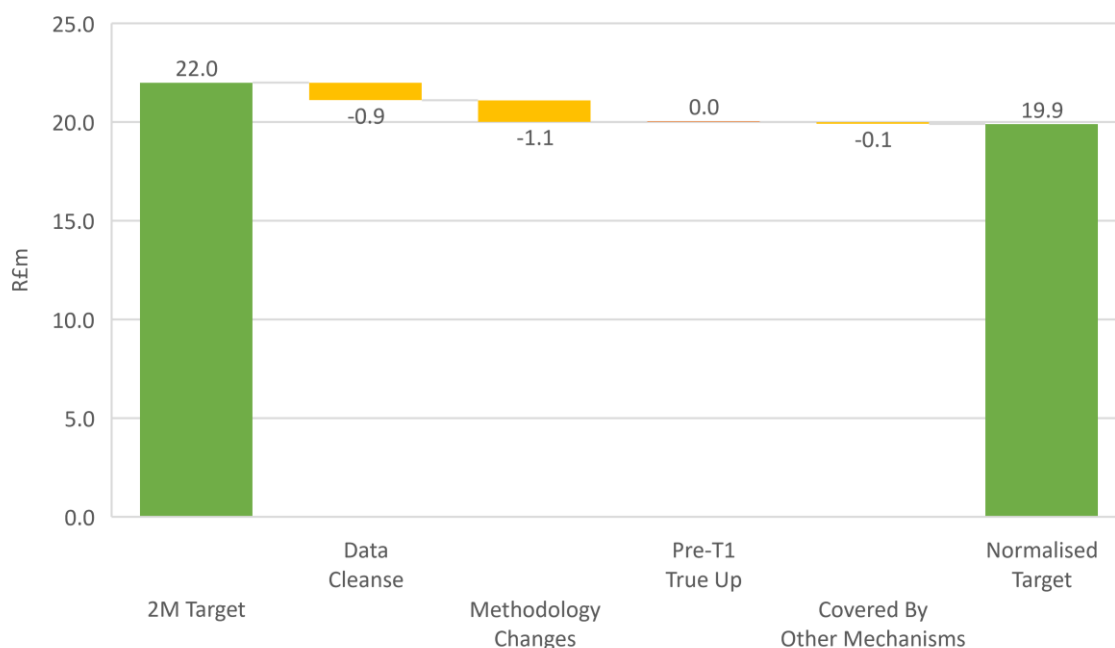
132kV reactors exhibited under delivery of R£1m, balanced by the over delivery at 275 and 400kV. The small asset population means that decisions impacting just one or two assets can be sufficient to swing from under to over delivery.

Reactor condition assessment has been improved using CMS in much the same manner as transformers. The latest onset of reactor failure has been extended; reflecting the increased service lifetimes both being achieved and indicated. ~50% of the reduction in the target is to life extensions.

Reactor condition as reported in the 2M rebasing was subject to the same data limitations as transformers necessitating extrapolation of the 2010 position.

After accounting for changes to the latest onset of failure, slow deterioration contributes to R£6.8m of delivery out-performance.

Normalisation generated a change in the risk target of 1%



The pre-normalisation target was R£22.0m and the post normalisation was R£19.9m. Adjustments have been made in the normalisation process for data cleansing, method change and load related activities.

## 7. Relevant Risk Changes

RIIO-T1 commenced on the 1st April 2013. The 2M rebased targets were developed using a snapshot of the asset data recorded in November 2010 (initially submitted to Ofgem in July 2011).

Relevant risk changes in each of the categories identified by Ofgem are summarised below.

Normalisation	Delta /R£m
Data cleansing (inc. CoF data error)	16
Methodology changes	-235
Consequence of Failure (CoF)	0
Pre-RIIO-1 work changes	-42
Changes covered by other mechanisms	-83
Delivery Normalisation	4.8

*Table 9: Normalisation of relevant risk changes in 2M target & delivery*

Targeted interventions were undertaken on many assets that were not in the original 2M plan. The original 2M plan was generated over a decade ago, numerous changes would be expected over this timescale. Plan differences are not normalised out as a relevant risk factor as they were a result of active decisions made to manage NLR risk by targeting the highest risk assets.

### 7.1. Data cleansing

The process of data cleansing included making corrections to the 2M asset base during RIIO-T1, for length, asset family type, years in service, asset populations, and data error in environmental consequence values used for cables. Data cleansing has been reported throughout T1 as part of the annual RRP returns.

The 2010 2M data were used in the rebasing exercise to convert the original outcome volume-based targets to monetised risk. The data were published in the license special conditions published January 2021. For the purposes of aligning RRP to T1 closeout, NGET have corrected the 2M data and normalised the target to match current understanding of asset populations. This facilitates a like-for-like comparison of the current network configuration.

Throughout T1, annual Regulatory Reporting (RRP) has documented data corrections to asset volumes. Significant updates to the OHL inventory were made in 2014. Length data is often updated following LIDAR measurements.

The 2M target included references to future assets that at that time had not been fully scoped, either in terms of substation layout or route selection. Data cleansing normalisation is applied to correct the 2M data to the as-built configuration of the network.

Assets erroneously missed in 2M, and unlicensed assets incorrectly included have been identified, altering the T1 closeout target.

Asset transfers of ownership have also required alterations in the 2M asset base and T1 closeout target.

A quantity of assets were reported in incorrect voltage tiers. The total risk is unaltered, though this does change the split reported for given voltage bands in the T1 closeout position.

Some assets were reported using incorrect deterioration curves, particularly those where refurbishment work meant the asset moved from one deterioration curve to another. These errors have also been cleansed from the source data for the 2M target.

## 7.2. Methodology changes

Life extensions resulting in policy changes that were not reflected in the 2M rebasing exercise impacting early and late onset of risk are to be normalised. Longer asset lifetimes mean less modelled deterioration, therefore reductions in the target and delivered risk would be the expected result. Method change also normalises out the effect of changes to the EOL scoring mechanism defined in the NARA.

Life extension normalisations OHL Conductors (GAP, Zebra & AAAC), and OHL Fittings. They are also applied to cables, categories 2 (oil filled with aluminium sheath, or oil filled with polyethylene oversheath) and category 5 (XLPE).

The NOMs methodology has continued to evolve through T1. Improvements have been made to both the methodology and associated licensee specific documents such as the NGET NARA. The improvements to the condition assessment of Overhead Lines and Transformers were significant. Original asset health assessments have been superseded by detailed condition monitoring and forensic information where available. Such detail will typically lead to a change in the assessment to the perceived risk of the asset; for better or worse. NGET has normalised out these changes to eliminate windfall gains or losses as the result of enhanced inspection.

## 7.3. Consequence of Failure Normalisation

The T1 Closeout Template includes a field for normalisation where change in the consequences of failure would change the assessment of risk for non-intervention reasons. For the purposes of the T1 closeout table; CoF values used in the rebasing exercise of 2017 are aligned to those used for the NGET T2 business plan; for consistency with the closing state of T1 and opening state for T2. There are therefore no changing consequences for non-intervention reasons to normalise.

Consequences of failure are evaluated by four terms in the monetised risk model; system, safety, environmental and financial consequences, as per the NARA. CoF change is rarely prompted by non-intervention related reasons – no such changes have been identified in T1.

Some changes in criticality and risk have been prompted by interventions, such as reduction in environmental risk associated with oil-filled cable replacement; or where ABCB (Air Blast Circuit Breaker) related safety risks have been entirely removed at a substation.

System risks would principally change as the result of new demand or generation on the network. Load-related changes to the network have the potential to alter boundary capabilities also. The most important change in this respect during T1 was the addition of Western Link; the effect of which is included in the boundary transfer capability data used to calculate system risk.

Changes in CoF for intervention reasons are not normalised.

## 7.4. Pre-RIIO-T1 work changes where these have not already been addressed through rebasing

Pre-T1 true-up is reserved for asset interventions completed after the 2010 business plan submission, but before the beginning of RIIO-T1. These normalisations to the target are necessary to avoid double-counting work completed under the previous price control.

NGET has normalised the 2M target to reflect the starting position of assets at the beginning of T1.

## 7.5. Changes covered by other mechanisms

The category 'Changes covered by other mechanisms' is used for normalisations arising from Load-related activities. Certain activities that were delivered due to load related drivers were potentially previously classified as NLR interventions in the 2M target. These items are normalised out from the target, as LR activities are covered by other funding mechanisms.

## 7.6. Delivery Normalisation

Delivery normalisation is applied to remove risk associated with load related interventions resulting in replacement of assets that were part of the original NOMs asset base.

Asset Category	Delivery Normalisation R£
OHL Fittings	£3,791,789
OHL Conductors	£933,912
Reactors	£27,564
Circuit Breakers	£10,317
Cables	£4,145
Transformers	£-
<b>TOTAL</b>	<b><u>£4,767,727</u></b>

Table 10: Delivery normalisations by category

## 7.7. Differences in Asset Deterioration (compared with forecast deterioration underpinning the rebased targets)

The rate at which asset condition deteriorates is a function of many factors including design, materials, operating regime, operating environment and intervention regimes. By grouping together assets with similar deterioration characteristics and applying End-of-Life (EoL) modifiers to those groupings we can model the impact of asset deterioration upon network risk. Individual assets within each grouping deteriorate at different rates. The EoL modifiers reflect our best understanding of the future performance of the assets at the time they are set. This is limited by the fact that we endeavour not to establish the limits by operating assets to failure. As a prudent asset manager, it is appropriate that we take a conservative, evidence-led approach to predicting asset lives.

Activities, such as condition monitoring, condition assessment and innovation, that we have undertaken during T1 have allowed us to better understand the condition of our assets. This improved understanding is applied through:

- Modifications to asset lives (EoL modifiers) where the new data and improved understanding supports the case that deterioration is progressing differently from our models.
- More effective targeting of the highest risk individual assets for intervention.

The former of these is a "real-asset" effect i.e. it reflects that assets are deteriorating differently than we predicted. These changes are incorporated into our EoL modifiers when enough evidence has been obtained. The need to gather and analyse evidence to support changes to asset lives means that the EoL modifier updates always lag the underlying change in asset deterioration. This is visible as slower than predicted deterioration.

The latter has no implications for the actual deterioration rate of individual assets or asset groupings. The assets are deteriorating as we predicted however we are better able to plan individual interventions which have the greatest impact upon network risk. Consequently, remaining assets within any grouping are a lower risk sub-set of the full asset grouping. This can be described in terms of “survival bias” and if only the remnant population is considered this also appears as slower than predicted deterioration.

These factors taken together under the heading “slower than predicted deterioration” account for R£215.8m of the over delivery against the target.

## 8. Methodology for deriving associated costs

### 8.1. Options for Deriving Associated Costs

National Grid have considered several options for a methodology for deriving associated costs with over or under delivery.

We note that other onshore TO's have opted for reporting on a project-by-project basis. This was discounted as the order-of-magnitude volume differences between TO's plans mean that such reporting is impractical. Also, this does not reflect the basis of the T1 framework.

A volume-based method does not reflect risk reduction and could place emphasis on assets of lower system consequence.

T1 allowances were not set at voltage level for each asset category. As such, there is no data readily available to formulate a methodology based on an asset category voltage-level breakdown.

A Unit Cost of Risk Reduction (UCRR) method, considering Asset Categories and aggregating the result at Network level appears the most practical route to establishing an associated cost with over/under delivery.

The data necessary to implement the proposed method are available in the Stage 1 & 2 submission, therefore, the results are presented rather than examples.

RIIO-T1 outturn expenditure include elements that will not deliver risk reductions within RIIO-T1, e.g. the delayed OHL fittings works, and the LPT2 (London Power Tunnels Phase 2) programme. This expenditure must be excluded to facilitate comparison of cost of risk reductions achieved in RIIO-T1.

### 8.2. Proposed method for deriving associated costs

Risk deltas must be considered for the purposes of this methodology. The target remains an absolute risk target, and under-/over- delivery shall continue to be assessed on an absolute basis.

The first step is to define outperformance in risk and spend terms, per asset category.

$$\text{Risk outperformance (\%)} = \frac{2M \text{ Forecast end of T1 with investment (R£)} - \text{Outturn end of T1 risk with investment (R£)}}{2M \text{ Forecast end of T1 with investment (R£)}}$$

Where the risk outperformance is a positive percentage; this is over-delivery of risk reduction compared to target.

$$\text{Spend outperformance (\%)} = \frac{2M \text{ Allowance (£)} - T1 \text{ Allowance for T2 deliverables} - \text{Outturn Expenditure (£)}}{2M \text{ Allowance (£)} - T1 \text{ Allowance for T2 deliverables}}$$

If spend outperformance is a positive percentage, this is under-spend compared to Baseline allowances.

Next, calculate the forecast and outturn unit cost of risk reductions (UCRR), accounting for T1 expenditure and allowances delivering risk reductions beyond RIIO-T1.

$$2M \text{ Forecast Unit Cost of Risk Reduction} = \frac{\text{Allowance (£)} - T1 \text{ Allowances for T2 deliverables}}{\text{Forecast net risk reduction (R£)}}$$

$$\text{Outturn Unit Cost of Risk Reduction} = \frac{\text{Expenditure (£)} - T1 \text{ expenditure for T2 deliverables}}{\text{Actual net risk reduction (R£)}}$$

We can now determine the quantity of risk that arising from plan differences at the end of RIIO-T1 period.

$$\text{Delivered risk arising from plan differences} = \text{Forecast residual risk (RE)} - \text{Outturn residual risk (RE)}$$

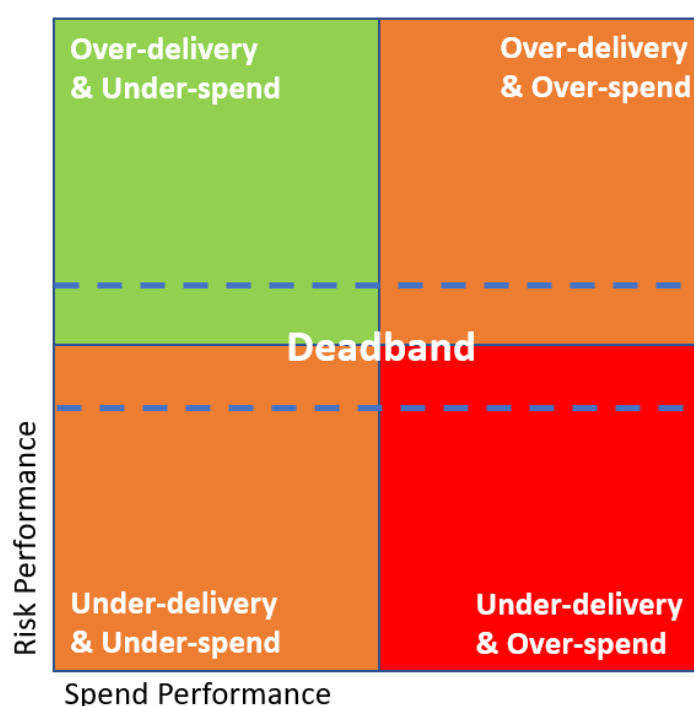
Having established UCRR, we derive an adjustment using the following:

$$\text{Associated cost} = \text{Delivered risk arising from plan differences} * \text{Outturn UCR}$$

Outturn UCRR to ensure the associated cost reflects the spend incurred in delivering the change in risk. A positive result indicates over-delivery of risk, and a negative number under-delivery.

Under-delivery would equate to a T2 clawback, and vice versa. The adjustment reflects the associated cost with the over- or under- delivery achieved.

There are four possible over or under delivery outcomes, plus the potential for out-turn to be within dead band.



At the time of writing, the baseline dead band percentage for under/over delivery is undefined. We understand that this will be defined during stage 3 & 4 of the T1 close out process. Over- or under delivery within the dead band is to be excluded from the T2 adjustment. For example, for 15% over delivery and 10% dead band, the adjustment is limited to 5%.

Over-/under- delivery and dead band are assessed for each asset category, and the associated cost aggregated for network level.

### 8.3. Associated cost results

The following table is a summary of the Baseline 2M target & out-turn delivery, and calculations of overall UCRR accounting for expenditure on projects completing in RIIO-T2.

Asset Category	Normalised targets					Outturn T1 Post-Normalisation Delivery			
	End of T1 Risk w/o investment (R£m)	End of T1 Risk with investment (R£m)	Net Risk Reduction (R£m)	Allowance excl. T2 Delivery Projects	Overall Unit Cost of Risk Reduction (£/R£)	End of T1 Risk with investment (R£m)	Net Risk Reduction (R£m)	Expenditure excl. T2 Delivery Projects	Overall Unit Cost of Risk Reduction (£/R£)
RX	34.9	19.9	15	40.3	2.687	17.5	17.4		
TX	353.6	193	160.6	669.7	4.170	107.9	245.7		
CB	223.4	138.4	85	1191.3	14.015	57.8	165.6		
OHF	368.1	130	238.1	221.4	0.930	155.4	212.7		
OHC	290.6	166.4	124.2	567.8	4.572	64.5	226.1		
UC	44.3	38.3	6	524.6	87.433	35.8	8.5		
<b>Overall</b>	<b>1314.9</b>	<b>686</b>	<b>628.9</b>	<b>3215.1</b>		<b>438.9</b>	<b>876</b>		

Table 11: Calculation of Outturn UCR

Next, we calculate associated cost per asset category and sum to overall. Examples presented for 0 & 10% deadbands.

Asset Category	Deadband (%)	DB upper thresh old (R£m)	DB Lower threshold (R£m)	Net Risk overdelivery (%)	Risk delivery beyond DB (%)	Spend delivery (%)	Risk Delivery Scenario	Expenditure Scenario	Plan Difference (PD) beyond DB threshold (R£m)	Adjustment = PD * Outturn UCRR
RX	0%	19.90	19.9	12%	12%	-11%	Over-delivery	Over-spend		
TX	0%	193.00	193	44%	44%	45%	Over-delivery	Under-spend		
CB	0%	138.4	138.4	58%	58%	46%	Over-delivery	Under-spend		
OHF	0%	130.00	130.0	-20%	-20%	82%	Under-delivery	Under-spend		
OHC	0%	166.40	166.40	61%	61%	20%	Over-delivery	Under-spend		
UC	0%	38.30	38.3	7%	7%	58%	Over-delivery	Under-spend		
<b>SUM</b>										

Asset Category	Deadband (%)	DB upper thresh old (R£m)	DB Lower threshold (R£m)	Net Risk overdelivery (%)	Risk delivery beyond DB (%)	Spend delivery (%)	Risk Delivery Scenario	Expenditure Scenario	Plan Difference (PD) beyond DB threshold (R£m)	Adjustment = PD * Outturn UCRR
RX	10%	21.89	17.91	12%	2%	-11%	Over-delivery	Over-spend		
TX	10%	212.30	173.7	44%	34%	45%	Over-delivery	Under-spend		
CB	10%	152.24	124.56	58%	48%	46%	Over-delivery	Under-spend		
OHF	10%	143.00	117	-20%	-10%	82%	Under-delivery	Under-spend		
OHC	10%	183.04	149.76	61%	51%	20%	Over-delivery	Under-spend		
UC	10%	42.13	34.47	7%	0%	58%	Baseline	Under-spend		
<b>SUM</b>										

Table 12: Application of dead band & calculation of associated cost

The overall position is one of over-delivering on risk while underspending.

Overall spend in T1 remains within the original allowance; that is, the additional risk reduction has been achieved with less actual spend than was forecast in 2M.

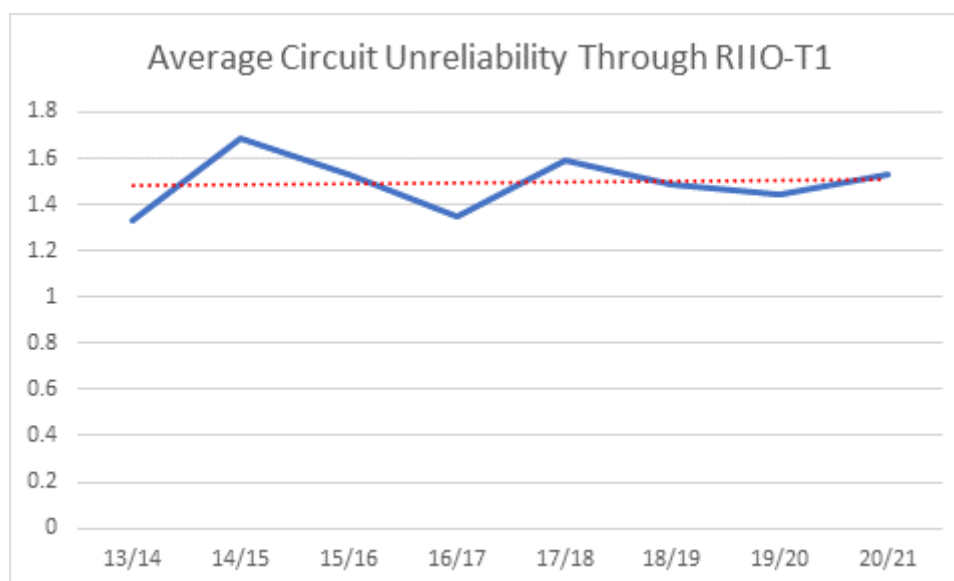
Had the expenditure increased from out-turn levels, producing minimal delivered risk benefit, then the Outturn UCRR would be greater (that is, negatively affected). It follows that the cost of achieving that over-delivery would increase. Similarly, had less risk been delivered for equal spend; the Outturn UCRR would also increase (as £1 of spend produces less R£ reduction). As with the increased expenditure scenario; the cost of achieving the given level of delivery would increase.



## 9. How our T1 delivery manifests as network asset performance

The T1 NOMs incentive mechanism's overarching purpose is to ensure that network risk is managed in the best interest of consumers. This manifests in network performance.

As outlined in Managing Electricity Transmission Network Reliability<sup>3</sup>, a useful measure to demonstrate NGET asset performance is the Average Circuit Unreliability (ACU) across T1. The chart below shows ACU for each year of T1. Annual Average Circuit Unreliability (ACU), network unavailability resulting from asset unreliability, has averaged 1.49% across the period. NGET has delivered the NOMs incentive target whilst continuing to provide high network performance levels that our customers and stakeholders expected during T1.



ACU is expected to vary from year to year as it is a function of both the number of unreliability events and their duration. Equipment failures, which often have long repair or replacement times, can also have a significant impact on the overall ACU, as do long-duration repairs. There is no notable indication of an increasing trend, outside of the fluctuations experienced from year to year.

Year	ACU (%)
<b>13/14</b>	1.33
<b>14/15</b>	1.69
<b>15/16</b>	1.53
<b>16/17</b>	1.35
<b>17/18</b>	1.59
<b>18/19</b>	1.49
<b>19/20</b>	1.44
<b>20/21</b>	1.53

Table 13: Annual ACU reporting

The annual Average Circuit Unreliability (ACU) outturn for 2020/21 was 1.53% compared with 1.44% in 2019/20 and 1.49% in 2018/19. The ACU has increased slightly this year but is broadly comparable with previous years.

<sup>3</sup> Managing Electricity Transmission Network Reliability Report, National Grid, March 2019, <https://www.nationalgrid.com/uk/electricity-transmission/document/129991/download>

The Energy Not Supplied incentive tracks the volume of unsupplied energy in incidents. The incentive neutral point in RIIO-T1 was set at 316MWh. Total ENS incurred during T1 was 261.1MWh, with an 8-year average of 32.64MWh. The strong performance displayed in this incentive is indicative of successful operational planning and intervention selections.

Year	Vol. Incentivised Events (MWh)
<b>13/14</b>	135
<b>14/15</b>	8.7
<b>15/16</b>	4.5
<b>16/17</b>	6.8
<b>17/18</b>	39.7
<b>18/19</b>	12
<b>19/20</b>	54.4
<b>20/21</b>	0
<b>Sum</b>	<b>261.1</b>

*Table 14: Annual ENS reporting*

A lag time between asset investment decisions & policies manifesting on the network would be expected; which puts emphasis on the need to continue to monitor ACU & ENS on an ongoing and long-term basis.

## 10. Appendices

### Appendix 1 – OHL Fittings planned for 2020-21 delayed to RII02

Asset ID	Volume	Comments
4YGBRAMLEY - DIDCOT 21101	-14.486	Part route complete only - delayed into T2
4VJDRAX - EGGBOROUGH 1130	-1.298	Part route complete only - delayed into T2
4VJDRAX - EGGBOROUGH 2130	-2.626	Part route complete only - delayed into T2
4VWALVERDISCOTT - INDIAN QUEENS - TAUNTON 1286496	-25.633	Part route complete only - delayed into T2
4YXCILFYNYDD - IMPERIAL PARK175	-10.545	Part route complete only - delayed into T2
4YXIMPERIAL PARK - MELKSHAM75105	-7.685	Part route complete only - delayed into T2
4ZMPELHAM - RYE HOUSE - WALTHAM CROSS 2116	-20.96	Part route complete only - delayed into T2
VJKEARSLEY - WHITEGATE 1145	-0.057	Part route complete only - delayed into T2
VJKEARSLEY - WHITEGATE 2145	-0.057	Part route complete only - delayed into T2
ZBTILBURY - WARLEY 2141	-13.635	Delayed into T2
ZBTILBURY - WARLEY 1241	-11.695	Part route complete only - delayed into T2
ZZVBRINSWORTH - TEMPLEBOROUGH 217	-1.571	Delayed into T2
ZZVBRINSWORTH - TEMPLEBOROUGH 2712	-1.247	Delayed into T2
4ZMPELHAM - RYE HOUSE - WALTHAM CROSS 2116	-5.193	Completed in T1 but not updated in Ellipse in time for RRP21
YYFBUSTLEHOLM - NECHELLS 1110	-2.708	Moved to T2
<b>Total</b>	<b>-119.396</b>	