Rebasing Methodology

Secondary Deliverables Rebasing

July 2017

Document Revision History Table: << optional >>

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V0.1	13/07/2017	Starting draft narrative
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Contents

1.0 Introduction

In RIIO-GD1, Ofgem moved to an output-based measurement of the drivers for network business plans. One Network Output Measure (NOM) was a measurement of Asset Health, the Criticality associated with network assets, and subsequently the impact of investments.

Following submission of the business plans for GD1, it became apparent that the Asset Health and Criticality framework (reported in workbooks) that was used to track the benefit of the investments did not provide consistent results between GDNs and did not enable risk trading (justification for the transfer of investment across asset groups).

To develop a consistent approach to Asset Health and Criticality assessment, the Safety and Reliability Working Group (SRWG) was established with representatives from each GDN. The SRWG reported back to Ofgem in 2013/14 with a revised methodology for the assessment of Asset Health and Criticality. The revised methodology was rejected by Ofgem, and the GDNs were asked to develop an alternative methodology, moving away from workbooks, for the reporting and trading of asset risks.

As part of our Business Plan submission for RIIO-GD1, we provided Ofgem with a range of deliverable interventions for the RIIO-GD1 period. These interventions were detailed in our narrative documents and in Ofgem's FP response.

In accordance with the requirements of Licence Special Condition 4G, GDNs have worked to develop the monetised risk (MR) methodology. It identifies the potential impact arising from the unavailability or failure of a network's assets by assessing the consequences of failures. Risk values are represented in monetary terms, providing a 'common currency' for comparison between different failure types and asset groups.

Ofgem have asked for the methodology to be used to report Table 7.3 in the 2017 RRP submission, which includes a restatement of the outcomes from the investment detailed in our original submission.

This commentary provides information on how the restatement of the investment, originally detailed in the narrative, has been carried out. It also details the results of the test regime to show that we have achieved the licence requirement that 'the resubmission be equally challenging'.

Best endeavours have been made to ensure that the submission is compiled using robust methods; that the data is free from error, accurately reflecting the health and criticality of assets; and that the 2013 business plan (FP) is reflected in the methodology as accurately as possible.

2.0 Scope

The current deliverables were agreed as part of the RIIO-GD1 process. The purpose of the rebasing is to translate the outputs in the FD, using MR, without revising the targets that were originally agreed. This document provides a commentary to the rebasing of the GD1 investments in the new MR methodology.

Scope covered:
 a) Methodology used to rebase the original GD1 investment plan
 b) Selection of interventions where these differ from the FP
 c) Results of the assessments used to test if outputs are equally challenging

Scope not covered:
 a) The RRP Reporting Pack and associated commentary
 b) Key principles of rebasing

 c) The Key principles are covered in the 'Safety and Reliability Working Group Rebasing Methodologies' document submitted to Ofgem at the same time as this document.

3.0 Process

This section provides an overview of the approach used to restate Investments in accordance with the MR methodology. To rebase the business plan, the following are stated in Table 7.3 of the 2017 RRP (illustrated in Figure 1):

A. What the monetised risk position would have been at the start of GD1 (2013)
B. What the risk will be at the end of GD1 without any intervention (2021)
C. The risk at the end of GD1 if the interventions laid out in the original BP were delivered
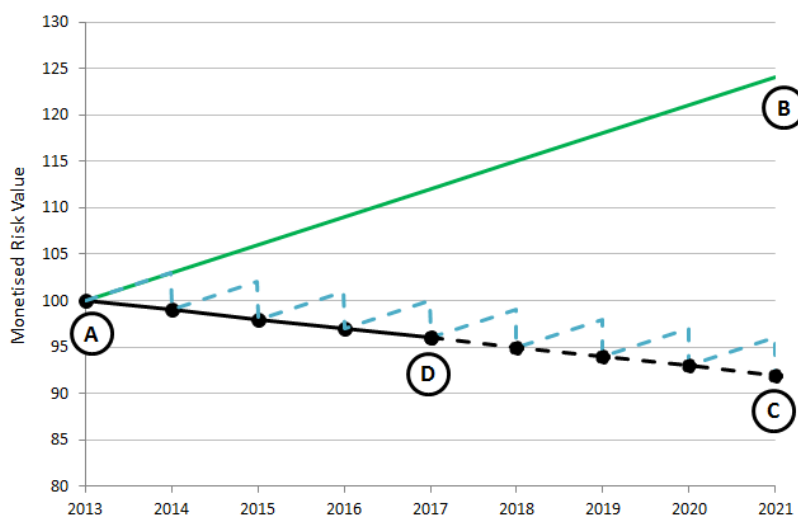D. The current 2016/17 year end risk position

Figure 1: Illustration of the Required Output for Table 7.3 2017

In order to deliver a high quality, rebaselined submission, extensive analysis has been carried out. This included the analysis of asset data and asset performance along with an understanding of the work carried out in GD1 to date.
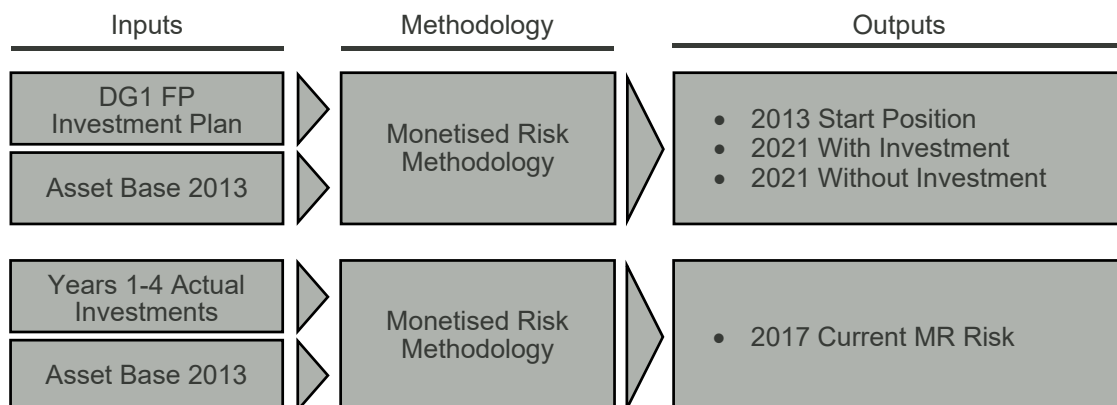
High-level overview of approach:

Figure 2: High Level Overview of Approach

Here is a brief description of the steps to achieve each output:

1. The 2013 starting MR position and the 2021 with-investment positions are calculated using the MR methodology by inputting a representation of the 2013 asset base (described below in detail for each primary asset group) along with the interventions as described in the business plan narratives or Ofgem final determinations.

2. The 2021 without-investment positions are calculated using the MR methodology by inputting the representation of the 2013 asset base and using the model to calculate the deterioration in risk over the GD1 period.

3. The 2017 current risk position is calculated by using the representation of the 2013 asset base and inputting the actual interventions carried out in years one to four.

4.0 Data Set Establishment

This section details how datasets for the rebaselining exercise have been established for each of the models. Following the processes detailed below ensures that the submission gives the best representation of the 2013 business plan in terms of the MR methodology, using information known today and resulting in a set of targets that are as challenging as the original targets agreed in 2013.

2013: Starting Position (A)

The most robust method, in the majority of cases, is to use asset snapshots taken from company core systems and having the appropriate attributes, condition scores and performance data taken at the time. These extracts will exactly represent the asset base at the time in terms of their condition and performance.

Table 1 below details how the 2013 starting asset base, and therefore the 2013 MR position, has been derived for each of the primary asset classes. Where a contemporaneous snapshot has not been used, explanation is given as to why.

Model	Methodology to Deriving the 2013 Starting Position
LTS Pipelines	• **Methodology 1.1 from 'Rebasing Methodologies' document. 2013 asset base snapshot taken from core system. Failure based on industry failure rates calculated by ICS/PIE from analysis of UKOPA and EGIG data over an extensive time period** • 2016/17 Asset base data converted to 2013/14 base data by removing commissioned pipelines and variance in original/diversion lengths since 1st April 2013. • As per the SRWG working group all GDNs are using network specific corrosion failure rates calculated by ICS/PIE. Network specific values depend on diameter, age and wall thickness. Mechanical and interference failure rates are based on the latest analysis and the makeup of the asset base in 2013.
Distribution Mains	• **Methodology 1.1 from 'Rebasing Methodologies' document. 2013 asset base snapshot taken from core system. Failure rates calculated using data extracted from core system.** • To establish the 2013 asset base, a pipe snapshot as of 31/03/2013 archived in our core system (ESRI) was used. The extract included a number of attributes such as material and diameter. These attributes were used to cohort the assets ready for MR modelling. As this snapshot comes from the company's core ESRI system, it is as accurate as it is possible to be. • The distribution mains model uses a ten-year weighted average failure rate to lessen the impact of single year effects such as poor/favourable weather conditions. To calculate this: o A weighted average failure rate across a ten year period (Jan 2007-December 2016) has been used. A higher weighting was applied to data from Jan 2012 – Dec 2016 as this 'GDFO data' is more accurate than earlier data. Failure rates calculated by dividing the count of mains leaks in each of the years by the average live mains length in each of those years taken from archived data.

Services	• **Methodology 1.1 from 'Rebasing Methodologies' document. 2013 asset base snapshot taken from core system. Failure rates calculated using data extracted from core system.**
	
	• The 2013 asset base for services was established by two methods:
	
	    ○ 2013 snapshot of asset information for above 63mm services from our corporate system ESRI.
	
	    ○ For below-63mm services the number of services was calculated based on the service density assumed in our business plan and the length of live mains as of 2013.
	
	• In line with the agreed industry practice, a Cadent specific failure rate has been used in the services model. This has been derived in accordance with the agreed SRWG methodology to utilise an average failure rate to lessen the impact of single year effects such as poor or favourable weather conditions. As services are not recorded within our core systems there is a lack of available data. Therefore, the temporal range used is less than agreed within the SRWG methodology. The failure rate was calculated for the period 2012/13 to 2015/16. When considering the volume of services maintained by Cadent this data set is large enough to accurately represent an annual failure rate.

Risers	• **Methodology 1.3 from 'Rebasing Methodologies' document. GD1 surveyed assets, with adjustment for deterioration, represent the 2013 risers asset base.** • At the time of submitting our GD1 plans, there was a lack of information related to risers and laterals. As such, it is not possible to have a complete asset base extract for 2012/13. • The model's asset base for 2013 includes all assets that have been surveyed in the first four years of GD1, and have been assessed as in scope of the MOBs classification. In line with the rest of the industry, the risk Table 7.3 is a statement of what is definitely known to be in the asset base at 2012/13. Consequently, an element of the asset base (that which has not been surveyed) is not included in the model. We have carried out an 'out-of-model' calculation for the risk associated with un-surveyed assets and have included this in the narrative that supports Table 7.3. • The failure rates are based on historic failures, adjusted by asset characteristics, using the industry agreed PIE risk-scoring methodology. This approach was agreed with the working group following direction from DNV GL.
Offtakes	• **Methodology 1.2 from 'Rebasing Methodologies' document. 2016/17 asset snapshot modified to take into account the interventions carried out over GD1 to date. Failure rates based RCM, in line with the MR methodology.** • 2015/16 Asset base data was converted to 2013/14 base data by removing systems commissioned since 1 April 2013. • Where available, the condition grades for offtakes were from the latest survey data as these surveys show the latest actual condition of the assets. For offtakes where a condition grade was not available, condition grades we assigned, at random, in the same proportion as those found through the surveys. Survey data is better than the condition grades stated in the asset health workbooks as it is asset specific, where available, and is based on actual inspection rather than on an assessment of asset life. • We have adjusted condition grades for historic and future BP interventions to ensure that the baseline risk is correctly represented; this ensures that we don't under state the risk we are targeting for removal.

Governors	- **Methodology 1.2 from 'Rebasing Methodologies' document. 2016/17 asset snapshot modified to take into account the interventions carried out over GD1 to date. Failure rates based RCM, in line with the MR methodology.** - To establish the 2013 asset base, an asset extract as of 2016/17, was taken from a core system (SAP). Where a governor had been intervened on during GD1, the condition of this asset was reset to its pre-intervention condition, assumed to be condition grade four or five based on the intervention type. Where a new governor had been installed, this was removed from the data extract. - Where available, condition grades for governors were from the latest survey data, as these surveys show the most recent actual condition of the assets. For governors where a condition grade was not available, condition grades we assigned, at random, in the same proportion as those found through the surveys. Survey data is better than the condition grades stated in the asset health workbooks as it is asset specific, where available, and is based on actual inspection rather than on an assessment of asset life. - We have adjusted condition grades for historic and future BP interventions to ensure that the baseline risk is correctly represented; this ensures that we don't under state the risk we are targeting for removal. - The governor model uses failure rates based on Reliability Centred Maintenance (RCM), this approach is set out in with the MR methodology. Data is available for 2013 however there has been significant data and process improvements regarding RCM in the past three years. The latest data is more accurate and includes >90% of the governor configurations we model. The latest RCM data is used in the model.

Table 1: High Level Overview of 2013 Starting Point Derivation

2021: Without Investment (B)

The without-investment position is calculated in the MR excel tools. The only additional data required, other than that detailed above for the without-intervention run, is cost data. All costs in the model are at the price base agreed by the SRWG: 2014/15.

A large number of the costs used in the model are agreed by the SRWG and common across models. This includes the 'cost of carbon'. Other costs are network specific, but the methodology used to derive the cost is common, such as the 'building damage cost', which is taken from the land registry house prices index.

5.0 Intervention Methodology

This section details how an intervention plan has been established for each of the models. Following the processes detailed below ensures that the submission is exactly as detailed in the 2013 business plan. This ensures that the targets set are as challenging as the original targets agreed in 2013 were.

2021: With Investment (C)

For all asset groups, the numbers of interventions modelled are the same as those detailed in the FP.

Where possible, the restated intervention plan is a direct translation of, and therefore consistent with, the original intervention plan. This ensures that new targets have an equivalent impact to those originally set.

Investment volumes have been taken either from Cadent's (formerly National Grid Gas Distribution's) FP narrative or from Ofgem's FP documents. The phasing of interventions over the GD1 period, where not stated in either document, has been based on the spread of investment from the FP allowance or has been equally profiled over the GD1 period, depending on what information was available.

The business plan does not identify the specific assets that were going to receive intervention; therefore the benefit of planned interventions has to be equal to the benefit of intervention on the average asset.

Cadent models mains, services, risers and LTS pipeline at a cohort level and, therefore, the planned interventions result in an average risk reduction for any given cohort.

Offtakes and governors (excluding service governors) are modelled at an asset level. For these assets we have applied business plan interventions volumes to assets with appropriate condition grades. Where there was not sufficient condition grades available from survey data, condition grades were adjusted, ensuring that we don't under state the risk we are targeting for removal.

2017: Current Year (D)

To calculate the risk for the current year, the interventions carried out in the first four years of the GD1 period have been entered into the 2013 baseline models. The results of this modelling demonstrate the monetised risk benefit of the investment on the 2013 assets but do not factor in the increased risk associated with growth (we are not extracting a 2016/17 asset base from our core systems, ie new, non-replacement, assets are not added to the model).

To calculate the risk associated with asset growth, a second 'growth' model has been run for each of the assets (excluding risers; see riser specific section in the RRP narrative for details). The growth risk has not been reported in Table 7.3 but has been included in the Table 7.3 narrative.

6.0 Testing for Equal Challenge

As part of the requirement for the rebasing, it is essential that a series of tests on the outputs from the above process is carried out to establish if the results create an equally challenging output when compared to the original published 'old NOMs' output.

We have applied four 'equally challenging' tests that we have applied;

Test	Description	Pass Criteria
1	**Asset base test** To ensure that the asset base used in the MR risk models reflects the actual 2013 asset base.	Green: The 2013 asset base represented in the model exactly represents the 2013 asset base Amber: The asset base is based on the best data available, but is not exactly as 2013 Red: A very large number of assumptions have been used to derive an asset base
2	**Volumes of investment test** To ensure the volume of the specific intervention driver is the same volume as that stated in the original FP business plan.	Green: The volume of interventions represented in the model exactly represents the number of interventions stated in the FP Amber: To map interventions a number of assumptions have had to be made Red: A very large number of assumptions have been used to assign interventions in the model
3	**Asset condition/performance test** To ensure that the modelled asset conditions and performance is the same as that of the 2013 asset base.	Green: The condition and performance of the assets represented in the model represents the condition/performance of the assets in 2013 Amber: A number of assumptions have been used to derive and assign an condition/performance Red: A very large number of assumptions have been used to derive and assign an condition/performance
4	**Consequential test** To identify if any investment is made in condition grades where it would not be expected.	Green: Interventions are mapped against assets with the same condition as the company based the GD1 plans on. Red: Interventions are not mapped against assets with the same condition as the company based the GD1 plans on.

7.0 Summary of Tests

This section contains the results of the tests referred to in the previous section. The test results from the Equally Challenging Tests (ECTs) are provided in the table below.

Where the results table has a test 'fail' result, additional information can be found in the evidence section of the table.

	1. Asset Base Test	2. Volumes of Investment Test	3. Asset Condition/ Performance test	4. Condition Grade Test
LTS Pipelines	The offtakes asset base is taken directly from the company's core systems, meaning it exactly matches the records of the time when accounting for adjustments for changes in years 1-4.	The intervention plan has been taken directly from the FP.	A time series of failure data, as described above (PIE methodology), has been used to set the starting failure rate.	N/A Interventions not mapped to a specific condition of asset.
Mains	The mains asset base and performance is taken directly from the company's core systems, meaning it exactly matches the records of the time.	The intervention plan has been taken directly from the FP.	A time series of failure data, as described above, has been used to set the starting failure rate.	N/A Interventions not mapped to a specific condition of asset.
Services	The services asset base and performance is taken directly from the company's core systems, meaning it exactly matches the records of the time.	The intervention plan has been taken directly from the FP.	A time series of failure data, as described above, has been used to set the starting failure rate.	N/A Interventions not mapped to a specific condition of asset.

Risers	The asset base is represented in the model uses the best data available to Cadent. As discussed above it is not possible to have a complete asset base extract for risers for 2012/13 so the known asset base following surveys in GD1 to date have been used in the model to represent the starting asset base.	The intervention plan has been taken directly from the FP.	Condition of the assets has been taken from the latest available surveys for the assets. Failure rates are based on analysis of riser leakage data from DNVGL adjusted for survey findings. A modelling assumption used in the model of one explosion per network per 100 years (regardless of the number of assets).	N/A Interventions not mapped to a specific condition of asset.
Offtakes	The offtakes asset base is taken directly from the company's core systems, meaning it exactly matches the records of the time when accounting for adjustments for changes in years 1-4.	The intervention plan has been taken directly from the FP. However, due to the model operating at a system level and business plan intervention stated at a system level, assumption regarding the number of intervention per system have been made.	Contemporaneous data is not available so the latest failure data has been used in the model.	Intervention in the model mapped against condition grade 4 and 5 assets.
Governors	The governor asset base is taken directly from the company's core systems, meaning it exactly matches the records of the time when accounting for adjustments for changes in years 1-4.	The intervention plan has been taken directly from the FP.	The latest RCM data has been used in the model. The latest data is more accurate than 2013 data as described above.	Intervention in the model mapped against condition grade 4 and 5 assets.