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## Network Asset Management Strategy

RIIO-GT3 NGT\_A08

Version: 1.0

Issue: Final

December 2024

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## 1. Executive Summary

- 1.0.1. This annex sets out our network asset management strategy for all our assets covered by our Asset Management System (AMS), for the RIIO-GT3 period, and beyond. It describes our approach for developing our asset management capabilities and AMS maturity to enable safer and more cost-efficient asset lifecycle delivery. We also establish the line of sight for our AMS, to ensure all our asset management processes can work together to maximise value generation for our customers and stakeholders.
- 1.0.2. This document outlines what we are doing to continuously pursue excellence in our asset class stewardship. We provide narrative on our asset management maturity journey since 2016, demonstrating clear progress. Our most recent (Jan 2023) asset management maturity assessment report by Asset Management Consulting Ltd (AMCL) places us within the “effective” band of maturity and provides the roadmap to generate greater value from our asset management activities. AMCL has compared us against their global register of organisations across major asset intensive business industries and placed us in the top quartile for asset management maturity, and stated that we were, ‘demonstrating leading practice.’ We have also received our ISO 55001: Asset Management System re-certification in 2024.
- 1.0.3. This document outlines our current asset management policy and strategy, which are aimed at maintaining asset health and long-term operational resilience across our network assets. We highlight the growth within our asset management planning approach for RIIO-GT3, leveraging insights and lessons learned from our RIIO-T2 planning experience. For example, we have made our investment decision-making process more risk-based, utilising the service risk framework and our enhanced modelling and risk forecasting capabilities.
- 1.0.4. The summary of our approach to managing NARMs and non-NARMs assets on our network is clearly outlined, which helps us in making efficient decisions considering safety, compliance, and risk management.
- 1.0.5. Our consistent approach of using Long-Term Risk Benefits (LTRB) for investment plan optimisation helps us in establishing the right interventions at the right time for the right assets, considering the baseline and forecasted views of asset health, criticality, and impact of various intervention options, through the lens of monetised risk.
- 1.0.6. Our long-term risk objective is to reach a monetised risk which is at or below the risk position seen at the start of the RIIO-T2 price control period (2022). We will work toward this objective throughout RIIO-GT3 and beyond.

## 2. Introduction

- 2.0.1. Our network asset management strategy annex sets out what we are doing to ensure that we continue to pursue excellence within our asset stewardship. This document outlines our strategic approach for the management of assets across our National Gas Transmission (NGT) business. Our asset management approach for RIIO-GT3 regulatory price control period (financial years 2027 – 2031) and beyond will be in line with our business priorities, which are governed by three guiding principles: Protect, Grow and Innovate.
- 2.0.2. Our RIIO-GT3 business plan submission is underpinned by our Business Plan Commitments (BPCs), which summarise in a clear, concise way, the value that we aim to deliver in RIIO-GT3, for our business, our customers, and consumers. We have developed a cohesive set of commitments which reflect the strategic direction of our plan and have advocacy from our stakeholders. These are explained in detail within our **Main Business Plan**.
- 2.0.3. To ensure that the interventions we propose are aligned to deliver against Ofgem’s regulatory outputs, we have established a clear line of sight from these outputs to our Asset Management Objectives (AMOs), which we have used to inform our asset management strategies and investment plans.
- 2.0.4. The drivers for our interventions (e.g. Asset Health, Network Decarbonisation etc) and our operational capital investments map across to our BPCs, AMOs and the Ofgem outputs. This clear line-of-sight (as shown in Figure 1) provides guidance and purpose to our investment plan and gives us confidence that we are prioritising the delivery of work that provides optimum value for our stakeholders.

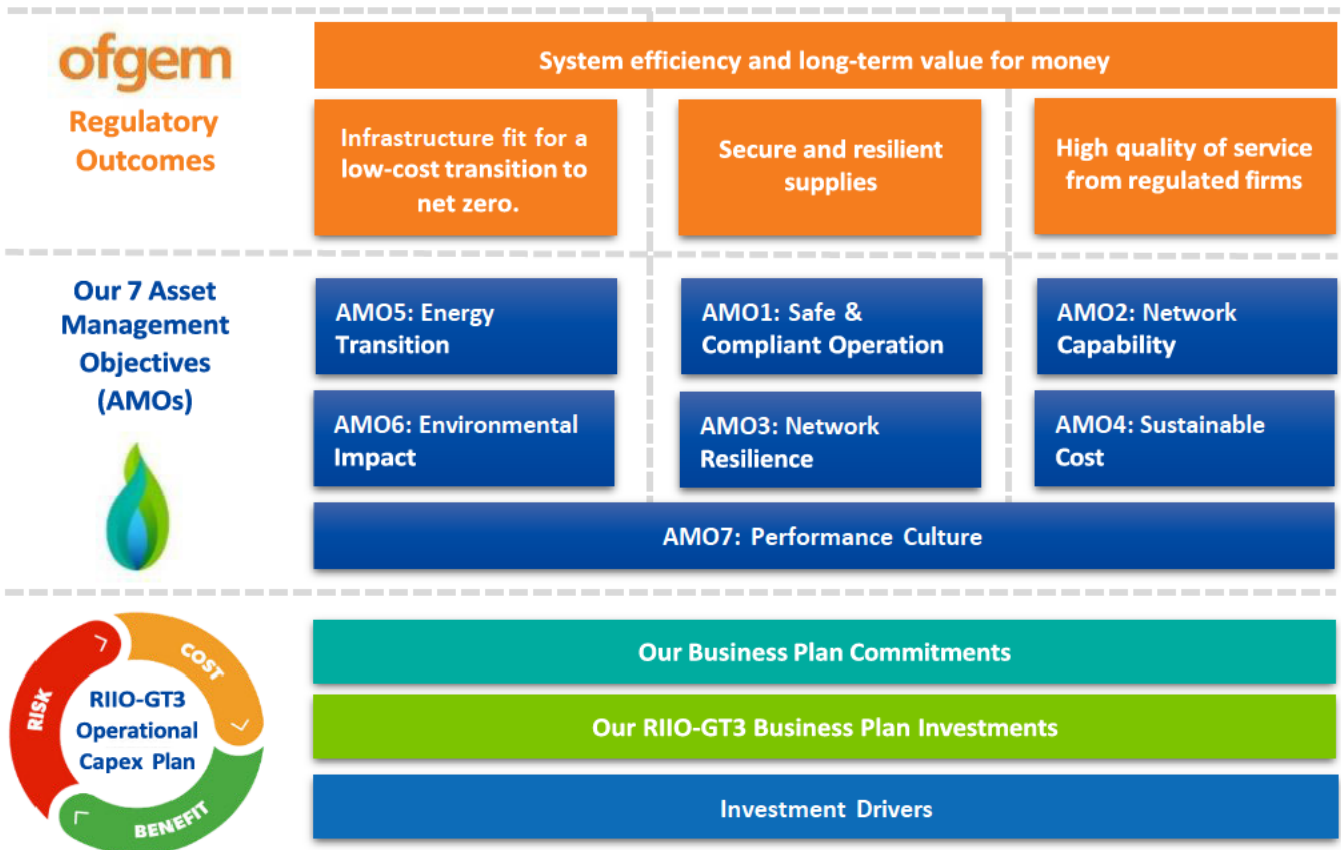


Figure 1: RIIO-GT3 Business Plan Line of Sight

- 2.0.5. Our ambition to ensuring value maximisation across our investments is supported by the Network Asset Risk Metrics (NARMs) methodology, which is reflected in a suite of outputs that compares and optimises risks in the following five categories of service risk measures:
- Safety
  - Environment
  - Availability and Reliability

- Financial
- Societal and Company

2.0.6. Comparing the costs and benefits of all the intervention options is a key outcome arising from a consistent risk valuation approach when optimising investment decisions. We define and measure consumer value through the units of Long-Term Risk Benefit (LTRB) and Unit Cost of Risk Removed (UCR). LTRB is defined as the **cumulative** monetised risk benefit over the life of an intervention, where an intervention is an activity which replaces an existing asset or extends the life of an existing asset. Comparing the cost of our intervention options with the LTRB delivered by them provides us the platform for good asset management decision making.

### 3. Pursuing Excellence in Asset Class Stewardship

- 3.0.1. This chapter discusses the strategy expectations for Section 5.2 of Ofgem’s Business Plan Guidance, July 2024, which asks us to outline what we are doing to ensure we are the best-in-class asset stewards.
- 3.0.2. We have achieved significant milestones during RIIO-T2 such as obtaining ISO 55001 recertification and being assessed by an independent external asset management maturity assessor where we were positioned within the “Effective” maturity band. We were also compared against AMCL’s global register of assessments of organisations across major asset intensive business industries and placed in the top quartile for asset management maturity.
- 3.0.3. That said, we remain on a continuous improvement journey in pursuit of excellence in asset management stewardship, through various strategic initiatives which will create process and cost efficiencies, risk reductions and thereby, consumer value.
- 3.0.4. Our Asset Management System (AMS) enables the development of good asset management policies, strategies, and plans, and provides the foundation for us to manage, coordinate, and direct our asset management activities to realise sustainable value. Our AMS connects the top-down line-of-sight to our business priorities, values, and purpose, with the bottom-up operational realities and challenges.
- 3.0.5. We show examples of our progress so far, including our proactive risk-based approach to asset management planning, and an improved approach to ensuring cost confidence within our decision-making framework. We now have a risk-based AMP which enables us to model risk scenarios and compare intervention options objectively and to select the interventions for our assets that unlock maximum consumer value.

#### 3.1. Our Asset Management System (AMS)

- 3.1.1. Our AMS conforms with the requirements of ISO 55001:2014, which we were recertified for in 2024. It governs our approach, processes, and capabilities for directing, integrating, coordinating, and controlling our asset management activities to realise maximum value from our asset portfolio.
- 3.1.2. One of our key asset management Policy statements is that “We are committed to achieving ‘Excellent’ asset management maturity levels by 2031”. This will require us to continuously improve our AMS by identifying gaps and opportunities and implementing strategic maturity development initiatives and projects.
- 3.1.3. Another key document within our AMS, is the Strategic Asset Management Plan (SAMP) that serves as the basis for translating requirements of our key stakeholders, our external business environment, and our asset management policy into Asset Management Objectives (AMOs).
- 3.1.4. Our AMOs are long-term aims that set a direction on how we use and develop our assets through their lifecycle, and the associated data, systems, and processes. By making our AMOs measurable, process owners are held accountable for contributing toward their delivery, ensuring a consistent purpose and a clear line-of-sight in decision making.
- 3.1.5. Figure 2 below shows the elements and scope of our integrated asset management system.

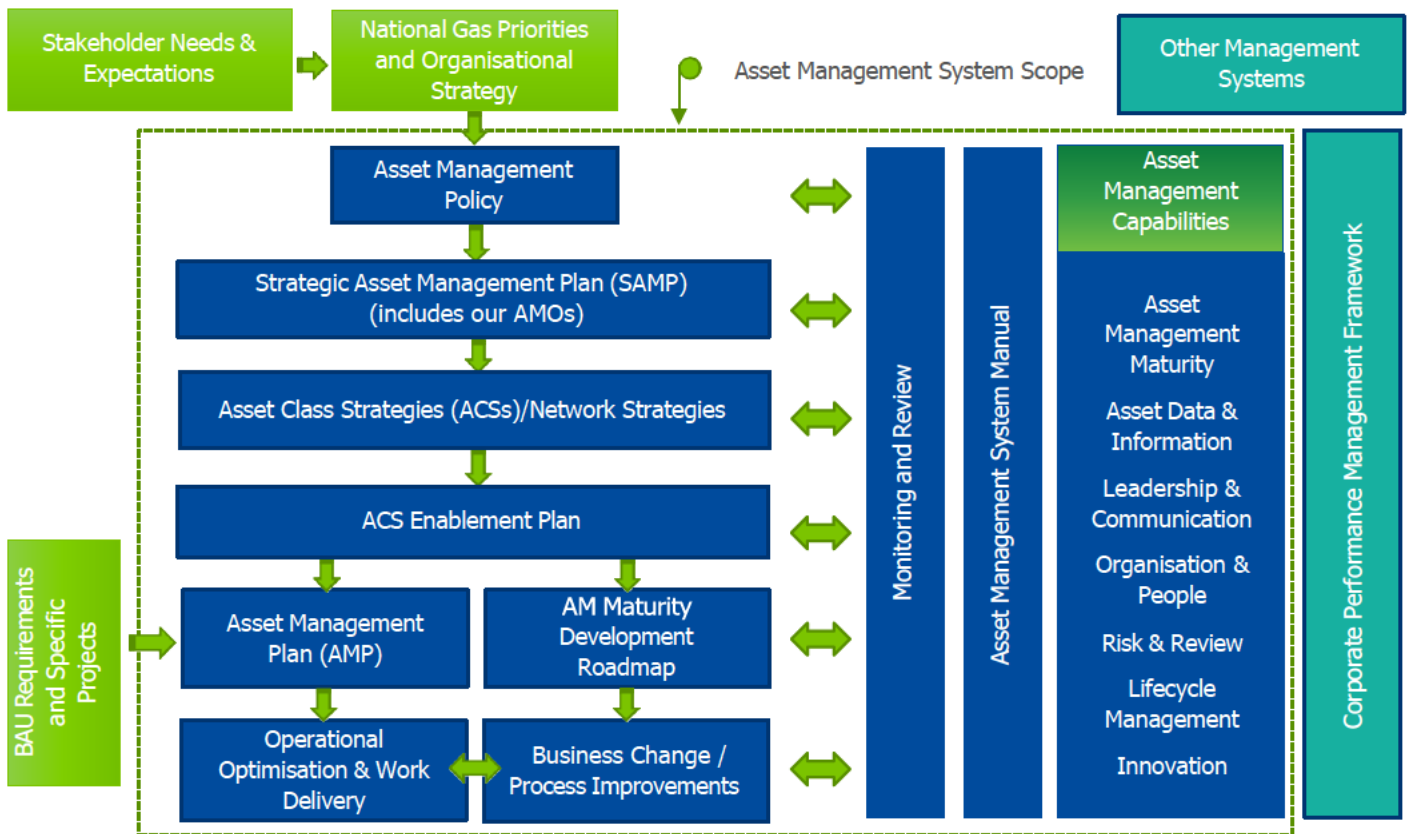


Figure 2: Our Asset Management System's Scope

- 3.1.6. Our AMS has been assessed to be “Effective” by AMCL’s independent benchmarking (as described further in section 3.2). Moreover, our ISO 55001 re-certification in 2024 proves that we have met or exceeded the minimum requirements for a competent AMS. Where other management systems seek to achieve outcomes in terms of specific dimensions, such as quality or environmental impact, our AMS is more holistic, considering all such dimensions when guiding the organisation to realise value. Our system helps to establish and maintain the alignment between asset management policy, objectives, strategies, plans, processes, and other supportive capabilities such as Leadership, Asset Data & Information and Risk Management.
- 3.1.7. The health of our AMS is monitored, reviewed, and governed by the Asset Management Performance Forum (AMPF), a cross-departmental forum of senior leaders within our organisation, chaired by the Director of Asset. This forum approves and monitors the progress of the maturity development initiatives and facilitates the embedding of an asset management culture throughout the organisation.

## 3.2 Benchmarking of our Asset Management Maturity

- 3.2.1. To assess how well we are currently performing within the 39 asset management subjects of the Global Forum on Maintenance and Asset Management (GFMAM), we requested for a maturity assessment which was conducted by AMCL during 2022 and reported in January 2023. Based on the criteria set out by the IAM and GFMAM, AMCL quantitatively assessed our asset management capabilities against internationally recognised good practice.
- 3.2.2. The assessment model known as AMCL’s Asset Management Excellence Model (AMEM), tests the existence, completeness, effectiveness, and integration of these 39 subjects (as shown in Figure 3) and is applicable to any asset intensive organisation such as ours, particularly those in regulated environments.



- Strategy & Planning**
  - 01 Asset Management Policy
  - 02 Asset Management Strategy & Objectives
  - 03 Demand Analysis
  - 04 Strategic Planning
  - 05 Asset Management Planning

- Asset Information**
  - 22 Asset Information Strategy
  - 23 Asset Information Standards
  - 24 Asset Information Systems
  - 25 Data & Information Management

- Asset Management Decision-Making**
  - 06 Capital Investment Decision-Making
  - 07 Operations & Maintenance Decision-Making
  - 08 Lifecycle Value Realisation
  - 09 Resourcing Strategy
  - 10 Shutdown & Outage Strategy

- Organisation & People**
  - 26 Procurement & Supply Chain Management
  - 27 Asset Management Leadership
  - 28 Organisational Structure
  - 29 Organisational Culture
  - 30 Competence Management

- Lifecycle Delivery**
  - 11 Technical Standards & Legislation
  - 12 Asset Creation & Acquisition
  - 13 Systems Engineering
  - 14 Configuration Management
  - 15 Maintenance Delivery
  - 16 Reliability Engineering
  - 17 Asset Operations
  - 18 Resource Management
  - 19 Shutdown & Outage Management
  - 20 Fault & Incident Response
  - 21 Asset Decommissioning & Disposal

- Risk & Review**
  - 31 Risk Assessment & Management
  - 32 Contingency Planning & Resilience Analysis
  - 33 Sustainable Development
  - 34 Management of Change
  - 35 Asset Performance & Health Monitoring
  - 36 Asset Management System Monitoring
  - 37 Management Review, Audit & Assurance
  - 38 Asset Costing & Valuation
  - 39 Stakeholder Engagement

Figure 3: Extract from the 2023 AMCL Report Showing Subjects within AMCL Asset Management Excellence Model (AMEM)

3.2.3. Figure 4 illustrates the assessment results and our journey in asset maturity since 2016, demonstrating clear progress. We have now moved into the “Effective” band, which provides us with the opportunity to generate greater performance efficiencies. Our asset management policy states our ambition to achieve 70% maturity by 2031, which is the lower threshold of the ‘Excellent’ band. A higher maturity corresponds to greater process efficiency, whole-life cost optimisation, and risk management.

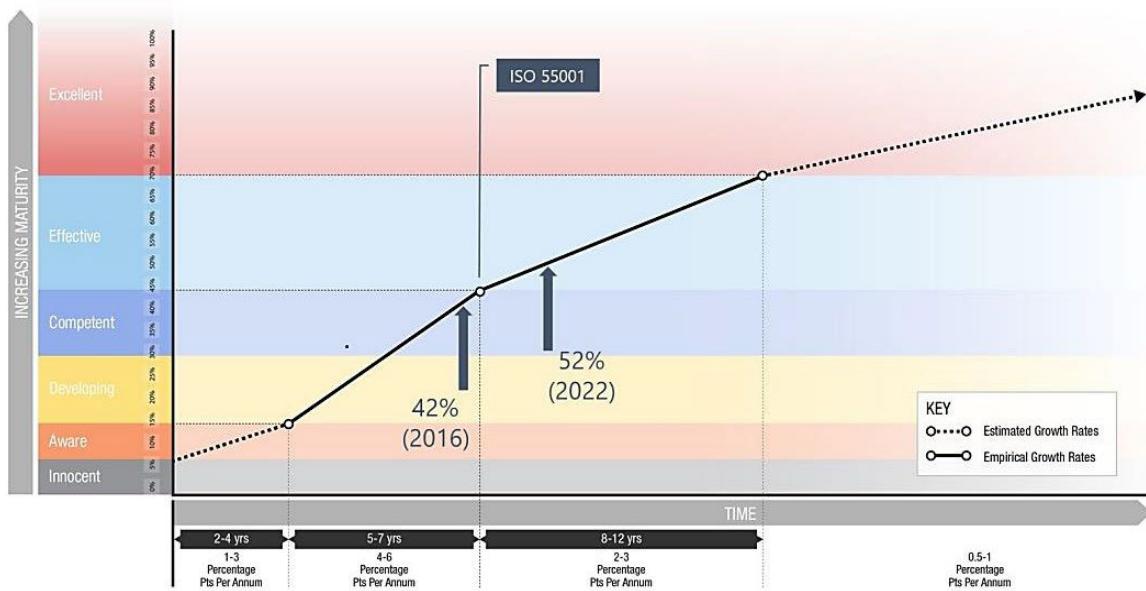


Figure 4: Extract from the 2023 AMCL Report Showing our Asset Maturity Journey

3.2.4. We were also compared against AMCL’s global register of assessments of organisations across major asset intensive business industries and placed in the top quartile for asset management maturity (indicated by the blue dots in Figure 5), and this shows that we are, in AMCL’s words, ‘demonstrating leading practice’. Figure 5 shows how we compared across AMCL’s global register.



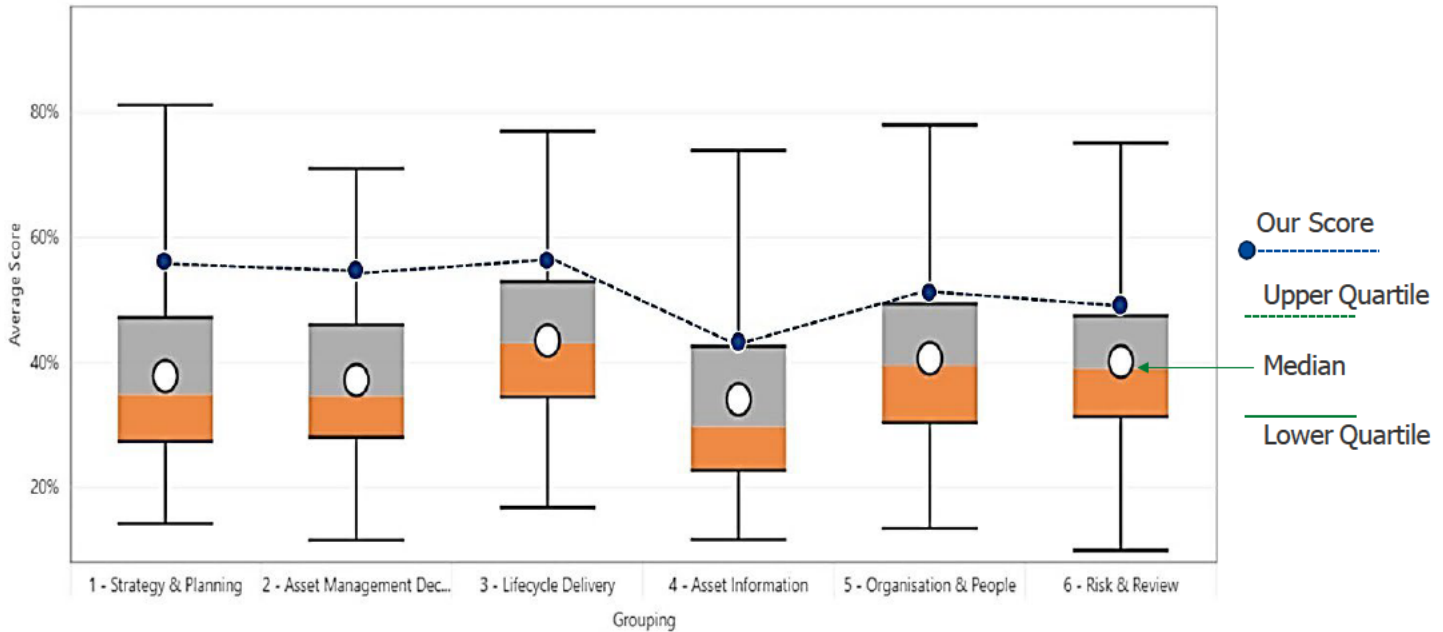


Figure 5: Extract from the 2023 AMCL Report Showing our Asset Management Capability Benchmarking

### 3.3 Our Progressive Asset Management Planning Approach

- 3.3.1. Through a series of engagements with internal and external stakeholders, we identified areas of improvement from RIIO-T2 which our RIIO-GT3 operational Capex business plan addresses, boosting our confidence within areas such as investment planning, risk modelling and optimisation, costing, cost benefit analysis etc.
- 3.3.2. One of our asset management Policy statements is, “We apply a risk-based approach to asset management.” This means that we look at whole-life costs and benefits of our decisions and build strong business cases for asset investments backed by what our stakeholders value. This is supported by our monetised risk approach, measured via the single value framework.
- 3.3.3. Beside the investment drivers (such as legislative compliance, asset health, climate change adaptation etc), our Asset Management Plan (AMP) takes input from the suite of 23 Asset Class Strategies (ACSs) that we have developed within the RIIO-T2 period. These ACSs explored asset management challenges that we faced within all our asset classes (such as Valves, Telemetry, Pipelines etc) and through cross departmental collaboration we determined ‘desired states’ that we wanted to reach to resolve those challenges. These desired states then formed the basis of our maturity development and process improvement initiatives, some of which paved way for improved planning capabilities used within the AMP development for RIIO-GT3, and others formed part of our wider longer-term business change ambitions.
- 3.3.4. Our AMP is revised annually and looks at a rolling 10-year investment cycle, which enables the business to continuously adapt to regulatory & commercial changes, and wider challenges within the energy landscape. Our rolling AMP forms the basis for the development of the regulatory business plan for the next price control period (RIIO-GT3), running across the five years from 2026 to 2031. The AMP includes information on where and when the proposed activities will be carried out and gives an indication of resource and outage requirements.
- 3.3.5. The content within our AMP has been distributed into four investment themes, namely, Compressors, Pipelines, Sites and Security. For the RIIO-GT3 period, our strategic approach to building and describing asset investment plans has evolved, to include site and zone level asset management planning incorporating the investment themes used in RIIO-GT3.
- 3.3.6. Initially, an unconstrained list of investment options is developed which is refined and optimised using the NARMs methodology and then the constraints like resource and outage availabilities are applied to the proposed business plan. The output is a constrained, deliverable, Cost-Risk-Benefit balanced, optimised and justifiable business plan. Portfolio planning and deliverability is continuously updated during the delivery of the plan and as and when

constraints vary. For further details of the deliverability assurance process, please refer to our Asset Management Plan (AMP) annex.

### 3.4 Improving Cost Confidence

- 3.4.1. One of the most significant challenges we faced in RIIO-T2 planning (which led to funding being disallowed for some of our proposed interventions) was inaccuracies within the costing information at the Secondary Asset Class (SAC) level.
- 3.4.2. Our asset hierarchy and approach in describing activities at asset level during our RIIO-T2 planning created significant challenges with determining exactly what units of interventions were needed and their associated unit costing. This was primarily driven by not describing sufficiently suitable packages of work in RIIO-T1 and not capturing enough cost and scope data.
- 3.4.3. As part of our learning from the 'RIIO-T2 and Beyond Ways of Working' project, we introduced new methods and processes to improve our costing capabilities, such as:
- New embedded end-to-end process (from strategy to investment sanctioning to delivery and commissioning) to track work delivery and expenditure.
  - New Work Breakdown Structure (WBS) in SAP, recording both project and asset level spend, enabling accurate RRP reporting and outturn unit cost capture.
  - Unit Cost Schedules (UCSs) are now populated for each completed intervention, drawing out detailed outturn cost components and cost differentiators.
  - New cost module deployed in Copperleaf, providing a structured library and enabling investment pick lists and automated intervention optimisation.
- 3.4.4. This process is facilitated by the creation of Unique Identifiers (UID) for describing work. A UID is a package of work, with an expected scope, unit cost and assets intervened within it. In RIIO-T2, this is described against a relevant Secondary Asset Class (SAC). This work packaging allows larger projects to be built from the lowest level of intervention, a UID on a specific asset, as well as the tracking of delivery progress and outputs.
- 3.4.5. This allows the unit cost of an intervention to be tracked based on actual outturn costs and cost breakdowns. We can now implement accurate unit costs for our NARMS assets to support funding request decisions and provide assurance toward a high-quality business plan.
- 3.4.6. We now have a new dedicated cost team embedded within our planning process to provide a central source for consistent costing methodology and benchmarking.
- 3.4.7. Close collaboration between our planning function and our SMEs and operational colleagues has ensured that where unit costs do not appear reasonable or are not confidently justifiable, we employ support from additional surveys and analysis (internal and/or independent) to increase cost confidence.
- 3.4.8. All these improvements have allowed us to conduct our intervention costing with a much-improved confidence and accuracy than previously possible.

### 3.5 Updated Asset Taxonomy and Asset Groups

- 3.5.1. In the process of building UIDs for RIIO-T2 work, it was apparent that the scope of our current regulated asset base was often too detailed or not detailed enough to accurately record costs and risk benefit for UIDs. The UIDs defined in our business plan and used for setting our Baseline Network Risk Output (BNRO) targets are often at a sub-SAC level of detail.
- 3.5.2. Based on this, it was decided to transition to a new work measurement system, and we therefore aligned our entire asset data structure to a new asset taxonomy based on the ISO 14224 standard. This approach enables a top-down

asset class investment view which helps to avoid gaps in our plans and build cost confidence in our RIIO-GT3 planning. This lets us consistently describe our assets, and any interventions on a “per asset” level. One of the drawbacks of using SACs in RIIO-T2 is that some measures of assets are “per site”, which leads to variance in site sizes and hence, cost inaccuracies. By adopting the ISO 14224 standard for our asset taxonomy needs, we can define a “standard asset” as the basis for unit costing, project scoping and industry benchmarking.

- 3.5.3. An **Equipment Unit** is now the standard method of defining an asset in terms of its constituent parts (or components). A standard EU asset definition allows unit costs to be calculated consistently.
- 3.5.4. A core principle of our new RIIO-T2 and expected RIIO-GT3 ways of working process is to allow investment engineers to scope out current and future investment projects using a recognisable and usable asset unit of measure, which may comprise one or more Maximo assets.
- 3.5.5. We have termed this an **Intervenable Unit (IU)**. An IU is a unique occurrence of an EU and relates to a physical asset (e.g., Actuator is an EU; Actuator 1234 at Aberdeen Compressor Station is an IU).
- 3.5.6. The IU can be formed in many ways depending on the nature of the investment. For example, an IU could be the whole site (ISO3), or intervention on a single component (ISO8). For the former example, the IU could consist of many hundred assets: for the latter only, a single asset. An example of a Maximo asset to IU aggregation is shown in Figure 6.

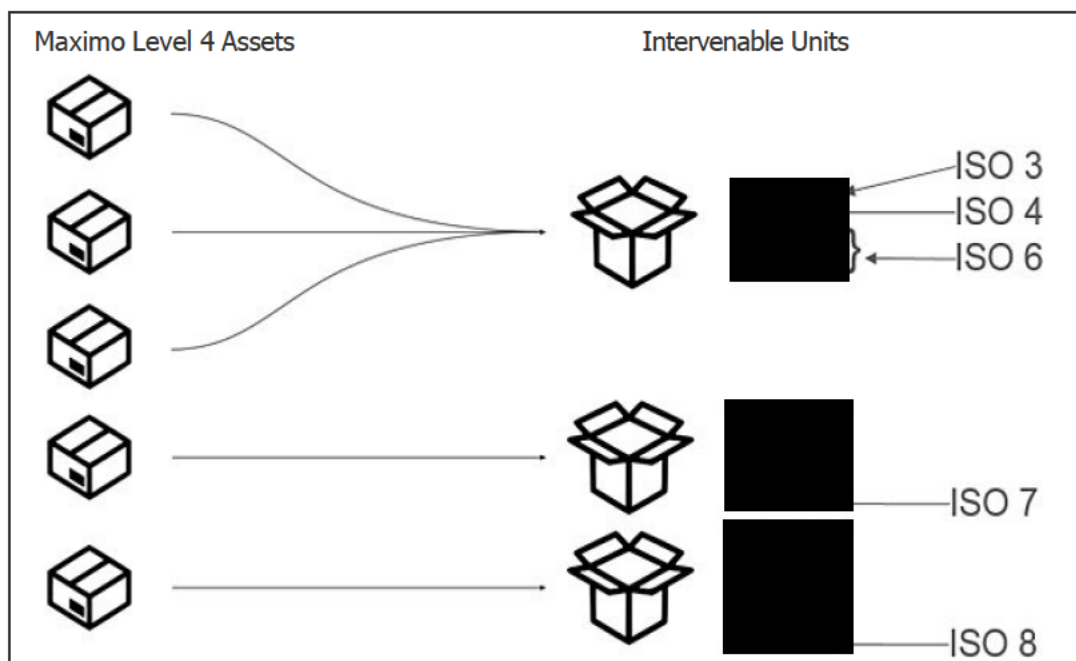


Figure 6: Creating Intervenable Unit Asset Definitions for Investment Planning.

- 3.5.7. Combining this with the RIIO-T2 UIDs and our cost learnings, Unit Cost Schedules (UCSs) are now being completed for each individual investment, drawn out of lower-level unit costs breakdown and cost differentiators. This is allowing us to analyse, explain and forecast future intervention costs and to further refine our UIDs for RIIO-GT3, understanding where they are too broad, or where multiple SACs cover the same assets: for instance, Valves.
- 3.5.8. From this process, our RIIO-T2 in period learnings and different investment requirements, we have proposed a slightly changed set of UIDs than RIIO-T2, but with the same basis and function.
- 3.5.9. We can now implement accurate unit costs for our NARMs assets to provide assurance and support funding request decisions that drive a high-quality business plan submission.
- 3.5.10. To ensure we consistently report (to our regulator) and talk about our assets in the same language across the business, we have realigned our asset investment planning tool, Copperleaf, to talk in Equipment Units. Copperleaf is integrated to both plan our investments, as well as to calculate and optimise the monetised risk outcomes of individual or groups of planned investments.

### 3.6 Capability Enhancements within Asset Management Systems

- 3.6.1. Information on the condition of our assets is held within our Computerised Maintenance Management System (CMMS), which is Maximo enterprise asset database. In RIIO-GT3, we will continue to support Maximo, to maintain the platform's health and deliver iterative changes to continue exploiting its capabilities and effectiveness.
- 3.6.2. Copperleaf is our asset risk modelling decision support tool. In RIIO-GT3, we will continue to invest into the upkeep of the Copperleaf platform and exploit new areas of capability within it to provide more accurate asset health scores and predictive models. We have also planned upgrades within our Geographic Information System (GIS) and the on-field safety and risk management platforms.
- 3.6.3. All these system maintenance and enhancement efforts will further improve our asset management decision-making capabilities in the future. Further detail on the scope and justification for these proposed investments is provided in our NGT\_A11\_IT\_and\_Telecoms\_Strategy\_RIIO-GT.

### 3.7 Our On-Going Maturity Development and Process Improvement Initiatives

- 3.7.1. We understand there are still underlying challenges and improvement opportunities which we need to address within our processes to progress closer to being excellent in asset management. This is why we have initiated various process improvement projects as part of our maturity development roadmap.
- 3.7.2. Our ambition is to achieve a target score of 70% in our asset management maturity by 2031, which is well ahead of our 2022 position of 52% as shown previously in Figure 4.
- 3.7.3. We have embarked upon several strategic initiatives across the subject areas of Asset Management as per the GFMAM Asset Management Landscape as shown in Figure 3. These initiatives were prioritised following suggested improvement actions from the assessment conducted by AMCL and from the opportunities identified through the desired states within our Asset Class Strategies.
- 3.7.4. We grouped the improvement opportunities into manageable projects and assessed their business-criticality (based on the five risk categories of the Service Risk Framework (SRF)) in collaboration with the relevant Subject Matter Experts (SMEs). After validation and governance from the Asset Management Performance Forum (AMPF), these initiatives were prioritised and mapped onto our asset management maturity roadmap which is a high-level visual roadmap of the prioritised improvement initiatives on a timeline to 2031.
- 3.7.5. Another initiative that we have prioritised, following assessment from our validation model, is our digitisation strategy. As part of this, we are rolling out targeted initiatives and improvements to the quality and effectiveness of our asset data and systems. These initiatives encompass all the asset management activities required to specify, collect, maintain, and dispose asset information. A dedicated project group known as the Future of Asset Management (FOAM), has been mandated to drive improvements in our asset information management strategy and standards.

## 4 Our Risk Management Framework

- 4.0.1. Before we explain our asset management policy and strategy to promote asset health and long-term operational resilience across our assets, and our approach for NARMs and non-NARMs asset classes, it is important to briefly describe the key concepts of the risk management framework within which the NARMs methodology operates.
- 4.0.2. Towards the end of RIIO-T1 and through the RIIO-T2 period, the NARMs methodology was implemented into our decision-making process. This methodology translates our asset health regulatory performance into monetised risk targets.
- 4.0.3. Our NARMs Methodology was validated by Pipelines Industry Experts and approved by OFGEM. Following updates to the methodology for analysing Equipment Units and an OFGEM led Audit, we conducted an independent review of our models in 2024. This review confirmed correct application of the NARMs methodology in preparation for our RIIO-GT3 Business Plan submission.

### 4.1 NARMs Methodology and Service Risk Framework (SRF)

- 4.1.1. The foundation of our risk management system is the NARMs methodology and its Service Risk Framework (SRF). The NARMs methodology describes the agreed method for calculating the monetised risk score of an asset. The NARMs asset risk score is a combination of how likely an asset is to fail (probability of failure), and the consequences of that failure (cost of the consequence in £s).
- 4.1.2. In general terms:  

$$[\text{Risk of Asset Failure}] = [\text{Probability of Future (PoF)}] \times [\text{Consequence of Failure (CoF)}]$$
- 4.1.3. In practice, it is usually not as simple as estimating a single probability and consequence value related to a given asset, as it is usually necessary to build up the asset risk from several sub-components, failure modes, conditional probabilities, criticality, demand forecasts and different types of failure consequences.
- 4.1.4. The model is split into 2, one describing Sites Assets – these are maintainable items held within Maximo, our Central Maintenance Management System (CMMS), with condition and attribution data, and Pipelines, representing pipe between two identifiable sites and are generally piggable pipeline. Data for pipelines is primarily geospatial and comes from Gas Link our geospatial system, being updated as routine surveys are complete.
- 4.1.5. Probability of Failure is built based on deterioration curves, which are determined by asset condition, with an expectation that assets will deteriorate at a yearly rate.
- 4.1.6. Consequences of failure is evaluated according to the SRF. SRF consists of a set of measures, arranged into five categories, which quantify the performance requirements of the company and customers. All asset interventions either directly or indirectly, contribute to the delivery of one or more of the measures within the SRF, and almost any intervention can be valued by its impact against measures within one or more categories.
- 4.1.7. The impact of asset performance, on one or more of these service risk measures, provides a consistent method of assessing and articulating the consequences of asset failure and consequently its monetised risk value. The risk maps (or event trees), provide the relationships between an asset condition, expressed in probability of failure to the consequence of that event in terms of its impact on one or more of the SRF measures as shown in Table 1.
- 4.1.8. The failure of each individual asset is measured against all relevant service risks. This quantifies the criticality of each individual asset (and the impact of the various modes of its failure) for investment prioritisation.

Table 1: Service Risk Categories and Measures

Category	Service Risk Measure
Safety	Health and Safety of the general public and employees
	Compliance with Health and Safety legislation
Environment	Environmental Incidents
	Compliance with environmental legislation and permits
	Volume of emissions

	Noise pollution
Availability and Reliability	Impact of network constraints
	Compensation for failure to supply
Financial	Shrinkage
	Impact on operating costs
Societal and Company	Property damage
	Transport disruption
	Reputation

- 4.1.9. By quantifying any consequence in terms of a monetary value, we allow for all risks, interventions, and outcomes to be valued in the common currency of monetised risk.
- 4.1.10. When it was first implemented, the SRF only applied to condition-related investments where a baseline failure rate could be assessed based on an asset deterioration curve. This scope of application has been expanded in RIIO-T2 to more complex problems, and asset health interventions can now be compared to options that change the network.
- 4.1.11. Chosen intervention options within the investment plans can be aligned to customer and stakeholders’ values, often measured in terms of long-term reduction in monetised risk, or a change in outcome of risk measure level, i.e. less network constraints. This ensures that the plan can be optimised against key constraints such as “must do” legislative work, impact on reliability, outages, financial caps, resource availability etc.

## 4.2 Single Value Framework (SVF)

- 4.2.1. The SVF is the engine/environment where the monetised risk, and Long-Term Risk Benefit (LTRB) calculations are undertaken. It allows for all interventions, and hence investment plans, to be valued against a common set of criteria, and then compared against one another, as well as against our business objectives.
- 4.2.2. Our SVF informs our asset management decision making and is based on potential investments and underlying changes to the network and future supply and demand scenarios.
- 4.2.3. The four main outputs of the SVF are as follows:

- **Quantification of our current risk profile based on future network development** - we can create, manage, and visualise asset strategies that maximises our business value while proactively managing risk. Our SVF provides quantitative, and comprehensive assessment of all asset risks, so that we can select the most effective interventions across the entire asset base to mitigate the most risk.
- **Balancing cost, risk, and business outcomes** - using our SVF, we consider funding, resources, and service level requirements, resulting in an actionable investment strategy that can be delivered with our available resources, we are able to demonstrate the ‘what-if’ scenarios that enable us to quantify and sensitivity-test the outcome risk for our business associated with different asset investment strategies.



Figure 7: Main Outputs of our SVF

- **Improvement in our planning efficiency** - our SVF enables us to create the right plan more efficiently. We can perform data aggregation and automatic asset modelling, resulting in improved planning efficiency leading to agility, and resilience in our planning cycle.
- **Aligning decisions with our strategic objectives** - using our SVF we can consider all business inputs during asset strategy optimisation, to ensure that our asset management plan will drive the achievement of our strategic objectives. We can leverage on our SVF to consistently assess risk, costs, and benefits across all assets and align decision with our strategic business priorities.

4.2.4. A key enabler, the SVF allows for valuation of “System” based interventions, i.e., New Compressor Build, by allowing the quantification of the risk before and after the interventions measured against the SRF. This has been used to complete the Cost Benefit Analysis (CBA) of the Network Decarbonisation and Fleet interventions.

### 4.3 Absolute Monetised Risk, and Long-Term Risk Benefits (LTRB)

4.3.1. As mentioned in 4.0.2, in RIIO-T1 we were assessed against our ability to keep absolute monetised risk stable across the period. Absolute Risk is defined as the summed of all Asset risk for a single year. For our RIIO-T1 target this means that the risk at the end of the price control period, after we had applied our delivered interventions, was equal to the risk at the start of the period.

4.3.2. Moving into RIIO-T2, the guidance was to consider the long-term benefit of interventions, to ensure that the best long term asset management decisions were made and rewarded, over short-term interventions, which may reduce the absolute risk quickly but do not resolve long term condition decline. This was formalised into the monetised risk measure of LTRB.

4.3.3. LTRB is defined as the **cumulative** monetised risk benefit over the life of an intervention, where an intervention is an activity which replaces an existing asset or extends the life of an existing asset through major refurbishment, minor refurbishment.

4.3.4. The LTRB is also equal to the cumulative single year monetised risk values over the defined period.

4.3.5. LTRB assume two different (and coinciding) impacts on the intervened-upon asset:

- A reduction in the probability of failure delivered by the improved asset (one-off reduction in monetised risk).
- A change in the rate of deterioration of the improved asset (cumulative reduction in monetised risk).

4.3.6. Figure 8 illustrates the concept.

4.3.7. The upper chart illustrates the benefit of an intervention delivering a 10-year extension in asset life:

4.3.8. The red line shows the deterioration in monetised risk (£), without intervention.

4.3.9. An intervention is carried out in the RIIO-T2 period (benefits accrue from the end of RIIO-T2). A similar approach is adopted for business planning in RIIO-GT3 and beyond.

4.3.10. This intervention immediately delivers a reduction in the probability, or consequence, of failure (50% in this case) which reduces the monetised risk of the intervened-upon asset.

4.3.11. This asset then deteriorates (generally at a slower rate) on the blue line.

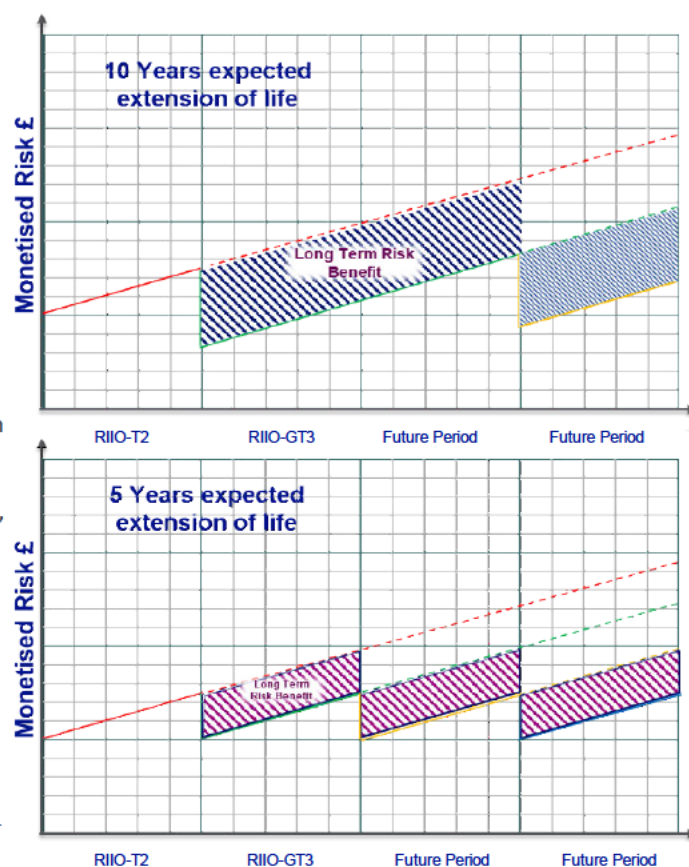


Figure 8: Long Term Monetised Risk Benefit Visualisation for 10- and 5-year Interventions

- 4.3.12. It is assumed to be necessary to repeat the same intervention after 10 years.
- 4.3.13. The LTRB (£) is the cumulative difference between the with and without intervention monetised risk profiles, represented by the hashed area in Figure 8.
- 4.3.14. The lower chart Figure 8 in shows the LTRB for a 5-yearly intervention frequency. An intervention will be required in each regulatory period (assuming they remain 5-yearly in the future), the intervention delivers a reduced initial probability of failure reduction and the LTRB accrues over only 5 years. The difference between the LTRB for the 5 and 10-yearly intervention is the additional benefit delivered by (for instance) a major over a minor refurbishment.
- 4.3.15. LTRB is our measure to gauge how much consumer value our interventions deliver. The LTRB does not consider the cost differences of alternative intervention options (this comparison is completed in subsequent Cost Benefit Analysis (CBA) process).
- 4.3.16. Within our RIIO-T2 delivery, an important concept to consider alongside LTRB is Unit Cost of Risk removed (UCR). This enables us to quantify our risk benefits by showing how much risk has been removed through the spend. It is calculated for each intervention by dividing the total intervention cost (not the unit cost) by the delivered LTRB, adjusted for agreed efficiencies and Real Price Effect (RPE). This is used for target setting within the NARMs mechanism of RIIO-2 and evaluating our performance in delivering the regulatory deal.
- 4.3.17. Individual UIDs with an expected LTRB output are used for Baseline Network Risk Output (BNRO) target setting and regulatory reporting.
- 4.3.18. NB: Please note, all charts show deterioration as linear. In practice, they are Weibull curves.



## 5 Our Strategic Approach to Managing NARMs and non-NARMs Assets

- 5.0.1. Currently, all our Secondary asset classes can be categorised into lead and non-lead based on whether assets within those asset classes carry gas (e.g. Pipelines, Gas Turbines etc) or if they support / protect the assets that carry gas (e.g. Security Fences, Marker Posts etc), respectively. Non-lead assets are generally dealt with outside of the NARMs mechanism in RIIO-T2.
- 5.0.2. Our approach to the management of NARMs and non-NARMs assets considers lessons learnt from RIIO-T2. As explained in Sections 3.4, 3.5, we have implemented a new asset taxonomy and equipment class groupings. This means, transitioning away from Secondary Asset Classes (SAC), and utilising an ISO14224 asset taxonomy for Intervenable Unit (IU). This allows us to define a standard asset as basis for unit costing, project scoping and industry benchmarking. Going forward we will replace SAC assets as the unit of measure for NARMs analysis and reporting.
- 5.0.3. The approach of lead and non-lead is expected to continue into RIIO-GT3. With lead assets categorised as A1 Interventions in NARMs and non-lead assets benefit reported in A3 NARMs. Where A1 interventions are applicable to the NARM funding adjustment and penalty mechanism and A3 interventions are ring-fenced project/activity.

### 5.1 Summary of our Approach to Managing NARMs Assets

- 5.1.1. The monetised risk NARMs methodology is part of the asset management decision making toolbox, alongside other inputs such as engineering judgement and Cost Benefits Analysis (CBA) which all help in justifying proposed intervention options.
- 5.1.2. Our long-term risk objective is to reach a monetised risk which is at or below the risk position seen at the start of the RIIO-T2 price control period (2022). We will work toward this objective throughout RIIO-GT3 and beyond. This risk reduction will require an increased focus on improving the health of our assets.
- 5.1.3. Most of the National Gas Transmission (NGT) asset health plan is covered by Network Asset Risk Metrics (NARMs) work that is necessary to maintain the safety and reliability of the network. The remainder is investments into non-lead assets such as cab infrastructure and civils interventions, which are necessary to maintain compliance with legislation, and to ensure the protection of and safe access to operational network assets.

### 5.2 Summary of our Approach to Managing Non-NARMs Assets

- 5.2.1. These assets are excluded from the NARMs mechanism as they do not have easily measurable or encompass non-existent relationships between condition and/or age and the likelihood of failure. Examples include, security fencing and pipe supports, where the relationship between a poor-quality asset and a measurable service risk consequence is highly uncertain.
- 5.2.2. Non-lead assets and interventions are also generally excluded from the BNRO if they have specific volume or other outputs targets.
- 5.2.3. Electrical assets are currently included in the NARMs mechanism, although their primary failure mode is obsolescence rather than condition or age. The deterioration curves assigned to electrical assets are calibrated to include assumed obsolescence risk.
- 5.2.4. Investments into these non-NARMs assets are bottom-up, based primarily on managing their condition to a satisfactory level by intervening on existing and/or forecast defects.

## 6 Our Long-Term Risk Objective and LTRB Delivered by Interventions

- 6.0.1. We are the owners of an ageing asset base, with a range of obsolescence and age-based deterioration implications. As our assets age, the level of asset risk increases at a faster rate, and therefore requires a greater volume of interventions to maintain a stable level of network risk.
- 6.0.2. Our NARMS methodology splits our assets into two separate models, Pipelines and Sites. Our pipelines model focuses on the corrosion of assets that can take years to propagate risk, whereas the sites model looks at the type of asset and models the probability of failure dependant on the age and condition of an asset, as described in Table 2 below.

Table 2: Our Copperleaf Asset Categories

Asset Group	Description
<b>Pipeline Assets</b>	These are recorded as single data entity for each 12-metre section of the pipeline (primary asset), which has recorded attributes relating to protection by a secondary asset. Common failure modes include; corrosion, mechanical failure, general failure, external interference, natural events.
<b>Site Assets</b>	These are recorded as a combination of individual equipment (which corresponds to the lowest level of asset stored in our asset register), plus an allocated failure mode associated with the asset. If an asset has multiple failure modes, then there will be multiple lines for each asset within sites model database.

- 6.0.3. Site assets face increasing risk during price control periods, requiring ongoing short-term risk management interventions to maintain stable risk levels. On the other hand, pipeline assets require less frequent but more strategic interventions due to their extended risk horizon.
- 6.0.4. The pipeline network's long-term risk benefits are projected over a 20 to 25-year period, reflecting the gradual impact of corrosion rates, which accelerate when coating systems or cathodic protection deteriorates. As corrosion defects escalate, periodic intervention becomes crucial to counteract this natural deterioration, protecting pipeline integrity and managing future risks effectively.
- 6.0.5. For pipelines therefore, the focus shifts towards long-term risk, as interventions on cathodic protection systems and in-line inspection (ILI) dig-and-repair areas help sustain pipeline asset health well into the future.

### 6.1 Our Long-Term Risk Objective

- 6.1.1. Our long-term risk objective is to reach a monetised risk which is at or below the risk position seen at the start of the RIIO-T2 price control period (2022). We will work toward this objective throughout RIIO-GT3 and beyond.
- 6.1.2. Pipeline risk management is guided by legislative compliance rather than purely risk-reduction objectives, which ensures compliance with legislative requirements while providing long-term asset integrity. By maintaining this approach, we anticipate £12.83 billion in Long-term Risk Benefit (LTRB) from our RIIO-GT3 proposed pipeline interventions, spread over the interventions' lifecycle, compared to £290.4 million in LTRB for site assets.
- 6.1.3. The graph in Figure 9 shows that through the proposed RIIO-GT3 interventions, risk is reduced during RIIO-GT3 to levels below the start of RIIO-T2. Across the RIIO-GT3 period £17m of risk will be removed from the network with the end position of RIIO-GT3 being 98% compared to the end of RIIO-T2.
- 6.1.4. The initial, unconstrained RIIO-GT3 plan aimed to maintain RIIO-T2 starting risk levels throughout and at the end of RIIO-GT3. After reviewing deliverability, supply chain constraints, and site access, we expect absolute monetised risk by the end of RIIO-GT3 to be 3.2% higher than at the start of RIIO-T2. However, with ongoing investment, we anticipate bringing risk levels back below the start of RIIO-T2 by 2032 (the first year following the RIIO-GT3 period). Please see the Asset Management Plan Annex for further details on the investments

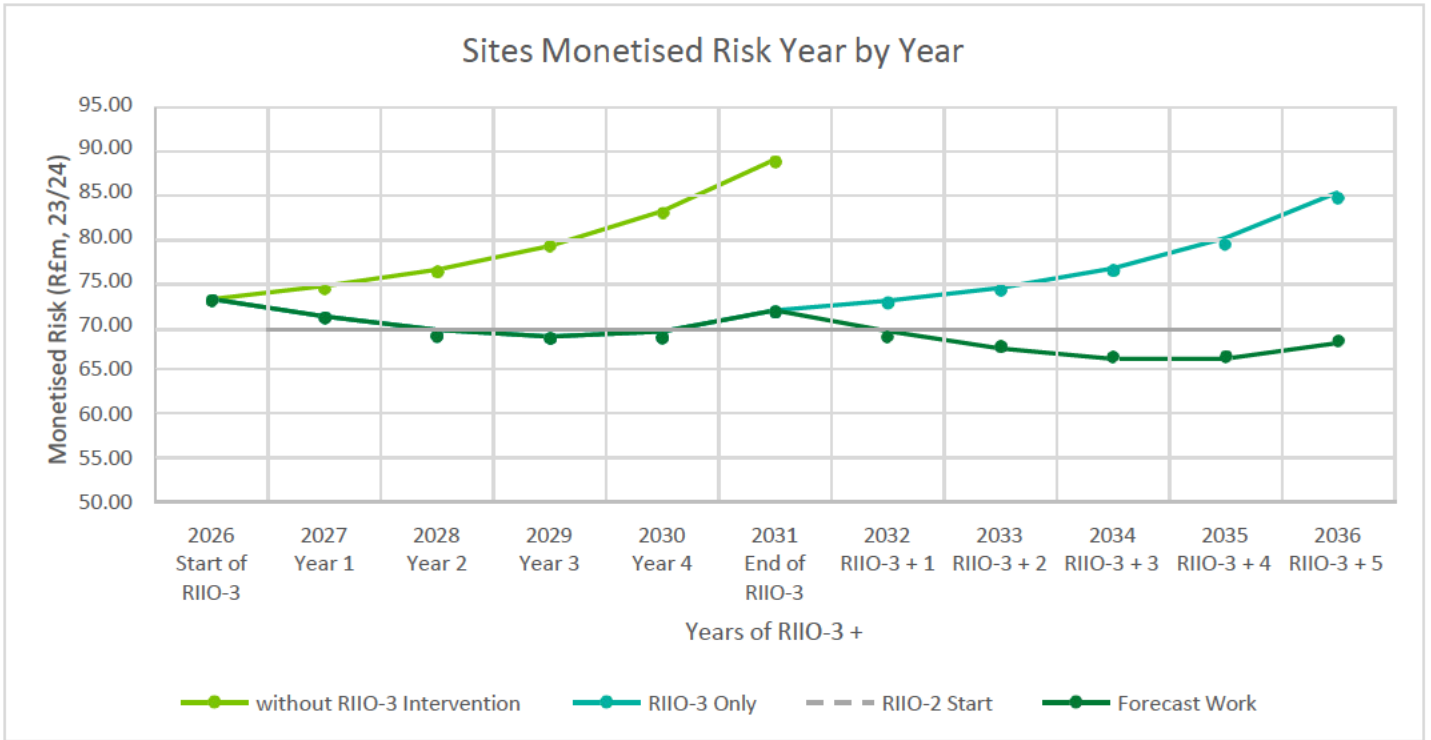


Figure 9: Achieving Long-Term Risk Objective through AMP Interventions

## 6.2 Our Views on Asset Health, Criticality and RIIO-GT3 Replacement Priorities

6.2.1. Combining the Site and Pipeline asset risk, Figure 10 shows the monetised risk position:

- At the start of the RIIO-GT3 price control period, effectively reflecting our baseline view on the asset health, criticality, and risk of assets on the network.
- At the end of the price control period with no intervention, effectively reflecting our view on asset degradation over the period.
- At the end of the price control period with proposed, deliverable interventions.

6.2.2. Total network risk (Pipelines and Sites combined) at the start of the RIIO-GT3 period (baseline) is expected to be at £125.6m, which would rise to £145.6m if we undertook no risk reducing interventions on the network. With the investments that we have proposed, the risk is forecast to be £128.57m at the end of RIIO-GT3. This is illustrated in Figure 10 below:

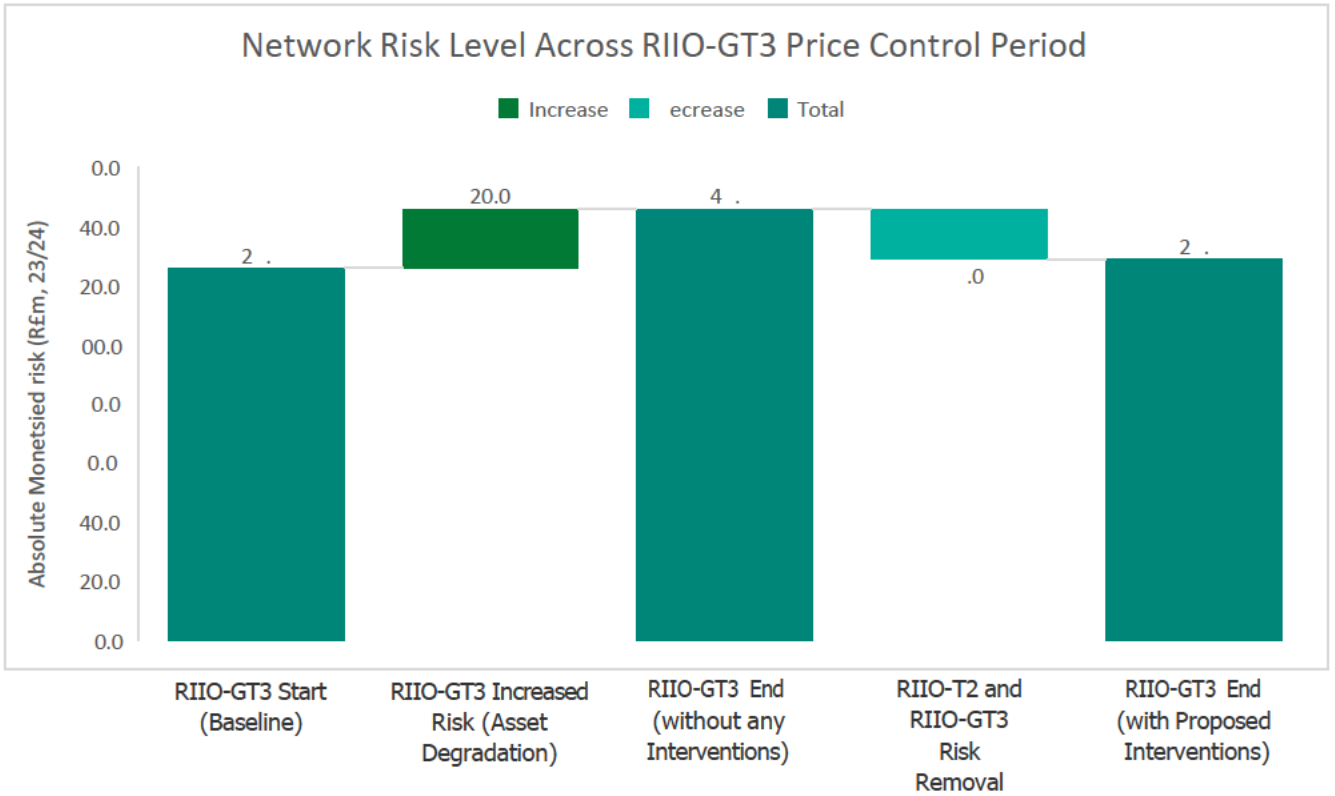


Figure 10: Total Network Risk with and without Proposed RIIO-GT3 Interventions

## 7 Monetised Risk Objectives Informed by CBA and Stakeholder Engagement

7.0.1. Our monetised risk objective has been informed by stakeholder engagement. Moreover, Cost Benefits Analysis (CBA) is utilised to validate that the intervention options we choose are generally the ones that maximise network risk reduction with minimum expenditure (any exceptions to this are explained and justified in the relevant Engineering Justification Papers (EJPs)). By utilising different cost elements, our CBA provides economic justification for the selected investment based on Net-Present Value (NPV).

### 7.1. Cost Benefit Analysis (CBA) for RIIO-GT3

7.1.1. All our asset management decisions revolve around balancing the cost of intervention against the level of risk reduction, through delivering the investments.

7.1.2. CBAs are included within EJPs in alignment with Ofgem’s RIIO-GT3 Investment Decision Pack (IDP) guidance annex. The CBAs utilise an Ofgem created Excel template that contains guidance, summary, fixed data, and multiple option sheets. The fixed data sheet contains discount rates and other parameters used in various calculations along with their sources. This section briefly describes the process for developing the CBA options, costs, and benefits, whereas further specific descriptions are embedded within EJPs across our different assets. Our approach for developing CBA options, costs and benefits is shown in Table 3.

Table 3 Process for Developing Cost Benefits Analysis (CBA) Options, Costs and Benefits

Options	Cost	Benefits
<p>As per Ofgem’s guidance document, each CBA compares investment options against a “do nothing” option where there are no costs nor benefits. The investment options considered for each CBA differ based on whether it is an Asset Health or bespoke CBA.</p> <p>If the CBA is based on asset health, Copperleaf’s Predictive Analytics (PA) is utilised to determine different investment options to be included along with the work identified in each Engineering Justification Paper (EJP). There are standard options aligned with the overall Asset Strategy designed to reduce or keep asset category risk at the levels at the beginning of RIIO-T2 (2022). These options may include:</p> <ol style="list-style-type: none"> <li>1. Do Nothing</li> <li>2. Monetised Risk Stable to RIIO- T2 Start</li> <li>3. Additional 10% Risk Reduction</li> <li>4. Lowest Whole-Life Cost (Unconstrained)</li> <li>5. Service Risk Measure Stable to RIIO-T2 Start</li> </ol> <p>The Bespoke CBAs do not include the standard options above and they differ based on asset type and their EJP identified interventions.</p>	<p>The costs for each option are included in the 23/24 price base. These costs come from both the Business Plan Data Tables (BPDTs) and Predictive Analytics (PA), where applicable. They are based on both the EJP and PA unit costs and volumes.</p>	<p>The benefits included in the Asset Health CBAs are calculated using the NARMS methodology built into Copperleaf. The asset-specific benefits are calculated for each asset intervention. Assets that are identified and attached to EJP investments or predictive analytics within Copperleaf contribute benefit to the CBA. Each option includes benefits for the five Service Risk Measure categories as per Table 1.</p> <p>Bespoke CBA benefits were identified by EJP SMEs. These SMEs were able to explain how asset-related parameters would change based on asset interventions. Using Copperleaf and NARMS, our modelling team made parameter changes and then calculated the asset intervention benefit from each intervention type. The benefits were broken out into the five categories of Service Risk Measures (SRMs) shown in Table 1 and included in the CBAs.</p>

### 7.2. Stakeholder Engagement

7.2.1. Our long-term risk objective (stated in section 6.1.1), was presented at the Resilience Summit in May 2023 and thereafter agreed at the Energy Security Steering Committee meeting in January 2024 as the 5<sup>th</sup> of the 5 agreed Resilience Outcomes as shown in Figure 11 (a screenshot of the slide presented at the meeting). The steering committee included representation from our key stakeholders including Department for Energy Security and Net Zero (DESNZ), Ofgem and Energy System Operator (now NESO).

## Resilience - agreed outcomes

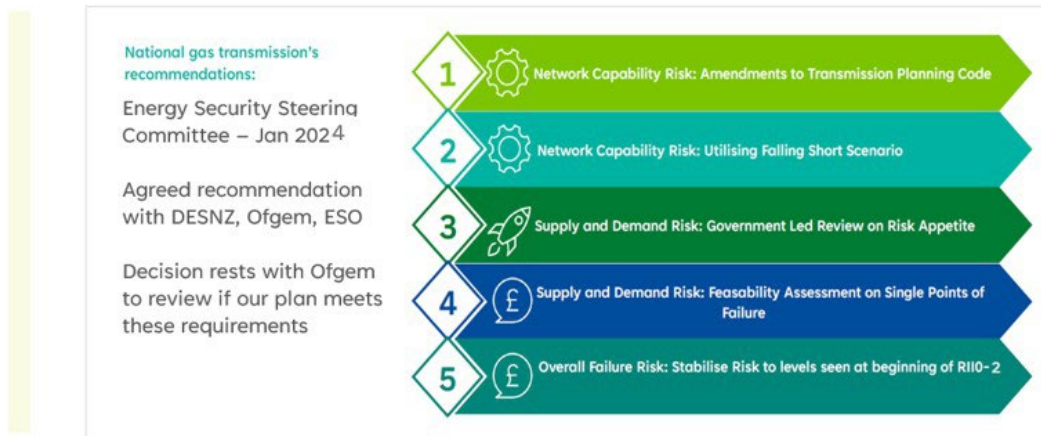


Figure 11: Our Risk Objective Tabled and Agreed at Energy Security Steering Committee

## 8 Conclusion

- 8.0.1. Ofgem's expectations from the Network Asset Management Strategy Annex document are contained in the Business Plan Guidance document from section 5.2 to 5.7.
- 8.0.2. With specific examples of improved processes and capabilities we have explained what we are doing to ensure we continue our best-in-class asset stewardship and pursue the continuous improvement journey toward excellence in asset management maturity.
- 8.0.3. Our strategic positions, including our long-term risk objective, asset management policy and strategy to promote asset health and long-term operational resilience across our network assets have been discussed.
- 8.0.4. We have taken the lessons learned from RIIO-T2 planning and delivery to ensure that we are better equipped to manage existing and new challenges in RIIO-GT3 planning period.
- 8.0.5. Our approach to network risk strategy for NARMs and non-NARMs assets has been provided to ensure granularity in work packaging. This includes the integration of unit cost schedules for improved cost confidence and adoption of the ISO 14224 standards for asset class standardisation.
- 8.0.6. Monetised risk profiles have been included to show the network risk position:
  - At the start of the price control periods (baseline view).
  - The end of the price control period with no intervention, effectively reflecting our view on asset degradation over the period.
  - The end of the price control period with proposed interventions.
- 8.0.7. Our approach for these scenarios is based on our target asset risk levels to maintain reliability and availability as well as maintaining high safety standards proportionate to the criticality of our national infrastructure.
- 8.0.8. Our aim for RIIO-GT3 is to continue gaining long term risk benefits across our networks to ensure our risk comes back down to the start of RIIO-T2 levels and then stabilised at this level going forward.
- 8.0.9. Our monetised risk objectives are based on what our stakeholders deem valuable, where value is measured in LTRB. Our CBA approach aims to guide us efficiently and objectively in making the right interventions, to the right assets, at the right time, maximising whole-life value for our existing and future customers.

## Addressing Ofgem’s BPG Requirements

This chapter sign posts the expectations and requirements of Ofgem’s business plan guidance, to sections within this document and / or within our wider BP submission which demonstrate how we comply with them:

BP Guidance Section Ref and Ofgem’s BP Strategy Expectations	Our Response - Chapters and Sections
<p><b>5.2</b> - Each company should submit a Network Asset Management Strategy alongside its Business Plan submissions. The company should submit a Network Asset Management Strategy which sets out what they are doing to ensure best in class asset stewardship.</p>	<p><b>Chapter 3</b> demonstrate what we are doing to be best in class asset stewardship</p> <p><b>3.1</b> shows how our AMS enables disciplined asset management activities</p> <p><b>3.2</b> describes the independent asset management maturity assessment and benchmarking done by AMCL, placing us in the upper quartile among similar companies and judging our AMS to be in the ‘Effective’ zone and ‘demonstrating leading practice.’ Recent ISO 55001 accreditation is also discussed here, certifying our strength within asset management</p> <p><b>3.3 to 3.5</b> provides 3 examples of areas where we have matured during RIIO-T2 and <b>3.6</b> talks about how we intend to continuously improve on the pathway to excellence through defined maturity and process improvement initiatives</p>
<p><b>5.3</b> - The strategy should set out the asset management policy and strategy to promote asset health and long-term operational resilience across its asset including lead and non-lead assets. This should include a summary of the company's approach to the management of NARM and non-NARM assets on its networks, considering safety, compliance, and risk management.</p>	<p><b>Chapter 4</b> demonstrates our asset management policy and strategy to promote asset health and long-term operational resilience across our lead and non-lead assets, through the Single Value Framework (SVF)</p> <p><b>4.1</b> introduces the NARMs methodology and the Service Risk Framework (SRF)</p> <p><b>4.2</b> describes the Single Value Framework (SRF) and its 4 outcomes</p> <p><b>4.3</b> describes how we use Long-Term Risk Benefit (LTRB) to consistently measure the value of intervention options</p> <p><b>Chapter 5</b> outlines our approach to the management of lead and non-lead / NARMs and non-NARMs assets</p> <p><b>5.1</b> discusses approach for NARMs assets</p> <p><b>5.2</b> discusses approach for non-NARMs assets</p>
<p><b>5.4</b> - Business plans should set out the company’s views on asset health, criticality, and replacement priorities for:</p> <ul style="list-style-type: none"> <li>• The start of the price control period (the baseline view), effectively reflecting its view on the asset health, criticality, and risk of assets on the network.</li> <li>• The end of the price control period with no intervention, effectively reflecting its view on asset degradation over the period.</li> <li>• The end of the price control period with proposed interventions.</li> </ul>	<p><b>6.2</b> addresses this requirement</p>
<p><b>5.5</b> - We consider that establishing a baseline view of asset health, criticality, and replacement priorities at the start of the price control period is essential to Ofgem to take fully informed decisions on a company's proposed asset interventions. This will be supported by the Portfolio asset EJPs.</p>	<p>Statement acknowledged</p>
<p><b>5.6</b> - Companies should explain their long-term risk objectives and strategy, as well as the long-term benefits delivered by their proposed interventions.</p>	<p><b>6.1</b> explains our risk objective and strategy with illustration of how the long-term benefit from our RIIO-T2 and RIIO-GT3 interventions will enable us to achieve it</p>
<p><b>5.7</b> - Monetised Risk objectives should be informed by stakeholder engagement and cost benefit analysis (CBA) and demonstrate that selected investment options both efficiently meet their stakeholder-driven objectives and efficiently deliver sufficient net benefit for existing and future consumers.</p>	<p><b>Chapter 7</b> discusses these requirements</p> <p><b>7.1</b> explains the process for undertaking CBAs in line with our monetised risk objectives</p> <p><b>7.2</b> identifies that our risk objectives are informed by and agreed with our key stakeholders</p>