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Guidance

Engineering Justification Paper Frameworks for RIIO-GD2 and RIIO-GT2

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As part of their RIIO-2 business plan submissions, network companies are required to provide Engineering Justification Papers which set out the scope, costs and benefits for major projects or aggregated investment programmes aimed at improving asset health. This document sets out the frameworks that must be used for these papers, highlights the information that is required by Ofgem for our review process and provides summary guidance on how to populate the frameworks.

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1. Introduction

1.1. The network company Business Plan submissions for RIIO-2 will contain a number of Cost Benefit Analyses (CBAs) which are used to support proposed investments across the networks.

1.2. In order to present a clear and transparent business case for engineering investments it is necessary to provide evidence that the costs and benefits defined in the CBA have a sound engineering justification. For the RIIO-2 price control, Ofgem are requesting that the engineering evidence that supports each CBA is collated in an accompanying document, which has been named as an Engineering Justification Paper for RIIO-2.

1.3. This document sets out the framework that should be used to generate Engineering Justification Papers for typical investment spends. Further guidance on the relationship between CBAs, Engineering Justification Papers and Business plans is provided in the parent guidance documents for GD and GT titled "Investment Decision Pack and CBA Guidance".

2. Framework Types

2.1. A review of previous company business plans has highlighted that network investment programmes normally contain two distinct types of investment spend:

- Major Engineering Projects –A major project investment where there is a defined scope, bespoke cost estimates and a known outcome. The project would typically install or renovate a package of equipment at one or a small number of locations and the work package would install more than a single asset type, e.g. a compressor package rather than focus on a single valve type. network extension, re-enforcement or site wide re-life projects are other examples of Major Engineering Projects. The framework for these types of projects is presented in Appendix A.

- Network Asset Health – An investment which looks to maintain the reliability/integrity of a single equipment type across the network, e.g. justification to replace or renovate 200 district governors. This type of investment is expected to be generated using asset health management software and use probability and consequence of failure to justify the investment. The framework for these types of projects is presented in Appendix B.

2.2. Given the differing scopes and justifications for these two investment types it is normal for an Engineering Justification Paper to draw on differing sources of data to justify each type of investment.

2.3. To reflect the difference between these investment types, two Engineering Justification Paper frameworks have been produced. The frameworks are presented in the appendices of this guidance document. The frameworks contain guidance on the type of information expected to be included in each section of the Engineering Justification Paper.

3. Use of the Frameworks

3.1. When a CBA is used to justify an engineering spend then it must have an accompanying Engineering Justification Paper. The Engineering Justification Paper must follow the appropriate framework type provided in this guidance.

3.2. The frameworks set out the key information that is required to allow a thorough review of the investment and they must be replicated in full for each CBA. Where a section in the framework is deemed not to be relevant for a given project/spend then this should be explained and the section retained. The purpose of this approach is to help the review team by having a consistent document structure and numbering format across multiple network company business plans.

3.3. The frameworks should be replicated in the company business plans. However, company-specific presentation styles (ie fonts/branding/images) can be used. This guidance note provides suitable frameworks for use rather than a document template.

3.4. Where appropriate, companies may include additional information to the framework, however, it is expected that the network company Engineering Justification Papers will be concise and the production of lengthy documents is discouraged.

3.5. In addition, where appropriate, the inclusion of simple annotated drawings is encouraged and engineering documents such as network layout documents can be attached to aid understanding.

4. Glossary of Terms

CBA – Cost benefit analysis.

Commissioning – Time in the project cycle when the newly installed equipment or processes are available for use, achieving the project goals.

Cost Estimate Accuracy – The claimed range of costs around the base cost quoted. Cost estimate accuracy is normally quote as a % of the base cost estimate e.g. £1.5m +/-20%

Long Lead Item – Piece of equipment or service that requires to be purchased early in the project cycle to avoid prolonging the project duration as it has a long lead time for delivery.

Milestone Date – A key date that is unlikely to change and effectively drives the project plan. For example, the date that a corroding pipeline should be replaced to avoid operating outside of its endorsement date.

Project Boundary – A physical or operational boundary where the project will begin or end. For example, an inlet block valve to a compressor or general accountability for operating a piece of equipment.

Project Operating Lifespan – The period of time that the equipment installed by the project is expected to operate and deliver the expected benefits.

Total Installed Cost – The overall forecast project cost to install and commission the required equipment. Cost includes all contingency costs, Risk margins etc. that make up the project.

Vendor Package Costs – A package of equipment to be delivered and installed by a third party, typically a skid unit or rotating equipment. Package includes all engineering, procurement and manufacturing costs for the delivered unit.

Appendix A - Major Project Engineering Justification Framework

1. Table of Contents

The Engineering Justification Paper must contain a table of contents and page numbers.

2. Summary Table

The following table sets out the key information on the project that the company must provide to Ofgem. This table must be produced at the beginning of each Engineering Justification Paper.

Name of Project	*Working Title of Scheme/Programme*		
Scheme Reference	*Company identifier for scheme*		
Primary Investment Driver	*Asset Health/Load/Environmental/VIP etc.*		
Project Initiation Year	*Year of first project spend*		
Project Close Out Year	*Year that project is fully commissioned*		
Total Installed Cost Estimate (£)	*Current view on total installed cost of the preferred option.*		
Cost Estimate Accuracy (%)	*Indication of accuracy of cost estimate*		
Project Spend to date (£)	*Total monetary value spent on project to date*		
Current Project Stage Gate	*Progress in company project process*		
Reporting Table Ref	*Where in BPDT volumes/costs/outputs are recorded*		
Outputs included in RIIO-T1 Business Plan	*Yes/No – where yes, to be fully declared in document*		
Spend apportionment	**T1/GD1**	**T2/GD2**	**T3/GD3**

Table 1 - Summary Table

3. Project Status and Request Summary

This section must describe the current status of the project and set out what funding is being requested, (ie is this funding to complete a project, funding to develop estimates and progress to the next gate or a request to fund a project from start to finish?). This section should also provide a summary of the work completed to date on the topic.

4. Problem/Opportunity Statement

This section must define the problem/opportunity that the project seeks to solve, and answers the key questions on the topic. This section must explicitly address the following questions:

a) *Why are we doing this work and what happens if we do nothing?*
b) *Under what circumstances would the need or option change for this project?*
c) *What are we going to do with this project?*
d) *What makes this project difficult?*
e) *What are the key milestone dates for project delivery?*
f) *How will we understand if the project has been successful?*

4.1. Related Projects

The purpose of this section is to highlight projects within the company which may have conflicting outcomes or spends. It can also highlight projects which may provide learnings from past projects or decisions made on similar topics.

4.2. Project Boundaries

The purpose of section is to describe the Project Boundaries and what is not included within the project.

5. Project Definition

This section should be used to define the project

5.1. Supply and Demand Scenario Discussion and Selection

The supply and demand scenario is a central element of the project definition and it is important to detail the when selecting a supply and demand scenario for the investment. A discussion on the supply and demand scenario used to generate the project scope and subsequent business case should be included in this section. Only if it is necessary should multiple supply and demand scenarios be carried through the document and logical arguments can be used in this section to discount scenarios.

It is expected that a base case supply and demand scenario is selected and justified in this section.

5.2. Project Scope Summary

This section must set out the project scope and contain headline engineering data. The headline values are the key elements that inform equipment selection/design or project execution. The section should not include explicit details about equipment; instead it should list headline data. Such data could include, for example:

- *New pipeline – Start and end points, distance, design pressure, design capacity, expected materials of construction*
- *Compressor – Location, design pressure, design capacity, availability required*
- *Decommissioning – Location, key dates, scope boundaries.*

The supply and demand scenario used for the project basis of design is a critical part of this summary and should be reported alongside the required equipment capacity

6. Options Considered

This section should include a summary of all options considered, including deferral or do nothing. This section focuses on the engineering options open to solve the problem described in section 4 and uses the project scope in section 5 to generate plausible engineering solutions.

The purpose of this section is to highlight:

- *The options were identified and evaluated*
- *The benefits associated with each option.*
- *The costs associated with each option*
- *The pros and cons of each option in relation to operation and project timescales etc*

6.1. First Option Summary

Each option should have its own sub section which describes the option, the basis for the cost estimate, project timescales and other items that differentiate the option from the others considered.

This section should be replicated for all viable options considered.

6.2. Options Cost Estimate Details

All plausible options must have a cost estimate. This section lists a simple cost breakdown for each option in a table format. The following items must be included in the table for each option:

Item	***Note***	***% of Total Installed Cost***
Engineering Design	*Detail costs for studies/FEED/Detailed design as appropriate.*	*Must be presented to Ofgem*
Project management	*Element of project costs attributed to project management, not direct or indirect company costs.*	*Must be presented to Ofgem*
Materials	*Bulk materials, breakdown preferred*	*Must be presented to Ofgem*
Main Works Contractor	*Project construction contractor costs.*	*Must be presented to Ofgem*
Specialist Services	*Costs for any additional services used to support the project i.e. surveys, data procurement etc.*	*Must be presented to Ofgem*
Vendor Package costs	*Costs of packages purchased for project*	*Must be presented to Ofgem*
Direct Company Costs	*Refer to Regulatory Instructions and Guidance for definition of direct company costs.*	*Must be presented to Ofgem*
Indirect Company Costs	*Refer to Regulatory Instructions and Guidance for definition of indirect company costs.*	*Must be presented to Ofgem*
Contingency	*Contingency included in base cost estimate*	*Must be presented to Ofgem*
Total Installed Cost	*Forecast total project cost including contingency. Sum of all elements noted above.*	*Must be presented to Ofgem*
Cost Estimate Accuracy	*This is an important element to give confidence that the engineering is mature and the costs can be relied upon.*	

Table 2 - Cost Estimate Details

6.3. Options Summary

Options must be collated into a single table to allow simple comparison between all the options considered. The table must include as a minimum the following information:

- *Sensible option title which helps to describe the scope. Avoid labelling options 1/2/3/4/5 etc.*
- *Project Start date*
- *Project commissioning date*
- *Project Design Life*
- *Operating costs*
- *Total installed cost*
- *Cost estimate accuracy noted in %*

7. Business Case Outline and Discussion

This section must use the costs described in section 6 to produce an outline business case for all the plausible options considered and discuss the merits of each option.
The use of normal project justification metrics such as NPV etc. need to be included in this section alongside justification for the benefits claimed alongside the spend.

7.1. Key Business Case Drivers Description

This section describes how the benefits of the project, i.e. Opex reduction, environmental safeguarding benefits etc. have been calculated. The section should be highly focused and should avoid replicating all the information already held in the CBA; it should only list the pertinent points. Only recognisable metrics based on industry accepted guidance will be accepted and companies should expect Ofgem to challenge the drivers included in this section.

7.2. Supply and Demand Scenario Sensitivities

The supply and demand scenario is a central element in setting the project scope and value the project delivers. It is important to highlight the changes to the business case that the supply and demand scenario would have on the business case. This section should be used to explain how changes in the supply and demand scenario used in the basis of design would alter the business case drivers. The sensitivity cases should be carried through into the business case summary to demonstrate the effect on project NPV.

7.3. Business Case Summary

The business cases produced are expected to include sensitivity cases which test the supply and demand scenarios. The options must be collated into a single table to allow a comparison to be made between each option.

The summary table must include:

- *Sensible option title which helps to describe the scope. Avoid labelling options 1/2/3/4/5 etc.*
- *Supply and Demand Scenario Description*
- *Project commissioning date*
- *Total installed cost*
- *Cost estimate accuracy noted in %*
- *Project Operating Lifespan*
- *Project NPV*

8. Preferred Option Scope and Project Plan

This section should complete the investment "story" and collate information on how the project will proceed to completion.

8.1. Preferred Option for this Request

This section should state the preferred option and is included to avoid ambiguity in the conclusions of the paper.

8.2. Project Spend Profile

A simple table listing the project spend profile from 2020 to project completion (including post RIIO-2 works), must be included in this section.

8.3. Efficient Cost

This section should provide evidence that the proposed costs are efficient. We expect the following to be considered:

- *Lessons learnt that have been incorporated*
- *Ongoing efficiencies that have been realised*
- *Historical benchmarks, both internal and external*
- *Expert view*
- *Procurement efficiencies*

This is not an exhaustive list and other relevant information may be included.

8.4. Project Plan

This section should set out the project plan and highlight key dates. At a minimum, it must include the following elements:

- *Progression through stage gate process*
- *Purchase of any long lead items*
- *Commissioning Dates*
- *Key Operational milestones*

A simple excel based plan is suitable for this section.

8.5. Key Business Risks and Opportunities

Key risks to delivery of the project and opportunities should be listed in this section along with the potential impact on costs. This section must answer the following question:

a) *What changes to the system operation or supply/demand scenario are required to alter the outcome of this justification paper?*

8.6. Outputs included in RIIO-T1/GD1 Plans

This section should describe/list scheme outputs included in RIIO-T1 plans but not carried out. It should also include a detailed explanation of the reasoning for re-inclusion in RIIO-T2/RIIO-GD2, i.e. deferral, substitution, late delivery etc.

Appendix B – Asset Health Engineering Justification Framework

1. Table of Contents

The Engineering Justification must contain a table of contents with page numbers.

2. Introduction

The introduction should provide a brief narrative of the project and highlight how the worklist has been generated (eg based on specific known issue, from asset health management tool or ongoing programme etc).

3. Equipment Summary

This section should contain a high-level summary of the operation of the equipment discussed in the justification and include some global summary data on the equipment, such as:

- *Location on the network and normal operating modes*
- *Pressure ratings*
- *Redundancy architecture (ie duty/standby etc.)*
- *Global equipment count (ie how many preheaters or governors are installed on the network)*
- *Where appropriate a breakdown of the manufacturers/models of equipment installed in the network*

4. Problem Statement

This is section should define the problem that the spend seeks to solve. This section must explicitly answer the following questions:

a) *Why are we doing this work and what happens if we do nothing?*
b) *What is the outcome that we want to achieve?*
c) *How will we understand if the spend has been successful?*

4.1. Narrative Real Life Example of Problem

This section should set out a narrative real life example of the problem that the spend seeks to solve. This section can contain drawings, photos or charts that help to convey the issue with the assets requiring spend and also highlight the outcomes/near misses which occur in real life with this asset class.

4.2. Spend Boundaries

The boundaries of the spend proposed by this justification paper should be summarised here, for example, the spend will only replace/repair/renovate the pre-heaters at our sites and does not include costs to remediate associated pipework/site facilities/control systems etc.

5. Probability of Failure

This section should provide a narrative of and data on the probability of failure of the equipment. This section should set out:

- *The likely failure modes of the equipment considered by the assessment*
- *The failure rates assumed for each failure mode*

This is important information which helps to justify the investment and it needs to be conveyed in a simple, consistent and coherent manner. For example, it is important to separate the effect that asset ageing has on the probability of failure from the inherent probability of failure of a given piece of equipment. This section should act as a sense-check on the data output from the asset management tool.

5.1. Probability of Failure Data Assurance

The probability of failure data drives the justification for these types of investments. This section should contain a discussion on the level of confidence the company has in the probability of failure data for the requested spend. This could be based on a summary of the sample size for a valve population for example.

6. Consequence of Failure

The consequences of failure of the equipment should be set out to help the reader understand the impact if the equipment fails to operate as expected. Generally, the consequence of failure should be split into the following consequences:

- *Loss of supply to customers*
- *Safety impact of failure*
- *Environmental impact*

This section should be broadly aligned with the failure modes identified in section 5 and should contain multiple supply and demand scenarios rather than a single case. Providing consequence of failure data for multiple supply and demand scenarios will help to justify the investment and this is a core component of this section.

7. Options Considered

This section should contain a summary description of all options considered including deferral or do nothing. This section focuses on the engineering options open to solve the problem described in section 4. The option scope will change between equipment types but generally it is expected that the following options would be included:

- *Replace on Failure*
- *Repair on Failure*
- *Pre-emptively replace*
- *Pre-emptively repair*
- *Do nothing*

The use of diagrams and simple drawings to convey the engineering scope is encouraged. This section can also quote expected reductions in monetised risk from the network NARM model to help convey the relative benefits between each option.

7.1. Options Cost Details

This section should contain a simple table which lists the costs considered for each option discussed in section 7. It is appreciated that there will be a range of costs/unit costs which are used for this type of spend. The option cost details should explain how the costs displayed have been built up and why they are relevant to the options described in section 7.

8. Business Case Outline and Discussion

This section should tie together the probability of failure, consequences of failure, engineering options and costs to investigate the optimum solution to the problem described in section 4.

8.1. Key Business Case Drivers Description

This section should set out the business cases which display the perceived value for each option considered. The key value drivers for each option should be clearly highlighted to allow a judgement to be made on the validity of each option. This section replicates data from the

CBA but it is important to provide justification behind the value drivers to ensure that they are aligned with the engineering scope.

8.2. Business Case Summary

A summary table with the selected headline business case metrics should be provided in this section to enable a high level comparison of the options.

9. Preferred Option Scope and Project Plan

9.1. Preferred option

This section should state the preferred option and is included to avoid ambiguity in the conclusions of the paper.

9.2. Asset Health Spend Profile

This section should contain a simple spend profile detailing when the interventions for the selected option are expected to take place. This in order to give the reader confidence that the spend being requested is achievable during the RIIO-2 control.