Overview

For Electricity and Gas Network Licensees, the RIIO framework provides specific incentives for network innovation as part of business as usual. The innovation incentives in RIIO are fundamental in promoting network innovation as more traditionally, research, development and demonstration projects are speculative in nature and can yield uncertain commercial returns. In addition, where benefits are linked to the decarbonisation of energy networks, it may be difficult to monetise the respective carbon and/or environmental benefits. The RIIO incentives recognise that previous incentives such as the Innovation Funding Incentive and the Low Carbon Networks Fund have delivered measurable results, however the scale of the challenge ahead to meet binding 2020 and 2050 carbon reduction targets requires a significant increase in all aspects of innovation within Licensees business activities.

Context

This document relates only to projects seeking funding under the Network Innovation Allowance (NIA), IFI and LCN funded projects are covered under separate guidance available from the Ofgem website (www.ofgem.gov.uk). The Network Licensee should use the methodology set out in this guide to estimate the financial benefit if the Problem is solved. This guide also defines the process for a qualitative summary of the resources the Network Licensee currently uses to address the Problem.

The Ofgem NIA Governance Document states:

> *3.17. To ensure a consistent approach in assessing the benefits of Projects, we require Network Licensees to work together to develop a common guide for converting different types of benefit into financial terms. We consider that the benefit scorecard approach that is currently part of the IFI development process would be a useful starting point in developing this guide. The guide will be approved by Ofgem before being used by Network Licensees. Network Licensees must submit the draft guide for approval to Ofgem by 1 October 2013.*
>
> *3.18. The Network Licensee must be able to use a methodology set out in the guide to estimate the financial benefit if the Problem is solved. This estimate should be accompanied by a qualitative summary of the resources the Network Licensee currently uses to address the Problem.*
>
> *3.19. In the case of a Development or Demonstration, the Network Licensee must be able to use the guide to explain the financial benefit of the Project by:*
>
> - *Estimating the costs of delivering the Solution (at the scale being tested within the Project) through the most efficient Method currently in use on the GB Gas/Electricity Transportation/Transmission System - the Base Case Cost; and*
> - *Estimating the costs of replicating the Method, at the scale being tested in the Project, once it has been proven successful - the Method Cost.*
>
> *3.20. The difference between the Base Case Cost and the Method Cost for a Development or a Demonstration is the financial benefit of the Project. Where a Network Licensee is looking to test more than one Method, it should outline the financial benefit of each separate Method.*

3.21. Until the guide is approved, the Network Licensee will only be able to start new Projects with a clear monetary benefit.

This guide also seeks to quantify non-network costs, such as health and safety, ecosystem and carbon savings as under G85 these have previously been excluded in the estimation of the benefits that a project could deliver.

In the case where a conventional Cost Benefit Assessment (CBA) shows that a project's costs exceed its financial benefits, the value of its non-financial benefits mentioned above can be quantified and taken into account. Where the value of these benefits is sufficient, they may be used to show a positive CBA. Only projects with a positive CBA are eligible for NIA funding.

Dependant on the circumstances of the project the time period of benefits and costs should be addressed by the Licence Network Operator on a case by case basis.

Document Review

This document will be reviewed by ENA on an annual basis to ensure that the figures obtained from external sources are still valid and up to date

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Associated Documents

NIA Governance Documents

http://www.smarternetworks.org/Project.aspx?ProjectID=738#downloads

Decision on strategy for the next transmission price control - RIIO-T1

https://www.ofgem.gov.uk/ofgem-publications/53833/t1decision.pdf

Decision on strategy for the next gas distribution price control - RIIO-GD1

https://www.ofgem.gov.uk/ofgem-publications/48258/gd1decision.pdf

Strategy decision for the RIIO-ED1 electricity distribution price control

https://www.ofgem.gov.uk/ofgem-publications/47067/riioed1decoverview.pdf

Derived as per the Health and Safety Executive's Cost to Britain of Workplace Injuries and Work related Ill Health (2010/11) Update

http://www.hse.gov.uk/statistics/pdf/cost-to-britain.pdf

Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal

https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

Valuation of energy use and greenhouse gas emissions for appraisal

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/360316/20141001_2014_DECC_HMT_Supplementary_Appraisal_Guidance.pdf

Data table 1-20 supporting the toolkit and the guidance

Data tables 1-20: supporting the toolkit and the guidance *(Opens in Excel)*

Contents

Introduction

This document relates only to projects seeking funding under the Network Innovation Allowance (NIA) and describes the minimum requirements for licensees to receive funding under NIA. This guide is not a substitute for individual company internal policies and procedures regarding the development, approval, management, delivery and dissemination of innovation projects. Projects funded under the NIA should at all times be designed to support the delivery of licensee specific well justified innovation strategies and this document does not prescribe how these strategies should be developed or implemented.

The aim of this document is to ensure information provided as part of any NIA funded project is presented with clarity and consistency to enable relative judgements to be made of the value of projects to Customers and to GB.

Consistency in Comparing Benefits

For projects expecting non-financial benefits such as safety improvements, carbon reduction or environmental benefit, an estimate of their value should be made in financial terms, using pre-determined figures based on Government publications, data and guidance. For such projects the benefits will be assessed against pre-determined parameters detailed on the Benefit Scorecard located in Table 1. The financial estimate of the costs avoided or benefits achieved can then be calculated to produce a Project Benefits Rating allowing projects to be consistently compared in terms of the benefits delivered.

Technology Readiness Levels

Technology Readiness Level (TRL) is a measure used to assess the maturity of evolving technologies. It is graded on a scale from 1 to 9, where, for the purposes of the NIA benefits guide it will look at TRLs 4-8, which are Development and Demonstration levels.

TRL 1-3 (Research) which means activity undertaken to investigate the Problem based on observable facts, is excluded from the benefit guide. This is because the NIA governance document states that justification of the Problem's received benefits is not required to be quantified.

Benefit Scorecard

The project benefit assessment should clearly record:

- The benefits which are anticipated, providing the project is technically successful;
- The facts and assumptions that the benefits are based upon; and
- The method that was used to determine the benefits.

The purpose of the benefit scorecard is to be able to quantitatively compare two projects that have a similar goal but achieved in a different manner. I.e. one that looks to achieve the end goal with primarily a health and safety benefit and one that is more focused toward an environmental benefit. The benefit scorecard is not to give a 'pass' or 'fail', this is decided upon by the financial benefit.

Table 1 presents the benefits grading assessment to define whether a project is of sufficient quality to be progressed via NIA. It is to be used as a guideline for companies' NIA project assessments, utilising a benefit scorecard approach, in recognition that a 'good' NIA project considers a range of factors.

Financial Benefit

Benefit Estimation for Development or Demonstration is calculated using the equation below

Base Case - Method Cost = Financial Benefit (£)

Base Case is the cost of delivering the current solution defined as a sum of relevant costs from the following categories and graded in Table 1 (Financial Benefit).

- Current delivery cost e.g. asset CAPEX or OPEX costs and cost of additional work due to current method, commercial and constraints cost due to base method.
- Method cost is an estimation of the cost of replicating the method once successful including cost for additional work due to method case deployment, constraints, commercial CAPEX and OPEX.

Safety Benefit

Safety benefits can come from either employee health & safety (e.g. improved tools, safety related equipment, etc) or public health and safety (i.e. implications of electromagnetic fields on health*, or publically reported gas escapes (PREs in gas* etc). A quantification of the potential safety benefits is graded in Table 1 (Safety Benefit per Reported Case).

It is important to note that these values are adopted only as a method to assess less financially tangible project benefits as per published governmental reports, data and guidance and are not formulated by ENA or its Members.

Environmental and Social Benefits

In recognition that NIA projects may give rise to environmental and societal benefits such as waste management, reducing infrastructure visual impact, *the management of gas shrinkage*, enabling energy solutions for vulnerable households, *fuel poor gas networks extensions* and improving information to customers, a quantification of these potential benefits is graded in Table 1 (Social and Environmental Benefit).

Carbon Saving

Carbon Saving can be calculated by various sources, from energy saving through more efficient transmission and distribution techniques to that of improvement in the management of assets i.e. substation heating; these are graded in Table 1 (Carbon Saving).

Benefit Scorecard

Grading of Benefit	Safety Benefit Per Reported Case	Social and Environmental Benefit	Carbon Saving
High (5)	Lead to the reduction of fatalities >£1m	Managed realignment (significant) –High incurred costs and social and/or environmental benefit/value > £50k	Major >£30k £/tCO_2e
Significant (4)	Significant improvement to public safety £100k-£1m	Managed realignment (minor) –Minor to medium incurred costs and social and/or environmental benefit/value > £25k	Significant >£10k £/tCO_2e
Medium (3)	Reduction of reportable injuries >£20k	Improve (significant) Significantly improve existing processes and systems to adapt the existing social and/or environmental characteristics > £10k	Medium >£5k £/tCO_2e
Minor (2)	Lead to the reduction of absence due to ill health >£11k	Improve (minor); Improve existing processes and systems to adapt the existing social and/or environmental situation > £1k	Minor >1k £/tCO_2e
Low (1)	Avoidance of minor injury >£0.33k	Do minimum; This is a continuation of existing processes and maintenance, delaying but not avoiding or improving < £1k	Low <£1k £/tCO_2e
Nil (0)	No Tangible Benefit	No Tangible Benefit	No Tangible Benefit
Project Benefit Rating 0-20			

Table 1 - Project Benefits

Safety Case

Derived as per the *Health and Safety Executive's Cost to Britain of Workplace Injuries and Work related Ill Health (2010/11) Update.*
http://www.hse.gov.uk/statistics/pdf/cost-to-britain.pdf

This report details the costs to society of various incident types. This allows all projects to be assessed to produce a consistent value through the use of the figures detailed in the Table 1 - Project Benefits.

Although not explicitly shown here, incidents involving members of the public and customers can be quantified using Table 2 - Safety Case Costs below.

	Non-Financial Human Costs (Rounded)	Financial Costs (Rounded)	Total Costs (Rounded)
Workplace Fatal Accidents	£1,084,000	£481,000	£1,565,000
Reportable Injuries	£11,500	£6,400	£17,900
Ill Health	£8,700	£7,600	£16,400
Minor Injuries	£30	£300	£330

Table 2 - Safety Case Costs

Safety Case Worked Example

Description: A new project that will reduce the number of reportable injuries by three cases if the project is successful.

Reportable injury valued at £17,900 per case and in the case of this project the deferment of three cases is valued at £53,700.

Therefore scoring for this element of the project as per the Benefit Scorecard, is calculated at 3 as the project has the potential to save over £20,000.

Social and Environmental Cases

These financial values are reflected and categorised in the Benefit Scorecard located in Table 1, these range from do nothing approaches, to more significant managed realignment approaches.

Societal Benefits

Using the strategy decision from the ED1 price control review (below), the areas of focus are as follows

Strategy decision for the RIIO-ED1 electricity distribution price control

https://www.ofgem.gov.uk/ofgem-publications/47067/riioed1decoverview.pdf

The general expectation for network operators in relation to this output category is set out below:

> ***Social obligations**: taking a strategic approach, adopting a coordinating and partnership role with other networks, suppliers and agencies to use data and knowledge more effectively to deliver benefits to vulnerable consumers.*

Specific expectations are set out in more detail:

> *5.43. We expect DNOs to include their strategy for realising this objective in their business plans. In particular, they need to set out how they will:*
>
> - *improve the quality of their information on vulnerable consumers*
> - *engage with a wide range of stakeholders to identify how to best use this information*
> - *explain how they will publicise the benefits and assistance that are offered through the Priority Service Register (PSR) and ensure it captures all of those that should be included*
> - *utilise relationships and build partnerships with other stakeholders to identify and deliver solutions (both energy and non-energy) for affordable energy*
> - *embed the strategy in their business, including customer services.*

Example types of customer benefits are available from Low Carbon Network Fund projects, details of the projects are available on both the

Ofgem website

www.ofgem.gov.co.uk

and the

ENA Smarter Networks Portal
http://www.smarternetworks.org/

Environmental Benefits

Along with social benefits, environmental benefits are often difficult to quantify, but using the tried, tested and well researched methodology from DEFRA, it is possible to come up with appropriate and consistent figures for the evaluation of ecosystems and environment.

Using DEFRA guidance, environmental benefits should be established in a consistent and transparent manner. Expert guidance should be sought in the calculation of environmental benefit.

Ecosystem Services
https://www.gov.uk/ecosystems-services

Social Case Worked Example

Description: In conjunction with the rollout of Smart Meters, a local authority looks to engage with the tenants of a local housing scheme to help reduce energy usage. The local Network Operator is asked to facilitate this with street level energy usage derived from monitoring at a local substation so that a 'Go Green' energy competition can be run.

As well as monitoring at a local substation a smart phone app is created to widen the scope and to help engage with a wider age demographic.

Over the course of 6 months energy usage will be monitored and the results will be available to all participants to compare against each other and in relation to the previous 6 months.

Potential value to one customer: £78 in savings via a reduction in non-essential energy use and increased awareness of potential energy savings.

Potential value to multiple customers: 34 housing scheme tenants

Potential maximum value to customer x customer numbers = 78 x 34 = £2652.00 over the six month trial period.

The Benefits rating of the project as per Table 1, is calculated at 2 as - Improve existing processes and systems to adapt the existing environmental situation.

Environmental Case Worked Example

Description: A project investigating minimising a Compressor Station footprint and impact in areas of environmental significance.

Assessed value of ecosystem, including biodiversity, groundwater and land use valued at £10,500.

The Benefits rating of the project as per Table 1 is calculated at 3 as - Significantly improve existing processes and systems to adapt the existing environmental characteristics

Carbon Saving Case

To calculate both the quantity and value of CO_2 saved on a project, this guide has used two government derived sources to maintain consistency with the government policy that sets out how the public sector calculates carbon emitted and carbon saved.

With consideration to the conversion factors as per the DEFRA Greenhouse Gas Conversion Factor Repository, there are various conversion factors available to choose from depending on the energy source.

> *'In order to report the greenhouse gas emissions associated with an organisation's activities, users must convert 'activity data' such as distance travelled, litres of fuel used or tonnes of waste disposed into carbon emissions.'*
>
> *http://www.ukconversionfactorscarbonsmart.co.uk/*

In the electrical example below, the conversion factor for electricity generated is adopted, which is 0.49426 per kWh. This value can be found by selecting the appropriate dataset year and selecting electricity generated, which will then allow the user to download the various metrics, which in this case will appear in the following table.

Activity	Country	Unit	Year	kg CO_2e
Electricity generated	Electricity: UK	kWh	2014	0.49426

To then convert this to a meaningful cost of carbon, the most recent government figures (DECC) are used taking **the central short-term traded carbon values** used for UK policy appraisal:-

https://www.gov.uk/government/collections/carbon-valuation--2

It should be noted that the conversion factors and value of carbon can change and should be checked prior to completing a Project Eligibility Assessment (PEA) by following the links above.

Carbon Case – Electrical Worked Example

Description: A new project that will improve voltage monitoring and reduce losses in one substation by 894 kWh over ten years.

Cost of Carbon = Energy x Conversion Factor x Value of Carbon

Using the equation above we get;

Energy = 894kWh

Conversion Factor = 0.49426

Value of Carbon = 62 £/tCO_2e

Cost of Carbon = 894 kWh x 0.49426 x £62 = £27,396

Carbon Saving = 894 kWh x 0.49426 = 441 tCO2e over 10 years and a saving of £27,396.

The financial value for carbon will be adjusted annually up until 2023 in line with the end of the RIIO ED1 Price Control.

The Benefits rating of the project as per Table 1 is calculated at 4 (Significant) as the project will avoid over £10,000 in CO_2.

Carbon Case – Gas Worked Example

Description: A new project that will improve gas shrinkage over a period of ten years by twenty thousand cubic meters of natural gas.

Volume of Gas = 20,000 m3	Volume (m3)	20,000
Density = 0.76 kg m-3 (average for GDNO)	Density (kg/m3)	0.76
Mass of Natural Gas = volume × density = 20,000 × 0.76 = 15,200 kg	Mass of Natural Gas (kg)	15,200
Methane content = 80% (Average for GDNO)	Methane Content	0.80
Mass methane = 15,200 kg × 0.8 = 12160 kg	Mass of Methane (kg)	12,160
Global Warming Potential Methane[1] = 21	GWP Methane	21
Mass of equivalent CO2e = 21 x 12,160kg = 255,360 kg = 255 t	Equivalent CO2 (kg)	255,360
Non Traded Value of Carbon[2] = 62 £/tCO2e	Value Carbon (£/tCO2e)	62
∴ Therefore saving = 255.36 t × 62/tCO2e = £15,832	Cost of Carbon	£ 15,832.32

The financial value for carbon will be adjusted annually up until 2023 in line with the end of the RIIO ED1 Price Control.

The Benefits rating of the project as per Table 1 is calculated at 4 (Significant) as the project will avoid over £10,000 in CO_2.

[1] *Data tables 1-20: supporting the toolkit and the guidance*

[2] *Valuation of energy use and greenhouse gas emissions for appraisal*

Appendix A

Example Full Project

A £500,000 project investigating the implementation of novel heat recovery devices, designed to capture useful heat from transformers. This captured heat will be used to heat local office, housing authority stock and industrial space located on and around a business park in Wiltshire.

Base Cost

The base cost for this project is £100,000 which is the installed cost for standard fans and pumps associated with cooling the transformer.

Safety Benefit:

None envisaged standard health and safety processes will be applied and any new learning gained from the project will be shared.

Saving: N/A

Benefit rating: 0 (nil)

Social and Environmental Benefit

The project will contribute to the existing district heating system that provides heating to local authority housing stock. It is envisioned that each property will see an annual average reduction in heating bills by approximately £100 per property.

Saving: £12,000 (120 properties x £100 saving)

Benefit rating: 2

Carbon Saving:

A saving of 1684kWh per annum is realised through the implementation of useful heat from substations replacing existing electric heating systems.

Cost of Carbon = Energy x Conversion Factor x Value of Carbon

Using the equation above we get;

Energy = 1684kWh

Conversion Factor = 0.49426

Non Traded Value of Carbon = 62 £/tCO2e

Cost of Carbon = 1684 kWh x 0.49426 x £62 = £51,604.70

Carbon Saving = 1684 kWh x 0.49426 = 832 tCO2e over 1 year which equates to a saving of £51,604.70.

The financial value for carbon will be adjusted annually up until 2023 in line with the end of the RIIO ED1 Price Control.

The Benefits rating of the project as per Table 1 is calculated at 5 (major) as the project will avoid over £30,000 in $C0_2$.

Saving: £51,604.70

Financial Benefit:

The project will implement a novel heat recovery device and system components which offer an improved cooling system for a pair of replacement 33/11kV power transformers.

Base Cost: £100,000

Method Cost: £150,000

Non-Network Derived Benefits:

Carbon + Social; £47,443.02 + £12,000 = £59,443.02

Method Cost – Non Network Derived Benefits;

£150,000 – £59,443.02 = **£90,556.98**

Financial Benefit = Base Cost – Method Cost

Financial Benefit = £100,000 – £**90,556.98**

Financial Benefit = £9,443.02

Project Benefit Score = 7

Financial Benefit	Safety Benefit Per Reported Case	Social and Environmental Benefit	Carbon Saving	Project Benefit Score 0-20
£9,443.02	0	2	5	7
	No Tangible Benefit	Improve (minor); Improve existing processes and systems to adapt the existing environmental situation > £1k	Major >£30k £/tCO2e	

Table 3 - Example of Benefit Scorecard

Example Completed PEA (Section 2b)

To highlight the positive financial benefit of the project and also to indicate the relative project score, this information can then be inserted into section 2b of the PEA as per Table 4 - Example PEA (Section 2b)

2b. Has the Potential to Deliver Net Financial Benefits to Customers	☐
Please provide an estimate of the saving if the Problem is solved.	
Financial Benefit = £9,443.02 **Social and Environmental Benefit** The project will contribute to the existing district heating system that provides heating to local authority housing stock. It is envisioned that each property will see an annual reduction in heating bills by approximately £100 per household. Saving: £12,000 (120 properties x £100 saving) **Carbon Saving:** A saving of 1684kWh per annum is realised through the implementation of useful heat from substations replacing existing electric heating systems. **Project Benefit Score = 7**	
Please provide a calculation of the expected financial benefits of a Development or Demonstration Project (not required for Research Projects). (Base Cost – Method Cost, Against Agreed Baseline).	
The project will implement a novel heat recovery device and system components which offer an improved cooling system for a pair of replacement 33/11kV power transformers. Base Cost: £100,000 Method Cost: £150,000 Non-Network Derived Benefits: Carbon + Social; £47,443.02 + £12,000 = £59,443.02 Method Cost – Non Network Derived Benefits; £150,000 - £59,443.02= **£90,556.98** Financial Benefit = Base Cost – Method Cost Financial Benefit = £100,000 – £**90,556.98** **Financial Benefit = £9,443.02**	

Table 4 - Example PEA (Section 2b)