

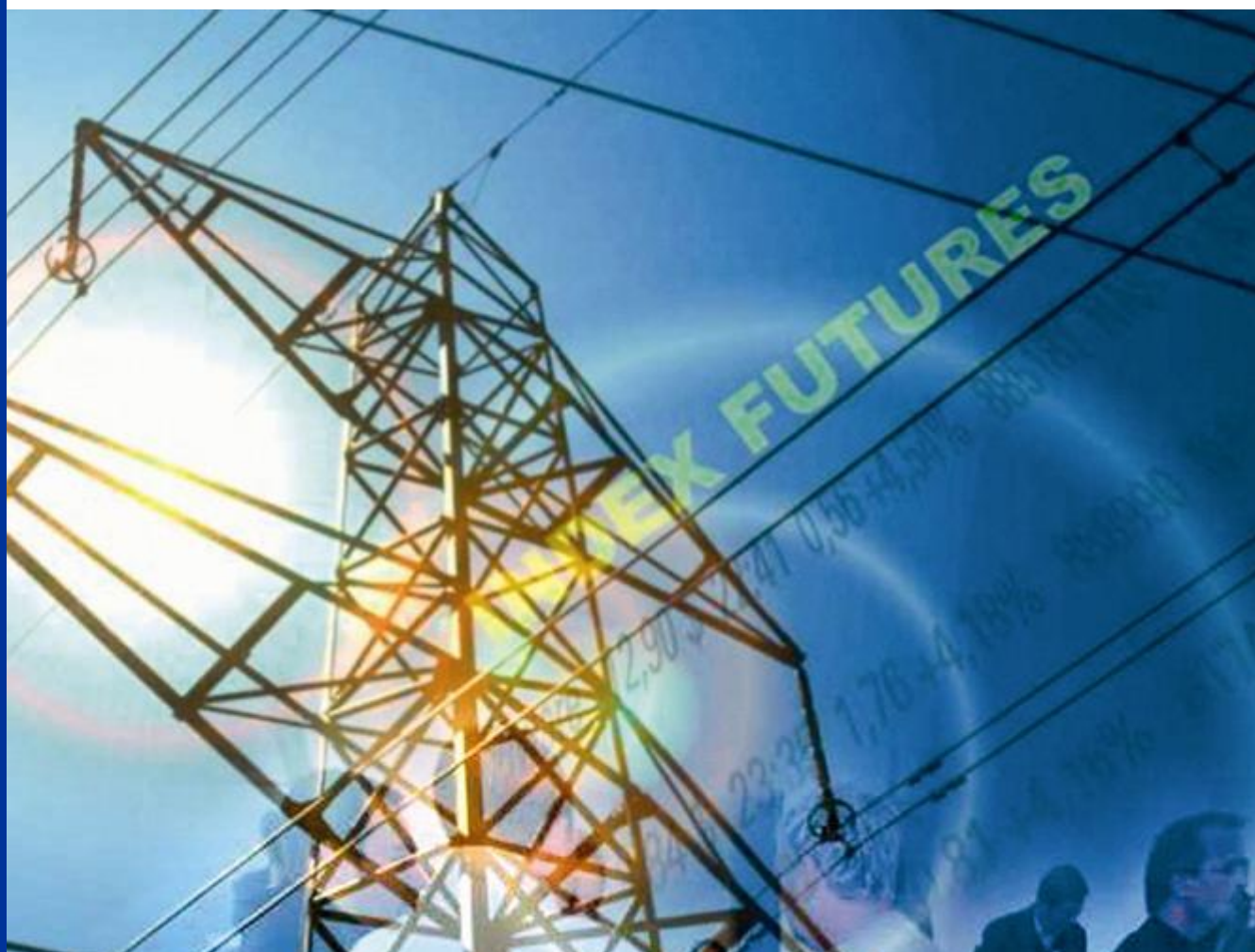


OVERVIEW OF RIIO FRAMEWORK

A report to AEEGSI

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OVERVIEW OF RIIO FRAMEWORK



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TABLE OF CONTENTS

1.	INTRODUCTION	5
1.1	Background on regulatory regimes	5
1.2	Aim of report	7
2.	RIIO FRAMEWORK IN GB	9
2.1	Rationale for RIIO	9
2.2	RIIO Framework Overview	9
2.3	Phases of the RIIO price control review	14
2.4	Allowed revenues under RIIO	16
2.5	Performance to date	21
3.	RIIO FRAMEWORK BUILDING BLOCKS	23
3.1	Business Plans	23
3.2	Cost assessment	25
3.3	Incentives	28

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1. INTRODUCTION

This report is prepared by Pöyry Management Consulting (“Pöyry”) for the Italian Regulatory Authority for Electricity Gas and Water (“AEEGSI”).

The AEEGSI has set out the intention to transition to a new incentive-based tariff regime that is targeted to be introduced in the second half of the fifth regulatory period (2020-2023). The key components of the regime will be:

- § an ex ante determination of allowed revenues based on forward-looking business plans to be submitted by the companies;
- § cost incentives to be based on TOTEX (total expenditure) to remove distortions between OPEX and CAPEX decisions; and
- § the introduction of output-based incentive schemes to link revenues clearly to agreed outputs and performance metrics.

1.1 Background on regulatory regimes

Though the proposed regime represents a major change in the form of Italian electricity regulation, it draws on practical experience of incentive regulation across a range of sectors and countries. In particular:

- § ex ante controls, where limits are placed upfront on the prices or revenues that a company can realise are well established as a means to deliver incentives for cost efficiencies;
- § TOTEX-based controls are used by several industry regulators in Great Britain; and
- § other regulators are applying TOTEX-based cost benchmarking within their regimes.

1.1.1 Ex ante incentive regulation

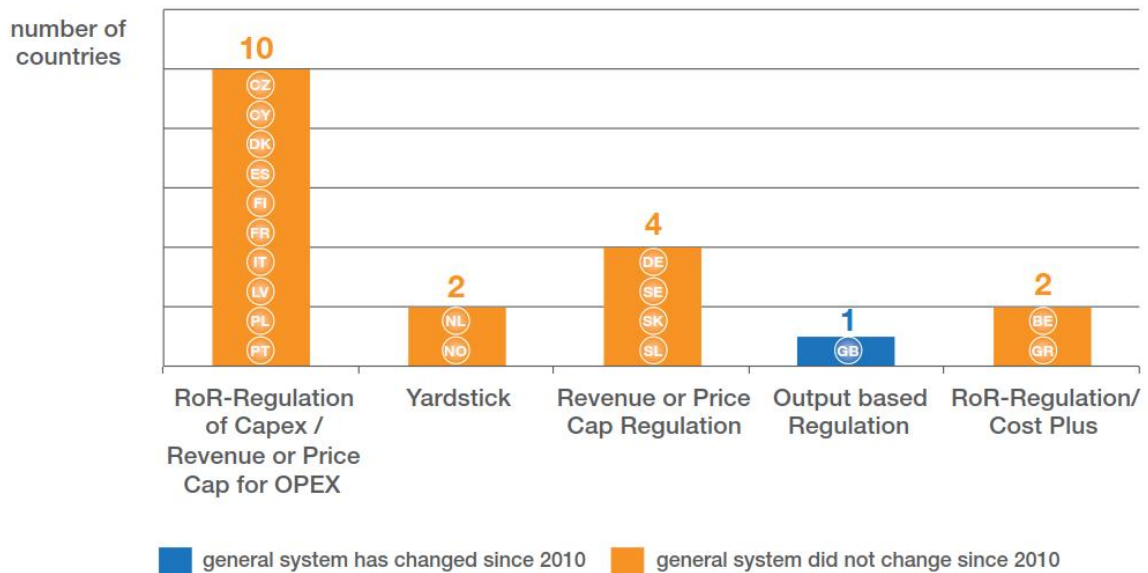
In general, the use of ex ante revenue or price caps works by separating the revenue that a company can earn from the costs that it incurs, creating the opportunity to earn profit by reducing costs beyond those assumed in the revenue allowance. Not only does this produce a benefit for the company, it also benefits the consumer since the lower costs are expected to feed into lower prices/revenues for the company in the future (i.e. in subsequent price-controls).

There are several variants of such regimes that differ in the costs to which the incentive structure is applied and whether the limit is on prices (a ‘price cap’) or revenue (a ‘revenue cap’). Figure 1 presents a summary of the alternative regulatory regimes applied across Europe to electricity distribution companies. It differentiates between five broad types of system:

- § Rate of return regulation of CAPEX/Revenue or Price Cap for Opex – where ex ante cost incentives are applied only to OPEX, and CAPEX is subject to ex post regulation with revenues linked to actual costs at an agreed rate of return;
- § Revenue or price cap regulation – where the ex-ante cost incentive applies to both OPEX and CAPEX;
- § Yardstick regulation – where revenue allowance are linked to industry average performance;

- § Output-based regulation – where, in addition to cost incentives, revenues also depend on the delivery of a series of pre-defined ‘outputs’ (such as quality of supply, reliability, etc); and
- § Cost plus regulation – where revenue allowances are based on an ex post assessment of the total actual expenditure in the previous year.

Figure 1 – Comparison of EU regulatory systems (electricity distribution)



Source: Eurelectric (2016), *Electricity Distribution Investments: What Regulatory Framework Do We Need?*

As can be seen in Figure 1, the majority of regimes summarised have some element of ex ante incentive regulation. However, in many, this does not extend to CAPEX and therefore there is a limited incentive for companies to reduce their costs and a tendency to ‘gold-plate’ systems as companies are guaranteed a return on the investments they undertake. By including ex ante projections of CAPEX in the revenue allowance, there will be a stronger incentive to reduce the cost of investments.

1.1.2 TOTEX incentives

Even where price controls include CAPEX, there have been concerns that the structure of the regime may affect companies’ decisions on whether to apply an OPEX or CAPEX-based solution. In general, there is a perception that the different treatment of OPEX (which is expensed in the year it is incurred) and CAPEX (which feeds into a regulatory asset base) means that companies favour CAPEX solutions – an issue that was assessed by Ofwat, the GB water regulator, as part of its review of the UK water sector ahead of price-controls in 2014¹.

With much greater investment anticipated in coming years, and with the emergence of a range of ‘smarter’ solutions for managing and developing electricity grids, there is an increasing risk that inappropriate CAPEX investments are made. To counter this, the GB regulators in energy and water have started to implement a TOTEX-based incentive

¹ Ofwat (2011), *Capex bias in the water and sewerage sectors in England and Wales – substance, perception or myth? A discussion paper*

regime. Under this type of regime, the company is incentivised to consider the whole life cost of the expenditure by creating an environment in which the company can consider OPEX and CAPEX symmetrically. The regulator does this by setting the ratio between OPEX and CAPEX that it will apply in the price-control (the capitalisation rate, which determines how much revenue will be expensed ('fast' money) or added to a regulatory asset base ('slow' money)) in advance of any expenditure. In this way, the company can make decisions on whether to incur OPEX or CAPEX in the knowledge that this will not affect how the allowed revenue is determined.

Such a TOTEX-based scheme has been applied in the GB energy sector for electricity distribution since 2010 (under DPCR5 and subsequently RIIO-ED1) and for other network businesses (transmission and gas distribution) since 2013. A TOTEX mechanism has also been applied in the GB water sector since 2014 (PR14).

While GB is the only regime to have applied a TOTEX-based system, with the concept of 'fast' and 'slow' money, to the determination of allowed revenues, there are further examples where regulators have used a TOTEX metric for benchmarking the performance and efficiency of network activities. For example, in both Germany and the Netherlands², TOTEX benchmarking is used to assess efficient costs and determine revenue allowances. While the incentive is not as explicit as in the GB situation, by benchmarking against TOTEX there is an implicit incentive on companies to consider operational and investment solutions for delivering services.

1.2 Aim of report

In broad structure the new regime is anticipated to be similar to the RIIO (Revenue = Incentives + Innovation + Outputs) regime that was introduced in Great Britain in 2013. While there are many lessons that can be learnt from the GB experience, there may be differences in the practical implementation of the framework to reflect differences in the current Italian and GB market and regulatory positions. In particular:

- § the GB regulatory system has operated various forms of ex ante regulation for a long period and therefore benefits from an established institutional infrastructure and deep historical data series – this foundation will need to be developed in Italy, particularly regarding capital expenditures³, and the different positions in current transmission and distribution reporting must also be taken into account;
- § the industry structure in GB makes comparative regulatory tools more relevant – there are three transmission owners and 6 main distribution network operators (DNOs) responsible for 14 distinct regional network businesses – in Italy, there is a single transmission owner and wide variation in the scale of operation amongst distribution businesses;
- § detailed regulatory instructions and guidance have been developed alongside the GB RIIO regime to ensure greater consistency in, and completeness of, information provided – since this is a new framework for Italy then such guidance will need to be produced; and
- § the GB regulator, Ofgem, is much larger than AEEGSI and therefore the practicality of managing a comparable regime in Italy must be taken into consideration.

² Glachant, J-M, Saguean, M., Rious, V. and Douquet, S. (2013), Incentives for investments: Comparing EU electricity TSO regulatory regimes; Florence School of Regulation

³ Operational expenditure (Opex) has been subject to an ex-ante incentive since 2004.

The aim of this report is to provide an overview of the RIIO price control framework in GB to understand the challenges of any transition to a similar regime in Italy and the implications for, and requirements on, companies and the AEEGSI.

To reflect this, the structure of this report is as follows:

- § Section 2 presents an overview of the current RIIO framework in GB including its key aspects, the determination of the allowed revenues, the phases and the outcomes of the process, and lessons learned from the RIIO-1 experience to date; and
- § Section 3 focuses in more detail on three key elements for any ex ante regime in Italy – business plans, cost assessment methodology and types of incentives.

2. RIIO FRAMEWORK IN GB

In this section we provide an overview of the RIIO framework in GB, including the rationale for the change in regime, key elements of the framework, the determination of the allowed revenues, and insights from performance to date.

2.1 Rationale for RIIO

The RIIO regime emerged from a wide-ranging, regulator-led, review of the existing 'RPI-X' price-control framework in GB. This review, called RPI-X@20, was initiated in 2008 in response to concerns that the RPI-X framework was not well suited to deal with the future challenges facing energy networks.

Specifically, the drive for decarbonisation of the energy system was expected to lead to substantial increases in the investment requirements on energy networks – an initial estimate of around £32bn by 2020 (around 75% of the existing regulatory asset bases of the network businesses) was made by Ofgem. However, the decarbonisation itself was likely to create an environment with higher risks of increasing costs as it was leading to a shift in the underlying generation mix to meet renewables targets and a change in the level and type of new connections.

Though it was recognised that the RPI-X framework had delivered significant benefits to consumers through lower network charges, improvements in operating efficiency and higher quality of service, it was felt that the structure of the incentives it contained would be inappropriate to meet the needs of network businesses and consumers in the longer-term and would highlight some weaknesses in the framework:

- § a short term focus within business planning;
- § a focus on the interaction with Ofgem (the regulator) as opposed to with network customers;
- § limited consideration of innovation and how to incorporate this into business planning; and
- § a bias towards CAPEX-based solutions in preference to alternative options for maintaining network performance and capability.

This need for energy networks to both invest and innovate to facilitate a sustainable energy system is now well recognised as a challenge for energy networks across Europe.

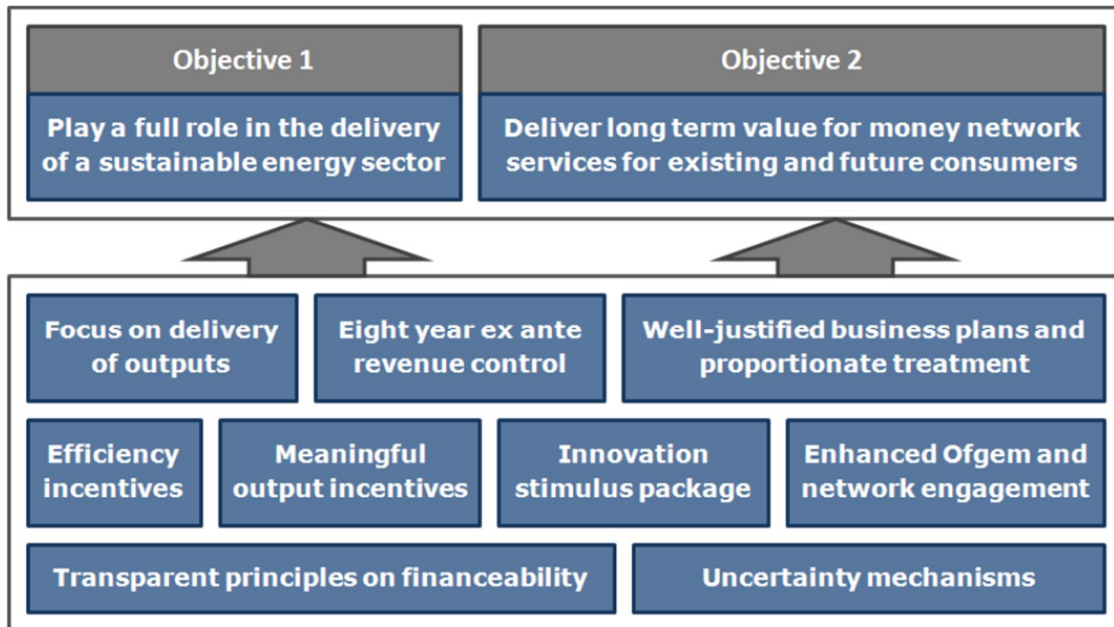
2.2 RIIO Framework Overview

The result of the review, published in October 2010, was the RIIO model– namely setting “Revenue” using “Incentives” to deliver “Innovation” and “Outputs”. It was designed with the objective that electricity and gas networks are developed efficiently in the context of the move towards sustainable energy markets.

The first RIIO controls were introduced in 2013 for electricity and gas transmission (RIIO-T1) and gas distribution (RIIO-GD1), with electricity distribution (RIIO-ED1) following in 2015. The distribution controls apply to the fourteen electricity distribution network operators (DNOs), and eight gas DNOs. The remaining smaller 'independent' DNOs are regulated through a 'relative price control' where their charges are capped at levels similar to the RIIO-regulated businesses. As such, the smaller networks are not required to develop and submit detailed business plans, as this is consider an undue cost burden and disproportionate requirement given the scale of their operation.

Figure 2 gives an overview of the objectives and components of the RIIO model.

Figure 2 – Overview of the objectives and components of the RIIO model



Source: Ofgem

The key components of the RIIO model are:

- § the **outputs of the networks** – these define what network expenditure is expected to deliver;
- § **well-justified business plans** – the business plan explains what the company will do and how it has come to its projected expenditure requirements;
- § **an 8 year ex ante price control** – the allowed revenue for the company is set before the start of the regulatory control for an eight year period to provide companies with the incentive to consider long-term costs;
- § **incentive and uncertainty mechanisms** – these mechanisms lead to adjustments in allowed revenue during the price-control period and are designed to both improve efficiency and standards of performance; and
- § **specific innovation incentives** – these have been considered necessary beyond the incentives already in the core price-control to encourage changes in behaviour and service by network companies as the energy system adapts to new technologies and decarbonisation.

2.2.1 Outputs

RIIO is an output-led system with outputs a core 'building block'. Network companies are expected to achieve agreed primary outputs and secondary deliverables (i.e. interim actions that are expected to lead to benefits in future regulatory periods) and to justify their business plans and submitted revenue requirements in relation to these outputs. The output categories are linked to licence obligations, existing standards of performance and policy objectives that networks can facilitate. Under RIIO, there are six key output categories:

- § **Safety:** ensuring the provision of a safe and reliable network in compliance with the Health and Safety Executive’s requirements, and by controlling network risk through managing asset health.
- § **Environmental impact:** ensure regulated business play their role in achieving environmental objectives and reduce their own carbon footprint. This is part of Ofgem’s objective to create regulatory environment that delivers a low carbon energy sector.
- § **Customer satisfaction:** ensuring that customer satisfaction levels are maintained and improved where required.
- § **Social obligations:** Ensuring decisions fit within the context of Ofgem’s ‘Consumer Vulnerability Strategy’.
- § **Connections:** RIIO is designed to encourage networks companies to connect customers in a timely and efficient way.
- § **Reliability and availability:** promoting reliability in networks performance. For example continued assessment of DNO’s based on the number of customer minutes lost and the number of customer interruptions.

The outputs are split into two types – primary outputs and secondary deliverables (see Figure 3). The introduction of secondary deliverables acknowledges the fact that some expenditure undertaken in the current price-control period may only produce changes in primary outputs in subsequent price-controls. Where this is the case, then an alternative metric is required for the current control period, to enable monitoring that appropriate action is being taken by the company.

Figure 3 – RIIO Outputs		
Output categories	Primary outputs	Secondary deliverables
Customer satisfaction	<ul style="list-style-type: none"> • Reflect ‘service’ that customers of network services experience • Priorities and level informed by stakeholder engagement • Limited number in each category • Rewards and penalties related to delivery performance • Ofgem set sectoral level, with potential variation by company • Common industry metrics developed at price control review (where feasible) • Companies expected to deliver over long term 	<ul style="list-style-type: none"> • Deliverables that companies can be ‘held to account on’ that relate to (a) management of network risk and hence long-term delivery of primary outputs; and (b) anticipation of future needs • Company-specific levels, tied to costs in business plan • Monitored on ongoing basis • Ofgem consider whether and how to take action if and when concerns with delivery arise • Signal in price control proposals what action might be taken and under what circumstances
Reliability and availability		
Safe network services		
Connection terms		
Environmental impact		
Social obligations		

Figure 4 shows an example of the company-specific incentives set for one of the transmission system operators in GB (SPTL) during the RIIO-T1 process. Outputs can be expected to vary by sector.

Figure 4 – Specific output targets agreed with SPTL during RIIO-T1

Output	Incentive
Safety	Compliance with safety obligations set out by Health and Safety Executive (HSE). No financial incentive.
Reliability	Primary output based on Energy Not Supplied (ENS) with a 3% collar on financial penalties and a licence condition on minimum performance standard.
Availability	Prepare and maintain a Network Availability Policy. No financial incentive.
Customer Satisfaction	Develop a customer satisfaction survey that will be subject to an incentive +/-1% of allowed revenue.
Connections	Requirement to meet existing legal requirements with a downside penalty of 0.5% of allowed revenue for failure to meet its timing requirements.
Environmental	Five separate components (SF, Losses, BCF, Visual Amenity, EDR)
Wider Works	Baseline wider works outputs of 3,300MW of additional network transfer capacity. To use SWW arrangements for additional SWW Outputs. Materiality criteria of £100m for initiating such requests.

2.2.2 Well-justified Business Plans

Business plans are intended to define and justify the expected revenue requirements over the review period, and therefore they have a pivotal role in the RIIO framework.

The projections of activities, costs and outputs of the network companies covering the eight-year period constitute the core content of the business plans. A well-justified business plan is expected to include all this information supported by the robust assessment of each option to reach the defined objectives, and the links between the cost of the selected option to the expected outputs with all the necessary justifications and the clear identification of the uncertainties. It is also expected to demonstrate how stakeholder engagement has been integrated into the business planning process.

2.2.3 Uncertainty Mechanisms

Both because of the length of the price-control period (8 years) and the extent of technology and market changes, the projected business plans are subject to a degree of uncertainty. Committing to a fixed revenue profile (net of incentive payments) over the period would create unnecessary risk for companies and/or users of the networks. To address this, a baseline revenue is established within the control, a range of adjustment, or uncertainty mechanisms are applied to enable revenue changes during the period – for example, extra revenues for providing greater network capacity. They apply only where changes in cost or output/activity are outside the control of the companies and have a material impact on the cost of operation. There are a range of uncertainty mechanisms employed in different circumstances, reflecting the different drivers and their likely impact on the cashflow position and financeability of the companies (further detail on these is included in section 3.3.4).

2.2.4 Innovation

RIIO framework is designed to encourage network companies to consider different ways to achieve greater cost savings or increase the scope of future delivery. Under RIIO, innovation is incentivized via both the core price control incentives and specific innovation schemes. As the part of the RIIO framework, there are three specific innovation mechanisms (together called Innovation Stimulus Package – ISP) which are designed to fund the investments for innovation:

§ *Network Innovation Allowance (NIA)*: It sets allowance that each of the RIIO network companies receives to fund small-scale innovative projects and the preparation of submissions to the Network Innovation Competition (NIC), which is an annual competition providing funding to a small number of network companies for large-scale innovation projects⁴.

Figure 5 – NIA projects and expenditure in 2015-16

Table 4.1: Network Innovation Allowance projects and expenditure, 2015-16⁵⁹

	Number of projects	NIA allowance spend (£m)	% of allowance
ENWL	18	2.5	97%
NPg	16	1.3	38%
WPD	14	1.5	42%
UKPN	24	2.5	96%
SPEN	21	3.1	86%
SSEN	35	3.1	24%
Total	128	14.0	56%

Source: https://www.ofgem.gov.uk/system/files/docs/2017/02/riio-ed1_annual_report_2015-16.pdf

§ *Network Innovation Competition (NIC)*: It is a competition for funding larger and more complex innovation projects - one for gas and one for electricity. Each year, 10% of the available total NIC funds are used for the ‘Successful Delivery Reward’ which the winning project will receive. Figure 6 shows example electricity distribution projects participated to the NIC in 2015 and awarded with a £17.8 million of funding.

Figure 6 – RIIO-ED1 NIC projects, 2015-16

Project Title	Lead company	Description	NIC funding awarded (£m)	Total project costs (£m)*	Project end date
Celsius	ENWL	To develop a new way of managing the temperature of substations – increasing their operational capacity and lifespan.	4.7	5.4	2020
ANGLE-DC	SPMW	To increase network capability through converting an existing Alternating Current (AC) circuit between the mainland and Anglesey to Direct Current (DC).	13.1	14.6	2020

Source: https://www.ofgem.gov.uk/system/files/docs/2017/02/riio-ed1_annual_report_2015-16.pdf

⁴ According to RIIO-ET1 Annual Report 2015/16, three electricity transmission projects were selected by Ofgem to receive a total of £26.7m of funding in 2015.

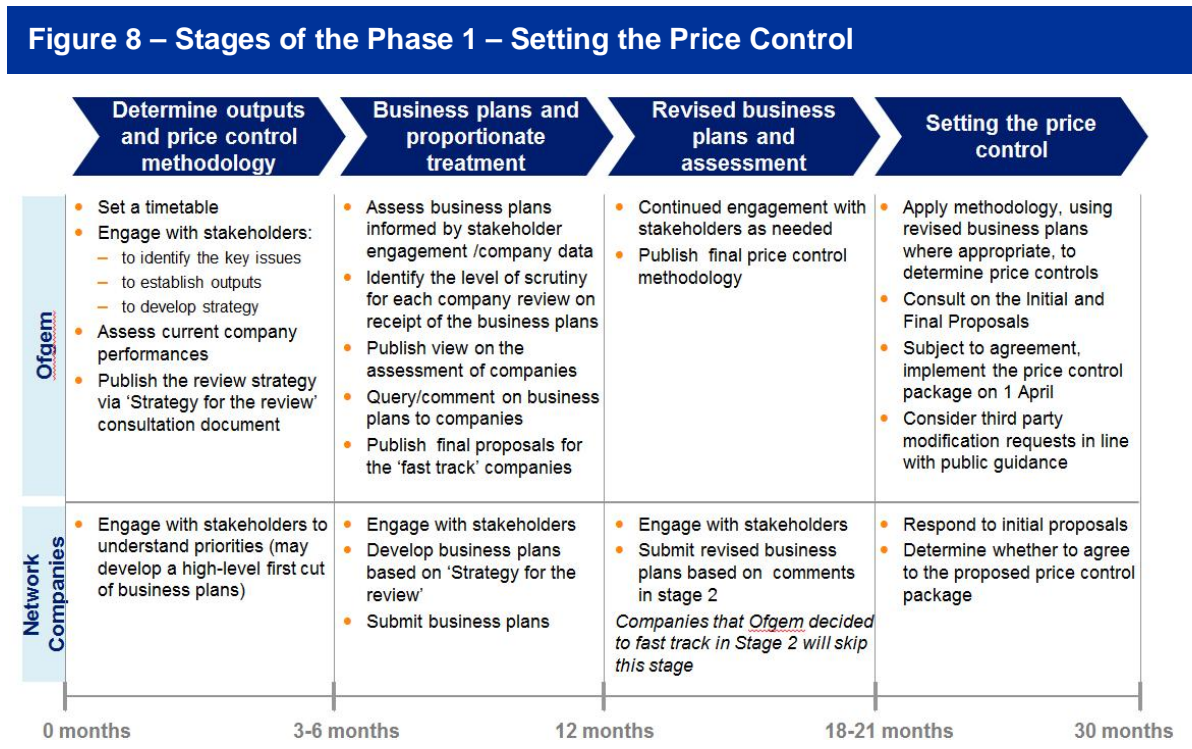
§ *Innovation Roll-out Mechanism (IRM)*: It facilitates the rollout of innovative technologies, which is expected to bring long-term value for the customers, carbon and/or environmental benefits.

2.3 Phases of the RIIO price control review

The RIIO mechanism consists of two phases as illustrated in Figure 7.

Figure 7 – Phases of the RIIO process		
	Phase 1 – Setting the Price Control	Phase 2 – Applying the Price Control
Period	<ul style="list-style-type: none"> Occurs prior to the start of the regulatory period 	<ul style="list-style-type: none"> Occurs during the regulatory period
Outputs	<ul style="list-style-type: none"> The baseline allowed revenue The efficiency incentive (sharing factors) The level of other incentives linked to outputs The type of uncertainty mechanisms 	<ul style="list-style-type: none"> Adjustments to the allowed revenues in line with agreed sharing factors and incentive structures
Informed by	<ul style="list-style-type: none"> Company Business Plan submissions Historical performance Regulatory guidance on requirements 	<ul style="list-style-type: none"> Annual reporting on performance of the companies against the business plan The price-control settlement in Phase 1

Setting the Price Control consists of four main stages, which are presented in Figure 8. There is a high level of stakeholder engagement in each stage of the process and the overall ex ante position can take between 24 and 30 months to complete.



Applying the Price Control consists of the Annual Iteration Process (AIP) which incorporates the annual reporting of the companies to reflect their activity levels and varying financial conditions during the regulatory period. AIP is carried out on or before the 30 November in a regulatory year, and calculates the change in the base revenue allowances for the regulatory year commencing on the following April.

2.3.1 Reporting Process

The company reporting process is governed by regulatory instructions and guidance (RIGs) issued by Ofgem under the standard licence conditions for each network type. RIGs provide instructions & guidance, the reporting packs and commentaries the network companies have to fill out for the collection of data to monitor company performance, to calculate any rewards or penalties associated with the incentive mechanisms, and to determine adjustments to allowances. Figure 9 presents the minimum content needed for the regulatory reporting of the network companies.

Figure 9 – Minimum content needed for the Reporting of each network type

Executive Summary
Revenue Impact - actual revenue vs. allowances for reporting year
Incentive - performance in the year against targets with potential future highlights
Innovation - summary of innovation projects, funding under NIA etc. to cover some of previous IFI reporting
Outputs - performance in the year against targets
Costs - performance in the year against targets for costs and workload where relevant, highlights of future performance, and expected outturn at the end of RIIO
Uncertainties (including Load Related) - a high-level commentary in relation to anticipated impact(s) of any uncertainty mechanism and how this has evolved from the expectations at the time of drafting the Business Plans. Comment on how these have affected forecast capex and output delivery.

One of the templates network companies have to fill in is called Price Control Financial Model (PCFM), which is a financial model in an excel template calculating the incremental change on the base revenue allowance of the companies (i.e. the modification of base revenue allowance term “MOD”) based on the annual updates in a limited number of cost variables specified in the template. With this model, network companies are required to update Ofgem annually for a limited number of changes in key variables specified in the PCFM.

There is also another reporting process called “Business Plan Commitment Reporting”, which is currently an obligation for only electricity distribution companies to provide information on how they are performing against the commitments they made in their business plans, and imposed by Standard Licence Condition 50 (SLC50) Business Plan Commitment Reporting (SLC50) of the Electricity Distribution Licence.

The report is required to have the “S11 summary table” from the RIGs templates with a one-page “Performance Snapshot” section with the structure illustrated in Figure 10.

Figure 10 – Performance Snapshot

General and financial indicators (Data contained in the Key Summary Information RIGs sheet S11)

- Number of customers;
- Total DNO network length;
- Total Expenditure, including total expenditure as a % of allowed revenue; and,
- Unrestricted Domestic Tariff charge

Outputs

- Reliability and Safety:
- Minutes Lost
- Connections: Time to Quote, Time to Connect;
- Customer Satisfaction (overall Broad Measure of Customer Satisfaction score out of 10)
- Social Obligations (individual Stakeholder Engagement and ' - Consumer Vulnerability score out of 10)
- Incentive on Connections Engagement (penalties incurred under the ICE scheme, if any)

Qualitative summary information

- Reliability and Safety
- Environmental Impact
- Additional qualitative summary information regarding the licensee's activities relating to innovation

2.4 Allowed revenues under RIIO

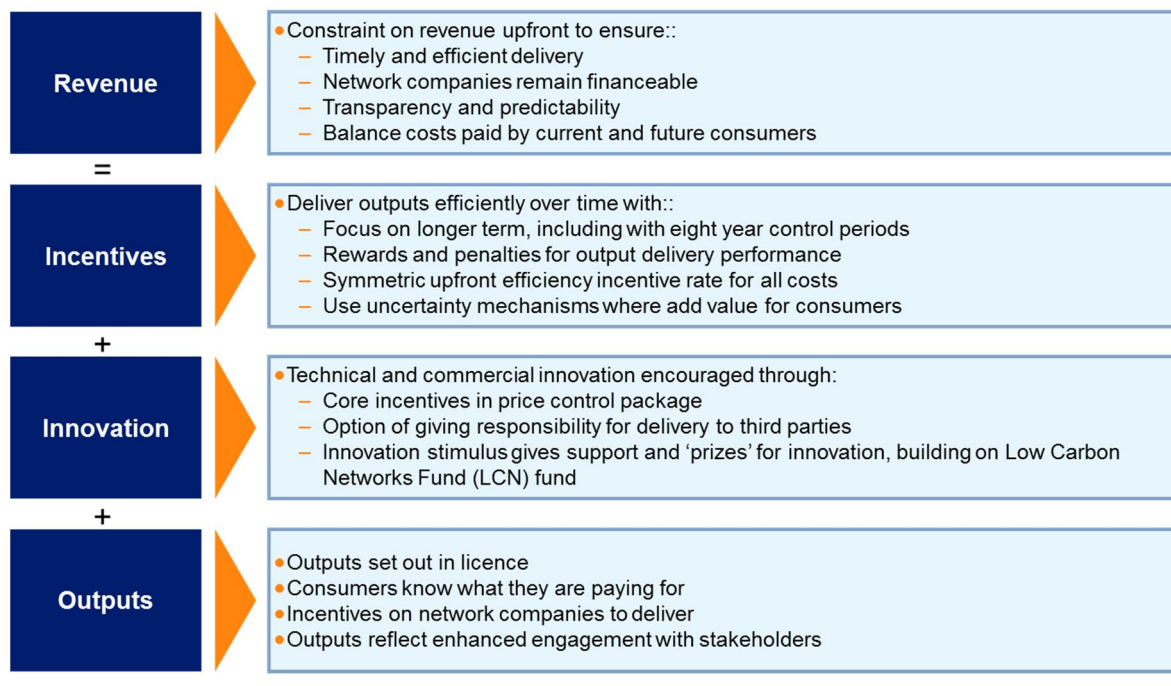
Prior to the start of the regulatory period, the ex-ante price-control decision (i.e. final determination) is made, setting out a range of parameters, including:

- § The baseline allowed revenue that a company can earn in each year of the control;
- § The strength of the ongoing efficiency incentive for the business;
- § The nature and form of any specific reward/penalty incentives linked to outputs; and
- § The nature and form of any uncertainty mechanisms applied to the business plan.

These parameters are determined via the company business plan submissions, review of historical performance and regulatory guidance on requirements (e.g. guaranteed standards of performance within licences).

In this section we outline the high-level approach taken to the determination of allowed revenues within the RIIO model (see Figure 11) and the general process followed in updating or applying the price-control during the regulatory period. Further details on some of the key building block components of RIIO – business plans, cost assessment and incentives – are presented in Chapter 3.

Figure 11 – The Pillars of the RIIO Framework

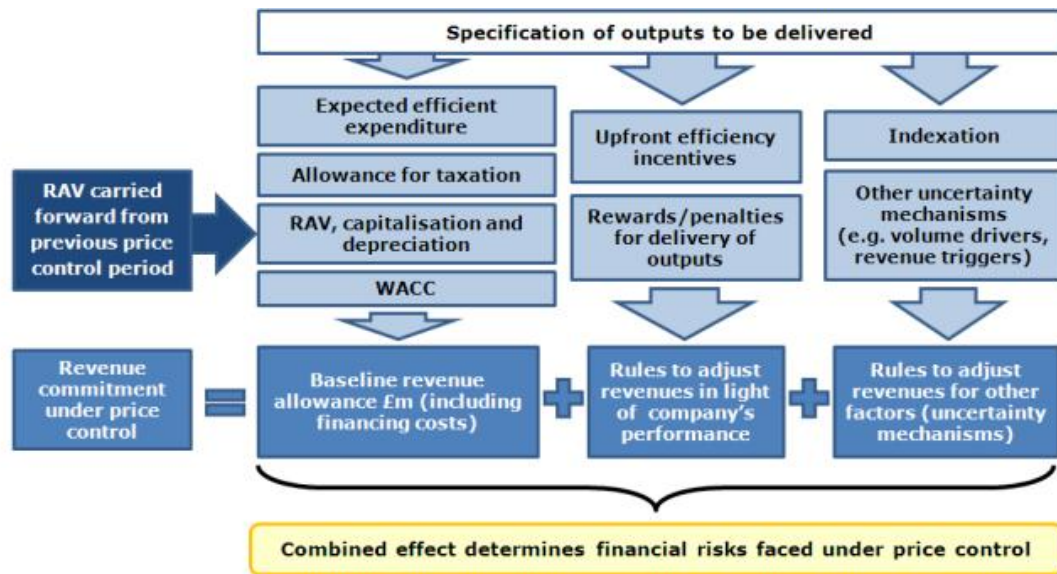


2.4.1 Initial revenue determination

The allowed revenues of a company are calculated from three components as illustrated in Figure 12.

- § *Baseline revenue allowance* is set for the whole review period, and based on the regulator’s view of an efficient level of cost, informed by the company business plans and the regulator’s benchmarking;
- § *Revenue adjustments based on performance*, reflect adjustments to reward or penalise for over- or under-performance by the company against baseline expectations. They include both adjustments to reflect variations in overall cost performance (the TOTEX Incentive Mechanism) and delivery against specific outputs or performance standards agreed in the price-control; and
- § *Revenue adjustments via uncertainty mechanisms* address changes made in response to pre-defined mechanisms introduced to account for uncertainty risk during the review period.

Figure 12 – The building blocks of the RIIO model



2.4.1.1 Baseline revenue allowance

The baseline revenue allowance is calculated in a similar way to the standard RPI-X building block approach to revenue determination with a return on an asset base, a depreciation allowance, an operating cost allowance and tax as illustrated in Figure 13. The main difference is in the determination of the asset base to which the cost of capital and depreciation are applied. Under RIIO, additions to the asset base do not reflect actual capital expenditure (CAPEX); instead they reflect a proportion (the capitalisation rate) of the total expenditure (TOTEX) of the company, referred to as ‘slow money’.

§ *The capitalisation rate*: reflects expectations of the future Opex-Capex split and determines the proportion of TOTEX added to RAV in base. This may change over time as the balance of operating and asset-based activities changes. It is set at the outset⁵ generally based on the historical and forecast split of Capex/Opex (e.g. ranging from 68% to 80% for RIIO-ED1).

§ *Totex*: is the sum of the projected operating expenditure (Opex) and capital expenditure incurred in that year.

The residual total expenditure is referred to as ‘fast money’ and is recovered in the year in which it is incurred.

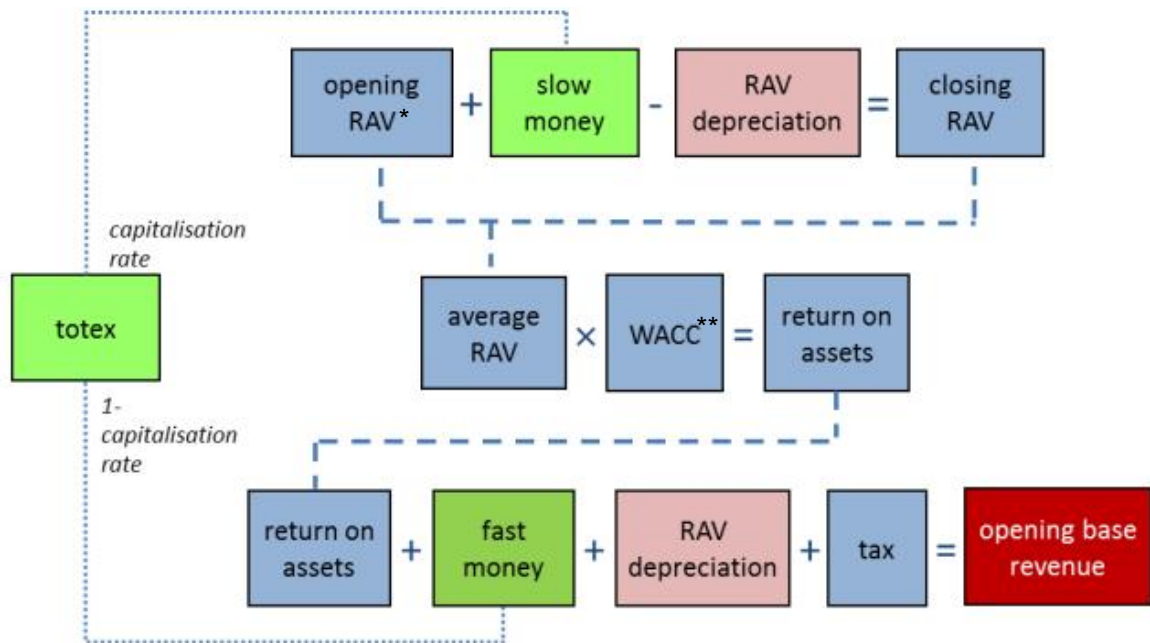
The main financial parameters – the WACC, depreciation profiles, and capitalisation rate are set for the duration of the price-control and follow established regulatory principles.

§ *Depreciation*: new assets are assumed to be depreciated through a 45 year period while the existing assets through a 20 year period, with straight-line depreciation.

⁵ From “Guide to the RIIO-ED1 electricity distribution price control”: “One DNO, SSES, has a capitalisation rate which changes during RIIO-ED1. This is to ensure that the effect of including certain costs for the energy supply on Shetland, which had previously been funded as fast-money only, in Totex is neutral.”

§ **WACC:** weighted-average cost of capital is the main parameter determining the return on assets, and is calculated from an assessment of the relevant cost of debt and cost of equity of the business. This is similar to the current approach applied by the AEEGSI for determining the cost of capital and would not require a change in methodology.

Figure 13 – Components of opening base revenue



Source: https://www.ofgem.gov.uk/system/files/docs/2017/01/guide_to_riioed1.pdf

* Regulatory asset value (sometimes referred to as regulatory asset base)

** Weighted-average cost of capital

2.4.1.2 Maximum revenue allowance

The maximum revenue allowance in any year consists of the following elements:

- § **Baseline revenue allowance** – as outlined in section 2.4.1.1.
- § **MOD:** this is the annual adjustment factor applied to the baseline revenue allowance via the Price Control Financial Model (PCFM) (see below for more details on PCFM) in order to reflect the market uncertainties as they become known, such as the prevailing financial parameters or taxation rules.
- § **Pass - through costs:** these are the uncontrollable variations in the costs which are directly transferred to customers.
- § **Incentive adjustments:** the revenue allowance is annually updated based on the performance of the company on the specified outputs.
- § **Correction factor (from the previous price control):** these are the costs belonging to the previous review period to be compensated through the revenue allowance set at the current price control review.

Revenue allowances of the Network Companies are adjusted in line with actual performance of the companies through annual updates, in what is called the Annual Iteration Process (AIP), a process that is supported by regular reporting of the Network Companies during the regulatory period. AIP is carried out on or before the 30 November

in a regulatory year, and calculates the change in the base revenue allowances for the regulatory year commencing the following April.

The main tool used in the AIP is the Price Control Financial Model (PCFM)⁶. This is a financial model (MS Excel model) that calculates the incremental changes on the base revenue (MOD) of a particular network company, based on the annual changes in a limited number of cost variables incorporated in the model, with the time value of money adjustments applied. MOD can be either positive or negative, and once it has been directed for a particular year, it is not changed retroactively as a result of a subsequent AIP.

The PCFM does not represent the entire regulatory financial position of the companies due to not including all the incentives available to them. The purpose is to apply the annual updates on the following data to the base revenue allowance of the companies:

- § the annual cost of corporate debt;
- § Totex components sufficient to apply the Totex incentive mechanism;
- § allowances on uncertainty mechanisms; and
- § financial adjustments (such as pension variables, tax variables and legacy adjustments).

Figure 14 shows the practical procedures to calculate the value of MOD (by referring to the PCFM excel model⁷), which is similar in RIIO-T1,GD1 and ED1 reviews.

Figure 14 – Practical procedures of updating the PCFM

Step 1	<ul style="list-style-type: none"> • In the 'Userinterface' sheet under the heading 'PCFM year t', select 31 March 2015, since the process will calculate the value of MOD to be applied in Relevant Year 2014/15.
Step 2	<ul style="list-style-type: none"> • In the 'Userinterface' sheet under the heading 'Active Company' select the designator for the licensee.
Step 3	<ul style="list-style-type: none"> • Update the PCFM Variable Values ('blue box values') on the Input Sheet for the designated licensee in accordance with revisions directed by the Authority - a consolidated direction of values will have been issued by the Authority by 30 November'.
Step 4	<ul style="list-style-type: none"> • In the 'Userinterface' sheet under heading 'Model Status', select model status 'Licence Model'.
Step 5	Repeat items 2-4 for other licensees as required, for example to obtain MOD values for other licensees within an ownership group.
Step 6	<ul style="list-style-type: none"> • Press the 'Run for All' macro button (or alternatively the 'Run for One button' if only one licensee's MOD value is being calculated).

⁶ [The Price Control Financial Handbooks](#) for the relevant sectors and companies governs the AIP, the methodologies involved, and how MOD is calculated and implemented.

⁷ The PCFM excel model used for RIIO-ED1 AIP process:
<https://www.ofgem.gov.uk/publications-and-updates/riio-ed1-financial-model-following-annual-iteration-process-2016>

Ofgem established a “PCFM Working Group” formed by technical/industry experts to review the issues arising with respect to the form or usage of the PCFM during the AIP process.

2.5 Performance to date

Ofgem has recently published an open letter⁸ setting out the context of the RIIO-2 framework (i.e. the second eight year control period that will commence in 2021 for transmission and gas distribution and 2023 for electricity distribution) and seeking stakeholder views on RIIO-2 objectives and key principles.

In its letter, Ofgem discusses the lessons learned from the RIIO-1 experience based on the annual assessments to date and outlines its plans to implement tougher price controls for the RIIO-2 review. Figure 15 presents the highlights from the results of the Annual Iteration Process (AIP) 2016 review across three main areas.

Figure 15 – Current assessment of the RIIO-1 based on AIP 2016

	Outputs	Expenditure	Financial Returns (RORE*)
Electricity TOs	<ul style="list-style-type: none"> Expected to meet or exceed the targets set out against five of the six categories 	<ul style="list-style-type: none"> expected to outperform their allowances 	<ul style="list-style-type: none"> delivering strong earnings towards the top end of expectations
Gas TOs	<ul style="list-style-type: none"> expected to be fully delivered 	<ul style="list-style-type: none"> Projected to overspend against their allowance by around 9% 	<ul style="list-style-type: none"> delivering strong earnings towards the top end of expectations
Electricity DNOs	<ul style="list-style-type: none"> expected to be fully delivered 	<ul style="list-style-type: none"> All electricity DNOs forecast to spend 3% less than their allowances 	<ul style="list-style-type: none"> delivering strong earnings towards the top end of expectations
Gas DNOs	<ul style="list-style-type: none"> expected to be fully delivered 	<ul style="list-style-type: none"> forecast to spend 12.3% less than their allowances 	<ul style="list-style-type: none"> delivering strong earnings towards the top end of expectations

* Return on Regulatory Equity

In Ofgem’s letter, a number of concerns over network returns, which are likely to contribute to tougher price controls for RIIO-2, were highlighted. One of these concerns was raised by the British consumer group, Citizen Advice (CA), which highlighted in its report⁹ that the actual equity returns of the network companies, as released in Ofgem’s RIIO Annual Reports¹⁰, were too favourable to the network companies.

While, as is shown in Figure 16, only two out of fourteen electricity distribution companies overspent their allowed Totex (or allowed revenue) expectation during the period 2015/16, implying the remainder earned above the baseline allowed return, this is not necessarily bad for consumers – they will have benefitted in terms of the sharing of any cost savings and (where relevant) realising higher quality of service from the network businesses.

⁸ https://www.ofgem.gov.uk/system/files/docs/2017/07/open_letter_on_the_riio2_framework_12_july_final_version.pdf

⁹ <https://www.citizensadvice.org.uk/Global/CitizensAdvice/Energy/EnergyConsumersMissingBillions.pdf>

¹⁰ <https://www.ofgem.gov.uk/publications-and-updates/riio-electricity-distribution-annual-report-2015-16>

Figure 16 – RIIO-ED1 pre-tax Totex allowed vs actual in 2015/16 (£m)

	ENWL		NPg		WPD			
	ENWL	NPgN	NPgY	WMID	EMID	SWALES	SWEST	
Allowed Totex	251	194	256	276	302	156	228	
Actual Totex	244	188	248	312	308	142	223	
Overspend / underspend	-6	-7	-8	36	6	-13	-4	
Sharing Factor ⁴	41.89%	44.16%	44.16%	30.00%	30.00%	30.00%	30.00%	
Allowed Totex after sharing ⁵	248	191	252	287	304	152	226	
	UKPN			SPEN		SSEN		
	LPN	SPN	EPN	SPD	SPMW	SSEH	SSES	
Allowed Totex	262	236	353	217	249	170	325	
Actual Totex	189	173	281	192	239	151	276	
Overspend / underspend	-73	-63	-72	-26	-10	-19	-49	
Sharing Factor	46.72%	46.72%	46.72%	46.50%	46.50%	43.53%	43.53%	
Allowed Totex after sharing	228	207	319	206	244	162	304	

Source: https://www.ofgem.gov.uk/system/files/docs/2017/02/riio-d1_annual_report_2015-16.pdf

Similar to the electricity distribution companies, we see from Figure 17 that all the gas distribution companies underspent against their allowed expenditure which resulted in higher actual returns. Since this is a natural consequence of the incentive-based framework, it is important that there is a common understanding of the impact on actual financial performance.

Figure 17 – RIIO-GD1 pre-tax Totex allowed vs actual in 2015/16 (£m)

	NGGD				SGN			
	EoE	Lon	NW	WM	NGN	Sc	So	WWU
Total allowed expenditure	316	303	237	186	261	196	406	254
Actual expenditure	297	238	226	172	227	165	336	209
Overspend (underspend)	-19	-65	-11	-14	-34	-31	-70	-45
Sharing Factor	37.00%	37.00%	37.00%	37.00%	36.00%	36.30%	36.30%	36.80%
Allowed expenditure after sharing	309	279	233	181	249	185	380	238

Source: https://www.ofgem.gov.uk/system/files/docs/2017/02/riio-gd1_annual_report_2015-16_0.pdf

3. RIIO FRAMEWORK BUILDING BLOCKS

In this section we discuss the core building blocks of the RIIO framework in GB which are the business plans of the network companies with their expectations on their Totex amounts throughout the review period, the assessment of these costs based on Ofgem's specified criteria and benchmarking views, and the incentive mechanisms linked to the specified outputs defined in the price control process.

3.1 Business Plans

One of the most important aspects of an ex ante price-control is the preparation of a well-justified business plan for the review period which takes on a prominent role under the RIIO regime. In order to incentivise the submission of the well-justified business plans, each company is given an ex-ante reward or penalty based on business plan quality. In case the business plan is assessed to be well-justified by Ofgem, then it is excluded from the iterative process of draft and final determinations of Ofgem which is called Fast-Tracking (see Section 3.3.3 for details). Fast-track companies receive several incentives which are further explained in Section 3.3.1).

Companies' business plans need to be informed by and tailored to their customers' needs e.g. level of network reliability, availability and environmental impacts. Therefore Ofgem does not impose a reporting template for company business plans in order to encourage the companies to provide all the information they believed was necessary to justify their plan.

In the RIIO-ED1¹¹ guide, Ofgem highlights how it expects DNOs to explain in their plans as follows:

- § the costs of delivering the outputs and secondary deliverables;
- § cost projections in the context of historical performance;
- § proportionate cost benefit analysis and other justification for the expenditure; and
- § the processes and tools they used to determine efficiency.

Ofgem reviews the Business Plan submissions by considering the five criteria presented in Figure 18.

¹¹ Ofgem, Guide to the RIIO-ED1 electricity distribution price control, Jan 2017

Figure 18 – Ofgem Assessment criteria of the Business Plans

Process	Outputs	Resources (efficient expenditure)	Resources (efficient financing)	Uncertainty & risk
<p>Has the NC followed a robust process?</p> <ul style="list-style-type: none"> Is the BP clearly presented, with all key content included? Is the BP engaged with stakeholders, and explained how this has influenced its business plan? 	<p>Does the plan deliver the required outputs?</p> <ul style="list-style-type: none"> Has the business plan covered the outputs specified in Ofgem's 'Strategy for the review' document or clear justification for any departures from the Strategy decision? 	<p>Are the costs of delivering the outputs efficient?</p> <ul style="list-style-type: none"> Has the NC clearly presented that cost projections (based on historical performance) and financial costs are efficient, and linked to the costs to relevant outputs Are alternative approaches considered to achieving value for money in the delivery of its outputs? Does the plan reflect wider best-practice? 	<p>Are the proposed financing arrangements efficient?</p> <ul style="list-style-type: none"> Does the BP conform with the financial policies specified in the strategy, are any departures well-justified? Has the NC provided evidence that financial costs are efficient? Is the data in the BP consistent and has the NC explained cost projections in context of historical performance? 	<p>How well does the plan deal with uncertainty & risk?</p> <ul style="list-style-type: none"> Has the NC clearly articulated the key uncertainties it faces and considered how it will address them Has the NC considered risk and how to mitigate those risks?

Western Power Distribution (WPD) had its business plan fast-tracked under RIIO-ED1, the table of content of which is given in Figure 19.

Figure 19 – Sections of WPD Business Plan Overview

Title	Content
Executive summary	An overview of the Business Plan, its aims and its conclusions
Who we are and what we do	A simple description of our business
Our track record	What we have achieved
Developing the plan for our business	The key business objectives and long term strategy that drive our business
Developing the plan for our stakeholders	An overview of our stakeholder engagement process and the preferences of stakeholders
Incentives	The incentives that we believe should be active in RIIO-ED1
Innovation	An overview of our Innovation Strategy
Outputs	The key services and results we are going to deliver
Expenditure	The amount we will be spending and on what
Uncertainty	Details of where there is uncertainty that could affect the overall programme planned for RIIO-ED1
Financing the plan	How we will finance the network investment through debt and equity
Impact on customers' bills	An illustration of how the costs for customers will change as a consequence of the expenditure in the plan
Glossary	An explanation of specific terms and acronyms

Ofgem (and the network companies in GB) have used ex ante price-controls for over 20 years, so while the emphasis on the business plan (in relation to fast-tracking and output definition) is enhanced under RIIO, there is a long experience of reviewing such plans, challenging and revising proposed costs.

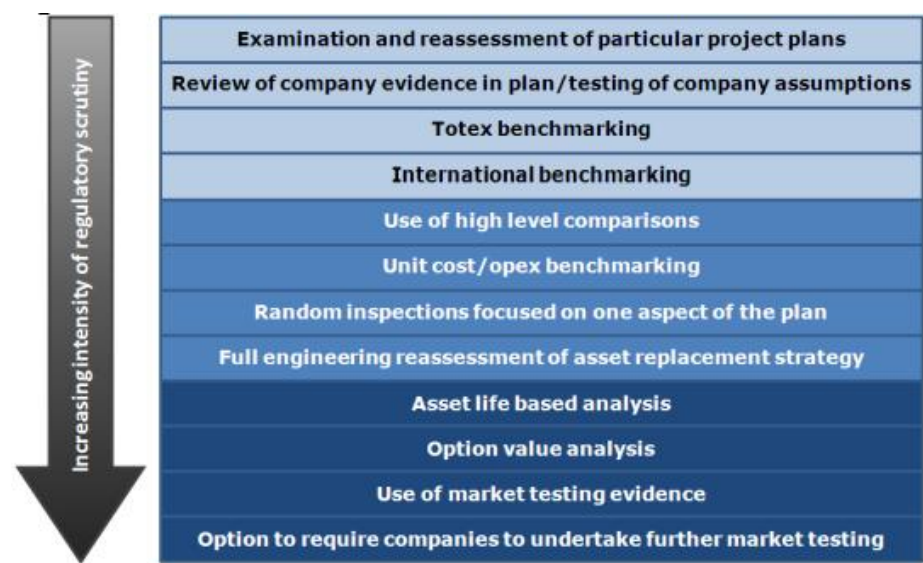
3.2 Cost assessment

The cost projections provided in the companies' business plans are subject to a range of different levels of analysis and adjustments based on econometric benchmarking, comparative assessment of unit costs and the narratives provided by all network companies. Cost assessment process has four elements:

- § **Comparative Cost Assessment:** It is used to justify the level of cost that the companies submitted in their business plans. Ofgem uses a toolkit approach to assess the efficient costs, using three models:
 - A top-down Totex model
 - A bottom-up Totex model
 - A disaggregated activity-level model
- § **Smart grids/ innovation benefits:** RIIO framework is design to encourage network companies to consider different ways to achieve greater cost savings or increase the scope of future delivery. As a part of the RIIO mechanism, Ofgem introduced an innovation funding mechanism called the NIA (see Section 2.2.4).
- § **Real price effects:** RPI indexation enables to reflect the unanticipated changes in the average price level of the cost inputs (e.g. labour, materials, equipment and plant, transport and other).
- § **Information Quality Incentive (IQI):** IQI is designed to encourage the slow-track companies to provide their best available future cost estimations by linking the incentive to the deviation between the network company forecast and Ofgem benchmarking view, and sharing the reward/penalty arising from the difference between the revenue allowance and the outturn cost with the customers (see Section 3.3.1 for more details).

Ofgem performs comparative cost assessment analyses via a wide range of tools (i.e. Toolkit Approach) given in Figure 20, as there is no single metric or analytical tool that will provide a full and robust overview of the efficiency of cost projections due to the varying levels of data disaggregation and availability.

Figure 20 – Alternative approaches used in cost assessment



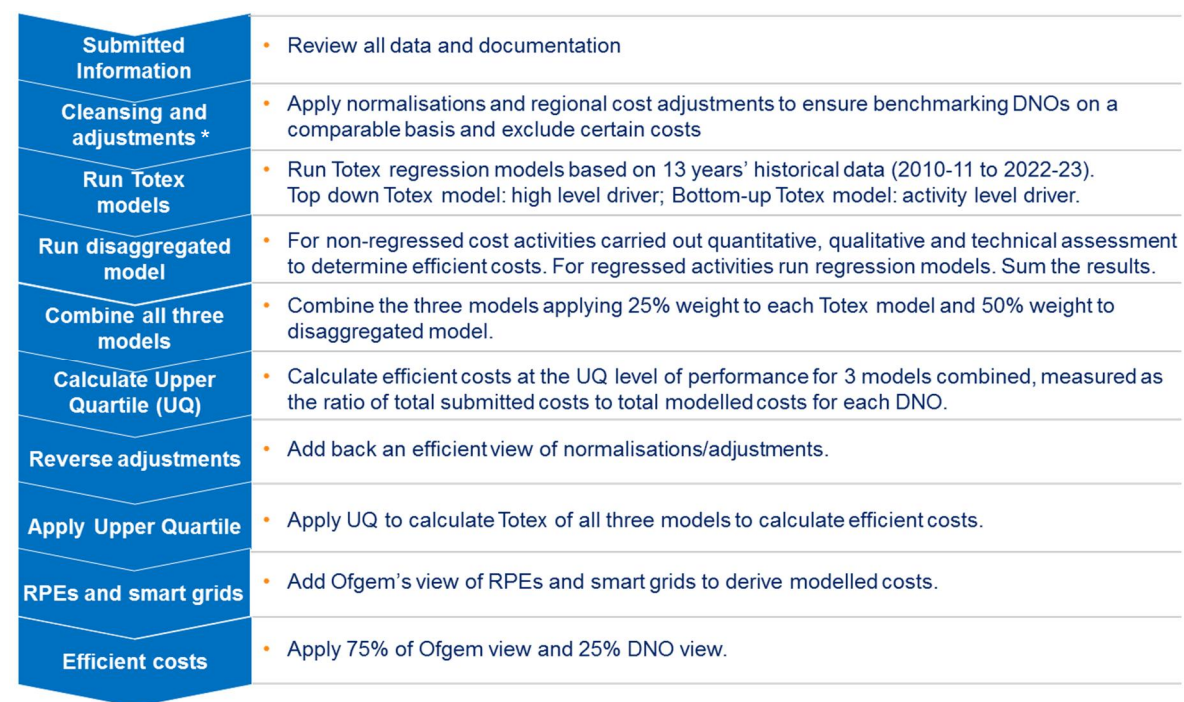
More specifically the “Toolkit Approach” described in Ofgem’s RIIO documents is based on three interacting models:

- § *Top-down Totex model with high level cost drivers:* It is a single regression model in which Totex is assumed to be a function of composite scale driver (CSV) – this is formed from a combination of the high level drivers (modern equivalent asset value, customer numbers, etc.)
- § *Bottom-up Totex model using drivers from the disaggregated analysis:* Separate regressions for each activity-level cost drivers which are aggregated into a single composite driver.
- § *Disaggregated activity-level model:* In this model the cost items are evaluated separately (e.g. overheads; capex unit costs; maintenance costs etc. or combinations of these) and a mixture of techniques are incorporated based on the activity in question. This includes regression analysis, age-based modelling, ratio analysis, trend analysis and technical assessment.

Benchmarking is performed on the efficient level of Totex for each company using the upper quartile* of the combined outputs of these above three models by weighting of 25% for each of the Totex models and 50% for the disaggregated activity-level modelling. TOTEX benchmarking is also undertaken in other regulatory jurisdictions including Germany and the Netherlands.

In order to prepare the sheer amount of data for the use of deployment of all these tools regarding cost comparison, Ofgem uses data normalisation and aggregation techniques in order to prepare the sheer amount of data collected for these analyses. Figure 21 shows each step of the cost assessment for the slow-tracked companies.

Figure 21 – Steps of slow-track cost assessment approach



* Ofgem used data from 2007 to 2009 for NGG and 29 US companies for the benchmarking of several cost drivers, where NGG was within the range of the FERC data companies in terms of pipeline length only, and the other cost drivers being potential outliers in the dataset. Ofgem highlighted the inadequate information to normalise pipeline lengths due to

the lack of information on operating pressure tiers and diameter of transmission pipes on the FERC data source. As NGG is the only gas transmission company, Ofgem couldn't benchmark against other companies.

In order to take into account the scale and composition of the network in cost assessment, MEAV (Modern Equivalent Asset Value) is calculated from the asset data and new build costs reported in business plan data templates of the companies (e.g. Under RIIO-GD1, Ofgem collects local transmission system asset data, which is the non-financial data movements in total length of pipelines by diameter and operating pressure during the period, to understand changes in the pipeline assets and the changes in investments over the period).

3.2.1.1 Choosing the cost drivers

In order to specify the cost drivers that will be used in the regression analysis, Ofgem chooses an initial set of cost drivers together with the network companies, and then refines it with the toolkit techniques (e.g. Totex benchmarking, disaggregated activity-level model). Figure 22 shows the final set of cost drivers used in RIIO-T1 for electricity transmission.

Figure 22 – Totex drivers used by Ofgem in RIIO-T1 (electricity transmission)

Explanatory variable	Comments
Network length	Transmission network length is an important cost driver in many international benchmarking studies. It could be measured in pole length (route length) or circuit length.
Peak demand	Peak demand is defined as the measured annual system peak demand based on the maximum half-hour average. The peak demand in the Great Britain Regulatory Reporting Packs includes transmission losses and station demand but excludes interconnector exports.
Energy delivered	Peak demand, rather than total annual energy delivered, dictates transmission investment requirements. Given a fixed transmission capacity, the higher annual energy delivered means the greater use of transmission assets, which may imply higher operating cost.
Age of network	In general, older assets results in lower capital outlays, while operating costs associated with older assets tend to be higher. In the absence of asset age profiles, financial proxies such as depreciation tend to be used instead.
Other cost drivers	Other factors such as population density, security standards and reliability performance also affect the costs of maintaining and expanding electricity transmission networks, and can be important cost drivers.

Source: Ofgem, "Decisions on strategy for the next transmission price control – RIIO-T1 Tools for cost assessment", March 2011, Oxera "How can the NMa assess the efficiency of an electricity transmission system operator?", September 2012

3.2.1.2 Normalisation and other adjustments

In order to ensure that the benchmarking of the company costs is robust, following adjustments are applied to the company data to make it comparable:

- § regional labour cost adjustments;
- § company specific factors;
- § other adjustments (to bring the non-robust data onto a consistent basis); and
- § exclusion of costs (that are incomparable, assessed through separate bespoke analysis or costs that are not subject to price control review).

3.2.1.3 Regression analysis

Ofgem has been using CPOLS (Corrected Pooled Ordinary Least Squares) as the regression technique for the Totex benchmarking. The term "Pooled" indicates the aggregation of the data of different companies to obtain one single slope parameter for

each relevant year throughout the forecast horizon. In its simple form, below is the cost function showing the relation of the cost and its driver:

$$\text{Log}(Y) = C + \beta \cdot \text{Log}(X) + \varepsilon$$

Where Y is a type of cost, X is the cost driver, β is the slope parameter, ε is the error term and C is the constant intercept parameter. For the cost items that will be subject to the econometric benchmarking, the regression analysis produce a cost function similar to above using historical costs and cost drivers (i.e. Y and Xs in the above equation). In this analysis some of the cost drivers may be grouped into a common cost driver where necessary.

These functions derived from the regression analysis are adjusted via scaling factors in the event of a significant deviation between the most recently submitted company forecasts and the costs derived from the functions.

3.2.1.4 Statistical testing

Ofgem measure the robustness and performance of the regression models with below statistical tests and makes necessary adjustments until all the regression models used pass these tests:

- § White test for heteroscedasticity;
- § Ramsey RESET test for model misspecification;
- § Skewness and Kurtosis test for normality; and
- § Panel robust standard errors.

The regression models used to forecast the Totex is finalized after this refinement process of statistical testing.

3.3 Incentives

In RIIO framework, revenues of the network companies are linked to the delivery of clear and agreed outputs/performance of the networks. Since RIIO regime is an ex-ante control, under and over-performance of the network companies is incorporated as part of the incentive structure.

There are various forms of incentives that are linked to target outputs such as financial/reputational; marginal/fixed; symmetric/asymmetric or automatic/manual. RIIO applies symmetric¹² financial incentives as well as reputational incentives mainly on environmental and social outcomes of the results achieved to the network companies based on their outputs (See Figure 23 for various forms of incentives for some outputs and incentives in RIIO-T1).

¹² The same reward/penalty for over/under delivery of the targeted outputs

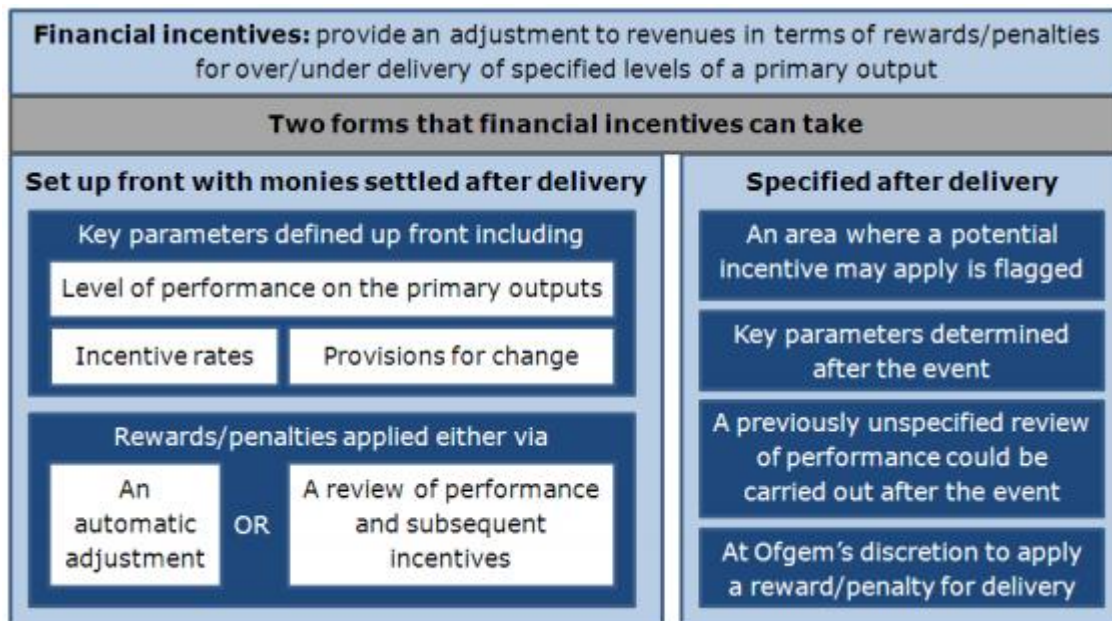
Figure 23 – Some of the outputs and type of incentives for RIIO-T1

Output name	Incentive
'Low carbon economy' – networks' contribution to UK's environmental goals e.g. • Emission intensity of network energy flows • % renewable of network energy flows	Potential financial reward or reputational incentive
Losses (elec)/shrinkage (gas)	Potential symmetric financial incentive
Business carbon footprint	No financial incentive – reputational
Release of SF ₆ (elec)	Symmetric financial incentives building on current framework and rollover proposal
Release of Methane (gas)	Potential symmetric financial incentive

Financial incentives are more appropriate where there is clarity on delivery of output and measurement of performance and when the output is considered to be important.

Figure 24 presents the various forms of financial incentives.

Figure 24 – Overview of the form of financial rewards/penalties



Source: Ofgem, Handbook for implementing the RIIO model, 2010

Reputational incentives are non-financial incentives that rely on the publication of the data which can be used in transition to financial incentives. It may be used in case other regulation is driving good behaviour in the area.

3.3.1 Information Quality Incentive (IQI)

IQI is an incentive mechanism, which is built around the savings/costs sharing between the company and customers in the event of a deviation between the allowed revenue and the actual cost amounts. It provides financial incentives to companies in order to:

- § encourage the submission of more accurate forecasts (to minimize the deviation between the company forecast and Ofgem’s cost assessment) and remove the incentive to inflate expenditure forecasts; and
- § encourage the submission of high-quality and well-justified business plans.

The IQI aims to reward the companies based on the quality of their business plans reflecting true costs by setting upfront efficiency incentives based on the differences between the company forecast and Ofgem’s expectation on their costs. The companies with a lower deviation (meaning a forecast closer to Ofgem view) will receive a higher efficiency incentive rate (sharing factor).

The IQI mechanism relies on a matrix showing the rewards/penalties the company will receive under different variants adjusted in a way to incentivise the companies for the above three intentions. Figure 25 shows an example IQI matrix taken from the RIIO-ED1 proposals, showing the payoffs (rewards as positive; penalties as negative) corresponding to different values of IQI ratio, actual expenditure, allowed expenditure, efficiency incentive and additional income.

Figure 25 – Example IQI Pay-off Matrix

DNO:Ofgem Ratio	90	95	100	105	110	115	120	125	130
Efficiency Incentive	65%	63%	60%	58%	55%	53%	50%	48%	45%
Additional Income (£/100m)	3.1	2.4	1.7	0.9	0.1	-0.8	-1.8	-2.8	-3.9
Rewards & Penalties									
Allowed expenditure	97.50	98.75	100.00	101.25	102.50	103.75	105.00	106.25	107.50
Actual Exp									
90	7.95	7.9	7.7	7.4	7.0	6.4	5.7	4.9	4.0
95	4.7	4.76	4.7	4.5	4.2	3.8	3.2	2.5	1.7
100	1.5	1.6	1.7	1.6	1.5	1.1	0.7	0.1	-0.6
105	-1.8	-1.5	-1.3	-1.2	-1.3	-1.5	-1.8	-2.2	-2.8
110	-5.1	-4.6	-4.3	-4.1	-4.1	-4.1	-4.3	-4.6	-5.1
115	-8.3	-7.7	-7.3	-7.0	-6.8	-6.7	-6.8	-7.0	-7.3
120	-11.6	-10.9	-10.3	-9.9	-9.6	-9.4	-9.3	-9.4	-9.6
125	-14.8	-14.0	-13.3	-12.7	-12.3	-12.0	-11.8	-11.7	-11.8
130	-18.1	-17.1	-16.3	-15.6	-15.1	-14.6	-14.3	-14.1	-14.1
135	-21.3	-20.2	-19.3	-18.5	-17.8	-17.2	-16.8	-16.5	-16.3
140	-24.6	-23.4	-22.3	-21.4	-20.6	-19.9	-19.3	-18.9	-18.6
145	-27.8	-26.5	-25.3	-24.2	-23.3	-22.5	-21.8	-21.2	-20.8
150	-31.1	-29.6	-28.3	-27.1	-26.1	-25.1	-24.3	-23.6	-23.1

The **IQI ratio** is the ratio of the network company’s forecast to Ofgem’s cost assessment, which feeds into the following three determinants of the reward/penalty received by the company:

- § **Allowed expenditure:** it is linked to the difference between the regulator and regulated projections, and is calculated based on 75% on Ofgem’s benchmark view, and 25% on the network company forecasts on their Totex amount.
- § **Efficiency incentive rate:** it is the percentage showing how much over or under performance is retained by the network company. It is a fixed and symmetric incentive tool, such that the rewards/penalties are shared between the company and customers based on this rate when the company delivers the same outputs with lower/higher costs, so that it acts as a risk-sharing factor. A company with a lower deviation from the Ofgem’s view receive a higher efficiency incentive rate which encourages it to minimise the deviation between its forecasts and Ofgem cost

assessment. Fast-tracked companies receive the maximum efficiency incentive rate¹³.

- § **Additional income:** it is an adjustment factor (as reward/penalty) to incentivise the companies submitting business plans that reflects their true potential cost reductions (to discourage inflating the costs). Fast-tracked companies receive the maximum additional income incentive¹³.

The realised revenue of the company is calculated as follows:

$$\text{Allowed exp.} = (75\% \times \text{Ofgem cost assessment}) + (25\% \times \text{Company forecast})$$

$$\text{Pay-off} = [(\text{Allowed exp.} - \text{Actual exp.}) \times \text{Eff. Incentive Rate}] + \text{Additional Income}$$

↓

$$\text{Realised revenue} = \text{Actual expenditure} + \text{Pay-off}$$

These rewards/penalties are received by the network companies either as an adjustment to the revenues reflecting the IQI ratio in the same review period (i.e. RIIO-1) or an additional revenue adjustment in the next review period (RIIO-2) to reflect the outturn costs, the IQI matrix and the deviation of the Ofgem cost assessment and company forecast for the current review period.

There are a number of issues identified with the IQI matrix approach:

- § Potential gaming – concerns have been raised that companies may look to inflate their business plan forecasts in an attempt to influence the regulator’s choice of the efficient baseline revenue for the IQI matrix. This potential can be mitigated if the regulator’s own forecasts are made independently of company forecasts or draw on submissions from several companies. For example, by using a wide range of potential benchmarks and databases (e.g. international comparators, existing unit cost databases, asset replacement modelling, comparative cost assessments) a regulator can produce an informed assessment of efficient costs.
- § Risk aversion – the underlying theory behind the IQI matrix is that companies are risk neutral and so will look to maximise the expected value of their regulatory decision. However, where companies are risk averse and there is a high level of uncertainty in the costs, it is possible that the incentive will be for companies prefer to inflate cost forecasts and accept a lower payoff to avoid the risk of being exposed to higher costs and incurring a penalty. One solution would be to strengthen the incentives within the IQI matrix (e.g. calibrate the IQI matrix so that the reduction in payoffs would be larger as the companies increase their forecasts), or to index the baseline costs to changes in input costs/prices.

3.3.2 Totex incentive mechanism

Totex incentive mechanism (TIM) is designed to incentivise the company to look for overall cost efficiency savings in its annual activities. In simple terms, the TIM defines what proportion of any deviation in actual expenditure from the allowed Totex is shared with customers. So, if the TIM is set at 50% then if the company underspends it must pass 50% of that saving through to customers through an adjustment to its allowed

¹³ In RIIO-ED1, four fast-tracked companies received an additional upfront income allowance of 2.5% of Totex and an efficiency incentive rate of 70%, which were the maximum values in the IQI matrix.

revenues (since this is an adjustment to Totex, it alters the revenues from both 'fast' and 'slow' money in line with the capitalisation ratios). However, it also retains 50% of the saving and this is the incentive (reward) for delivering outcomes at a lower cost than expected.

Consequently, there are benefits for both consumers and the company. For example, if allowed revenues were 100 and a company spent 90, then with a TIM of 50% the following (simplified) outcomes would be realised:

- § the company would be allowed to recover a revenue of 95 ($90 + (0.5 \times 10)$) meaning it would earn a higher return; and
- § consumers would face charges to recover a revenue of 95 (actual allowed revenue) instead of 100 (initial allowed revenue).

This is the basic cost efficiency mechanism that applies under RIIO and in many other ex-ante incentive regimes in regulated industries (as outlined in section 1.1).

The strength of the incentive can differ across companies and between regulatory periods. In the RIIO scheme the strength is linked to the IQI ratio – the closer the company projections are to the regulator's expected expenditure baseline, the higher the incentive rate.

Incentive strength rate is fixed for the period and is symmetric (i.e., the same proportion of overspend and underspend is retained by the company).

Figure 26 illustrates two examples for the pay-off calculations under the TIM. Both examples assume Ofgem assessing National Grid in year T-1 based on its expenditure against its allowances in year T-2, with an incentive strength rate of 44.36%. As an outcome of this assessment, allowed revenue is adjusted in year T to account for the £2m underspent amount in the first example (or similarly £3m overspent amount in the second example) in year T-2 by multiplying it with the incentive strength rate to calculate the amount National grid will receive (or pay in the second example) as an adjustment.

Figure 26 – Example: TIM calculations for National Grid

UNDERSPEND	T-2	T-1	T
Allowance	£5m	£5m	£5m
Expenditure	£3m	£5m	£5m
Over / under spend	-£2m	--	--
National Grid share	--	--	£0.89m (keep)
Adjustment to allowed revenue	--	--	£1.11m (return to industry)

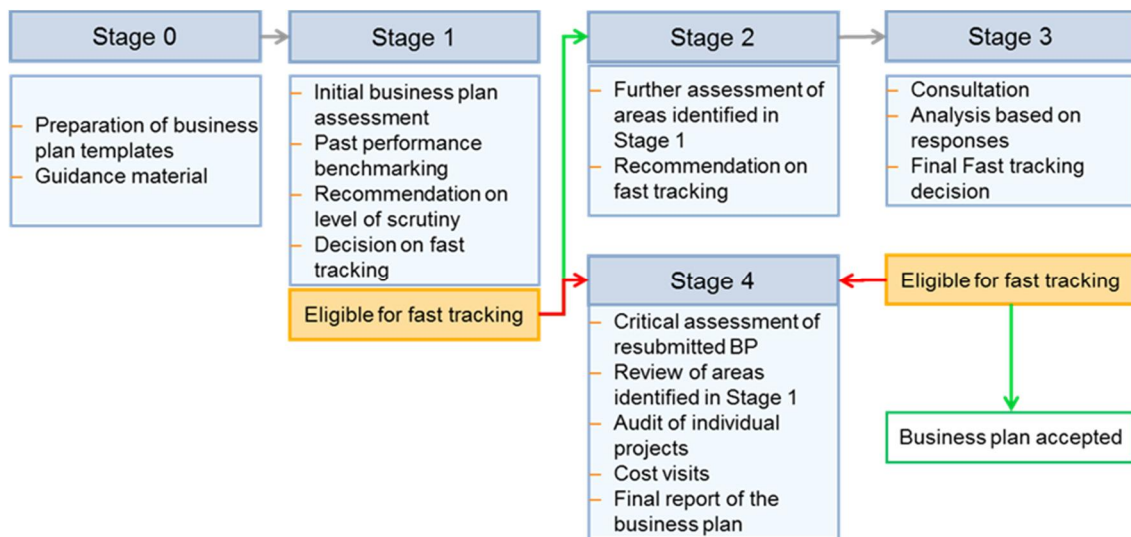
OVERSPEND	T-2	T-1	T
Allowance	£5m	£5m	£5m
Expenditure	£8m	£5m	£5m
Over / under spend	+£3m	--	--
National Grid share	--	--	£1.33m (pay)
Adjustment to allowed revenue	--	--	£1.66m (recovered from industry)

Source: National Grid

3.3.3 Fast-tracking

This process is designed to incentivise the network companies to submit high quality and well-justified business plans (see Section 2.2.2 for the details of well-justified business plan). Figure 27 illustrates the stages of business plan submissions with the fast-track decision process.

Figure 27 – Fast-track process



The fast-track process determines how strictly the business plans will be scrutinized and how quickly Ofgem will make a decision on each business plan (i.e. proportionate treatment) with its assessment according to the five main criteria given in Figure 18. Fast-tracking enables the companies to conclude their revenue allowances ahead of the standard timetable, and the fast-tracked companies receive the following financial and non-financial incentives:

- § Acceptance of the presented business plan and shorter regulatory scrutiny with the exclusion from the iterative process of draft and final determinations of Ofgem reducing the need to divert the resources to ongoing engagement;
- § Maximum additional income through IQI mechanism;
- § Maximum efficiency incentive rate applied through IQI mechanism.

To date, Ofgem fast-tracked two Scottish TSOs (SPTL and SHETL) in RIIO-T1 and four licensees owned by WPD (WMID, EMID, SWALES, SWEST) in RIIO-ED1. No gas distribution company was qualified for fast-tracking at RIIO-GD1.

As mentioned in Section 3.3.1, four fast-tracked licensees in RIIO-ED1 received an additional upfront income allowance of 2.5% of Totex and an efficiency incentive rate of 70% through the IQI mechanism.

3.3.4 *Uncertainty mechanisms*

There is a range of uncertainty mechanism employed within RIIO. These are not strictly incentive mechanisms but they are means by which the lack of predictability in future market conditions can be accounted for without introducing too great a risk around the baseline revenue allowance. This is particularly important given the length of the price-control and the major transformations that are expected in the energy sector over the period of the control. By introducing uncertainty mechanisms, the cost to consumers can be managed whilst also ensuring that the cashflow position and financeability of the companies is sufficient for them to continue to fulfil their functions.

Uncertainty mechanisms can be deployed automatically or manually/assessed (i.e. determined directly by the regulation through a review). Companies are expected to propose expenditures that they believe should be subject to uncertainty mechanisms, and the type of mechanism they deem appropriate, in their business plan submissions. Mechanisms include:

- § *Volume drivers (automatic)*: revenue allowance linked to changes in volume (e.g. new connections, smart meter roll-out¹⁴, etc.). Figure 28 shows the load-related expenditure (LRE) volume drivers proposed by NGET for RIIO-T1. NGET proposed to include Uncertainty Mechanisms for each of these LRE categories, which aim to adjust the revenue allowed to reflect the actual outputs based on the unit costs per output (i.e. volume drivers with the parameters, such as the unit cost allowances (UCAs), set at the start of the price control period).

¹⁴ The UK government has set a target of installing smart meters in every home and small business by the end of 2020.

Figure 28 – LRE volume drivers proposed by NGET, March 2012

LRE Category	Source of Uncertainty	Proposed Volume Driver Constituents	Proposed UCA
Local Enabling (Exit – Shared Use)	Volume and timing of demand connections	Substation Costs	£4.6m/ Super Grid Transformer (SGT)
		Overhead Lines Costs (OHL)	£1.2m/circuit km
Local Enabling (Entry – Shared Use)	Location and timing of local generation connections	Substation Costs	£23/kW
		Within-zone Costs	Zonal (£2.7/kW to £36.8/kW)
		OHL	£/circuit km
Wider Works (Entry)	Location and timing of new generation load	Network Development Policy and Boundary Specific Reinforcement costs	Boundary specific unit costs for capacity increases; Banded for below gone green and above gone green; Range between £33/kW to £155/kW.
		Planning requirements for new infrastructure	Undergrounding Costs
			DNO Mitigation Costs

- § *Indexation (automatic)*: adjustment in line with changes in a specific index (e.g. RPI), which passes the risk from the network companies to customers;
- § *Pass-through (automatic)*: changes in costs that are fully recoverable from customers (e.g. business rates, licence fee);

- § *Re-openers (manual/assessed)*: potential to re-set the costs at specific dates or above specific thresholds (e.g. street works);
- § *Triggers (manual/assessed)*: provision allowing a review of a specific cost linked to an event (e.g. a legislative change, tax) and adjusted during the price control period;
- § *Logging up (manual/assessed)*: to compensate the company’s unforeseen cost based on efficiency review through the revenue allowance set at the next price control review; and
- § *Mid-period reviews (MPR), (automatic)*: the mid-period review is an opportunity for a more comprehensive review of performance and outputs half way through the review period. There is no requirement for a mid-period review (and indeed, no such review was deemed necessary for the gas distribution businesses under GD1), but it does enable the regulator to revisit where there may be material changes to business plans or delivery over what was projected in the business plans and not directly covered through other uncertainty mechanisms. Figure 29 shows the updated revenues in specific activities/projects as a result of the mid-period review for National Grid electricity and gas companies (NGET and NGGT) in RIIO-T1. It is important to note that there are both reductions and increases to revenue allowances as a result of the review.

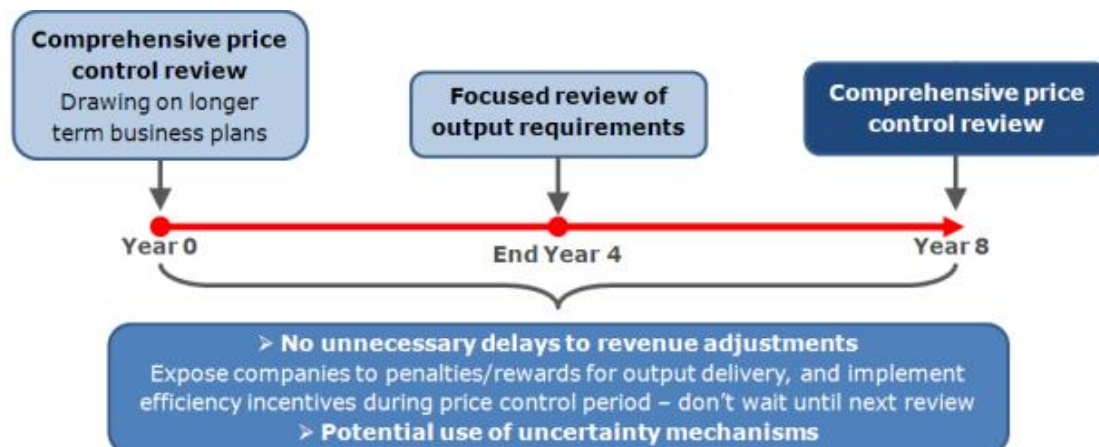
Figure 29 – Changes made in RIIO-T1 mid-period review for NGET and NGGT

NGET		NGGTs
<p>Enhanced SO role</p> <ul style="list-style-type: none"> – This includes obligations arising from the ITPR project, and the introduction of additional balancing services products and DSR not included in RIIO-T1 – Ofgem will provide additional funds to ensure the SO is appropriately funded for these services if deemed to be efficient. 	<p>Non-variant outputs</p> <ul style="list-style-type: none"> – Outputs in this area included the following two: protecting nine sites against rising fault level currents and installing 11 shunt reactors. – NGET’s current assessment is that only one out of the original nine sites needs protection and does not expect to do any more work 	<p>Avonmouth output</p> <ul style="list-style-type: none"> – This output was included in RIIO-T1 to help manage the consequences of the closure of the Avonmouth liquefied natural gas (LNG) storage facility. NGGT has now confirmed that the pipelines are no longer needed and that it does not propose to build them.
<p>– Ofgem are proposing an allowance of £21.5m</p>	<p>– Ofgem are proposing a reduction of £168.8m</p>	<p>– Ofgem are proposing a reduction of £38.8m</p>

3.3.5 Financeability

Figure 30 presents the way the RIIO mechanism works over the eight-year price control period. Comprehensive reviews covering all aspects of the price control are set at the beginning of each review period. There is also a potential for a mid-period review focused on outputs only if government policy changes or new outputs are required to meet consumers’ needs. The financial elements such as WACC, depreciation profiles, and capitalisation policy are also fixed based on company and Ofgem view.

Figure 30 – Overview of the eight-year price control review period



The RIIO framework intends to provide a longer-term view of financeability reinforced by regulatory commitment with the principles summarised in Figure 31. The key financial elements used in the calculation of the company revenues are set at the outset (such as WACC, depreciation profiles, and capitalisation policy) to give a clear view on the future.

Figure 31 – Summary of financeability principles

- a longer-term view of financeability - reinforced by regulatory commitment;
- risks to be allocated appropriately between companies and consumers - depending on who is the best placed to manage them;
- a principles-based approach to the calculation of notional gearing, with the size of the notional equity wedge reflecting the company's risk exposure and potentially varying within and between sectors;
- a real, weighted average cost of capital (WACC) based approach to setting allowed return;
- the cost of debt assumed in the WACC to be based on a long-term trailing average and updated annually within a price control;
- CAPM, supported by other approaches, to be used to determine the cost of equity;
- a capitalisation policy that equalises incentives but is also based on companies' business plans and so is closely aligned with actual opex/capex split;
- assumed asset lives underpinning the depreciation policy to reflect expected economic life, with potential to weight the depreciation profile to reflect uncertainty in the future consumption of assets;
- financeability assessment to be informed by a number of sources, including relevant equity and credit rating considered over the long term;
- an onus on companies to manage short-term requirements and to provide equity where necessary, and
- Return on regulated equity (RORE) analysis used to check the package fits together appropriately.

Source: <https://www.ofgem.gov.uk/ofgem-publications/51871/riiohandbookpdf>

Output-based incentive mechanism under the RIIO process gives the companies the possibility to receive the remuneration amounts higher than the WACC levels based on their outputs delivered.

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