
Methodology review for a regulatory framework based on a total expenditure approach (‘ROSS-base’)

Prepared for Autorità di Regolazione
per Energia Reti e Ambiente
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1 Introduction

1.1 Context

The Decision 271/2021/R/com,¹ published on 28 June 2021, marked the beginning of the regulatory process for the introduction of a new approach in setting allowed revenues of the electricity and gas infrastructure services regulated by Autorità di Regolazione per Energia Reti e Ambiente (ARERA).

Overall, the new approach is part of a broader regulatory reform based on setting expenditure and output targets (so called ‘*regolazione per obiettivi di spesa e di servizio*’, ROSS). The ROSS reform is expected to be introduced in two steps.

- **Step 1.** Initially, ARERA is aiming to develop a cross-sector ‘ROSS-base’ framework, based on the scope set out in the regulatory proceeding started with Decision 271/2021/R/com.
- **Step 2.** Finally, ARERA will introduce a ‘forward-looking’ approach for setting cost and quality targets. We understand that the development of a ‘forward-looking approach’ is beyond the scope of the regulatory process started with Decision 271/2021/R/com.

The present report focuses on step 1. In this context, Oxera has been required to undertake an assessment of regulatory best practice in total expenditure (TOTEX) regulation and possible implementation options in the Italian context with respect to the following areas:

- **TOTEX efficiency incentives**, also by means of TOTEX efficiency sharing rates that take into account both operating expenditure (OPEX) and capital expenditure (CAPEX);
- **capitalisation rates** aimed at determining the portion of TOTEX that is remunerated as OPEX (‘fast money’) and the portion that is remunerated as CAPEX (‘slow money’);
- **approaches aimed at monitoring the actual level of returns** on the regulatory asset base (RAB), so as to assess how companies perform relative to the weighted average cost of capital (WACC) set by the regulator.

1.2 Rationale for the intervention: the issue of CAPEX bias and ‘make-or-buy’ trade-offs

Price cap regulation is a form of incentive regulation, and is usually contrasted with rate-of-return regulation or cost-of-service regulation. Currently, ARERA adopts a ‘hybrid’ approach, with a price-cap applied to OPEX, and cost-of-service regulation applied to CAPEX. Among the energy networks regulated by ARERA, the only exceptions to the ‘hybrid’ approach are the cost incentive schemes in place on both OPEX and CAPEX for electricity 2G smart meters and gas smart meters, as well as the incentive mechanism aimed at efficiency of investment costs adopted for the electricity TSO.

Under cost-of-service regulation, allowed revenues are linked directly to the underlying costs: actual costs are passed through into the allowed revenues without a long delay. The main limitations of such systems could be:

¹ ARERA (2021), ‘Decision 28 June 2021 271/2021/R/COM’, June.

- low incentives to avoid inefficient costs;
- preference of CAPEX solutions over OPEX ones, even when the former have higher system-wide costs. This is known as the ‘Averch–Johnson effect’, and in more recent literature is often referred to as the ‘CAPEX bias’.

In recognition of the potential that regulatory incentives provide a bias towards excessive CAPEX, some national regulatory authorities introduced TOTEX-based regulation. Notable examples are the regulatory models introduced by Ofgem (Great Britain) and Ofwat (England and Wales) in the energy network and water sectors respectively.

Moreover, other regulators have examined the problem of CAPEX bias and have considered (or are considering) the adoption of a TOTEX-based regulation—for example, the Australian Energy Market Commission (AEMC)² and ERSE (Portugal).³

- The AEMC has considered the potential CAPEX bias as part of its Power of Choice reform program.⁴ Among the possible solutions to balance incentives for CAPEX and OPEX expenditures, the AEMC included: (i) assigning a rate of return on OPEX; (ii) capitalising all demand side participation (DSP) projects; or (iii) adopting a TOTEX approach.⁵
- The Portuguese energy regulator, ERSE, in a recent consultation document described the TOTEX approach as having the advantage to allow ‘companies to respond more efficiently to technological challenges and organisational structures that arise in the energy sector.’⁶

An approach based on total expenditure aims to treat both OPEX and CAPEX symmetrically, thereby reducing the risk of any CAPEX bias. This could be achieved by capitalising a pre-specified proportion of TOTEX irrespective of whether it is OPEX or CAPEX. During the recent PR14 review, Ofwat pointed out that the TOTEX approach has contributed to a more efficient balance between OPEX and CAPEX solutions:⁷

[The TOTEX framework] helped increase value for money, as it reduced incentives to opt for less efficient capex-based solutions. There are some good examples of how this changed behaviour during the period. And, overall, the OPEX share increased compared to historic levels, reaching 52% compared to 40%-43% in the previous three reviews, suggesting the capex bias did reduce.

In addition to OPEX–CAPEX trade-offs, networks also face ‘make-or-buy’ decisions—that is, they need to determine what products or services an organisation will provide themselves in house, and which will be purchased from outside sources. This is closely related to the issue of ‘CAPEX bias’.

² See, for example, Australian Energy Market Commission (2019), ‘Economic Regulatory Framework Review – Integrating distributed energy resources for the grid of the future’, September, section 7. See also Australian Energy Market Commission (2018), ‘Economic Regulatory Framework Review – Promoting efficient investment in the grid of the future’, July. In the end, the AEMC decided not to proceed to a regulatory reform for the time being due to other reform priorities.

³ See, for example, ERSE (2021), ‘Consulta pública 101. Proposta de reformulação do Regulamento Tarifário - setor elétrico’, May; and the subsequent July document: ERSE (2021), ‘Consulta pública 101. Proposta de reformulação do Regulamento Tarifário - setor elétrico’, July.

⁴ See, for example, Australian Energy Market Commission (2012), ‘Final report. Power of choice - giving consumers options in the way they use electricity’, March.

⁵ Ibid., p. 238.

⁶ ERSE (2021), ‘Consulta pública 101. Proposta de reformulação do Regulamento Tarifário - setor elétrico’, May.

⁷ Ofwat (2021), ‘PR14 review: discussion paper on findings’, August. pp. 5–6.

While ‘make’ decisions are generally characterised by more CAPEX-intensive solutions, ‘buy’ decisions are likely to be OPEX-intensive.

For example, Ofgem’s RIIO model is aimed at encouraging network companies to strive for timely delivery, be more innovative and seek out lower long-term cost delivery solutions. This could result in ‘finding new ways of delivering in-house so as to be as efficient as, or more efficient than, alternative third party delivery approaches’.⁸ Having the option may also encourage companies to think about how they take forward market testing of aspects of delivery themselves, including potential opportunities to look for input from third parties on the ‘design’ of delivery solutions. Similarly, it may provide incentives for them to consider more carefully the contractual sharing of risks associated with costs and volume when outsourcing projects or activities.

Assuming that ‘make’ decisions are predominantly CAPEX-based, and ‘buy’ decisions are OPEX-based, a TOTEX-based approach can be helpful in avoiding an excessive bias in ‘make’ solutions. For example, Ofwat noted that, according to some stakeholders, the TOTEX approach ‘facilitated greater openness towards collaboration and partnership-oriented ways of funding and operating because contract payments would be treated equally with in-house capital expenditure from a regulatory perspective’.^{9,10}

Within this report, TOTEX-based approach and ‘ROSS-base’ are used interchangeably—that is, they refer to an approach of setting allowed revenues based on total expenditure.

1.3 Conceptual framework and *building blocks* for ROSS-base regulation

1.3.1 Existing regulatory practice: the RIIO model

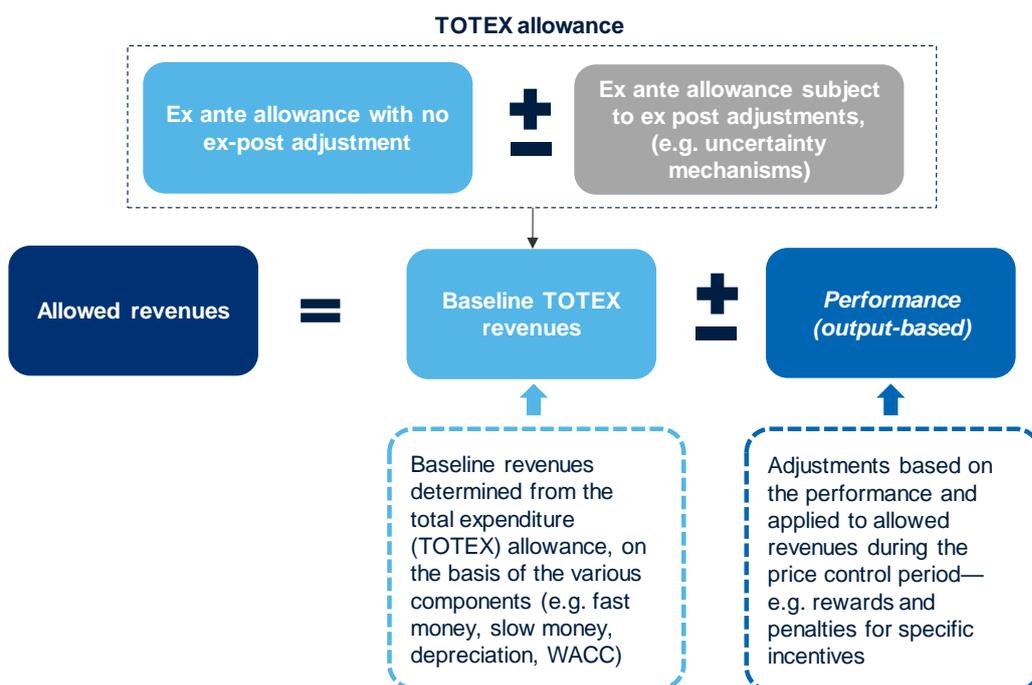
In Great Britain, regulatory practice in setting a TOTEX-based level of allowed revenues can be summarised in the following way (Figure 1.1).

⁸ Ofgem (2011), ‘Handbook for implementing the RIIO model’, October.

⁹ Ofwat (2021), ‘PR14 review: discussion paper on findings’, August, p. 48.

¹⁰ *Ibid.*, p. 49.

Figure 1.1 Building blocks of allowed revenues (RIIO)



Source: Oxera.

Baseline TOTEX revenues represent the key component. In order to set baseline TOTEX revenues, it is necessary to build a baseline TOTEX allowance. The **TOTEX 'ex ante' allowance** can be set in either of the following ways:

- assuming no ex post adjustment, when there is sufficient certainty to set a level of allowed revenues over the entire price control period;
- subject to ex post adjustments. Often, the allowance is subject to uncertainty mechanisms, which represent adjustment mechanisms to deal with uncertainty. These are applied to adjust revenues during the price control in order to manage uncertainty and ensure a fair balance of risks between consumers and operators.

Ex ante allowances require an assessment of the expected efficient level of TOTEX that a company can incur in the future. A wide range of methodologies can be used, including:

- **top-down** approaches (e.g. based on high-level comparisons of cost forecasts between companies, or business units);
- **bottom-up** (based on detailed information from the assessed company—including engineering evidence and management accounting information);
- **business plan review** (e.g. in relation to a company's planned CAPEX schemes, its planning assumptions, cost–benefit analysis, and forecasts).

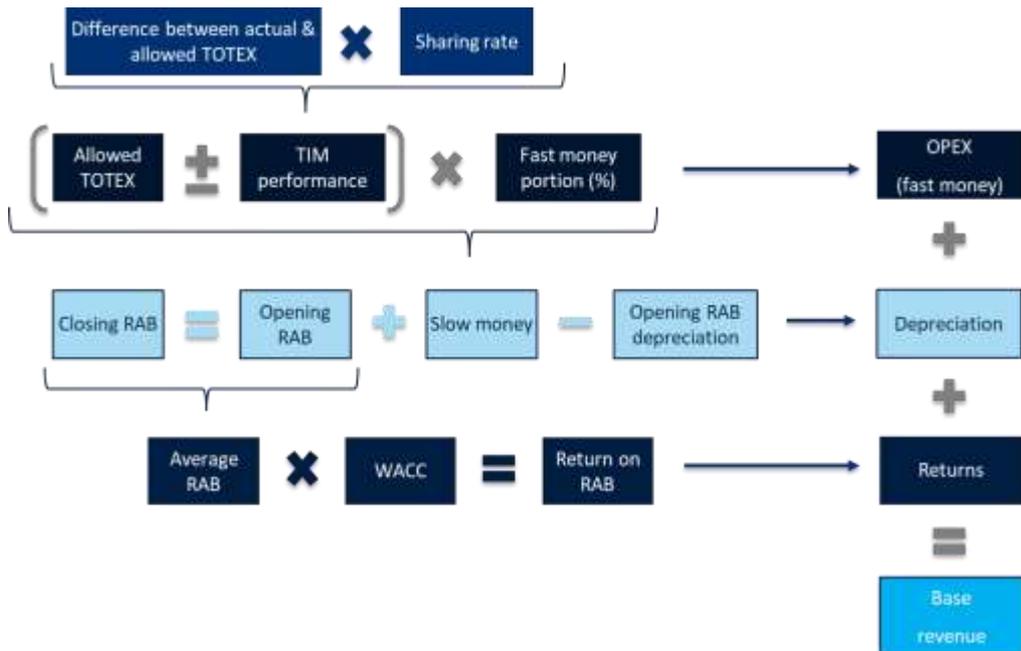
Given that the development of a 'forward looking approach' is beyond the scope of the regulatory process started with Decision 271/2021/R/com, the present report does not explore different ex ante approaches in detail.

In addition to baseline revenues, the RIIO model includes a specific item to account for **performance**, or output-based adjustments, according to rewards

or penalties with respect to the various outputs defined for each network operator.

In order to convert the TOTEX allowance into the baseline level of revenues, a number of steps are required. The most important parameters involved in the baseline computation are the capitalisation rate, according to which the TOTEX allowance is divided into 'fast money' and 'slow money' (i.e. recovered or capitalised into the Regulatory Asset Value – RCV, or RAB),¹¹ depreciation rates, and the allowed cost of capital, WACC. These steps are summarised in Figure 1.2 below.

Figure 1.2 Baseline revenues (TOTEX approach)



Note: 'TIM' stands for TOTEX Incentive Mechanism.

Source: Oxera.

This approach is used to split the total expenditure allowance between 'fast money' and 'slow money' by means of a capitalisation rate (i.e. the portion of 'slow' money). 'Fast money' is financed immediately, while 'slow money' is recovered over time via depreciation and return on the RAB.

Once information on actual TOTEX becomes available, the baseline allowance is revised on the basis of a TOTEX incentive mechanism (i.e. the percentage that a company bears of an under or overspend against allowances) that is common to both CAPEX and OPEX.¹²

In general, allowances are updated on an annual basis. The annual adjustment over the price control period is called the 'Annual Iteration Process' (AIP). The AIP takes into account the companies' annual reports to reflect their activities and financial performance. The AIP is generally carried out by 30 November, and is reflected in the base revenue allowances in the following April.

¹¹ In the Ofgem framework, the asset base is called 'RCV' (regulatory capital value). For simplicity, in this section, we refer to RCV as 'RAB'.

¹² Sharing mechanisms are discussed further in section 2.

1.3.2 Initial considerations on the application of ROSS-base regulation in Italy

The introduction of a ROSS-base framework may require a number of changes relative to the existing approach in Italy.

First, in relation to **efficiency incentives**, the current model is specific to OPEX and it does not consider TOTEX-wide efficiency. According to the current model, at the end of the regulatory period, efficiency gains are shared between network operators and network users in order to set tariffs for the following period.

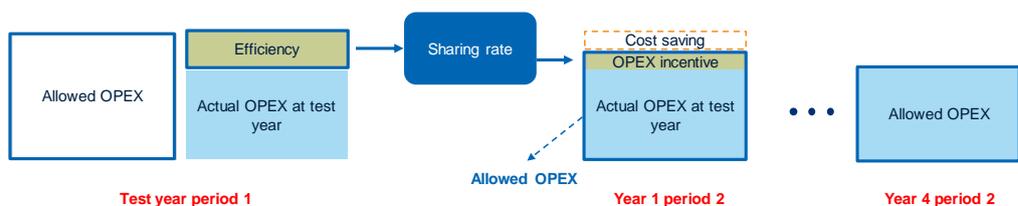
In general, the level of allowed operating costs is established on the basis of the actual recurring costs, determined at a reference year, with a sharing of 50% on any outperformance.¹³ Cases of underperformance are analysed on a case-by-case basis. An efficiency factor ('X-factor') is applied, calculated in such a way as to return to users the greater efficiencies achieved in the previous regulatory period. It is worth noting that the X-factor formula not only considers cost-reduction targets, but also incorporates the profit-sharing mechanism.

In other words, according to the existing cost outperformance mechanism,

- 50% of any OPEX saving is immediately passed on to customers at the end of the period through the new baseline, and is reflected in the level of allowed revenues for first year of the new period;
- the remaining 50% is passed on to customers progressively (for example, in four years) through the X-factor.

Figure 1.3 below represents the cost-sharing mechanism applied in cases of OPEX outperformance, assuming that no cost-reduction targets are set.

Figure 1.3 OPEX cost-sharing mechanism in Italy (illustrative example)



Note: Sector-specific rules may apply. The figure shows a simplified representation of the OPEX outperformance mechanism for illustrative purposes.

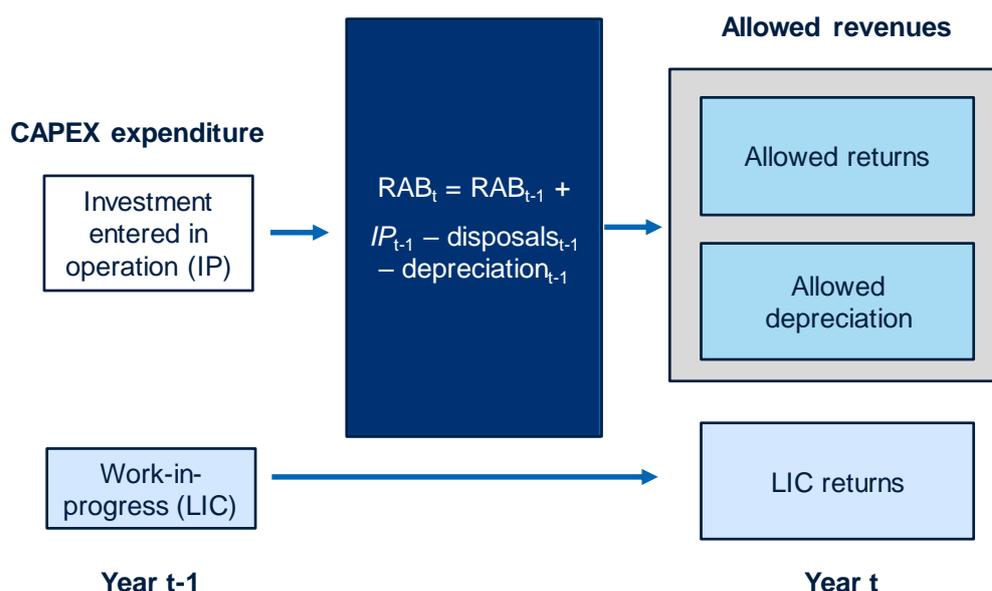
Source: Oxera.

A more detailed representation of the OPEX-sharing mechanism over the full regulatory period is provided in section 2.2.

Second, in relation to the issue of **CAPEX bias**, the existing approach treats CAPEX according to different rules based on this general scheme (although differences may exist across specific regulated sectors).

¹³ Therefore, the out-/underperformance-sharing mechanism is symmetric. For each period-specific level of outperformance, the sharing rate generally decreases in subsequent price reviews.

Figure 1.4 General approach for setting allowed CAPEX in Italy



Note: Figure for illustrative purposes. Sector-specific rules may apply.

Source: Oxera.

According to the regulatory frameworks currently in place in Italy, assets that are in operation (so-called '*incrementi patrimoniali*', IP) are remunerated through both depreciation and return on the RAB.¹⁴ Assets under construction (so-called '*lavori in corso*', LIC, or working in progress CAPEX, WIP CAPEX) are not considered in the RAB but only receive a return, which in some instances can be lower than the allowed WACC. In some cases, assets under construction are only remunerated for a limited number of years and with decreasing rates—for instance, a maximum of four years for electricity transmission and a rate of 5.20% for the first two years, 2.40% for the third and fourth years, and no remuneration afterwards until the asset becomes operational.¹⁵ The lower remuneration represents an incentive for the timely delivery of the CAPEX plans of network operators.

The existing approach controls for progress in CAPEX delivery—i.e. work in progress CAPEX does not result in an increase in allowed depreciation until the investment is fully operational.

Within this context, sections 2 and 3 cover the issues of efficiency and capitalisation, and sections 4 and 5 provide a review on financial issues based on international evidence in ROSS-based approaches. Accordingly, we consider the following matters in turn below:

- cost efficiency incentives (section 2);
- capitalisation approaches for 'slow money' and 'fast money' (section 3);
- monitoring financial performance (section 4).

¹⁴ In particular, the capital remuneration in a given year t is computed on the basis of the existing RAB and the additional investments that became operational in $t-1$. Sector-specific rules may apply—for instance, a two year lag was applied to gas transport before 2017.

¹⁵ For gas transport, assets under construction are remunerated at 5.3%, without time limits for the assets to become operational.

2 TOTEX efficiency incentives and cost-sharing mechanisms

2.1 Introduction

An important component of a TOTEX model is represented by TOTEX outperformance mechanisms, to incentivise network operators to spend below their allowed TOTEX and share any underspend (but also overspend) with consumers.

TOTEX cost-sharing schemes can be seen as risk-sharing mechanisms, which allocate the performance risk between regulated company and customers. The risk-sharing mechanism has implications for the incentives on the regulated company: if a company can retain part of the efficiency savings (and conversely will have to pay for a portion of any inefficiency), it will have an incentive to reduce costs.

The calibration of the risk-sharing mechanism depends on two factors:

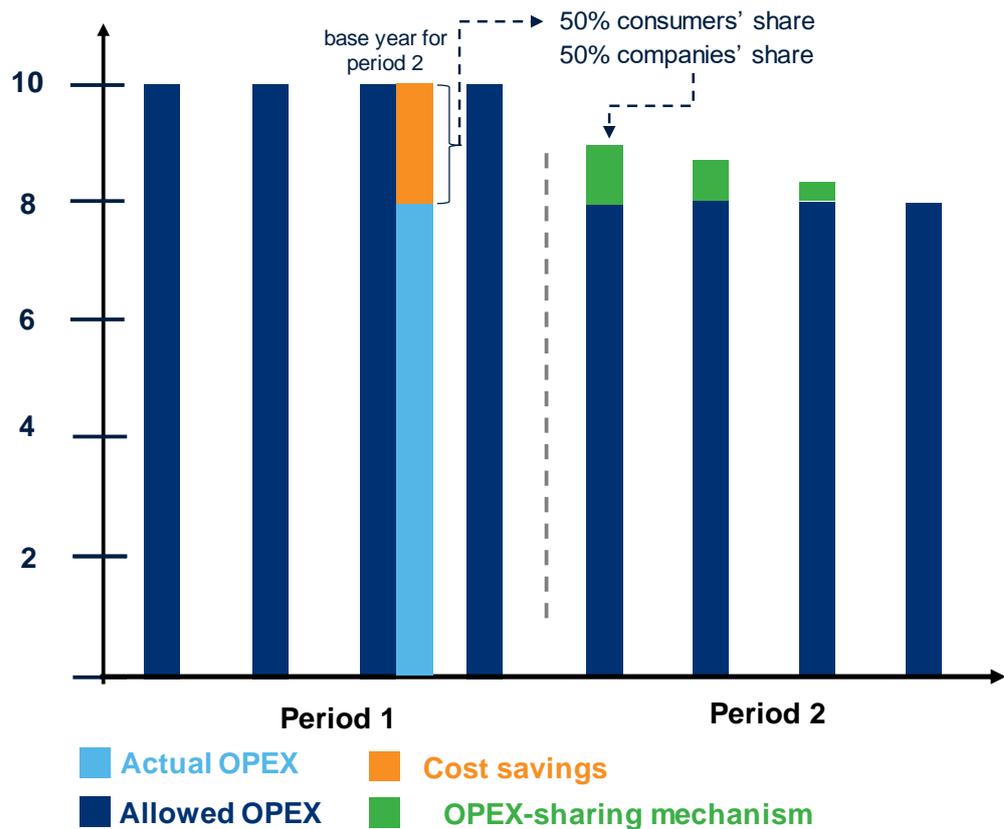
- the size of the overall efficiency savings that are made;
- the proportion of the savings that are passed on to customers (i.e. the size of the savings passed on to consumers).

The approach to setting cost-efficiency targets is beyond the scope of this paper. However, as a general principle, there may be a trade-off between the size of the savings that are achieved and the proportion retained by the firm (the incentive). The present section provides an assessment of the existing incentive scheme applied to OPEX and evaluates alternative mechanisms based on TOTEX.

2.2 Review of ARERA’s current approach

The OPEX-sharing mechanism currently applied in cases of outperformance in the reference year is represented in Figure 2.1 below. For simplicity, the X-factor is assumed to be zero.

Figure 2.1 OPEX-sharing mechanism in Italy (illustrative example)



Note: Figure for illustrative purposes. Sector-specific rules may apply. The figure shows a simplified representation of the OPEX-sharing mechanism. In this example the X-factor is assumed to be zero.

Source: Oxera analysis.

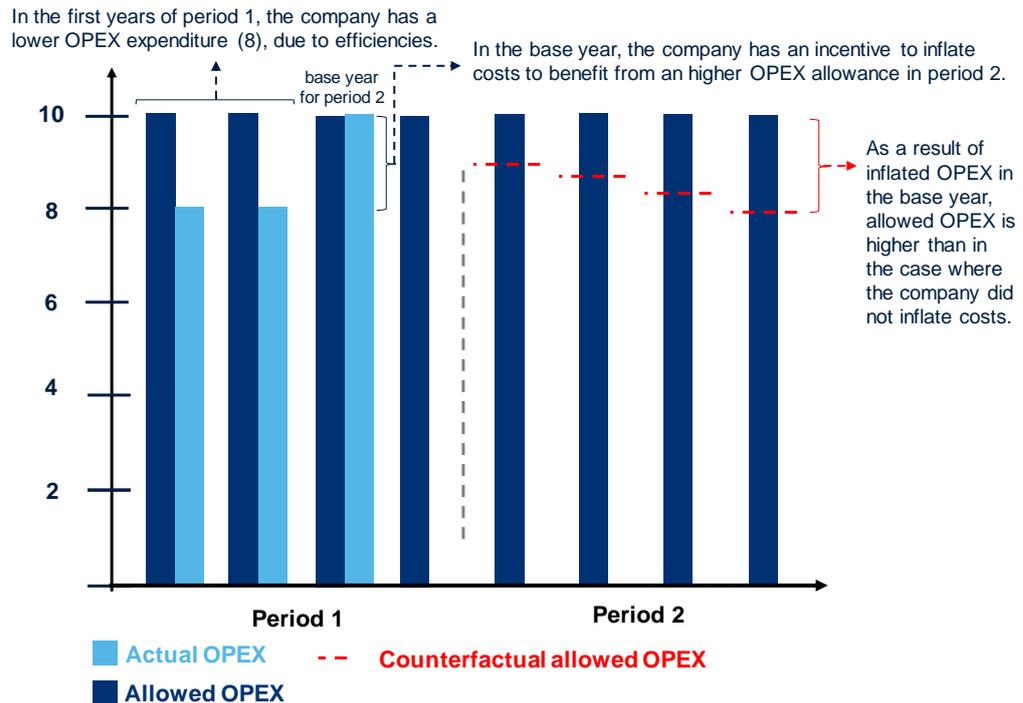
In the first year of the regulatory period, 50% of costs savings in the reference year are passed on to consumers, while the company can retain 50% as an efficiency incentive, which is gradually decreased over the regulatory period, so as to converge to the level of actual costs in the reference year by the end of the regulatory period.

The current approach presents two features.

- The OPEX allowance (before any sharing mechanism) is set with respect to actual OPEX in a 'base year' (typically, two years before the first year of the regulatory period).
- The sharing mechanism is also based on a comparison between allowed costs and actual costs in a 'base' year.

As a result of this, firms may have an incentive to reprofile their expenditure or 'front-load' as much of their efficiency savings as possible and inflate their base year spend. Figure 2.2 provides an illustrative example.

Figure 2.2 OPEX outperformance mechanism in Italy and risks of strategic behaviour (illustrative example)



Note: Figure for illustrative purposes. Sector-specific rules may apply. The chart shows a simplified representation of the OPEX outperformance mechanism. In this example, the X-factor is assumed to be zero.

Source: Oxera analysis.

Under this scenario, the company would achieve and benefit from cost efficiencies in the first two years of the regulatory period. However, if the company incurs spending equal to the level of allowed OPEX in the 'base year', the mechanism would not return any efficiency gain to customers for Period 2. This may result in strategic behaviour on the part of companies. For example, by incurring high OPEX in the 'base' year, companies can achieve a higher level of allowed OPEX in the following regulatory period.

In what follows, we consider two alternatives to the existing approach that could be applied in a TOTEX framework:

- a 'rolling incentive scheme';
- an annual efficiency incentive mechanism—the process for determining the sharing rate has evolved over time, for example in the case of Great Britain, from the Information Quality Incentive (IQI) matrix (RIIO-1) to the business plan incentive (RIIO-2).

2.3 Rolling incentive schemes

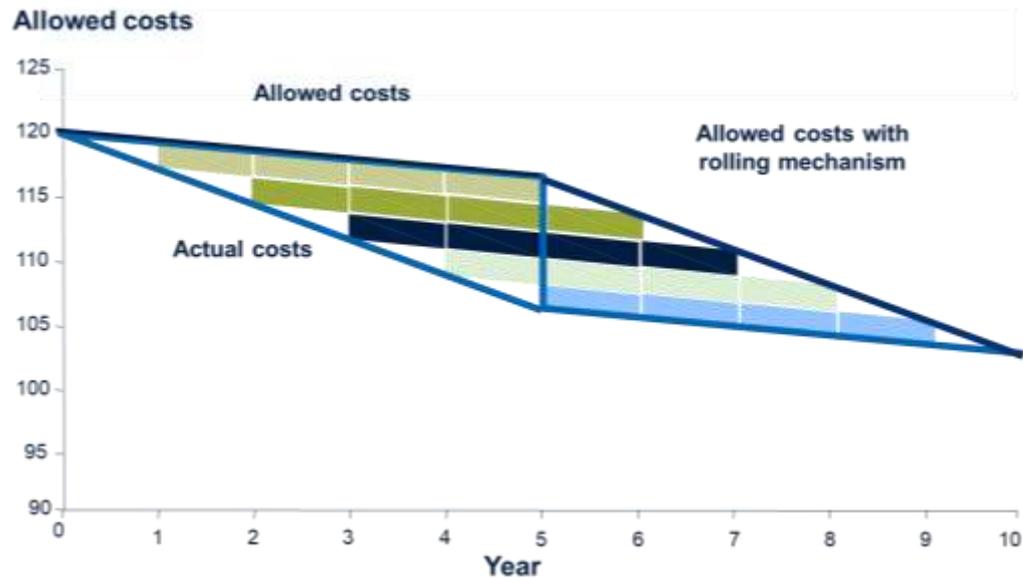
Under a rolling incentive scheme¹⁶ companies can benefit from cost savings for a fixed number of years, regardless of when in the regulatory period the savings have been achieved. Without such a mechanism, the incentive to outperform would be diminished over the course of the price control period as

¹⁶ An example of an early introduction of a rolling scheme is the one in place for price reviews PR04 and PR09 by Ofwat, the water regulator for England and Wales (though it has now been replaced since the introduction of Ofwat's TOTEX framework and the use of an annual efficiency incentive mechanism).

the benefits from outperformance would be kept by the company for shorter periods of time.

If outperformance is realised in years other than the first year, under the rolling incentive mechanism, this outperformance may be retained beyond the regulatory period, for a number of years equal to the duration of the regulatory period. This is illustrated in Figure 2.3 below.

Figure 2.3 Rolling incentive scheme: illustrative example



Note: Figure for illustrative purposes.

Source: Oxera.

Initially, a company has allowed costs that fall over the year control period (dark blue line). The company manages to reduce its costs more over this period (light blue line). Without a rolling incentive mechanism, the regulator would observe costs in the last year of the price control (for illustrative purposes in this chart, year 5) and would set allowed costs for the first year of the second price control based on this level. The efficiency gains made towards the end of the first control would only be retained for a short period of time. Under a rolling incentive mechanism, the gains are retained for a period of five years regardless of when they are made such that allowed costs for the second price control period are given by the dark blue line.

The goal is to equalise efficiency incentives over time such that the time profile of outperformance incentives is the same irrespective of the year when expenditure is incurred.

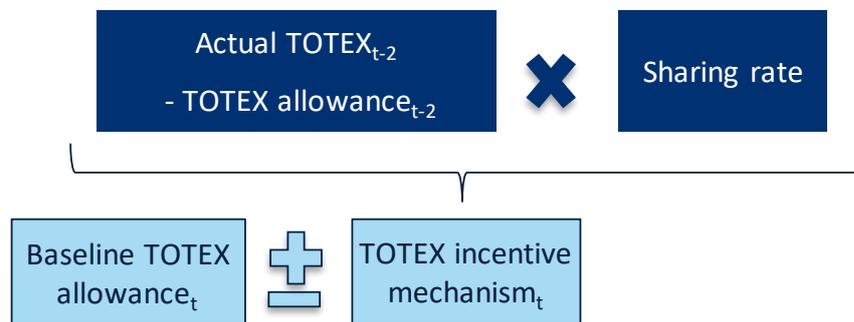
The introduction of the rolling mechanism meant that any savings made were retained over a number of years equal to the price control period (e.g. five years in the example provided), regardless of when in the price control they were achieved, thereby removing this timing distortion. In addition, this change in the regulatory contract strengthened the benefit from outperformance (i.e. increased the size of the carrot) since, on average, companies retained the benefits for longer.

2.4 TOTEX incentive mechanisms (TIMs)

An important component of the RIIO model is represented by TOTEX outperformance mechanisms, to incentivise network operators to spend below

their allowed TOTEX from year to year and share any underspend (but also overspend) with consumers.

Figure 2.4 TIM: illustrative example



Source: Oxera.

The TOTEX Incentive Mechanism (TIM) is the mechanism used in RIIO-1 and RIIO-2 and designed to encourage network companies to improve efficiency in delivery and to ensure that the benefits of these efficiencies are shared with consumers. At the same time, this mechanism gives companies some protection against overspend, since these costs are (partially) shared with consumers. Compared to the scheme in place in Italy, the TIM is calculated with respect to t-2 data for any given year, rather than exclusively with respect to a base year.

The approach for setting sharing rates within the TIM underwent a number of changes in RIIO-1 and RIIO-2.

2.4.1 The RIIO-1 experience: the IQI matrix

In RIIO-1, the IQI matrix was designed to incentivise companies to provide accurate and ambitious cost forecasts in their business plans and used to determine:

- an ex ante IQI 'additional income' reward/penalty (as a percentage of TOTEX), depending on the company's IQI score;¹⁷
- the sharing rate, according to which any under-/overspend is split between consumers and companies.

It is worth noting that, in RIIO-1, Ofgem also used 'fast-tracking' (or early settlement) mechanisms to encourage companies to submit well-justified business plans. Fast-tracked companies received additional upfront income as well as higher incentive rates compared to slow-tracked companies.

The IQI matrix was subject to review for RIIO-2.¹⁸ Overall, Ofgem considered that their business planning incentive scheme presented some limitations.

- Ofgem found limited evidence that the IQI sufficiently influences company behaviour to submit business plans that reflect the best estimate of their likely efficient expenditure.

¹⁷ The IQI score is the ratio between a network operator's forecast TOTEX (adjusted by Ofgem for costs deferred to an uncertainty mechanism and output disallowances and normalised so that they are comparable across companies) and Ofgem's baseline.

¹⁸ See, for example, Ofgem (2018), 'RIIO-2 Framework Consultation', March.

- The IQI matrix was very similar in scope to fast tracking, which may result in a double-counting of business-plan incentives.
- Fast-tracking has the potential to drive improved business plans, but only in sectors where there is adequate diversity of ownership and comparability between the companies.

According to Ofgem’s review, for the IQI to be effective in practice, two conditions must be in place.

- The assessment of a company’s costs needs to be entirely independent of that company’s plan.
- Companies must respond in a purely rational way to the incentive and seek to maximise profits by revealing their most accurate assessment of the costs they believe they will incur.

According to Ofgem, risk aversion, management incentives to beat regulatory targets (rather than maximise profits), and a belief that company forecasts can influence the regulator’s view of costs can outweigh the power of the IQI.

2.4.2 The RIIO-2 experience: the business planning incentive

As a result of Ofgem’s review, the RIIO-2 framework, Ofgem introduced the so-called Business Planning Incentive (BPI).

According to the BPI, the out-/underperformance will be shared with consumers in proportion to the incentive (or sharing) rate, which is specific to each network company and based on the confidence Ofgem has in the efficiency of the costs proposed by the company. The greater confidence that Ofgem has in the proposed costs, the higher the incentive rate. The formula used to determine the incentive rate is the following:

$$\text{Incentive rate (\%)} = \frac{[50\% * \text{confidence metric}] + [15\% * (1 - \text{confidence metric})]}{1}$$

Where the confidence metric¹⁹ is the ratio of high-confidence baseline costs to TOTEX.

- In general, high-confidence baseline costs are those costs for which Ofgem had a high level of confidence in its ability to independently set a cost allowance.
- All other baseline costs would be categorised as lower confidence baseline costs.

Ofgem considered high-confidence baseline costs to be such that the respective cost allowance could be set using information that is substantially independent of cost forecasts provided by companies in their business plans. Companies could put forward supporting information in their business plans to inform Ofgem’s assessment of confidence in submitted costs.

¹⁹ The confidence metric for each licensee is the ratio of high-confidence baseline costs to TOTEX, where the aggregate efficient cost benchmark for high-confidence baseline costs is the numerator and the network company’s overall TOTEX allowance is the denominator. Ofgem (2021), ‘Decision - RIIO-2 Final Determinations - Core Document (REVISED)’, February, p. 131-132.

Not only does the assessment of ‘confidence’ affect the incentive rate, but also a series of monetary rewards (for high-confidence costs) or penalties (for low-confidence costs) during the business planning assessment process.²⁰

The incentive rates in RIIO-2 are in the range 33–50%, with gas distribution networks in the range 49–50% and electricity transmission operators of 33–49%.²¹ This is lower than for RIIO-1. Other things being equal, lower incentive rates reduce companies’ ability to retain any savings, but at the same time they provide less protection to the company against any overspend.

²⁰ In RIIO-2, the business-planning process is based on four steps. In stages 1 and 2, the assessment is on the quality of the business plan. More specifically, stage 1 is used to assess whether the business plan fail to meet the minimum requirements, while stage 2 is used to assess the consumer value propositions (CVP— i.e. bids for a reward on specific aspects of the plan as based on evidence of their additional value for consumers). In stages 3 and 4, the assessment is on the cost forecasts. More specifically, in stage 3, Ofgem determines whether there are any poorly justified low-confidence costs. In stage 4, Ofgem determines any rewards for high-confidence costs.

²¹ NGGT’s (National Grid Gas Transmission) incentive rate is 39%.

3 Overcoming CAPEX bias: slow money and fast money

3.1 Introduction

In order to overcome CAPEX bias, it is important to consider three implementation issues:

- the definition of capitalisation rates—i.e. what is categorised as fast money and slow money by means of a capitalisation rate;
- the depreciation policy;
- the treatment of capital expenditure (CAPEX) that is subject to capitalisation, also considering the specificities of the Italian regime.

3.2 Capitalisation rates

The TOTEX expenditure is categorised as fast money and slow money by means of a capitalisation rate. As a result, some expenses are funded immediately (‘fast money’), and others are funded gradually through revenues recognised over time (‘slow money’) through depreciation and return on capital (RAB).

Capitalisation rates determine, therefore, the proportion of costs added to the RAB with the remainder recovered within the year incurred, affecting financeability.

In principle, capitalisation rates could be fixed ex ante or could be updated ex post (e.g. for cost items under uncertainty mechanisms). In what follows, we consider the precedents by Ofgem and Ofwat.

3.2.1 Ofgem’s approach in RIIO

Under RIIO-1, in order to set the capitalisation rate, Ofgem took into consideration:

- the average of the capitalisation rates estimated by the companies over a period of eight years. The estimates of the capitalisation rates were reported in the business plans of each company and calculated considering as ‘fast money’ the expenses related to assets with a useful life of less than three years, and ‘slow money’ all other expenses.
- the levels of capitalisation used by the companies in the previous tariff determinations;
- the level of technological innovation introduced. Ofgem considered ‘fast money’ investments in innovative assets with a useful life of just over three years motivated by well-detailed business plans.²²

In some cases, like electricity distribution, Ofgem accepted the proposals made by operators to reduce their capitalisation rate.²³ These changes have no effect

²² Ofgem (2013), ‘Strategy decision for the RIIO-ED1 electricity distribution price control- Financial Issues’, https://www.ofgem.gov.uk/sites/default/files/docs/2013/02/riioed1decfinancialissues_0.pdf, p. 30.

²³ For example, for ENWL, from 72% to 68%.

on the overall value of the allowed revenue level, but allow the company to reduce its debt level and improve its cash flows.²⁴

In other sectors (e.g. gas distribution, RIIO-GD1), Ofgem provides for the separate calculation of the capitalisation rate for the so-called ‘replacement expenditure’ or REPEX (e.g. plant replacement costs).²⁵

The RAB value, in addition to the yearly ‘slow money’ value computed through the capitalisation rate, allows companies to postpone part of the expenses incurred during a given year to future years. The capitalisation rate plays a key role in defining the right price balance between current and future consumers. Accurate rates help ensure, over time, that charges are fair and reflect annual and economic investment.²⁶

For RIIO-2, capitalisation rates are set ex ante, based on forecast CAPEX proportions, for each relevant category of expenditure.

For TSOs, the capitalisation rate(s) were set as the average of the five-year forecast CAPEX proportion, for each of the following two categories of expenditure:

- ex ante allowances, including Price Control Deliverables (PCDs). PCDs are defined by Ofgem as a mechanism ‘to capture those outputs that are directly funded through the price control and where the funding provided is not transferrable to a different output or project’²⁷ (see section 3.4 for further detail);
- re-openers and volume drivers.

For gas distribution, the capitalisation rate(s) was set as the average of the five-year forecast CAPEX proportion, for each of the following three categories of expenditure:

- ex ante allowances (including PCDs);
- re-openers and volume drivers;
- REPEX.²⁸

For the ESO, distinct capitalisation rates were set for the first two years of the regulatory period, to be confirmed for subsequent years according to the decisions on the business plan.

Table 3.1 below provides an overview of capitalisation rates by sector.

²⁴ Ofgem (2014), ‘RIIO-ED1: Final determinations for the slow-track electricity distribution companies’, pp. 43–4.

²⁵ Before RIIO-1, Ofgem capitalised 50% of REPEX, whereas the other 50% was expensed in the year it is incurred. In RIIO-1, Ofgem decided to capitalise 100% of REPEX. As a transitional arrangement and to overcome potential financeability issues, Ofgem introduced a separate capitalisation rate.

²⁶ Ofgem (2017), ‘Guide to the RIIO-ED1 electricity distribution price control’, https://www.ofgem.gov.uk/system/files/docs/2017/01/guide_to_riioed1.pdf, p. 61.

²⁷ Ofgem (2019), ‘RIIO-2 Sector Specific Methodology – Core document’, May.

²⁸ For the electricity system operator (ESO), to set a distinct capitalisation rate for each of the first two years of RIIO-2, and to confirm rates for subsequent years alongside decisions on the ESO’s second Business Plan.

Table 3.1 Capitalisation rates in RIIO-1 and RIIO-2

Sector	Type	RIIO-1	RIIO-2
Gas Transmission (TO)	Ex ante allowances (including PCD)	64%	65%
Gas Transmission (TO)	Re-openers and volume drivers	90%	75%
Gas Transmission (SO)	Ex ante allowances (including PCD)	37%	34%
Electricity Transmission	Ex ante allowances (including PCD)	85–90%	78–84%
Electricity Transmission	Re-openers and volume drivers	-	85%
Gas distribution	Ex ante allowances (including PCD)	24–36%	20–44%
Gas distribution	Re-openers and volume drivers	-	70%
Gas distribution	Replacement expenditure	Increasing from 50% to 100%	100%

Source: Ofgem (2021), 'RIIO-2 Final Determinations – Finance Annex (REVISED)', February.

In some instances, specific capitalisation rates are applied at the company level. For example, Table 3.2 provides company-specific capitalisation rates for electricity transmission.

Table 3.2 Comparison of the capitalisation rates for RIIO-1 and RIIO-2 (ET sector)

Company	Ex ante allowances		Re-openers and volume drivers	
	RIIO-1	RIIO-2	RIIO-1	RIIO-2
SHET	90%	78%	NA	85%
SPT	90%	84%	NA	85%
NGET	85%	80%	NA	85%

Source: Oxera based on Ofgem (2021), 'Final Determinations – Finance Annex (REVISED)', February.

The decision to set different rates for different expenditure categories was adopted as a compromise between the companies' preference to set ex ante rates and the need to consider future decisions for re-openers and volume drivers.

The decision to use sector-specific, rather than company-specific rates, for the Uncertainty Mechanism (UM) category, is an attempt to avoid over-capitalisation, which could result in less fast money and possibly hamper company investment and consumer interests. UMs exist to allow price control arrangements to respond to change, so as to protect customers and companies from risk that is not possible to forecast (see section 3.4 for further detail).

In conclusion, Ofgem's approach is to set capitalisation rates on an ex ante basis, considering a wide range of historical and forward-looking evidence. In

some instances, capitalisation rates can vary to reflect company-specific conditions.

Also, while capitalisation rates can be set at different levels depending on the level of uncertainty for specific items, they are not expected to change over the course of the regulatory period. The use of a ‘notional’ ex ante capitalisation rate ensures that companies have no control over the share of TOTEX that goes under ‘fast’ or ‘slow’ money, and therefore that they are indifferent between OPEX and CAPEX solutions.

3.2.2 Ofwat’s approach in PR19

Under the latest periodic review (PR19), Ofwat sets the pay-as-you-go (PAYG) rate to determine the proportion of TOTEX that is considered as OPEX.²⁹ The PAYG rate is the proportion of a company’s TOTEX allowance that is funded through revenues, rather than added to the RAB. The related concept, the ‘RAB run-off rate’, represents the rate at which the RAB is depreciated.

Companies earn revenues through the PAYG share of allowed TOTEX, which is comparable to operating expenditure or current expenses, and RAB run-off (a form of depreciation of regulated assets). When developing their business plans, companies proposed PAYG rates and RAB run-off rates for each of the four price controls (water network, wastewater network, bioresources and water resources). The use of these measures is intended to mirror the standard accounting concepts of operating expenditure, recovered from current customers, and capital expenditure, recovered over the life of the assets. The use of the regulatory measures of PAYG and RAB run-off as an alternative to accounting measures should allow the companies and Ofwat to set the recovery of costs over a suitable period and to address any timing issues.

A company’s choice of PAYG and RAB run-off rates balances the recovery of costs and affects bills for current and future customers.

In its Final Determination for PR19, Ofwat calculated the yearly PAYG rates based on the profile of operating expenditure in allowed TOTEX resulted from its assessment of efficient costs, for each company. Following the assessment, Ofwat increased PAYG rates for 12 companies.

To ensure the financeability of the determinations on the basis of the notional capital structure, Ofwat made amendments to the PAYG and RAB run-off rates to increase in-period cash flows where this is required to improve weak financial ratios.

During the PR19 appeals, the Competition and Markets Authority (the appeal authority) said that the PAYG rate should be based on the ‘natural’ rate, accepting the submission of a disputing company that the decision made implied a higher ‘natural rate’ than it had requested and had been allowed by Ofwat.³⁰

3.3 Depreciation policy

Under a cost-of-service regulation applied to CAPEX, it is possible to apply different depreciation assumptions for specific asset types (e.g. plants, building, pipelines, lines). This approach is currently adopted by ARERA.

²⁹ This is equivalent to Ofgem’s ‘fast money’ in Figure 1.2.

³⁰ Competition and Market Authority (2021), ‘Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited Price Determinations, Final report’, March, para. 106.

Under a TOTEX model, each year a portion of total expenditure is classified as ‘slow money’, and will represent a ‘RAB addition’ that will subsequently be recovered via the depreciation component. In the British application, there is no distinction between different asset types.

As a general rule, under a TOTEX framework the depreciation rate can reflect the average expected economic life of the RAB. By doing so, the interests of existing and future consumers will be fairly balanced.

3.3.1 Ofgem’s approach in RIIO

Following the introduction of the TOTEX approach in DPCR5/RIIO-1, the RAB no longer precisely corresponds to physical assets. Rather, the RAB simply represents the balance of unrecovered financial investment in the networks and the licensee’s share of incentivised out- or underperformance. A return is paid on the RAB through the allowed cost of capital, and the RAB is repaid through depreciation allowances. Therefore, according to Ofgem, the rate of depreciation should be set so that different generations of consumers pay network charges broadly in proportion to the value of network services they receive.

Depreciation policy can also serve as a financeability tool and may reflect considerations around stranded assets. For example, declining demand prospects due to government policy could lead to stranding risk, which can be resolved through faster RAB recovery.

Under a TOTEX regime, depreciation policies can vary:

- depending on the year in which for the RAB addition is in place;
- by sector;
- in the calculation method (e.g. straight-line and accelerated depreciation are possible).

Table 3.3 below shows the RIIO experience.

Table 3.3 Depreciation policy RIIO-1 and RIIO-2

Sector	RIIO-1	RIIO-2
Gas Transmission (TO)	Pre-2002 56 years, front-loaded	Post-2021 45 years, front loaded
	2002–21 45 years, straight line	
Gas distribution	Pre-2002 56 years, front-loaded	Post-2021 45 years, front loaded
	2002–21 45 years, front-loaded	
Electricity Transmission ¹	Pre-2013 20 years, straight line (with backlog recovered over 15 years from 2011)	Post-2021 45 years, straight line
	2013–21 Starting at 20 years, and increasing to 32.5 years in the RIIO-1 period	
ESO		Seven years, straight line
Electricity Distribution	Pre-2015 20 years, straight line	Post-2023 No sector-specific proposals yet. The majority of network companies believe that they should be able to propose different asset lives as levers to improve financeability.
	2015–23 45 years, straight line	

Note: ¹ In electricity transmission, some differences have been in place for some companies.

National Grid Gas Transmission (NGGT) did not agree with the assumed life of 45 years for RIIO-2 RAV additions, suggesting an asset life of 30 years for RIIO-2 additions would be more appropriate. Other network companies did not object to the proposals for depreciation.

Source: Ofgem (2021), 'RIIO-2 Final Determinations – Finance Annex (REVISED)', February. Ofgem (2021), 'RIIO-ED2 Sector Specific Methodology Decision: Annex 3 Finance', March.

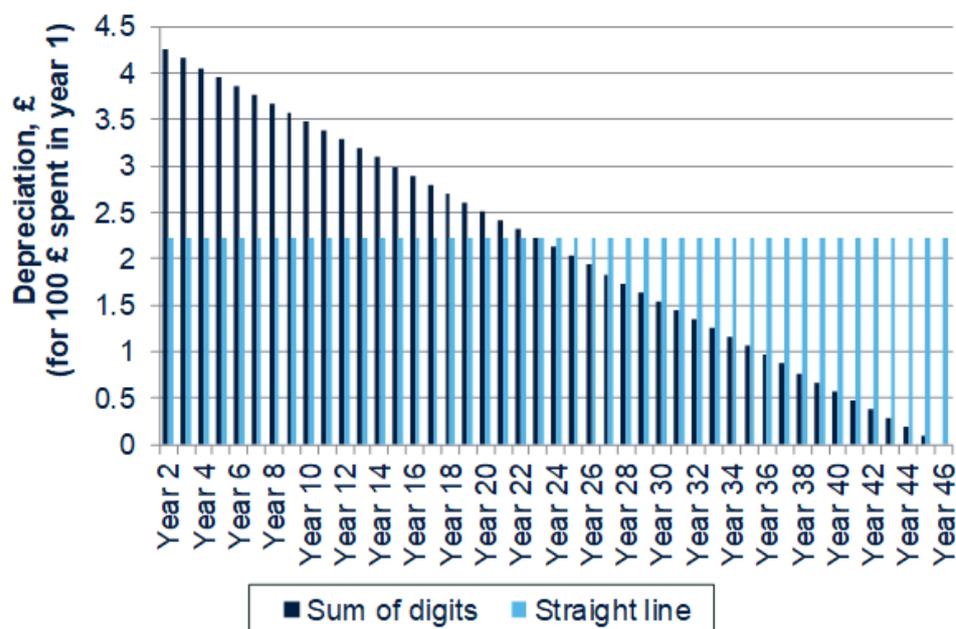
In relation to the possibility of changing depreciation policy over time, the RIIO experience shows some differences, for example, in relation to pre-vesting assets.

In relation to the second point, the RIIO experience shows differences across sectors. For example, during RIIO-1, there has been a slower rate of depreciation for National Grid Gas Transmission (NGGT) compared to the other sectors—new additions to the RAB were depreciated on a straight-line basis over 45-year asset life.

The calculation method can also vary. In addition to straight-line depreciation, the RIIO experience shows forms of accelerated depreciation. For example, the 'sum-of-digits' depreciation is calculated by first adding each year's digits, over the depreciation period. So, for instance, with a depreciation of five years, this would be $1 + 2 + 3 + 4 + 5 = 15$. Next, the depreciation for each year is calculated by dividing the asset's number of useful years left (in year 2, for instance, this would be four), by the sum-of-years' digits (15) (i.e. around 27%). This figure is then multiplied by the Gross Book Value of the asset to give the depreciation for that year. With sum-of-digit depreciation, therefore, the rate of depreciation could be set so that different generations of consumers pay

network charges broadly in proportion to the value of network services they receive.

Figure 3.1 Example for different depreciation policies (sum-of-digits, straight line)



Source: Oxera analysis.

The sum-of-the-digits method provides for a front end-loaded depreciation profile. In the early years, depreciation on existing assets would represent nearly 10% of the RAB (equivalent to an average asset life of a little over ten years), but would decline linearly over a 20-year period.

3.3.2 Considerations on the application of depreciation policy

In conclusion, depreciation assumptions generally reflect the average expected economic life of the RAB. The depreciation rates should also follow an inter-generational equity principle, so that different generations of consumers pay network charges broadly in proportion to the value of network services they receive. Finally, depreciation policy can also serve as a financeability tool and may reflect considerations around stranded assets. Precedents in TOTEX regulation rely on average asset lives being applied to total expenditure, unlike the current Italian regulatory framework that takes into account specific asset categories.

A key implementation point is whether the standard approach in TOTEX regulation can be applied (i.e. if a single asset life is used) and how the Italian regulator may preserve the existing granularity of depreciation by asset life. In general, this could be done by applying 'notional' shares to total depreciation that are in line with the breakdown that would be observed under the current regime, everything else being equal. While this could increase the level of complexity of the TOTEX mechanics relative to the Ofgem precedent, it would ensure that the regulator as well as networks maintain a dataset with information available by asset type, consistent with the existent approach.

3.4 Managing uncertainty

Together with the incentive rate (discussed in section 3) used to share the risk between companies and consumers, there are a number of mechanisms in RIIO-2 to specifically deal with uncertainty.

Notable features of the RIIO regime also include:

- the use of 'uncertainty mechanisms'. These address uncertain workloads, unforeseen circumstances requiring changes to allowances and external factors beyond the control of network companies;
- specific regulation to deal with large investments on onshore transmission assets. Large projects can be more complex and can often involve higher uncertainty and risk of delays.

In what follows, the topic of 'managing uncertainty' and the treatment of large CAPEX investments are explored in detail.

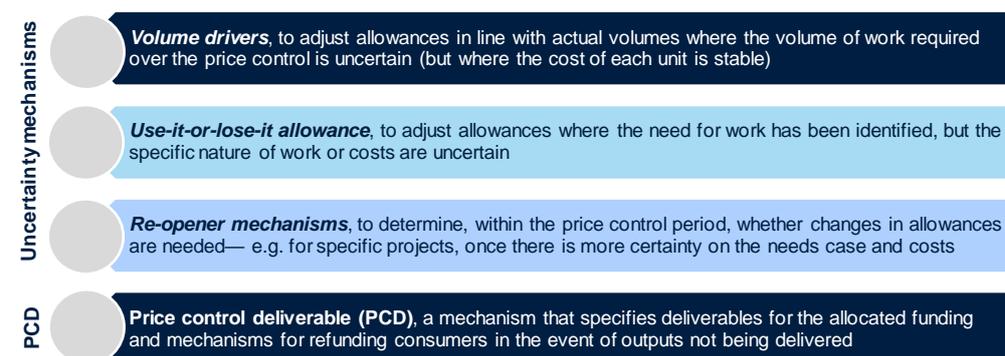
3.4.1 Managing uncertainty in RIIO-2: overall framework

Compared to RIIO-1, RIIO-2 placed greater emphasis on uncertainty mechanisms, which also means that larger proportions of allowances are linked to uncertainty mechanisms. In RIIO-2, around 50% of baseline TOTEX for GDNs and around 70% of baseline TOTEX for TOs is linked to mechanisms, such as PCDs and volume drivers, to ensure that companies are only paid for what they deliver.³¹

RIIO-2 includes both 'common' uncertainty mechanisms, defined by Ofgem and applied to either all sectors (i.e. cross-sector uncertainty mechanisms), all companies in a given sector (i.e. sector/specific), or as a result of specific proposals by companies (i.e. bespoke).

In RIIO-2, there are five main types of uncertainty mechanisms, summarised in the Figure 3.2 below.

Figure 3.2 Main types of uncertainty mechanisms and price control deliverables



Note: Other examples of uncertainty mechanisms include indexation and pass-through.

Source: Ofgem (2020), 'RIIO-2 Final Determinations Core Document', December.

Specific uncertainty mechanisms to deal with large investments are further analysed in the following sections.

³¹ Ofgem (2021), 'Decision - RIIO-2 Final Determinations - Core Document (REVISED)', February, p. 42.

Volume driver. This is used to adjust allowances in line with actual volumes, where the volume of works required over the price control is uncertain, but the cost of each unit is stable. Table 3.4 below provides an overview of some volume drivers applied in RIIO. A full list is provided in appendix A1.1. Table A1.1 presents the full list of volume driver mechanisms applied in RIIO-1 and RIIO-2.

Table A1.1 Volume driver mechanisms in RIIO-1 and RIIO-2

Table 3.4 Examples of volume driver mechanisms in RIIO-1 and RIIO-2

RIIO period	Volume-driver mechanism	Description	Sector
RIIO-1	Generation connections	Volume driver to adjust baseline expenditure each year for deviations in generation capacity connections from annual baseline profile, including RPEs adjustment	ET
RIIO-1	Wider reinforcement works	Mechanism based on delivered wider works outputs (additional transfer capability) that meet Network Development Policy (NDP) criteria and funded using boundary specific unit costs and delivered outputs	ET, GT
RIIO-2	Demand and generation connection volume drivers	An automatic mechanism to flex ET allowances	ET
RIIO-2	Incremental Wider Works	Funding through an automatic mechanism to undertake required incremental wider works investments	ET
RIIO-2	OPEX escalator	OPEX escalator to reflect changes in CAPEX through UMs	ET, GT

Source: Oxera based on Ofgem (2021), 'RIIO-2 Final Determinations - NGET Annex (REVISED)', February; Ofgem (2021), 'RIIO-2 Final Determinations – GD Sector Annex (REVISED)', February. Ofgem (2012), 'RIIO-T1: Final Proposals for National Grid Electricity Transmission and National Grid Gas. Final decision – Overview document', December.

Looking, for example, at demand and generation connections, volume drivers are used to ensure appropriate funding to (electricity transmission) companies when required to undertake important works to connect new generators or new demand to the network, while managing the uncertainty associated to these expenses.

The volume driver terms are included in the calculation of the allowance, according to the operator's special conditions. For both generation and demand connections:

- the allowance is computed as the product of the unit cost allowance and the difference between the actual and the baseline capacity;
- the profile of the allowance provided via the volume driver will be a percentage of the total allowance for the project, in order to ensure that funding is made available as a project progresses.³² The efficient costs of

³² This percentage will be based on a standard construction expenditure profile provided by the companies. In particular, a flat four-year profile will apply to both SP Transmission (SPT) and Scottish Hydro Electric Transmission (SHET) (25% per annum). For National Grid Electricity Transmission (NGET), the following profile will apply to the delivery of new generation connections: 16.0%/31.5%/31.5%/21.0%. For new demand connection projects, the following profile will apply: 16%/26%/37%/21%.

the delivered output in a given year will be profiled over the relevant price control years using the agreed four-year profile.

The effect of these conditions is to adjust revenue to fund the expenses delivered during the current price control period and those forecast for the first two years of the following regulatory period.

Through the AIP, recalculations are performed each year to ensure that maximum allowed revenue and income received from customers through the connection charging methodology match the recalculated total allowance.

The OPEX escalator is a volume-driver mechanism used to provide additional allowance for capital expenditure. For example, as the CAPEX allowance associated with specific uncertainty mechanisms increases, a portion of allowed OPEX (related to operational activities, so-called 'closely associated indirect costs') is increase by a pre-determined share.

Use-it-or-lose-it (UIOLI) allowance. This uncertainty mechanism is applied when the need for works has been identified, but the specific nature of work or costs are uncertain. The UIOLI allowance gives the network operator flexibility in delivering qualifying activities, while ensuring that customers only pay for work undertaken. Actual expenditure can be recovered only if the conditions set ex ante are met and within a predefined cap. The TOTEX Incentive Mechanism does not apply on UIOLI allowances, since any underspend is returned to consumers and any overspend will be covered by the company.

Key examples from RIIO-1 and RIIO-2 are shown in Table 3.5. The full list of UIOLI allowances applied in RIIO-1 and RIIO-2 is provided in appendix A1.2.

Table 3.5 Examples of UIOLI allowances in RIIO-1 and RIIO-2

RIIO period	UIOLI mechanism	Description	Sector
RIIO-1	Network Innovation Allowance	Innovation funding for small projects with companies self-certifying against published criteria	Cross-sector
RIIO-1	Worst served customer mechanism	Conditional allowance to improve the reliability of service experienced by 'worst served' customers	ED
RIIO-2	Net zero and re-opener development UIOLI	To enable net zero-related development work and small value net zero facilitation projects to go ahead	Cross-sector
RIIO-2	Network Innovation Allowance	To enable smaller-scale innovation projects that relate to the energy system transition (and/or consumers in vulnerable situations)	Cross-sector
RIIO-2	Net zero Carbon Construction	To fund offsetting in carbon emissions to achieve net zero on capital construction projects and claw back any unused funding	ET

Source: Oxera based on Ofgem (2020), 'RIIO-2 Final Determinations – Core Document', December and sector-specific decisions.

Re-opener mechanisms. Re-openers provide the opportunity for network companies to request amendments in allowances, outputs, or delivery dates during the price control, when there is more certainty.

The main benefit is that re-openers protect both companies and consumers, since there is no need to set allowances when costs are very uncertain and changes can be agreed at a later stage.

In RIIO-2, re-openers were characterised by the following features.

- A shorter application window of one week, compared to one month in RIIO-1.
- Adjustments to allowed revenues can be made only if the materiality thresholds of 0.5% of annual average ex ante base revenue is met.

Specific re-openers include:

- **Coordinated Adjustment Mechanism (CAM)**, which reallocates activities and associated responsibilities and allowances from one licensee’s price control to another who can deliver that output/project with greater overall value for consumers. This mainly refers to potential assets or infrastructure solutions on a network. The CAM can only be triggered by network companies on a voluntary basis;
- **net zero re-opener**, which allows for changes to the price control allowances related to the achievement of net zero. This is a cross-sector uncertainty mechanism, which can be triggered at any time during the price control period, but only by Ofgem;
- **net zero pre-construction and small projects re-opener**, designed to allow gas companies to undertake design and construction work which is not material enough to be considered within the net zero re-opener but too big for the UIOLI. This is specifically intended for projects of small value but potentially high impact. The materiality threshold is £1m.

Price Control Deliverables (PCDs). These are one of the three types of outputs components³³ in RIIO-2 and specify the deliverables for the allocated funding and mechanisms for refunding consumers in the event of outputs not being delivered. Ofgem has defined two types of PCDs linked to baseline allowances:

- **mechanistic PCDs** that can be linked to defined volumes of work and allow recovery of undelivered work based on unit costs;
- **evaluative PCDs** where the exact work is not clear and an in-depth assessment is required. In this case, there is more flexibility in the output and how to deliver it.

For PCD, the allowance is linked to the actual delivery of prespecified outcomes. If the output is not delivered, not delivered on time, or not delivered according to the ‘standards’ required, the level and/or the time of allowances is adjusted accordingly.³⁴

³³ The RIIO-2 outputs are categorised into three components: (i) licence obligations (i.e. minimum standards); PCDs; and output delivery incentives (to drive service improvement through reputational and financial incentives).

³⁴ For example, if the PCD output has been ‘delayed’, then allowances will be reprofiled according to the actual delivery. If the PCD output has been ‘partially delivered’, then the allowances will be adjusted to take into account the share of output delivered. If the PCD output has been ‘not delivered’, then allowances will be reduced by the full amount associated to the PCD (efficient costs of reasonable and necessary works undertaken can be recognised—e.g. engineering assessment). See Ofgem (2021), ‘Price Control Deliverable Reporting Requirements and Methodology Document: Version 2’, March.

Table 3.6 Examples of PCD in RIIO-2

PCD	Description	Sector
Physical Security	Funding to ensure that the network operators deliver physical security upgrades at sites designated Critical National Infrastructure	Cross-sector
Network Asset Risk Metric (NARM)	Funding related to the Network Asset Risk Metric (NARM) outputs that network companies will be required to deliver during RIIO-2	Cross-sector
Cyber Resilience OT and IT	Funding to reduce risk, improve cyber resilience and response outcomes on the networks and comply with relevant regulations	Cross-sector
Large Project Delivery (LPD)	Mechanism to incentivise the timely delivery of large transmission projects	ET
Incremental Wider Works	Mechanism to adjust allowances should the defined deliverables for the Incremental Wider Works projects be not delivered in full	ET
Redundant assets	Funding for NGGT to decommission network assets that are now redundant (i.e. asset sites, customer sites and compressors)	NGGT
Commercial Fleet EV PCD	Funding to enable operators to convert their commercial vehicle fleets to electric vehicles (EVs) or other zero-emission equivalents	GD, all

Source: Oxera based on Ofgem (2020), 'RIIO-2 Final Determinations – Core Document', December, sector-specific and company-specific decisions.

The full list of PCDs applied in RIIO-2 is in appendix A1.3.

Overview. Overall, each of these mechanisms has pros and cons, which are summarised in Table 3.7.

Table 3.7 Pros and cons of uncertainty mechanisms (UMs) and Price Control Deliverables (PCDs)

UM	Key purpose	Pros and cons
Volume driver	Where there is uncertainty in the volume of certain types of work that will be required over the course of a price control (but where the cost of each unit is stable) Example: volume driver to adjust baseline expenditure each year for deviations in generation capacity connections	+ simple implementation when there is limited uncertainty over the evolution of unit costs – it may not capture uncertainty with broader policy and technology-related events that may affect specific investments
Use-it-or-lose-it	To adjust allowances where the need for work has been identified, but the specific nature of work or costs are uncertain Example: mechanism to fund offsetting in carbon emissions to achieve net zero on capital construction projects and claw back any unused funding	+ flexibility for the companies and protection to customers, which will receive back unspent allowances – disincentives to over-delivery that could potentially result in higher quality/outcomes for consumers, as companies must bear any overspend
Re-opener	Where there is uncertainty as to both prices and quantities (and/or the economic needs case is not proven, or the scope of expenditure is unclear) at the start of the control period Example: net zero re-opener	+ can deal with any changes in the technology, regulatory and/or risk landscape – implementation costs in terms of resources required to assess whether costs should be allowed
Price Control Deliverables	If the scope of work has the potential to change during the control period so that allowances are no longer required Example: mechanism to ensure that allowances can be adjusted downwards if there is no longer a need to develop one or more large project	+ clarity between baseline allowances and associated outputs; companies are only paid for what they deliver – they may require an evaluative assessment which may represent a regulatory burden

Source: Oxera.

3.4.2 Managing uncertainty for large investments in the RIIO regime

RIIO-1. Given the larger uncertainty and greater complexity associated with large investment projects, especially in electricity transmission, the RIIO regulatory framework includes specific mechanisms to deal with these projects and manage the issue of CAPEX delays. These mechanisms usually take the form of volume drivers or re-openers, applied for investments above a given threshold.

As part of the RIIO-T1 control process, Ofgem introduced two different uncertainty mechanisms to deal with large investment projects, called 'wider works', in electricity transmission (NGET price control determination is used as a reference):

- **the Wider Works volume driver**, applied to wider works outputs—i.e. additional transfer capacity, that meet Network Development Policy (NDP) criteria. These projects are funded through specific unit cost allowances set

at the beginning of the regulatory period, applied to the outputs actually delivered, and included in the baseline allowances;³⁵

- **the Strategic Wider Work (SWW) within period determination**, applied to very large reinforcement outputs—i.e. those costing more than £500m.³⁶ The cost thresholds to define SWW outputs varies between TSOs, see the following table.

The SWW could also be applied to other 'smaller' wider works which did not meet the NDP criteria. For NGET, also the Hinkley-Seabank reinforcement has been included among SWW, given the size of the work and the uncertainty around new nuclear generation.³⁷

Table 3.8 Cost thresholds for SWW outputs

Transmission Operator	Cost threshold (£m)
SHET	50
SPTL	100
NGET	500

Note: SHET: Scottish Hydro Electric Transmission Plc. SPTL: Scottish Power Transmission Ltd.
 Source: Ofgem (2017), 'Guidance on the Strategic Wider Works arrangements in the electricity transmission price control, RIIO-T1', November.

Rather than providing a risk-adjusted return or revenue uplift for higher-risk projects, Ofgem sought to 'de-risk' networks' exposure from SWW by delaying the quantification of expenditure allowances until good information about cost exposures was available.

The SWW mechanism allows TOs to trigger a regulatory assessment of their proposals for a wider reinforcement, notifying Ofgem that they intend to do so. If Ofgem positively assesses the proposal, a new SWW output will be defined and TOs allowed revenues will be adjusted to ensure efficient costs for delivery are recovered.³⁸ The SWW therefore allows for a case-by-case assessment, at a time when sufficient information is available.

Adjustments to allowed revenues approved by Ofgem in line with the SWW mechanism would become effective through the AIP, which takes place each year in the autumn. If allowed expenditures are not updated before the TO starts to incur delivery costs for approved SWW, allowances would be amended retrospectively in the following AIP, with a time value of money adjustment.

If outputs are not delivered on time and the TO could be held responsible for this, then the delay could represent a breach of the licence condition. In this case, financial penalties may be applied. An application of the SWW mechanism can be found in Appendix A2.

Competition. It is worth mentioning that during RIIO-1, Ofgem has proposed treating projects for construction of transmission assets where none currently

³⁵ Ofgem (2012), 'RIIO-T1: Final Proposals for National Grid Electricity Transmission and National Grid Gas. Final decision - Overview Document', December, para. 3.52.

³⁶ Ibid., para. 2.115.

³⁷ Ibid., para. 4.142.

³⁸ Ofgem (2017), 'Guidance on the Strategic Wider Works arrangements in the electricity transmission price control, RIIO-T1', November, paras 1.14–1.15.

exist, or where the new assets will fully replace existing ones, as subject to a competitively appointed transmission owner (CATO) regime.³⁹ This is designed to capture projects that are worth £100m or more, and would therefore potentially introduce competition for delivery of SWW outputs instead of assuming that these works will be delivered by NGET.

RIIO-2. The mechanisms used in RIIO-2 are slightly different, and take the form of a Large Project Delivery (LPD) and a Large Onshore Transmission Investment (LOTI) re-opener. These are particularly relevant for electricity transmission.

Large Project Delivery (LPD). The LPD is a combination of:

- a financial output delivery incentive (ODI-F)—i.e. a mechanism to drive service improvement through financial incentives;
- a price control delivery (PCD)—i.e. a mechanism which specifies deliverables for the allocated funding and mechanisms for refunding consumers in the event of outputs not being delivered.⁴⁰

The LPD financial ODI framework may be applied to large projects—i.e. those with a value of £100m or higher. The aim of the mechanism is to incentivise timely delivery of these projects, thus minimising consumer detriment from delays.

In order to remove any benefit that a network operator can have from delays, two possible approaches are foreseen:

- re-profiling of the allowances to reflect the actual expenditure;
- a milestone-based approach—i.e. setting project allowances on the basis of specific and pre-agreed milestones. The allowances would be granted only once the milestone has been reached.

Moreover, a ‘project delay charge’ could also be applied.⁴¹ The application of the LPD mechanism and the specific form (e.g. performance measure, target, incentive value) will be defined on a project-by-project basis during RIIO-ET2.

For projects costing more than £100m that have been granted baseline allowances or set as PCD in the Final Determinations, Ofgem specified that the re-profiling of allowances will apply to any project delivered late, while the project delivery charge will not be applied.⁴²

³⁹ Ofgem’s stated rationale for the introduction of the CATO regime is the following: ‘In previous policy reviews, we identified that the introduction of competition to onshore high-voltage transmission assets would create significant benefit for consumers through capital and operational cost savings on specific projects. As well as cost savings, it will also provide us with cost benchmarks that may be helpful in our regulation of monopoly delivered networks. We also expect that competition will lead to increased innovation across the project development and operations process, which may be beneficial to consumers in other ways (e.g. through identifying efficiencies for future project development)’—see Ofgem (2016), ‘Quick Guide to the CATO Regime’, November 2016.

⁴⁰ See Ofgem (2020), ‘RIIO-2 Final Determination – Core Document’, December.

⁴¹ Ofgem (2021), ‘RIIO-2 Final Determination Electricity Transmission System Annex (REVISED)’, February, para. 2.99.

⁴² Because this is a new mechanism and it is possible that companies were not aware of it when negotiating their contracts.

In the Final Determinations, Ofgem retains the ability to extend these mechanisms also to gas distribution and gas transmission and the option to apply the milestone-based approach under the LPD framework.⁴³

Large Onshore Transmission Investment (LOTI) re-opener. This is an uncertainty mechanism foreseen for electricity transmission, applicable to strategic investments greater than £100m. This takes the form of a re-opener, which can be triggered at any time during the price control.⁴⁴

This mechanism aims to ensure that TOs are funded to undertake the large investments needed on the network, while allowing Ofgem to assess the project at a point when ‘needs’ case and costs are less uncertain.⁴⁵ The LOTI mechanism is similar to the Strategic Wider Works mechanism used in RIIO-1.⁴⁶

Both of these mechanisms provide companies with some flexibility, allowing for changes in their allowed revenues depending on works carried out during the price control. At the same time, the LPD financial ODI incentivises companies to deliver on time.

3.5 Work-in-progress CAPEX

3.5.1 General approach

In the RIIO model, costs are added to the RAB, according to the capitalisation rate, in the same year as they are incurred. This can be seen in Figure 3.3 below.

⁴³ Ofgem (2021), ‘RIIO-2 Final Determination Electricity Transmission System Annex (REVISED)’, February, paras 2.101 and 2.105.

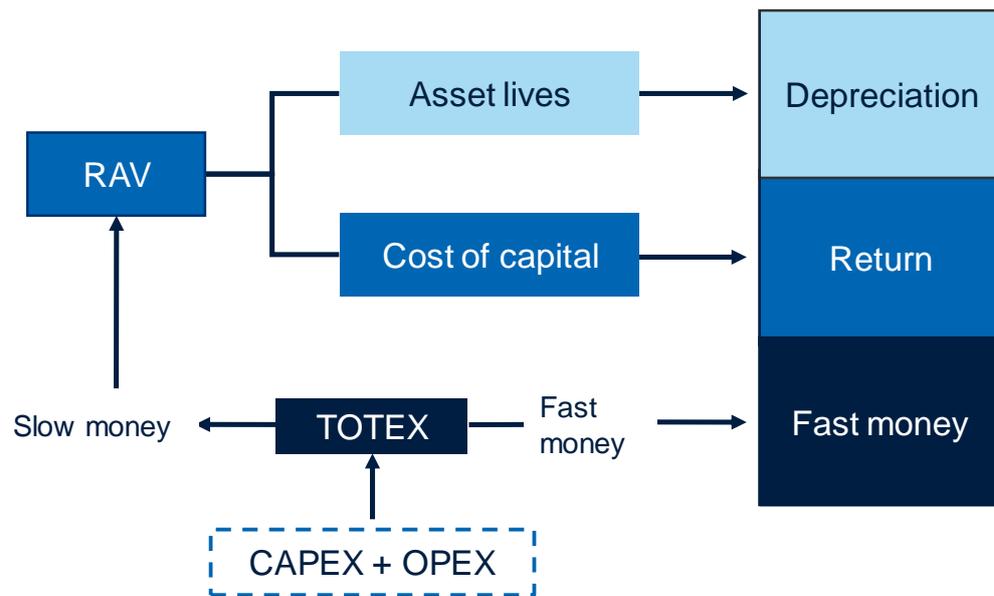
⁴⁴ Ofgem (2020), ‘RIIO-2 Final Determination – Core Document’, December, p. 87; Ofgem (2021), ‘RIIO-2 Final Determination Electricity Transmission System Annex (REVISED)’, February, paras 4.29–4.34.

⁴⁵ The LOTI re-opener consists of a four-stages assessment process: eligibility to apply, initial needs case, final needs case and project assessment. See Ofgem (2021), ‘Large Onshore Transmission Investments (LOTI) Re-opener Guidance and Submissions Requirements Document’, March.

⁴⁶ See, for example, Ofgem, ‘Onshore transmission project delivery’,

<https://www.ofgem.gov.uk/publications/extending-competition-electricity-transmission-tender-models-and-market-offering>.

Figure 3.3 Building blocks of allowed revenues



Source: Oxera.

At the end of the year, the operator receives a return on the costs incurred for assets under construction (included in the 'slow money' pot), based on the same cost of capital defined in the price control determination.

Over time, the transmission operator recovers these costs through the regulatory depreciation, based on the defined asset life, starting from the year after costs were incurred. These costs are therefore recovered in the same way as CAPEX costs of built assets—i.e. through the regulatory asset base.⁴⁷

This general approach is therefore different to the one currently in place in Italy, which distinguishes between 'operational' assets and assets 'under construction'.

3.5.2 Treatment of work in progress CAPEX for large investments in the RIIO regime

Electricity transmission in the UK provides an example of possible treatment of work-in-progress for large investments. Ofgem applies three different regulatory regimes, depending on the type of asset/activity: onshore transmission, offshore transmission or interconnectors. These regulatory regimes foresee a different treatment of work-in-progress.⁴⁸

Onshore transmission. Investments in onshore transmission assets fall within the RIIO regulatory regime. These investments are recovered through the TOTEX approach, over the established control period (eight years in RIIO-1 and five years in RIIO-2). There is not any difference in the treatment of work in progress CAPEX and assets already in operation.

Moreover, for projects meeting certain criteria—i.e. high-value (£100m or greater CAPEX), new and separable projects, Ofgem applies a 'late

⁴⁷ If actual costs differ from the assumed level, then the TOTEX incentive mechanism applies to share any over-/underperformance between the network operator and consumers.

⁴⁸ For a detailed explanation of the three regulatory regimes, see, for example, Ofgem (2013), 'Open letter – Offshore electricity transmission and interconnector policy: proposed scope and timetable for review of interest during construction', May.

competition’ model.⁴⁹ This is, for example, the case of the Competitively Appointed Transmission Owner (CATO) regime, where different operators compete in a tender to own and operate onshore transmission assets.

In the tender, CATOs compete for an annual revenue stream. This revenue stream, which is set to ensure the principles of economic and efficient cost recovery and which generally is not subject to changes or re-openers. In this approach, the cost of capital implicitly covers also work-in-progress CAPEX.

Ofgem also introduced performance incentives for CATOs, including ‘paying on completion’, meaning that CATO revenue stream usually starts only once construction is complete. This is specifically done to incentivise CATOs to complete construction on time.⁵⁰ Some exceptional circumstances for earlier payments could be allowed, if justified.⁵¹

Offshore transmission. Offshore transmission assets are competitively tendered out through the Offshore Transmission Owner (OFTO) scheme. For generator-built projects, offshore generators are responsible for the development and construction of transmission assets that connect the offshore generator to the onshore transmission grid. However, generators are not allowed to own transmission assets.^{52,53} Therefore, once construction is complete, they need to transfer these asset to an OFTO, selected through a competitive tender, which is responsible for making these systems operational.

In these cases, Ofgem applies a different cost of capital on work in progress depending on the interest during construction assumed. In particular, Ofgem determines the transfer value which the OFTO will pay to the offshore generator, based on its assessment of the costs which should have been ‘economically and efficiently incurred’⁵⁴ for the completed offshore transmission asset.

The final transfer value is paid to the offshore generator in a one-off payment. Therefore, once construction is completed, the generator is reimbursed, in cash, the economical and efficient costs incurred during construction, which include both CAPEX and Interest During Construction (IDC). The allowed IDC is the lower of an explicit capped rate defined by Ofgem and the rate proposed by the offshore generator.⁵⁵

⁴⁹ See Ofgem (2020), ‘RIIO-2 Final Determination – Core Document’, December, p. 117.

⁵⁰ Ofgem (2016), ‘Extending competition in electricity transmission: tender models and market offering’, August, paras 3.39–3.40.

⁵¹ For example, when construction period is longer than 3–5 years, or when projects are developed in stages. *Ibid.*, para. 4.5.

⁵² Ofgem (2018), ‘TNUoS charging for offshore generators and the Offshore Transmission Owner regime’, December.

⁵³ Neither onshore TOs are allowed to own offshore transmission assets. *Ibid.*

⁵⁴ Ofgem (2013), ‘Open letter – Offshore electricity transmission and interconnector policy: proposed scope and timetable for review of interest during construction’, May.

⁵⁵ In 2013, Ofgem committed to annual reviews of the IDC to reflect market conditions. Later, in 2017, Ofgem decided to adopt a different methodology to compute the IDC on the basis of the approval stage of the projects. See Ofgem (2018), ‘Review of the methodology for the calculation of the Interest During Construction for Offshore Transmission and future Interconnectors granted the Cap & Floor Regime’, February.

The IDC cap rates applicable during 2020–21 are the following: 6.81% (pre-tax, nominal) for offshore transmission and 2.64% (vanilla, real-RPI) for interconnector projects, on the cap and floor Window 2, reaching the Final Investment Decision during 2020–21. See Ofgem (2020), ‘Decision on Interest During Construction (IDC) rates to be applied during 2020–21 to offshore transmission projects and electricity interconnectors granted the cap and floor regime’, April.

In practice, funding and efficient and economic CAPEX costs incurred during construction are entirely reimbursed post construction, when assets are transferred.

Once the assets have been transferred, the generator is liable for local Transmission Network Use of System Charges (TNUoS). At the same time, the OFTO is granted an annual revenue stream from Ofgem. This is paid by National Grid Electricity System Operator (NGESO), from TNUoS revenues, and mostly comes from the amount paid by the generator that is using the OFTO assets, while a smaller part is paid by all TNUOs consumers through the residential tariff.⁵⁶

Interconnectors. A third regulatory regime applies for interconnectors. This has been first applied to the project NEMO, the interconnector between GB and Belgium. This framework allows the operator to recover economic and efficient CAPEX costs incurred. Cost recovery takes place after an ex post cost assessment and the allowance includes an explicit rate for the defined IDC.⁵⁷

The economic and efficient costs incurred during construction form the opening RAB. The IDC is added to CAPEX costs in the RAB and this opening RAB depreciates over the length of the regime (20 or 25 years).

The depreciation level contributes to the cap and floor levels. The floor ensures that economic and efficient costs incurred during construction are always fully recovered over the length of the scheme.

3.5.3 Consideration of potential applications in Italy

In general, the existing approach in Italy presents some significant differences compared to the RIIO precedents, in that it controls for progress in CAPEX delivery via the separate treatment of work in progress CAPEX. Under this approach, work in progress CAPEX does not result in an increase in allowed depreciation until the investment is fully operational.

As ARERA moves to an ex ante approach in setting the baseline (also based on a forward-looking methodology), it may be important to control for any uncertainty in CAPEX delivery via a set of uncertainty mechanisms or price control deliverables. Volume drivers may prove effective in controlling for CAPEX delivery.

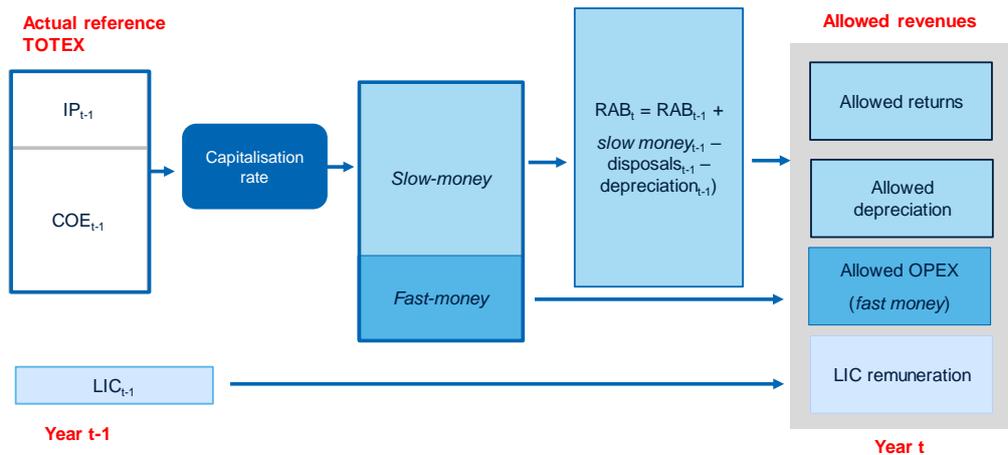
One possible application of the TOTEX regime may involve maintaining a different treatment in cost recovery between work in progress CAPEX (or LIC) and assets already entered into operation (or IP), while introducing a capitalisation rate.

This implementation ‘scenario’ is outlined in Figure 3.4 below.

⁵⁶ Ofgem (2018), ‘TNUoS charging for offshore generators and the Offshore Transmission Owner regime’, December.

⁵⁷ Ofgem (2013), ‘Open letter – Offshore electricity transmission and interconnector policy: proposed scope and timetable for review of interest during construction’, May.

Figure 3.4 Overcoming CAPEX bias: possible implementation scenario (split between IP and LIC)



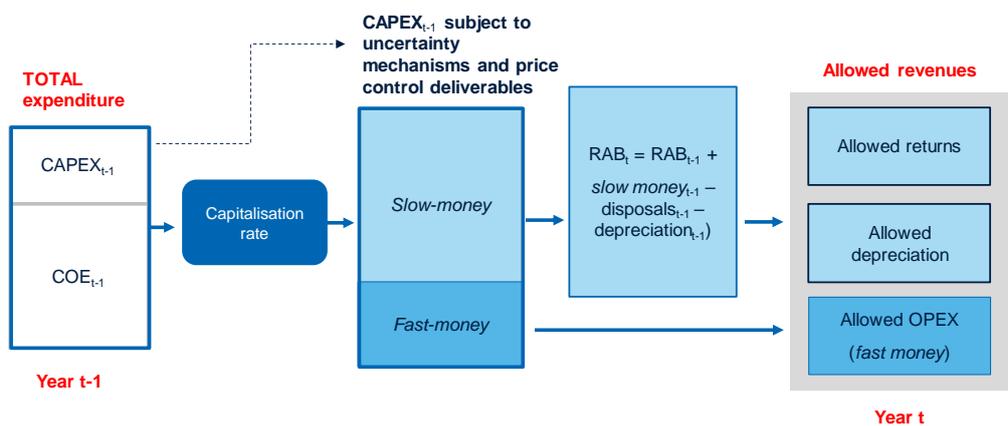
Note: 'IP' stands for 'incrementi patrimoniali' (i.e. the gross value of assets that enter in operations in a given year) 'LIC' stands for 'lavori in corso' (assets under construction in a given year), 'COE' stands for 'costi operativi effettivi' (actual operating expenditure).

Source: Oxera.

In this case, LIC is considered for the purposes of the cost efficiency incentives (according to the possible mechanisms shown in Section 2), but for the purposes of determining 'slow' and 'fast' money, LIC variation is treated separately.

As an alternative, it could be possible to consider overcoming the IP/LIC distinction, thereby focusing exclusively on capital 'spending'.

Figure 3.5 Overcoming CAPEX bias: possible implementation scenario (based on 'spending')



Note: 'CAPEX' stands for capital expenditure. 'COE' stands for 'costi operativi effettivi' (actual operating expenditure).

Source: Oxera.

Under this approach, it is possible to control for any uncertainty in CAPEX delivery via a set of uncertainty mechanisms or price control deliverables.

4 Monitoring financial performance

4.1 Introduction

An important feature of ROSS regulation will be the ability to set clear, ex ante rules and principles, as well as a transparent approach that ensures ongoing monitoring and publication of company performance in delivering against the targets set by the regulator, including any rewards and penalties.

A more transparent framework provides more confidence to investors, companies, ratings agencies and consumers. In the RIIO framework, there are different aspects that contribute to an open and transparent regulatory framework.

- These can include a Price Control Financial Model (PCFM). PCFMs are published by Ofgem and contain detailed information on the annual allowed revenues of the network operators. Each year, specific inputs are updated through the Annual Iteration Process (AIP), resulting in updates to allowed revenue.

The PCFM is also used to assess financeability, in order to cross-check that an efficient company—given all the components of its Final Determination—can generate sufficient cash flow to meet its financing need. Different financial metrics are used in the financeability assessments and a number of assumptions and information on the evolution of costs and revenues in future years are also required. In RIIO-2, the PCFM provided forward-looking projections until 2026 (i.e. the end of RIIO-2).⁵⁸

- Also contributing to an open and transparent regulatory framework, there can be annual performance monitoring, based on the latest data collected by Ofgem and summarised in the ‘Annual Report’ for each sector, which include information on: output and incentive performance, TOTEX expenditure compared to allowances in the Final Determination, Return on Regulatory Equity (RoRE), and the impact on customer bills.

More specifically, RoRE provides an estimate of the financial return achieved by shareholders during a price control period from a company’s performance under the price control. In other words, it provides an overall picture of how regulated equity is performing under the price control compared to the assumed return used in setting allowed revenues.

Given that the PCFM and financeability assessments are more closely related to the forward-looking aspect of the ROSS regulation, that will be further investigated at a later stage, the rest of the section is focused on RoRE as a tool for monitoring historical financial performance.

4.2 Monitoring the Return on Regulatory Equity (RoRE)

4.2.1 Theory and recent applications

Financial performance can be measured in a variety of ways. One relevant financial index is the return on equity (ROE), which represents the ratio between post-tax profits and the company’s equity.

⁵⁸ For gas transport, electricity transmission and electricity distribution.

RoRE represents a ‘notional’ index capturing the key components of the financial performance of regulated networks. It is a measure used by Ofgem to assess the financial performance of network companies.

While RoRE can be driven by many factors—both within and outside the company’s control, and may not reflect a number of factors that would impact the actual returns realised by shareholders—it is a tool that allows a holistic assessment of the various parameters of the regulatory framework. It can, for example, be used to calibrate the strength of various incentives and other mechanisms of the regulatory package.

Moreover, the presence of RoRE estimates can give more transparency about financial performance compared to the case in which the regulatory framework only provides shareholders and investors with the allowed level of returns. As stated by Ofgem:⁵⁹

[A]n excessive focus on the allowed return means that the impact on returns of performance against other elements of the price control may be overlooked even though these may be of a greater magnitude than the range of allowed returns under consideration. The RORE analysis shows that this has indeed been the case in DPCR4.

The RoRE analysis requires a wide range of robust information that is consistent across companies. In the RIIO framework, the body of evidence has required a long process for developing the company reporting framework, as well as validating the data. Initial RoRE evidence is available for price control DPCR4 (2005–10) and DPCR5 (2010–15),⁶⁰ but information has evolved over time together with the methodology.

Box 4.1 Evolution of the RoRE framework in RIIO

The Regulatory Instructions and Guidance (RIGs) is the principal means by which Ofgem collects data from operators to monitor performance against their price control objectives. RIGs provide guidance, the reporting packs and commentaries the network companies have to fill out for the collection of data, to calculate any rewards or penalties associated with the incentive mechanisms, and to determine adjustments to allowances. Data collected through the RIGS also allows Ofgem to carry out analysis between price controls and are used to inform the assessment for future price control reviews.

The RIGs are subject to regular consultation and have evolved over time, also in response to frequent interaction between network operators and Ofgem. For example, in the case of electricity distribution, the first draft of the RIGs for the ED-1 control period was published in January 2015, seeking stakeholder feedback. The document represents an evolution of the RIGs used in the previous control period, DPCR5.

Ofgem highlighted that they have been working with DNOs to revise the RIGs and committed to continue to do so. Some of the initial questions posed by Ofgem in the first draft included feedback on the proposed structure of the reporting documents and templates, as well as views on the information that Ofgem was asking companies to forecast.¹ Some areas have been developed at a later stage of the consultation process, since Ofgem acknowledges that further work was needed.

The data templates comprise a series of tables in a Microsoft Excel workbook. The purpose of the workbook is to facilitate the submission of uniform and comparable financial information from Licensees. This enables comparison across the Licensees and comparative regulation on a consistent basis. It consists of a number of data entry tables and various summary tables.

The RoRE calculation has been first included in the DPCR5 financial model and refined in different consultation processes.⁴ In DPCR5, Ofgem:

⁵⁹ Ofgem (2008), ‘Electricity Distribution Price Control Review Policy Paper’, December, p. 11.

⁶⁰ See, for example, Ofgem (2009), ‘Electricity Distribution Price Control Review Final Proposals - Incentives and Obligations’, December, Annex 3.

- assessed the performance of DNOs during the previous regulatory period (DPCR4), also to identify potential areas for improvement;
- assessed the regulatory package that was proposing for DPCR5, seeking to define Final Proposals that ‘provide an appropriate balance of risk and return to shareholders and a fair deal for customers’.⁵

In the DPCR5 Final Proposals, Ofgem explains how several DNOs provided feedback on the RoRE analysis and tested the tool ‘to conduct their own analysis of the risk reward balance in the proposed DPCR5 package’⁶. Ofgem also made some adjustments to the analysis in response to some DNO concerns, for example, using a tighter collar on a maximum penalty in an incentive mechanism or limiting the maximum payment that DNOs may be required to pay under the guaranteed standards.

The RoRE analysis is included in the Licence Model, available for each sector and published at the Final Determination stage.⁷ Specific worksheets are dedicated to RoRE, in particular to:

- summarise all the input data under the different scenarios (in addition to the ‘standard’ scenarios, network companies can simulate customised scenarios);
- summarise the various drivers of RoRE performance;
- show the RoRE ranges, both at the annual level and as an average over the period.

Over time, the RIGs have been progressively refined, in particular to clarify reporting requirements, rather than introducing new requirements. The latest amendment to RIIO-ED1 RIGs has been done in April 2019, when the version 5.0 has been published.² For RIIO-2, Ofgem is following a similar process and, for example, a draft set of data templates, associated instructions and guidance and draft glossary document are currently under consultation for electricity transmission.³

Note: ¹ Ofgem (2015), ‘Consultation on the regulatory instructions and guidance for the next electricity distribution network operators’ price control, RIIO-ED1’, January. ² Ofgem (2019), ‘Direction to make modifications to the Regulatory Instructions and Guidance (RIGs) for RIIO-ED1 (version 5.0)’, April. ³ Ofgem (2021), ‘Consultation for RIIO-ET2 draft annual reporting data templates and associated instructions and guidance’, November. ⁴ Ofgem (2009), ‘Electricity Distribution Price Control Review Initial Proposals’, p. 9, August. ⁵ See previous note. ⁶ Ofgem (2009), ‘Electricity Distribution Price Control Review Final Proposals’, p. 65, December. ⁷ Ofgem (2020), ‘RIIO-2 Final Determinations for Transmission and Gas Distribution network companies and the Electricity System Operator – Technical Annex part one’, December.

Source: Oxera based on Ofgem documents.

From a methodological point of view, RoRE is calculated using regulatory assumptions, such as the notional gearing ratio of the companies.

At the beginning of RIIO-1, the RoRE analysis was always carried out at notional gearing. In particular, returns represented the post-tax cost of equity set final proposals plus revenue adjustments for actual (or forecasted) out-/underperformance on TIM, IQI income reward/penalty and output incentives.⁶¹ In RIIO-1, the return is the total of the following:

- the allowed Equity Return, which was set at the start of the price control period and did not change throughout RIIO-1;
- the Information Quality Incentive (IQI) income reward/penalty—a reward or penalty set as part of the RIIO-1, which reflects the accuracy and quality of the business plans submitted by the licensee. This was set at the start of the price control period and did not change throughout RIIO-1;
- TOTEX performance—where the TOTEX incentive mechanism (TIM) represents the amount that a licensee bears for an overspend against allowances or retains for an underspend against allowances;

⁶¹ See, for example, Ofgem (2015), ‘RIIO Transmission Annual Report 2013-14’, pp. 60–3.

- output incentives—a financial reward or penalty based on the licensees’ performance against defined incentives;
- innovation—this represents the amount licensees cannot recover through revenue or contributions they make in relation to funded innovation projects;
- penalties or fines—an adjustment is made to licensees return for any Ofgem related penalties and fines, and guaranteed standard payments made to customers. These costs are borne by the shareholders;
- WACC performance, including:
 - debt performance—this compares companies’ actual cost of debt against the cost of debt allowance set as part of the RIIO-1 price control.
 - tax performance—this compares licensees actual tax liability against the tax allowance set as part of the RIIO-1 price control.⁶²

The calculation may require some adjustments (e.g. the Enduring Value Adjustments, in RIIO-1). The enduring value of the business factors in the financial impact of any decisions or future events, which have yet to be reflected in revenue and RAB but are known at the time of estimation.⁶³

Subsequently, Ofgem refined the methodology at RIIO-2,⁶⁴ but the overall methodology remained broadly similar.

4.2.2 Possible applications for Italian energy networks

In the Italian context, the regulator could consider the gradual introduction of a monitoring framework based on the RoRE—that is, the operators’ returns based on a ‘notional’ equity value that take into account some performance drivers, starting from a regulatory post-tax cost of equity. The objective of this exercise would be to reconcile part of the observed equity returns with the allowed equity returns.

The methodology used to estimate the impact of specific drivers could involve estimating the additional ‘cash flow to equity’ and comparing it to the notional value. The estimation process gives rise to a specific RoRE value for each company, which may differ from what is captured by the ROE.

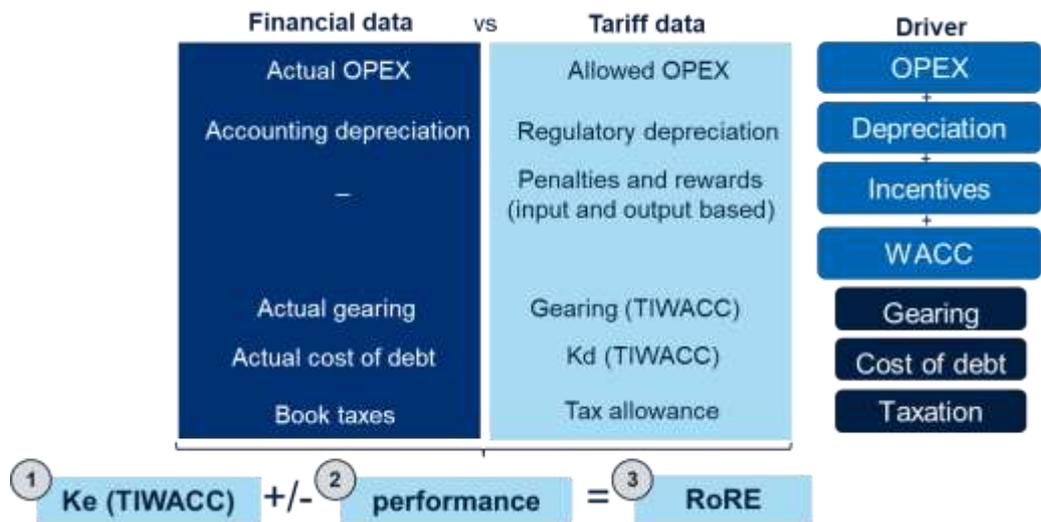
The monitoring framework could consider the following drivers.

⁶² Ofgem (2019), ‘Regulatory financial performance annex to RIIO-1 Annual Report’, March.

⁶³ Some examples of Enduring Value adjustments are estimates of: future uncertainty mechanism claims; close out mechanism (e.g. NARMS incentive); timing differences of delivery of outputs (e.g. volume drivers); known changes to future output delivery (e.g. volume drivers); and known adjustments not yet made as part of the AIP (e.g. mid-period review decisions, voluntary returns).

⁶⁴ In general, RoRE analysis is usually done at notional gearing, but estimates that also include financing and tax performance are now reported in the annual reporting data files. See, for example, Ofgem (2021), ‘RIIO Electricity Transmission Annual Report 2019-20 – RIIO-ET1 Supplementary data file 2019-20’, March.

Figure 4.1 Overview of a possible RoRE monitoring framework



Source: Oxera.

OPEX. OPEX performance could be assessed by comparing actual OPEX and allowed OPEXs.

Depreciation. In order to capture any depreciation-related performance, it would be possible to compare the accounting depreciation and the regulatory depreciation. Depreciation, unlike the other drivers, has peculiar characteristics, as it may not depend directly on regulatory policies but it may be linked to the asset valuation process and the accounting standards used.

Incentives. Input- and output-based incentives (rewards and penalties) represent a source of out-performance (or underperformance). Potentially, this could also be broken down in specific areas of quality of service regulation associated with financial penalties or rewards.

Gearing. Higher gearing can lead to higher ROE as debt financing is less expensive than the allowed cost of capital.

It is worth noting that the Modigliani–Miller Theorem states that, under certain conditions, changes in gearing should leave the WACC substantially unchanged (as gearing increases, the cost of equity will increase). Therefore, higher ROE due to higher gearing will reflect the higher risk taken by equity.

Cost of debt. The cost of debt out-performance (or underperformance) may be due to various factors (e.g. scale efficiency, management efficiencies, debt timing). While it is not possible to unpick the reasons for cost of debt performance, it is possible to estimate the difference between book and actual cost of debt, at constant gearing.

Taxation. Tax performance could be examined by comparing the implicit tax allowance in the real, pre-tax WACC formula of the TIWACC with the tax expenses incurred by the company.

The overall methodology could be implemented using the general formulas in Table 4.1 below.

Table 4.1 Possible RoRE methodology

Driver	Possible methodology
OPEX	$\frac{(\text{Allowed OPEX} - \text{actual OPEX}) * (1 - T)}{\text{RAB} * (1 - \text{notional gearing})}$
Depreciation	$\frac{(\text{Regulatory depreciation} - \text{accounting depreciation}) * (1 - T)}{\text{RAB} * (1 - \text{notional gearing})}$
Incentives	$\frac{\text{Rewards or penalties} * (1 - T)}{\text{RAB} * (1 - \text{notional gearing})}$
Gearing	$\frac{(\text{Regulatory real, pre-tax cost of equity} - \text{actual real, pre-tax cost of debt}) * (\text{debt RAB at actual gearing} - \text{debt RAB at notional gearing}) * (1 - T)}{\text{RAB} * (1 - \text{notional gearing})}$
Cost of debt	$\frac{(\text{Regulatory pre-tax real cost of debt} * \text{RAB} * \text{notional gearing} - \text{book real pre-tax cost of debt} * \text{RAB} * \text{notional gearing}) * (1 - T)}{\text{RAB} * (1 - \text{notional gearing})}$
Taxation	$\frac{(\text{WACC real pre-tax} - \text{WACC real post-tax}) * \text{RAB} - \text{book taxes}}{\text{RAB} * (1 - \text{notional gearing})}$

Note: 'notional gearing' is the regulated gearing level set under the TIWACC methodology. 'T' is the overall tax rate determined in the TIWACC.

Source: Oxera.

The proposed methodology would require developing a robust body of evidence.

Based on an initial review of the data available to ARERA, a number of issues have emerged that would require further scrutiny.

- The dataset that is necessary to run the RoRE analysis requires accounting data for specific activities (e.g. distribution, transmission, metering) that are compatible with the regulatory accounting data that are collected for tariff-setting purposes. For example, some specific financial data (e.g. taxes, cost of debt, gearing) are only available at the company-wide data.
- It would be important to identify and deal with any outlier that may lead to biased estimates (e.g. merger and acquisitions and changes in the perimeter of regulated activities).
- It would be necessary to deal with inter-company transactions and allocation issues that may affect some of the estimates (e.g. for OPEX or cost of debt).

A1 Managing uncertainty in RIIO – full list of examples

A1.1 Volume driver mechanisms

Table A1.1 presents the full list of volume driver mechanisms applied in RIIO-1 and RIIO-2.

Table A1.1 Volume driver mechanisms in RIIO-1 and RIIO-2

RIIO period	Volume-driver mechanism	Description	Sector
RIIO-1	Generation connections	Volume driver to adjust baseline expenditure each year for deviations in generation capacity connections from annual baseline profile, including RPEs adjustment	ET
RIIO-1	New demand connections	Volume driver for demand related infrastructure backed by commercial agreements to adjust baseline revenues as delivered infrastructure deviates from baseline profile of investment	ET
RIIO-1	Smart meter roll-out costs	A proportion of costs are set ex ante, the remainder is subject to an uncertainty mechanism	ED
RIIO-1	Medium rise multiple occupancy buildings (MOBs)	Mechanism for additional costs arising from replacement/repair workload on medium rise MOBs due to uncertainty around the volume of workload required	GD
RIIO-1	Wider reinforcement works	Mechanism based on delivered wider works outputs (additional transfer capability) that meet Network Development Policy (NDP) criteria and funded using boundary specific unit costs and delivered output	ET, GT
RIIO-1	Other	Sector- or company-specific volume drives, e.g. planning requirements to mitigate impacts of new transmission infrastructure on visual amenity for NGET	Sector-specific
RIIO-2	Demand and generation connection volume drivers	An automatic mechanism to flex ET allowances	ET
RIIO-2	Incremental Wider Works	Funding through an automatic mechanism to undertake required incremental wider works investments	ET
RIIO-2	Replacement expenditure—Tier 2A iron mains	Enables adjustment of Baseline Cost Allowances to reflect differences between Outturn Workloads and Baseline Workloads	GD
RIIO-2	Domestic connections	Enables adjustment of Baseline Cost Allowances to reflect differences between Outturn Workloads and Baseline Workloads	GD
RIIO-2	OPEX escalator	OPEX escalator to reflect changes in CAPEX through UMs	ET, GT

Source: Oxera based on Ofgem (2021), 'RIIO-2 Final Determinations - NGET Annex (REVISED)', February; Ofgem (2021), 'RIIO-2 Final Determinations – GD Sector Annex (REVISED)', February. Ofgem (2012), 'RIIO-T1: Final Proposals for National Grid Electricity Transmission and National Grid Gas. Final decision – Overview document', December. Ofgem (2012), 'RIIO-GD1: Final Proposals - Finance and uncertainty supporting document. Finance and

uncertainty support document', December. Ofgem (2013), 'Strategy decision for the RIIO-ED1 electricity distribution price control, Overview. Final decision', March.

A1.2 Use-it-or-lose-it allowances (UIOLI)

Table A1.2 Table A1.2 presents the full list of UIOLI allowances used in RIIO-1 and RIIO-2.

Table A1.2 UIOLI allowances in RIIO-1 and RIIO-2

RIIO period	UIOLI mechanism	Description	Sector
RIIO-1	Network Innovation Allowance	Innovation funding for small projects with companies self-certifying against published criteria	Cross-sector
RIIO-1	Worst served customer mechanism	Conditional allowance to improve the reliability of service experienced by 'worst served' customers	ED
RIIO-2	Cyber resilience	UIOLI related to cyber resilience (operational technology)	Cross-sector
RIIO-2	Net zero and re-opener development UIOLI	To enable net zero-related development work and small value net zero facilitation projects to go ahead	Cross-sector
RIIO-2	Network Innovation Allowance	To enable smaller-scale innovation projects that relate to the energy system transition (and/or consumers in vulnerable situations)	Cross-sector
RIIO-2	Substation Auxiliary Interventions	Mechanism to ensure any unused funding for replacing NGET's Standby Diesel Generators and low voltage Alternating Current (LVAC) Boards is returned to the consumer	ET
RIIO-2	Net zero Carbon Construction	To fund offsetting in carbon emissions to achieve net zero on capital construction projects and claw back any unused funding	ET
RIIO-2	Vulnerability and carbon monoxide allowance	Allowance to fund activities addressing consumer vulnerability and carbon monoxide (CO) safety	GD

Source: Oxera based on Ofgem (2020), 'RIIO-2 Final Determinations – Core Document', December and sector-specific decisions.

A1.3 Price Control Deliverables (PCDs)

Table A1.3 to Table A1.6 present the PCDs applied in RIIO-2.

Table A1.3 Cross-sectoral PCDs in RIIO-2

PCD	Description	Sector
Physical Security	Funding to ensure the network operators deliver physical security upgrades at sites designated Critical National Infrastructure	Cross-sector
Network Asset Risk Metric (NARM)	Funding related to the Network Asset Risk Metric (NARM) outputs that network companies will be required to deliver during RIIO-2	Cross-sector
Cyber Resilience OT	To reduce risk, improve cyber resilience and response outcomes on the networks and comply with relevant regulations	Cross-sector
Cyber Resilience IT	See above	Cross-sector

Source: Oxera, based on Ofgem (2020), 'RIIO-2 Final Determinations – Core Document', December.

Table A1.4 Sector-specific PCDs in RIIO-2: electricity transmission

PCD	Description	Sector
Large Project Delivery (LPD)	Mechanism to incentivise the timely delivery of large transmission projects	ET
Pre-Construction Funding	Mechanism to ensure that allowances can be adjusted downwards if there is no longer a need to develop one or more large project	ET
Incremental Wider Works	Mechanism to adjust allowances should the defined deliverables for the Incremental Wider Works projects be not delivered in full	ET
Atypical Shared Infrastructure Schemes	PCD to manage uncertainty with load related reinforcement works which include significant non-load related elements or other external interfaces	ET
Generation Connection Schemes	Scheme to adjust allowances should the defined deliverables for these Generation Connection schemes, not covered by the volume driver, not be delivered in full	ET
Demand Connection Schemes	Mechanism to adjust allowances should the defined deliverables for these Demand Connection Schemes, not covered by the volume driver, not be delivered in full	ET
Resilience and Operability	Funding for specific investments proposed by some network operators (e.g. SHET and SPT) to ensure network resilience and operability	ET
Tower and foundations	To allow NGET to seek funding for a range of steel and foundation works on Overhead Line routes. It ensures an appropriate level of funding is provided following receipt of sufficient levels of asset data from NGE	ET
Instrument transformers	To ensure allowances are adjusted down if NGET does not deliver in full the replacement of instrument transformers based on the following drivers: PCB-filled, Dissolved Gas Analysis (DGA) condition, SF6 leakage and asset family issues	ET
Bay replacements	To ensure allowances are adjusted down if NGET does not deliver in full certain Protection and Control works	ET
Protection and control	To ensure allowances are adjusted down if NGET does not deliver in full certain Protection and Control works.	ET

Overhead line replacements	To ensure allowances are adjusted down if NGET does not deliver in full the replacement of km of Aluminium Steel Core Reinforced Core Greased Conductors and Aluminium Composite Core Conductor (ACCC)	ET
Visual amenity in designated areas	To fund mitigation projects that reduce the visual amenity impacts of existing infrastructure in national parks, areas of outstanding natural beauty and national scenic areas	ET
SF6 asset intervention	Delivery of site-specific interventions on assets containing SF6	ET
Operational transport carbon reduction	Aiming at holding NGET to account to deliver the volume of Electric Vehicles (EVs) and charging infrastructure it has been funded for during RIIO-ET2	ET

Source: Oxera, based on Ofgem (2020), 'RIIO-2 Final Determinations – Core Document', December, sector-specific and company-specific decisions.

Table A1.5 Sector-specific PCDs in RIIO-2: gas transmission

PCD	Description	Sector
Asset health—non lead assets	PCD aimed at funding asset health expenditure that is not covered by NARM	NGGT
Bacton terminal site redevelopment	PCD aimed at funding development costs for the Bacton Terminal Redevelopment project	NGGT
King's Lynn subsidence	To fund development costs for the King's Lynn Subsidence project	NGGT
Redundant assets	Funding for NGGT to decommission network assets that are now redundant (i.e. asset sites, customer sites and compressors)	NGGT
Compressor emissions—Wormington	PCD aimed at funding development costs for the Compressor Emissions projects that are subject to an uncertainty mechanism	NGGT
Compressor emissions—King's Lynn	See above	NGGT
Compressor emissions—Peterborough	See above	NGGT
Compressor emissions—St Fergus	See above	NGGT
Hatton	To ensure NGGT deliver emissions compliance at Hatton	NGGT

Source: Oxera, based on Ofgem (2020), 'RIIO-2 Final Determinations – Core Document', December, sector-specific and company-specific decisions.

Table A1.6 Sector-specific PCDs in RIIO-2: gas distribution

PCD	Description	Sector
REPEX—tier 1 mains replacement	To fund Tier 1 iron mains decommissioning and replacement activities	GD, all
REPEX—tier 1 services	To fund service interventions associated with Tier 1 mains decommissioning activities	GD, all
Gas holder demolitions	To demolish all redundant gas holders by the end of RIIO-GD2 (for NGN and WWU by the end March 2029), with the exception of those that have a listed status	GD, all
Capital projects	To hold companies to account for the delivery of specifically funded capital investments	GD, all
Commercial Fleet EV PCD	To enable GDNs to convert their commercial vehicle fleets to electric vehicles (EVs) or other zero emission equivalents	GD, all
Personalising welfare facilities	Funding to provide additional tailored welfare support to consumers in vulnerable situations in the event of a supply interruption	Bespoke, Cadent
London Medium Pressure	To hold Cadent to account for delivering specific sections of the London Medium Pressure (LMP) project during RIIO-GD2. The project involves replacing large diameter, medium pressure iron mains in central London, it began in RIIO-GD1	Bespoke, Cadent
Gas escape reduction	To facilitate rollout of specified innovations SGN has developed to reduce the volume of gas lost during escapes	Bespoke, SGN
Biomethane improved access rollout	PCD to hold SGN to account for the delivery of its biomethane rollout project (technologies to increase biomethane volumes on the network)	Bespoke, SGN
Intermediate pressure reconfigurations	To support resilience in a specific region of Scotland. To fund SGN to install 85 small pressure reducing installations and 355 service governors, to allow reconfiguration and replacement of 515 services and 9.32km of steel mains connected to intermediate pressure gas mains in its Scotland network	Bespoke, SGN
Remote pressure management	To provide for installation of pressure management equipment at 702 district governors across the Southern network	Bespoke, SGN
HyNet Front End Engineering Design (FEED)	To provide funding for a Front End Engineering Design (FEED) study for an 85km hydrogen pipeline which supports the development of GB's first hydrogen industrial cluster	Bespoke, Cadent

Source: Oxera, based on Ofgem (2020), 'RIIO-2 Final Determinations – Core Document', December, sector-specific and company-specific decisions.

A2 An example of a Wider Works output

A2.1 The Western HVDC link (‘Western Bootstrap’)

The ‘Western Bootstrap’ is a transmission project jointly developed by NGET and SP Transmission Ltd (SPTL), to build a sub-sea link between Scotland and Wales, which has been included as a baseline output for NGET and SPTL.

A2.1.1 Regulatory treatment

Ofgem defined allowances, funding arrangements and risk-sharing agreements between the two TOs and consumers under the Transmission Investment Incentives (TII) and RIIO-T1. In particular, the following conditions apply:

- a total ex ante allowance of £1,050.7m (2009/2010 prices), linked to agreed deliverables;⁶⁵
- the project is treated as a whole, using a fixed cost allocation rate of 68.5% to NGET and 31.5% to SPTL, both ex ante and ex post;
- company-specific efficiency incentive-sharing factors applied to the project;
- a possibility to review funding during the price control period if planning on a specific station has an important impact on costs or delivery of the project;
- triggering of the re-opener if and when a pre-defined event⁶⁶ results in a total cost increase of 10% or more of total ex ante allowance (considering the project as a whole and expenditures in both TII and RIIO-T1 periods).

A2.1.2 Late delivery

The Western HVDC link was initially expected to be delivered in 2016/17, but then it was delayed due to 2017/18. Ofgem assessed this situation as part of the annual reporting process and while preparing the mid-period review. In particular, the Western HVDC link was identified as one of the matters that required specific attention and was addressed during a separate workstream, the mid-period review parallel work. The delay was expected to increase constraints payments and therefore costs to consumers. According to Ofgem, NGET and SPTL may benefit from this situation, since they can pay suppliers later, while still receiving the allowances. Ofgem consulted on how to deal with this situation and in particular examined two options:

- doing nothing—i.e. make no changes to the agreed allowances, allowing companies to retain the timing benefits from late delivery;
- delaying the allowances to remove the timing benefit. This resulted to be Ofgem’s preferred option, to remove perverse incentives from late delivery and protect consumers.

The definition of a specific methodology for delaying allowances is still ongoing;⁶⁷ however, this example shows how, in certain cases, Ofgem can intervene ex post to adjust allowed revenues according to what companies actually delivered.

⁶⁵ This allowance has been reduced in the Final Proposals determination, according to updated assumptions and best view.

⁶⁶ Adverse weather, unforeseen ground or seabed conditions, and consent, approval or permission.

⁶⁷ See, for example, Scottish Power Transmission PLC, ‘Regulatory financial performance report 2020/21’, available at https://www.spenergynetworks.co.uk/userfiles/file/SPT_Executive_Summary_2020-21.pdf.

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