

Reflections On the Successes of RIIO And the Scope for Future Improvement

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Energy Regulation Insights

From the Editor

Following the conclusion of the price controls for GB electricity distribution networks, all GB energy networks are now subject to Ofgem's new RIIO price control framework. At its core, RIIO (like the RPI-X approach), involves setting an ex-ante revenue control that provides incentives to minimise costs. In addition, RIIO contains a number of new elements to sharpen incentives to deliver network services and outputs, notably the extension from a five- to an eight- year control period.

In this issue of *Energy Regulation Insights*, Associate Directors, James Grayburn and Richard Druce discuss the application of the new RIIO framework to GB energy networks. They consider the RIIO framework represents a positive development on the previous RPI-X regime, with greater focus on companies' outputs and customer engagement. They also highlight some potential improvements around the need to develop a more robust set of totex benchmarking models that reflect the greater number of factors that explain companies' costs, and to certain design aspects of the cost of debt indexation mechanism. As a sign of its overall success, the authors observe that several elements of Ofgem's RIIO framework have been adopted by regulators in GB and elsewhere.

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Introduction

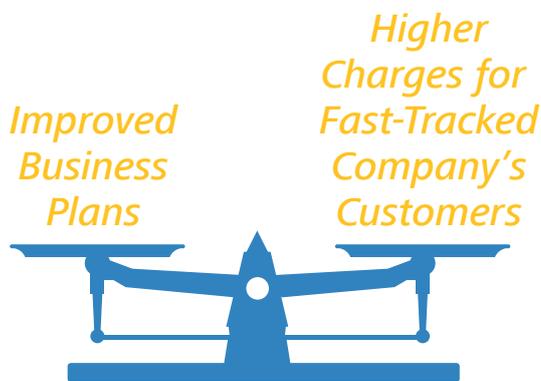
Following the final decisions published recently by the Competition and Markets Authority (CMA) in relation to electricity distribution,¹ all British gas and electricity transmission and distribution networks are now subject to a new form of price control regulation, under a framework known as "RIIO". The RIIO framework represents an evolution relative to the "RPI-X" approach that Ofgem had previously used to set energy network price controls.

- At its core, and like the RPI-X approach, RIIO price controls are still *ex ante* revenue controls, and thus provide strong incentives for networks to minimise costs. These incentives have been strengthened under RIIO to the extent that Ofgem has lengthened the duration of price control periods from five to eight years.
- Under RIIO, Ofgem provides network companies with a wider range of targeted incentives that adjust revenues up/down if companies deliver more/less outputs for consumers than under previous arrangements.
- With RIIO, Ofgem has also introduced new mechanisms to set allowed revenues and to update revenues over time. Notable examples are the use of "totex benchmarking" to set allowances, and the use of a market index of debt costs to set companies' allowed cost of debt.
- The new framework also involves some process changes. These include subjecting some companies to less scrutiny at price control reviews where Ofgem considers their business plans well-justified (a process known as "fast-tracking"), and greater consumer engagement in formulating companies' plans.



This Energy Regulation Insight (ERI) examines the successes and failures of the new RIIO framework, based on both Ofgem's RIIO price control processes and the recent appeals of the RIIO-ED1 decision to the CMA.² Overall, we find that the new framework has worked well in incentivising companies to improve the quality of their business plan submissions. However, other core elements of RIIO—totex benchmarking and the cost of debt indexation mechanism—increase the risk that some networks will be denied a fair opportunity to recover their efficient costs.

In addition to the introduction of RIIO, the price control process has also changed as part of the latest round of EU energy market legislation, known as the Third Energy Package.³ These changes permit “materially affected”⁴ parties (e.g., energy suppliers) to appeal network price controls, and for appeals to be restricted to specific elements of the decision, as opposed to a re-hearing of the decision in its entirety. Along with the substantive changes under RIIO, these changes have profound implications for the design and conduct of future reviews in the GB energy sector, as we discuss further below.



Companies' Business Plans Have Improved under RIIO, a Clear Success of the New Framework

A key objective of the new framework was to encourage companies to produce business plans focussed on the needs of network users, as opposed to the requirements of the regulator. As acknowledged by Ofgem in its business plan assessment, companies have developed more comprehensive plans. For example, companies have demonstrated a greater level of engagement with network users over the type and level of outputs required, as well as exhibiting more detailed strategies for managing network assets to deliver outputs at least cost.⁵

“Agreeing to plans in full has led to increased bills for consumers of the fast-tracked company, relative to the outcome where the company was subject to the slow-track process.”

The process of fast-tracking, whereby Ofgem agrees to a company's plan early and in its entirety, and where it considers the plan is sufficiently high quality, has been an important component of encouraging companies to produce better plans. Under this process, companies compete with each other to have the best plan (as assessed by Ofgem), and the winner(s) receive financial and “reputational” rewards, as well as the ability to return to business as usual with greater certainty regarding the upcoming price control.⁶ For the set of recent reviews, Ofgem fast-tracked both Scottish Power Transmission and Scottish Hydro Electric Transmission (at RIIO-T1), and Western Power Distribution (at RIIO-ED1), but no company qualified for fast-tracking at GD1.⁷

Running the competition has come at a cost, however. Agreeing to plans in full has led to increased bills for consumers of the fast-tracked company, relative to the outcome where the company was subject to the slow-track process. For example, Ofgem's own analysis shows that WPD's allowances are around £600 million higher relative to the allowance it would have received if it had not been fast-tracked or around 10% of its total expenditure (totex).⁸ By contrast, the benefits of fast-tracking are less tangible, and stem from a general improvement in companies' business plans. Higher quality business plans ought to bring benefits through companies tailoring their proposed outputs to better meet customers' needs, greater use of innovation, etc.

In addition to uncertainty over whether the costs of fast-tracking justify the benefits, another downside is the subjectivity of the fast-tracking process. In particular, success in the fast-tracking competition involves performing well under inexact benchmarking techniques that may favour the same set of companies over time. We comment below on Ofgem's approach to benchmarking, and potential improvements, which would in turn improve the objectivity of the fast-track competition.



The RIIO Framework Has Not Addressed Underlying Concerns with the Application of Benchmarking

The use of comparative benchmarking to set British energy networks' price controls is not a new innovation, but Ofgem now applies it more widely under RIIO. At previous reviews, Ofgem subjected gas and electricity distribution networks' operating costs to comparative regression-based benchmarking at the activity level, and assessed the efficiency of other cost categories (notably capex) mainly using other methods such as expert appraisal. However, the RIIO framework has combined these "disaggregated" benchmarking techniques with totex benchmarking, which involves assessing the efficiency of companies' total costs (opex and capex together) using regression models. At both RIIO-ED1 and GD1, Ofgem took a 50:50 average of the results from both the disaggregated benchmarking (similar to that used in past price controls) and the new totex approach when setting allowances.⁹

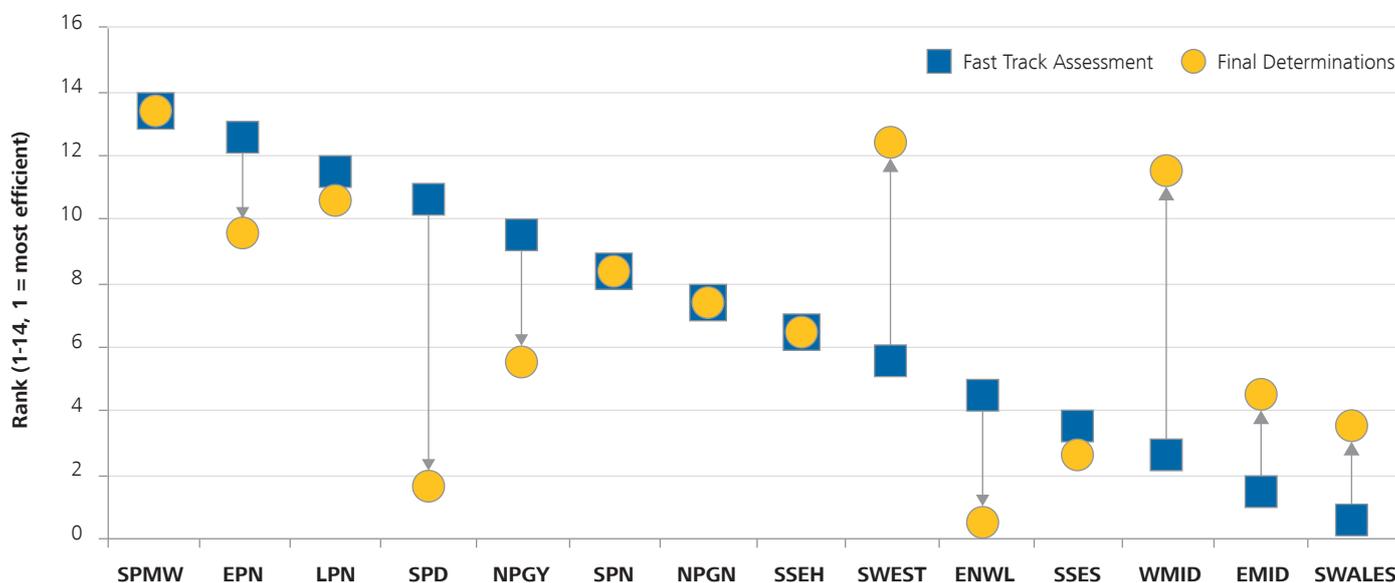
The rationale for introducing totex benchmarking was that it better accounts for trade-offs between operating and capital costs,¹⁰ reducing the potential for misleading results from disaggregated modelling, where the combination of cost targets set on a line-by-line basis are infeasible in the round. It is also intended to equalise incentives for companies to put forward operating and capital measures, and thus encourage

companies to deliver outputs at the lowest total cost.¹¹ For similar reasons, Ofwat also developed and implemented a totex benchmarking methodology at its recent PR14 review.

As with all benchmarking models, Ofgem's totex models, which only control for differences in companies' scale and regional labour variation,¹² may confuse genuine "inefficiency" with exogenous differences between companies not controlled for by the model (e.g., regional topography, population density, network design, etc.), data errors or differences in accounting cost allocation. However, our analysis suggests Ofgem's totex benchmarking may be particularly susceptible to this problem, which means that companies operating in relatively high-cost conditions might expect to see larger disallowances than their peers.

For instance, while Ofgem controlled for some underlying differences between companies by applying "special factors",¹³ we are sceptical of the fundamental assumption underlying Ofgem's totex models, namely that companies have a common, synchronous investment cycle. In fact, companies undertaking relatively large capex programmes appear inefficient in Ofgem's totex benchmarking models, yet the findings from Ofgem's own disaggregated benchmarking suggest this might not be the case.¹⁴ For similar reasons (i.e., the challenges associated with applying common statistical models to lumpy categories of expenditure), the CMA limited

Figure 1. Companies' Relative Efficiency Ranking Changed Markedly Between Fast-Track Assessment and Final Determination





the application of benchmarking models following the Bristol Water referral to the sum of operating and capital maintenance expenditure (base totex or “botex”), which excluded the lumpy “enhancement” cost category.¹⁵

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Another, more procedural, problem with Ofgem’s benchmarking relates to the fast-tracking process, as discussed above. Ofgem improved its benchmarking models during the slow-track process after consultation, and following its decision to fast-track WPD as the least-cost company. However, Ofgem’s own analysis shows that WPD is no longer the most efficient company (and indeed relatively poorly ranked) using the more developed slow-track models.¹⁶ As well as highlighting the subjectivity inherent in Ofgem’s benchmarking approach and the associated risk to companies, this calls into question Ofgem’s view, taken at the fast-track stage, that WPD had “*the most efficient cost package of all the DNOs*”.¹⁷

Following the initial implementation of RIIO, there remains a challenge for Ofgem and the industry to develop totex models, and the cost assessment framework more generally, to accurately capture the varied characteristics that explain companies’ costs (beyond scale and regional price effects, as per Ofgem’s RIIO-ED1 models). In particular, further work is required to set allowances that recognise differences in companies required levels of investment. One approach might be to include measures of asset condition in statistical models. But even then, results from any improved models will need to be interpreted with caution, acknowledging that residuals from regression equations do not necessarily equate to inefficiency, but will also reflect statistical error.

There Is a Greater Focus on Measuring Outputs Rather Than Inputs

As noted above, a key goal of RIIO is an increased focus on setting obligations and incentives to deliver outputs as part of the regulatory process (such as improvements in network reliability), with less prescription on companies’ choice of inputs used to deliver them. Broadly, this approach seeks to encourage companies to provide the economically efficient levels of outputs at least cost.

The RIIO framework identifies six output categories: customer satisfaction, safety, reliability and availability, conditions for connection, environmental impact, and social obligations, and requires companies (in consultation with network users) to define associated outputs and output levels, drawing (where possible) on consumer preferences including willingness-to-pay studies.¹⁸

The outputs regime has the potential to improve cost efficiency in key areas. For example, for the gas distribution networks (GDNs) mains replacement programme, GDNs are required to deliver improvements in measures of safety risk as opposed to “decommissioning mains”, as at previous reviews. The expectation is that the change to stipulating an output (reduction in risk) instead of inputs (mains decommissioned) will spur innovation and reduced costs, e.g., prompting the investigation of lower cost pipe insertion in place of costly mains decommissioning to manage network risk.¹⁹

However, the outputs approach also faces some familiar problems. In many instances, it has been difficult to define outputs robustly, i.e., those that are measurable, controllable, auditable, etc. For example, in relation to maintaining electricity distribution network reliability, the output is defined as the frequency and length of planned and unplanned system outages. DNOs are incentivised to improve performance on this measure compared to a target through a scheme known as the Interruptions Incentive Scheme (IIS). Because some outage events are not covered by the IIS performance indices, amongst other factors, companies are required to report on measures of asset condition.²⁰ But asset condition measures themselves are often subjective (e.g., dependent on the engineer or company performing the assessment), and performance is subject to external factors (e.g., bad weather). As a result, Ofgem has not introduced mechanistic penalties and rewards associated with reliability measures, and performance will be subject to an ex-post review with the risk that the process defaults to measuring companies’ level of investment activity (e.g., network replaced) as before.



The RIIO outputs framework should provide stronger incentives for cost efficiency than the previous regime, but the ambition for a comprehensive outputs regime still faces challenges, given the inherent difficulties in defining outputs robustly.

The Cost of Debt Indexation Mechanism Needs to Be Designed to Ensure that Allowances Track Costs

As part of the RIIO framework, companies' allowed cost of debt is based on an indexation mechanism, which updates the allowance annually in line with changes in benchmark debt costs. Prior to RIIO, allowances were set based on Ofgem's view of debt costs fixed *ex ante* for the regulatory period—regulatory forecast error (generally to the benefit of networks) and the extension of the regulatory period from five to eight years rendered the *ex ante* approach untenable.

“...where debt issuance has been lumpy, the simple weighting approach creates winners and losers.”

The design of a cost of debt indexation mechanism requires the regulator to make a number of choices to ensure that the mechanism tracks efficiently incurred debt costs, and provides incentives to minimise costs. These include the choice of the benchmark cost of debt index; the relevant period covered by the mechanism (or trailing average); the weighting of each historical year included in the mechanism; and the allowance for transaction costs, etc.

For all RIIO controls, Ofgem decided to use the average of the A and BBB iBoxx indices of the yields on GBP non-financial corporate debt of at least 10 years remaining maturity (“iBoxx index”).²¹ Ofgem's choice of market index has been relatively uncontroversial but other elements have been more so.

A key design issue has been the number of historical years of iBoxx data used to calculate the allowance. For RIIO-GD1 and T1, Ofgem included 10 years (referred to as a 10-year trailing average). However, the average tenor at issuance (i.e.,

the initial time left before repayment of the bond) for energy networks' bonds is around 20 years, and therefore at any one point in time half of all companies' bonds will fall outside the period covered by the mechanism. In response to this criticism, for RIIO-ED1, Ofgem decided to extend the trailing average from 10 years to 20 years over time—the so-called “trombone index”.^{22, 23}

A related issue is the weighting applied to each year in calculating the average index value. For RIIO-ED1, each year receives an equal weight (i.e., one-tenth in the first year increasing to one-twentieth as the trombone extends). The problem with this approach is that, where debt issuance has been lumpy, the simple weighting approach creates winners and losers. For example, those companies that issued relatively high levels of debt when market costs were relatively high will not be able to recover such costs, whereas those that issued debt more recently when markets were low will tend to over-recover.

Ofgem has made no allowance for wider debt issuance costs associated with liquidity, book running fees (e.g., underwriting costs), and other fees (such as rating agency fees). Ofgem claims that such costs are compensated for by the existence of a “halo effect”—the ability of networks to systematically outperform the market owing to the positive impact on debt costs of the GB regulatory environment. However, Ofgem's halo effect is based on a comparison of the cost of a set of energy company bonds with the set of bonds in benchmark index, but without controlling for differences between the two sets, e.g., such as tenor, average rating etc. We have shown that the alleged outperformance of energy networks or halo reflects differences in the two sets, e.g., the sample of energy bonds has a shorter tenor than the benchmark index, and if you control for such differences the halo effect disappears.²⁴

By Ofgem's own admission, as a consequence of no allowance for debt transaction costs, as well as choices over the number of years included in the mechanism, and the weighting for each year, networks are unlikely to recover efficient level of debt costs over ED1.²⁵

Notwithstanding these design issues, in principle a well-designed indexation mechanism could improve the extent to which allowances reflect companies' efficient debt costs over the eight-year control period. Other British regulators (as with other elements of RIIO) are considering similar mechanisms.



Changes to the Appeals Process May Lead to a More Robust Regulatory Process (and a Greater Number of Appeals)

Following changes to statute to implement the EU Third Internal Energy Package,²⁶ the right of appeal to the CMA is no longer restricted to DNOs (“relevant licence holders”) but also includes any other licensee under the Act whose interests are materially affected by the decision. In practice, the new appeals process also allows for reconsideration of specific elements of the revenue control as opposed to a re-consideration of the control in its entirety.

The effect of the changes has been immediate. For RIIO-ED1, British Gas Trading (BGT), an electricity supplier and “*materially affected party*”, appealed Ofgem’s decision on six specific grounds.²⁷ In addition, Northern Powergrid (NPG) appealed the decision on three specific grounds.²⁸

In the course of the BGT and NPG appeals, some DNOs argued that CMA should reconsider the control in its entirety rather than limit the appeal to specific grounds. These DNOs argued they accepted the price control as a whole hence reconsidering one element in isolation would undermine the “global bargain” struck by the DNOs.²⁹ Along the same lines, Ofgem noted that the decision is “*made up of a number of discrete but interconnected determinations*”,³⁰ and that the CMA should be mindful of the “*distortive effects that may arise from artificially cherry picking aspects of the decision for reconsideration*”.³¹ However, the CMA decided not to re-run Ofgem’s original decision-making process or to re-hear all the evidence. If the concerns identified about “*cherry picking*” and its “*knock-on effects*” were significant, it would consider such matters, but it did not see any such evidence.³²

These legislative changes, and the precedent set by the CMA, may increase the number of appeals at future controls, and/or change the conduct of future price controls. Whereas a network may have previously accepted the revenue control as a global bargain or “in the round”, it may now decide to challenge those elements where it considers the corresponding allowances are insufficient. Indeed, given the prospect for third-party challenge, network licensees may feel compelled to appeal specific elements where the allowances are insufficient to offset the risk that a third party is successful in reducing allowances in other areas (and rendering the total revenue allowance unacceptable). In short, it may no longer be tenable

for a network licensee to accept the revenue control as a whole, unless it is truly and fully robust in all its elements.

The changes to the appeals process also require Ofgem to consider its approach to setting allowed revenues. Until now, Ofgem has set revenues “in the round”, in the expectation (or hope) that the many decisions that make up a price control will result in a viable package overall, even if some of those decisions set allowances too high and others set allowances too low. For example, Ofgem considered that the expected under-recovery of efficient cost of debt could not be justified in isolation but needed to be considered along with its generous approach on the cost of equity.³³

To minimise the scope for future appeals, Ofgem will need to provide justification for each of the many different elements that constitute its overall decision, and ensure that each element is justified in its own right. If this is indeed the effect of the revised appeals procedures, it is a welcome development: Ofgem will need to account for all aspects of its decisions, and its decisions will be subject to independent review. Overall, this should improve regulatory decision-making, investor security, and improve overall performance for customers.

Conclusions

The RIIO framework represents a positive development on the previous RPI-X regime, with greater focus on companies’ outputs and customer engagement, and innovations around totex benchmarking and allowing for efficient financing costs.

However, there are potential improvements that could be made, as we have identified in this ERI. On benchmarking, we consider that Ofgem needs to develop a more robust set of models that reflect the greater number of factors that explain companies’ costs, and interpret models’ results with caution. The models also need to be established well in advance to allow for an objective fast-track assessment process. We have also noted that certain design aspects of the cost of debt indexation mechanism should be reviewed, notably Ofgem’s decision to exclude an allowance for debt transaction costs on the basis of a so-called halo effect.

However, as a sign of the success of the RIIO framework, other regulators in both Great Britain and elsewhere have (or intend) to adopt many of its elements.³⁴



Endnotes

- ¹ (1) CMA (2015), *British Gas Trading v The Gas and Electricity Market Authority—Final Determination*, 29 September 2015. https://assets.digital.cabinet-office.gov.uk/media/5609588440f0b6036a00001f/BGT_final_determination.pdf.

(2) CMA (2015), *Northern Powergrid (Northeast) Limited and Northern Powergrid (Yorkshire) plc v The Gas and Electricity Market Authority—Final Determination*, 29 September 2015. https://assets.digital.cabinet-office.gov.uk/media/5609534de5274a036c000012/NPg_final_determination.pdf.
- ² Ofgem completed the price control for Gas Distribution Networks (GDNs), referred to as RIIO-GD1, and for electricity and gas transmission networks, referred to as RIIO-T1, in 2013. These controls set revenues for the period from 2013 to 2021. Ofgem also completed price controls for the electricity Distribution Network Operators (DNOs), known as RIIO-ED1, in 2014, although as noted in this paragraph, these were appealed to the CMA, which reached its final determination in September 2015.
- ³ The Third Energy Package consists of two Directives and three Regulations: (1) Directive 2009/72/EC, which concerns common rules for the internal market in electricity and repealing Directive 2003/54/EC; (2) Directive 2009/73/EC, which concerns common rules for the internal market in natural gas and repealing Directive 2003/55/EC; (3) Regulation (EC) No 714/2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003; (4) Regulation (EC) No 715/2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005; and (5) Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009, establishing an Agency for the Cooperation of Energy Regulators.
- ⁴ Under section 11C of EA89, certain persons are entitled to appeal the Gas and Electricity Markets Authority's (GEMA) decision to the CMA. These include (i) persons who hold a licence under section 6(1) of EA89, where the decision at issue involves a modification to the terms of that licence (referred to in EA89 as a 'relevant licence holder'), as well as (ii) any other person who holds a licence of any type under section 6(1) of EA89 whose interests are materially affected by the decision.
- ⁵ For example, Ofgem states: "*The companies' plans are much higher quality relative to previous price control submissions, and the plans were informed by a much greater degree of stakeholder engagement.*" Source: Ofgem (February 2012), RIIO-GD1: Decision on fast-track process, p. 2. https://www.ofgem.gov.uk/sites/default/files/docs/2012/02/120217_fast_track_decision_letter.pdf.
- ⁶ Ofgem (2013), Strategy decision for the RIIO-ED1 electricity distribution price control—Overview, 4 March 2013, paras. 6.10–6.13. <https://www.ofgem.gov.uk/sites/default/files/docs/2013/03/riioed1decoverview.pdf>.
- ⁷ Ofgem (February 2012), RIIO-GD1: Decision on fast-track process, p. 1. https://www.ofgem.gov.uk/sites/default/files/docs/2012/02/120217_fast_track_decision_letter.pdf.
- ⁸ Ofgem (2014), RIIO-ED1: Final determinations for the slow-track electricity distribution companies, business plan expenditure assessment, Table 2.5, p. 14. https://www.ofgem.gov.uk/sites/default/files/docs/2014/11/riio-ed1_final_determination_expenditure_assessment_0.pdf.
- ⁹ Ofgem (28 November 2014), RIIO-ED1: Final determinations for the slow-track electricity distribution companies, business plan expenditure assessment (supplementary annex to RIIO-ED1 overview paper), p. 39, Table 3.1.
- ¹⁰ In many operational or investment decisions, companies will face a choice between an operating cost or capital cost solution. For example, additional capacity on gas networks could be met through laying additional mains (a capital cost), or through agreeing to interruptible contracts with large users (which has an associated operating cost). Comparative efficiency modelling that treats operating and capital costs separately fails to take into account such choices, whereas total expenditure (or totex) modelling accommodates such trade-offs.
- ¹¹ Ofgem's "RPI-X@20" review raised concerns that scrutinising different costs using different techniques could distort the incentives of DNOs. If operating expenditure is subject to aggressive benchmarking, while capital expenditure is subject to less regulatory scrutiny, then DNOs "*would rationally seek to classify more costs to the cost type subject to weaker scrutiny*". Also, if only operating expenditure is subject to benchmarking, then DNOs will not face "*an incentive to operate existing assets efficiently*", and will not plan an efficient trade-off between operating existing assets and installing new ones. Ofgem argued that using a totex model would address both these problems, as "*it is not affected by cost categorisation issues*" and "*it captures cross-activity trade-offs relatively well*".

Sources: (1) Frontier Economics (May 2010), RPI-X@20: The future role of benchmarking in regulatory reviews—A final report prepared for Ofgem, paras. 2.2.1 and 5.4.1; and (2) Ofgem (4 March 2013), Strategy decision for the RIIO-ED1 electricity distribution price control—Tools for cost assessment, para. 2.26.
- ¹² Ofgem's totex models sought to explain variation in companies' totex (adjusted for regional labour costs) as a function of a Composite Scale Variable, using an Ordinary Least Squares regression model.
- ¹³ For instance, at RIIO-ED1, Ofgem allowed SP Manweb a special factor reflecting the relatively high costs of developing and operating its "interconnected" network, which differs from the radial network designs seen in most other DNOs. UK Power Networks also received a special factor allowance at RIIO-ED1 and GD1 to reflect the relatively high costs of operating in London, and SSE Power Distribution received allowances to reflect the relatively high costs of operating in the highlands and islands of Scotland. Source: Ofgem (28 November 2014), RIIO-ED1: Final determinations for the slow-track electricity distribution companies, business plan expenditure assessment (supplementary annex to RIIO-ED1 overview paper), pp. 45–50.
- ¹⁴ Ofgem's disaggregated benchmarking analysis found that some DNOs' efficient levels of replacement and refurbishment expenditure over the ED1 control period are around twice as high as for other companies, when calculated as a share of their respective Modern Equivalent Asset Values. This contradicts Ofgem's belief that DNOs' investment cycles are aligned. Source: NERA analysis.
- ¹⁵ Competition and Markets Authority (6 October 2015), Bristol Water plc: A reference under section 12(3)(a) of the Water Industry Act 1991, Report, pp. 5–6.
- ¹⁶ Ofgem (2014), RIIO-ED1: Final determinations for the slow-track electricity distribution companies—Expenditure Assessment, 28 November 2014, Table 2.6. https://www.ofgem.gov.uk/sites/default/files/docs/2014/11/riio-ed1_final_determination_expenditure_assessment_0.pdf.
- ¹⁷ Ofgem (28 February 2014), Decision to fast-track Western Power Distribution, p. 3.
- ¹⁸ Ofgem (2010), *Handbook for Implementing the RIIO Model*, 4 October 2010, pp. 37 and 106. https://www.ofgem.gov.uk/sites/default/files/docs/2010/10/riio_handbook_0.pdf.
- ¹⁹ Both Ofgem and GDNs comment on the scope to introduce pipe insertion techniques. See, for example, Wales and West Utilities (November 2011), Part B6, Asset Strategy. <http://www.wvutilities.co.uk/media/1311/part-b6-asset-strategy.pdf>.



- ²⁰ DNOs assign a health level of HI1 to HI5 for each of their assets, with HI1 corresponding to its healthiest assets and HI5 corresponding to its least healthy assets. Each asset then receives a score of 1 for HI1, 10 for HI2, 30 for HI3, 70 for HI4, and 100 for HI5. Those scores are added across all assets to estimate a network's overall need for asset replacement and refurbishment.
- Source: DNO business plans; Ofgem (2012), RIIO-ED1 Glossary of Terms, p. 12. <https://www.ofgem.gov.uk/sites/default/files/docs/2012/09/riioed1sconglossary.pdf>.
- ²¹ The cost of debt allowance for the first year of the RIIO-ED1 price control (the year 2015/2016, starting April 2015) would be based on the iBoxx index for the period 1 November 2004 to 30 October 2014. Ofgem (28 November 2014), RIIO-ED1: Final determinations for the slow-track electricity distribution companies—Overview, p. 41, para. 5.6. <https://www.ofgem.gov.uk/ofgem-publications/92249/riio-ed1finaldeterminationoverview-updatedfrontcover.pdf>.
- ²² Specifically, Ofgem decided to fix the start date of the trailing average period such that the trailing average extends by one year for each year of the RIIO-ED1 price control, and into the next price control period, until the trailing average reaches 20 years for the year 2025/2026. Ofgem (28 November 2014), RIIO-ED1: Final determinations for the slow-track electricity distribution companies—Overview, p. 41, para. 5.6. <https://www.ofgem.gov.uk/ofgem-publications/92249/riio-ed1finaldeterminationoverview-updatedfrontcover.pdf>.
- ²³ As a consequence of bringing the term of the trailing average (of 20 years) in line with the average tenor at issuance of DNO debt (of around 20 years), the trombone mechanism ensures the cost of debt allowance more closely tracks DNOs' debt costs. By contrast, the mechanisms for GD1 and T1 do not extend to 20 years but comprise a fixed 10-year trailing average, and at any one time around half of all outstanding debt may fall outside of the trailing average period. Ofgem reports that DNOs' average tenor is around 21 years. See: Ofgem (30 July 2014), RIIO-ED1: Draft Determination for the slow-track electricity distribution companies—Financial Issues, p. 11, para. 2.36. <https://www.ofgem.gov.uk/ofgem-publications/89072/riio-ed1draftdeterminationfinancialissues.pdf>.
- ²⁴ NERA (2014), A Response to Ofgem's Proposals on the Cost of Equity and Debt for RIIO ED1, section 3.3. http://www.spenergynetworks.co.uk/userfiles/file/App13_201409_NERA_ResponseToOfgemProposalsCoECoD.pdf.
- ²⁵ Ofgem (2014), RIIO-ED1: Draft determinations for the slow-track electricity distribution companies Financial Issues, para. 2.46. https://www.ofgem.gov.uk/sites/default/files/docs/2014/07/riio-ed1_draft_determination_financial_issues.pdf.
- ²⁶ Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009, concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0055:0093:EN:PDF>.
- ²⁷ See: British Gas Trading (March 2015), Notice of Appeal of Energy Licence Modification. https://assets.digital.cabinet-office.gov.uk/media/55102d72ed915d142400016/British_Gas_Trading_Ltd_notice_of_appeal.pdf.
- ²⁸ See: Northern Power Grid (March 2015), Notice of Appeal of Energy Licence Modification. https://assets.digital.cabinet-office.gov.uk/media/551029b840f0b6140100000b/Northern_Powergrid_notice_of_appeal.pdf.
- ²⁹ Competition and Markets Authority (September 2015), *British Gas Trading Limited v The Gas and Electricity Markets Authority, Final Determination*, para. 3.47.
- ³⁰ Competition and Markets Authority (September 2015), *British Gas Trading Limited v The Gas and Electricity Markets Authority, Final Determination*, para. 3.52.
- ³¹ Ofgem (2015), Response to the Notice of Appeal Energy Licence Modification, Non-confidential version, para. 69. https://assets.digital.cabinet-office.gov.uk/media/55c48241ed915d5343000009/GEMA_resp_to_NoA.pdf.
- ³² Competition and Markets Authority (September 2015), *British Gas Trading Limited v The Gas and Electricity Markets Authority, Final Determination*, para. 3.50.
- ³³ See: Ofgem (2014), RIIO-ED1: Draft determinations for the slow-track electricity distribution companies Financial Issues, para. 2.46; NERA (2014), *A Response to Ofgem's Proposals on the Cost of Equity and Debt for RIIO ED1*, p. i http://www.spenergynetworks.co.uk/userfiles/file/App13_201409_NERA_ResponseToOfgemProposalsCoECoD.pdf.
- ³⁴ For example, the price control conducted by Ofwat that set allowed revenues for the period 2015–20 for water companies in England and Wales adopted many of the elements of the RIIO framework, including an equivalent fast-track assessment, greater focus on outputs, and total expenditure (totex) benchmarking approach.

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