



Frontier Shift at RIIO-T2 Draft Determinations

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Project Team

Richard Druce
Soren Christian

NERA Economic Consulting
Marble Arch House
66 Seymour Street
London, UK W1H 5BT
+44 207 659 8500
www.nera.com

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Executive Summary

On 9 July 2020, Ofgem released its Draft Determinations for electricity and gas transmission network companies for the RIIO-2 price control period.¹ Ofgem’s base revenue determination includes an adjustment for “frontier shift”: the rate at which efficient costs change due to external factors, namely industry-wide productivity improvements (“ongoing efficiency”) and Real Price Effects (RPEs).

We have been commissioned by Scottish Power Transmission (SPT) and National Grid (NG) to review Ofgem’s proposed approach to accounting for frontier shift for electricity transmission and gas transmission companies: SPT, NG Electricity Transmission (NGET), Scottish Hydro Electricity Transmission (SHET) and NG Gas Transmission (NGGT).

Ofgem’s approach relies heavily on a report from its economic consultants CEPA.² We review both CEPA’s recommendations contained in its report, as well as Ofgem’s interpretation of CEPA’s recommendations as proposed in the Draft Determinations.

Ongoing Efficiency

Summary of Ofgem’s approach

Ofgem proposes to set the ongoing efficiency challenge at 1.2 per cent per annum for capex, and 1.4 per cent for opex, based on the top end of the range estimated by CEPA and including a 0.2 per cent uplift for the innovation efficiency challenge. We have reviewed the evidence that CEPA presents to support its range of possible ongoing efficiency challenges, as well as Ofgem’s use of it to select a single point for capex and for opex.

CEPA ignores shorter-term dynamics in productivity growth

CEPA analyses data from 1997 to 2016, the longest period possible from the 2019 EU KLEMS dataset that includes only complete business cycles. This approach is appropriate insofar as the forward-looking period is not fundamentally different from the historical period.

However, this approach is not appropriate if the nature of the economy has changed such that expected productivity growth in the future is no longer consistent with long-term trends. In fact, CEPA acknowledges that productivity growth since the 2008 financial crisis has been below its long-term trends, even as the economy has recovered.³ CEPA’s approach effectively assumes that productivity will return to long-term levels during RIIO-2, but no reliable evidence suggests that it will.

CEPA cites external forecasts from the Office of Budget Responsibility (OBR) and the Bank of England (BoE) which suggest that productivity will increase in the coming years. However, the OBR forecast is a top-down forecast which has consistently proven to be

¹ The Draft Determinations also cover gas distribution network companies (RIIO-GD2), but they are not directly relevant to this report. Source: Ofgem (9 July 2020), RIIO-2 Draft Determinations – Core Document

² CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper.

³ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.16.

overestimated since the financial crises, and the BoE has revised down its forecast in the wake of the COVID-19 pandemic, and it no longer corroborates CEPA's assumption.

Therefore, CEPA should give weight to productivity estimates in the post-crisis period, in case growth rates do not immediately return to pre-crisis levels.

CEPA misrepresents the choice between VA and GO productivity measures

Noting a “long-standing debate over which definition of output is more relevant for measuring ongoing efficiency”, CEPA analyses productivity measures based on both value added (VA) and gross output (GO) definitions. The latter is by definition lower than the former.

In fact, recent regulatory decisions have considered that GO is theoretically preferable in most cases, while giving some weight to VA measures (albeit only implicitly in Ofwat's PR19 decision).

With no explanation for why it does so, CEPA presents its VA values as its “reference value” and GO as its “downside” sensitivity, which contradicts regulatory precedent which, if anything, would suggest the opposite emphasis is appropriate. At a minimum, therefore, CEPA should present its VA and GO estimates with equal prominence.

CEPA presents only a selective “lower bound” view

CEPA's “reference value” productivity measures are based on the midpoint between its “narrow” industry definition and its “wide” industry definition. Without offering any justification, CEPA does not consider the “narrow” industry definition to be relevant to calculating the “lower bound” GO value, and instead bases it only on the (higher) “wide” industry definition.

This is arbitrary and internally inconsistent: if *selected industries'* productivity growth is relevant to transmission companies' ongoing efficiency when measured in VA terms, then it is also relevant when measured in GO terms.

There is no basis for an innovation funding adjustment

On top of the “reference value” TFP estimates derived from the EU KLEMS dataset, CEPA computes an additional efficiency challenge of “up to 0.2% [that] represent[s] a reasonable return to consumers on the upfront funding they provided in the form of innovation allowances in RIIO-1” through the Network Innovation Competition (NIC) and the Network Innovation Allowance (NIA).⁴

Rather than basing the uplift on a bottom-up estimate of the relationship between innovation and productivity gains, CEPA seeks to estimate “cost savings to consumers [that] would be required in order to make providing the innovation allowances seem a reasonable investment”.⁵ CEPA estimates that, if transmission companies reduced costs at a rate of 0.2 per cent per annum during RIIO-2, this would represent a fair return to customers on the upfront costs of the innovation schemes.

⁴ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.35.

⁵ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.24.

CEPA's approach to determining the innovation funding adjustment has no basis in the additional cost reductions an efficient company could reasonably achieve during RIIO-2. Instead, the target takes what CEPA deems to be a fair return to customers (4.2 per cent), and "goal seeks" an arbitrary set of *input* assumptions that yield that result, including the cost reduction profile during RIIO-2.

However, cost reductions are only one objective of the projects funded through the NIC and the NIA. In practice, much of the funding has targeted other objectives, such as environmental objectives and ancillary service integration. Of the £88.5 million in NIC funding awarded to transmission companies during RIIO-1, less than £10 million was directed to projects which were primarily focused on cost reductions that are remunerated via the TOs' price controls. A further £36.2 million was directed to projects where cost reductions are an ancillary benefit to the project. The remaining £41.8 million was directed to projects which may reduce whole-system costs but outside of the scope of the RIIO revenue controls. We would therefore not expect these innovations to be "profitable" from a price-controlled customer's perspective.

Any adjustment which accounts for the cost savings from innovation funding must consider the extent to which those benefits are already captured in business plans and/or the pre-adjusted cost allowances. This potential double count was at issue in Northern Powergrid (NPG)'s successful appeal of RIIO-ED1 to the Competition and Markets Authority (CMA). CEPA acknowledges the importance of controlling for embedded cost savings in light of the CMA appeal, but makes little effort to actually do so.

The innovation funding adjustment is intended to capture additional cost savings that companies could achieve over and above the productivity target already included as the reference value. However, R&D across the economy is a fundamental part of driving productivity gains, especially in competitive sectors. Even with the dedicated RIIO-1 allowances, transmission companies' R&D budgets were smaller as a proportion of total expenditure than aggregate R&D is as a proportion of GDP. In other words, the dedicated allowances bring transmission companies more closely in line with comparators in competitive sectors in terms of R&D spending. There is therefore no reason to believe that transmission companies can achieve faster productivity growth than the economy as a whole simply because of their RIIO-1 R&D allowances.

Ofgem's use of the CEPA Report

CEPA's report concludes by presenting a range of possible ongoing efficiency targets (0.5-1.2 per cent for capex, 0.5-1.4 per cent for opex), along with some caveats and points of consideration. From this range, Ofgem ignores all of the caveats and selects only the upper bound of each range.

When presented with a range of methodological choices where the precise answer is not obvious, the most reasonable approach would be to "triangulate" between the options, e.g. through selecting a midpoint or a weighted average of multiple estimates.

Instead, Ofgem places full weight on the upper bound of CEPA's estimate, and hence its determination relies on a series of unjustifiable positions that all serve to exaggerate the scope for ongoing productivity improvement by the transmission companies over the T2 control period:

- The relevant comparator sector is the “wide” industry definition, not the “narrow” definition, thus drawing evidence selectively from the evidence presented by CEPA.
- Productivity growth will return to the 1997-2016 long-term average, not continue at the current suppressed levels, despite projections from the BoE that it will remain low.
- Value-added productivity improvement is an appropriate way to assess the scope for productivity improvement, contradicting regulatory precedent which also places some weight on gross output metrics
- Companies can achieve a 0.2 per cent innovation funding adjustment, which is not justifiable when considering the stated intention of the innovation funding projects supported during the RIIO-T1 period.

As a further cross check to our conclusion that Ofgem has exaggerated the scope for ongoing productivity improvement, its proposed targets are also significantly higher than any recent regulatory precedent. The highest previous decision was 1.1 per cent by Ofwat at PR19. Instead, the result seems to reflect Ofgem’s aspiration to set a demanding productivity target, rather than a fair and robust assessment of the available evidence.

We have calculated alternative estimates that consider a more balanced range of methodological choices across these parameters, using only figures presented in the CEPA report. In particular, we:

- Place equal weight on VA and GO measures of productivity growth, and include both the “wide” and “narrow” industry definitions in calculating GO productivity growth;
- Place equal weight on the longer data series (1997-2016) and the post-crisis series (2006-2016);
- Assume that the cost-related benefits of RIIO-1 innovation funding (insofar as they exist) are already captured in the EU KLEMS dataset and companies’ business plans, and do not apply an uplift for innovation funding; and
- Take an unweighted average across all estimates, rather than selecting the upper bound.

We present our alternative ongoing efficiency estimates in Table 1 below.

Table 1: Alternative Ongoing Efficiency Estimates

	TFP (Capex)		LP (Opex)	
	1997-2016	2006-2016	1997-2016	2006-2016
Narrow (GO)	0.3%	-0.1%	0.4%	-0.2%
Wide (GO)	0.5%	0.1%	0.5%	0.1%
Narrow (VA)	0.6%	-0.3%	1.0%	-0.6%
Wide (VA)	1.0%	0.2%	1.2%	-0.2%
Average by Window	0.6%	0.0%	0.8%	-0.2%
Average	0.3%		0.3%	

Source: NERA calculations from CEPA Tables 2.2 and 2.3

Note: Narrow = Unweighted average of selected industries (exc. manufacturing); Wide = Weighted average all industries (exc. real estate, etc).

This more balanced assessment of the available evidence suggests an ongoing efficiency target of 0.3 per cent per annum, for all cost categories.

Given that the ongoing efficiency challenge implied by the range in Table 1 is below the targets included by the transmission companies in their business plans suggests that Ofgem should accept that TOs' own ongoing efficiency targets, which are reasonable and ambitious when assessed against the available data on productivity improvement.

Real Price Effects

Ofgem proposes to set an RPE allowance for transmission companies that tracks movements in a set of external indices, selected on the basis that they are (i) simple; (ii) accurate; and (iii) independent. In the DD, Ofgem adopts CEPA's RPE recommendations without amendment. We consider both the implications of Ofgem's indexation approach as well as CEPA's design of the indices themselves.

RPE index selection process

CEPA adopts a two-step approach to building up each of the RPE indices. First, it selects the cost categories (labour, materials, plant & equipment, transport and other) which are material enough to include an RPE index for a particular company, based on whether the cost area is at least 10 per cent of the company's costs. CEPA determines that Labour and Materials are material cost categories for all companies, while Plant & Equipment is material for SHET only.

Second, CEPA chooses indices to track cost changes in each cost category. It applies criteria including (a) simplicity; (b) accuracy in their reflection of transmission companies' costs; and (c) independence of the transmission companies' costs. However, CEPA considers only the indices that were used in RIIO-T1/GD1, offers no evidence that they satisfy these criteria, and is materially pared down from how it proposed to carry it out this selection process in its June 2019 report. In fact, CEPA does not consider any indices beyond those used at RIIO-T1/GD1, and importantly, it fails to assess whether these indices accurately reflect year-to-year movements in transmission costs.

Therefore, it is impossible to say from CEPA's assessment: (a) whether other indices would have been more appropriate as comparators; (b) whether each individual index actually satisfies the "Accuracy" criterion; or (c) whether the indices would satisfy other indices which CEPA deemed to be important in its June 2019 report, such as the double counting of ongoing efficiency. The indexation approach means that choice of individual indices is more important than under Ofgem's previous practice of setting ex ante RPEs. Therefore, the selection process should have a higher standard of evidence.

Labour RPE

CEPA bases the Labour RPE index on five series:

- ONS Average Weekly Earnings (AWE) private sector;
- ONS AWE construction;
- ONS AWE transport & storage;
- BCIS PAFI civil engineering; and

- British Electrical Allied Manufacturers Association (BEAMA) electrical engineering (electricity transmission only).

CEPA has not presented any evidence that movements in any of the selected indices reflect movements in cost pressures faced by transmission companies. Each of these indices moves differently, with real annual growth rates from 2000 to 2019 ranging from 0.85 per cent to 1.88 per cent above CPIH inflation. Assessing the extent to which these indices track the TOs' real labour cost pressures, which CEPA has neglected to do, would be necessary to assess the risk that the new indexation approach over or under compensates TOs' for changes in the market cost of labour during the T2 control period.

CEPA combines these indices using an unweighted average, implicitly assuming that each series corresponds to 20 per cent (electricity) or 25 per cent (gas) of companies' labour costs. It is highly unlikely that each of these labour series would correspond to a 20 or 25 per cent subset of labour costs.

Some of the data series relied upon appear to be more susceptible to COVID-related declines than companies' actual labour costs, meaning that companies may be arbitrarily penalised for negative wage shocks beyond the reduction in their own wage bills. Despite the general stability of the indices up to 2020, since February 2020 the AWE Private Sector and AWE Construction series have declined sharply to June 2020, by 4 per cent and 10 per cent, respectively. The other three series have not yet exhibited such declines.

According to the ONS, these earnings shocks "are not just a measure of pay rises as they also reflect changes in the number of paid hours worked".⁶ The prevalence of furloughs in some sectors has driven a decrease in the paid hours worked and hence the average weekly earnings. These recent trends are not relevant to transmission companies if they have not furloughed their staff at similar rates, for instance if staff were deemed to be essential.

If such shocks persist into (or return during) RIIO-2, then companies will be penalised for labour cost reductions associated with the economy-wide furlough scheme that they themselves did not participate in.

Materials RPE

In choosing the indices which would feed into the Materials RPE index for transmission companies, CEPA considers the following indices which it used in RIIO-1 against its criteria:

- BCIS PAFI Copper pipes and accessories (capex materials for electricity transmission companies);
- BCIS PAFI Structural Steelwork Materials: Civil Engineering Work (capex materials for gas transmission companies); and
- BCIS FOCOS Resource Cost Index of Infrastructure: Materials (opex materials for all transmission companies).

⁶ Office for National Statistics (11 August 2020), Average weekly earnings in Great Britain: August 2020, p.4.

For most companies, CEPA applies a 25 per cent weight to the FOCOS index and 75 per cent on the relevant PAFI index. For SPT, it applies 35 per cent and 65 per cent weight to these indices, respectively.

These weights appear to be derived from CEPA's assessment of opex and capex as drivers of companies' materials needs, but it has not provided any detail about this assessment. However, at least compared to the Labour indices, the long-term average growth rates of these indices are similar, so companies' allowances *in expectation* are not highly sensitive to this weighting factor.

As described above, CEPA considers only the indices which Ofgem used to track RPEs at RIIO-T1/GD1, and finds that all indices satisfy its criteria (without giving any detail about any one index against the criteria). It is not apparent that the selected indices most accurately reflect companies' costs in comparison to alternative indices. For example, CEPA assumes that electricity transmission companies' capex materials costs are driven by the cost of copper piping, a material input of little relevance to transmission companies. The BCIS data set includes several series which, on the face of it, appear more directly relevant to electricity transmission companies' costs (e.g. the cost of electrical cables). CEPA's failure to even consider indices which appear to be more directly relevant to electricity transmission companies' costs than the cost of copper piping demonstrates the arbitrariness of its selection process. The use of inaccurate indices introduces the risk that the index (and associated revenue allowances) will move independently of companies' efficient costs.

The materials indices appear to capture economy-wide productivity trends. The PAFI materials indices are composed of ONS PPI series, and the FOCOS series is composed of PAFI indices. The PPI series are a mixture of input and output indices, though it is not clear which ones inform the relevant PAFI series. The output PPIs capture productivity improvements, so, insofar as the PAFI and FOCOS series are driven by output PPIs, then they capture the effects of productivity improvements.

Plant & Equipment, Transport and Other RPE

Ofgem does not apply an RPE for any other cost category for transmission companies (except for Plant & Equipment for SHET), because it does not find these cost categories to be sufficiently material.

CEPA's materiality threshold is arbitrary, unjustified and unnecessary. In its 2019 report, CEPA stated that "it is not clear that there is a set numeric threshold that Ofgem should set to consider evidence put forward by companies".⁷ In its 2020 report, CEPA sets a 10 per cent materiality threshold, citing its proposal to do so in its 2019 report. The 2019 report includes no such proposal.

CEPA suggests that a materiality threshold has value in reducing the complexity of the indexation process. However, in applying a Plant & Equipment RPE to SHET, Ofgem must already carry out the process of maintaining and applying the index, so it adds little if any complexity to apply it to all companies.

⁷ CEPA (June 2019), RIIO-GD2 cost assessment – frontier shift, p.15.

If Ofgem does maintain its approach to assessing materiality, it should re-assess materiality based on *allowed* costs rather than business plan costs, as this is the measure that actually determines companies' totex during RIIO-2.

For cost areas which do not receive RPE indexation, Ofgem assumes that they will grow with inflation, which is consistent with Ofgem's past RIIO-1 decisions. However, the RIIO-2 price controls will be indexed to CPIH rather than RPI. According to Ofgem, the wedge between RPI and CPIH is 1.049 per cent.⁸ While some of that wedge is due to a "formula effect" in how averages are calculated, at least 0.35 per cent of the wedge remains unexplained.

Ofgem therefore assumes that these cost areas grow slower than they did in RIIO-1, without considering the merits of this assumption beyond the "formula effect". One solution would be to reduce the ongoing efficiency assumption; another solution would be to apply RPE indices to more cost categories, lowering the share of costs which are exposed to the change in inflation methodology.

RPE conclusions

While Ofgem has introduced the concept of RPE indexation as a way to insulate customers from the risk of forecasting error, its approach introduces new risks for transmission companies, especially where the indices themselves do not perfectly track external pressures in input costs.

The selected indices may have been adequate for setting ex ante RPE allowances in previous decisions, because they were only intended to capture the long-term tendency for some input costs to rise faster or slower than general inflation. Using them for indexation, however, has wider consequences (e.g. financeability) and so requires a higher standard of evidence.

Conclusion

Ofgem's Draft Determinations approach to setting a frontier shift represents a flawed assessment of the available economic evidence that hampers companies' ability to recover their efficient costs. Ofgem's approach is arbitrary and inconsistent with regulatory precedent and economic theory. A more balanced review of the evidence suggests that companies' submitted ongoing efficiency challenges are a reasonable reflection of the external evidence.

Ofgem's approach to indexing RPEs introduces undue revenue risk to companies, exacerbated by the current macroeconomic climate and the fact that any shocks to RPEs will not be offset by changes in the ongoing efficiency challenge.

We recommend a pragmatic solution, in which Ofgem sets an ex ante productivity target and an ex ante RPE allowance that offset each other, in effect indexing the price control to CPIH inflation. The current outlook for RPEs is within the range of evidence on long-term productivity growth, which suggests this approach is reasonable, and significantly simplifies the regulatory process.

⁸ Ofgem (24 May 2019), RIIO-2 Sector Specific Methodology – Core document, para. 12.62.

1. Introduction

On 9 July 2020, Ofgem released its Draft Determinations for electricity and gas transmission network companies for the RIIO-2 price control period.⁹ The price control will run from 1 April 2021 to 31 March 2020.

One component of each company's revenue allowance is its base revenue allowance, based on Ofgem's assessment of the company's proposed business plan. Ofgem's base revenue determination includes an adjustment for "frontier shift": the rate at which efficient costs change due to external factors, namely industry-wide productivity improvements ("ongoing efficiency") and Real Price Effects (RPEs).

We have been commissioned by Scottish Power Transmission (SPT) and National Grid (NG) to review Ofgem's proposed approach to accounting for frontier shift for electricity transmission and gas transmission companies: SPT, NG Electricity Transmission (NGET), Scottish Hydro Electricity Transmission (SHET) and NG Gas Transmission (NGGT).

To inform its frontier shift assumption at RIIO-2, Ofgem commissioned CEPA to write a report on ongoing efficiency and RPEs.¹⁰ We review both CEPA's report as well as Ofgem's use of it, noting where Ofgem's actual Draft Determination proposal deviates from the recommendations contained in the CEPA report.

This report is structured as follows:

- In Chapter 2, we appraise Ofgem's proposed methodology to measuring ongoing efficiency;
- In Chapter 3, we appraise Ofgem's proposed methodology to measuring RPEs; and
- In Chapter 4, we present our conclusions.

⁹ The Draft Determinations also cover gas distribution network companies (RIIO-GD2), but they are not directly relevant to this report. Source: Ofgem (9 July 2020), RIIO-2 Draft Determinations – Core Document

¹⁰ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper.

2. Ongoing Efficiency

Ofgem proposes to set the ongoing efficiency challenge at 1.2 per cent for capex, and 1.4 per cent for opex, based on the top end of the range estimated by CEPA and including a 0.2 per cent uplift for the innovation efficiency challenge. In this chapter, we discuss CEPA's analysis and Ofgem's interpretation of it.

- In Section 2.1, we describe recent regulatory precedent for setting ongoing efficiency targets;
- In Section 2.2, we appraise CEPA's choice to place relatively little weight on the trends in productivity since the 2007-08 Global Financial Crisis;
- In Section 2.3, we discuss CEPA's choice between Value Added (VA) and Gross Output (GO) measures of productivity;
- In Section 2.4, we review CEPA's "lower bound" productivity estimates;
- In Section 2.5, we review CEPA's approach to estimating a reasonable return from innovation funding provided in RIIO-1;
- In Section 2.6, we assess Ofgem's interpretation and application of CEPA's analysis; and
- In Section 2.6.6, we present an alternative productivity estimate that corrects the shortcomings of CEPA and/or Ofgem's work.

2.1. The Evidence CEPA Presents is Broadly Consistent with Regulatory Precedent

2.1.1. Recent regulatory determinations of ongoing productivity targets

Ofgem's proposed ongoing efficiency challenge draws on CEPA's report on frontier shift. The first step of CEPA's analysis is to generate a range of long-term TFP and labour productivity estimates based on data from the EU KLEMS dataset.

We have reviewed the methodological choices that CEPA has made to generate a range of potential ongoing efficiency targets, before applying additional adjustments, including to account for the assumed benefits of innovation funding. As part of this, we have compared CEPA's methodological choices to regulatory precedent.

In setting an ongoing efficiency challenge, regulators face a set of methodological choices, which regulatory precedent can provide a useful guide to informing. Ensuring consistency of Ofgem's proposals with regulatory precedent also helps to ensure the regulatory framework is predictable for companies and other stakeholders.

In this section, we briefly summarise the regulatory decisions which appear to be most relevant to Ofgem at RIIO-T2 because they (a) are recent; (b) are set in the UK; and/or (c) directly relate to regulated utilities (energy and water networks):

- **Ofgem's RIIO-1 decisions** for transmission and distribution companies in Great Britain. The T1/GD1 decision set an ongoing efficiency challenge of between 0.7 and 1.0 per

cent.¹¹ At ED1, Ofgem accepted the targets that the electricity distribution companies embedded it into their business plans, which were all around 1 per cent.¹²

- **The Competition Commission’s (CC) 2014 RP5 decision** for Northern Ireland Electricity (NIE), in 2014. This decision set an ongoing efficiency challenge of 1.0 per cent.¹³ The Utility Regulator of Northern Ireland subsequently applied this decision without amendment to (a) its 2016 GD17 determination for gas distribution networks; and (b) its 2017 RP6 determination for NIE.¹⁴
- **Ofwat’s PR14 decision for water companies in England and Wales.** This decision did not separately estimate frontier shift (i.e. ongoing efficiency and RPEs), and instead accounted for these effects through the use of an econometric time trend. Therefore, the PR14 decision does not include any methodological choices relevant to informing Ofgem’s RIIO-2 decision on ongoing productivity.
- **At Bristol Water’s appeal of Ofwat’s PR14 decision to the Competition and Markets Authority (CMA),** the CMA set a frontier shift target of 1.0 per cent, encompassing both ongoing productivity and RPEs relative to RPI.¹⁵
- **Ofwat’s 2019 PR19 decision for water companies in England and Wales.** This decision set an ongoing efficiency challenge of 1.1 per cent, based largely on the advice of its consultants Europe Economics drawing on long-term trends in productivity indices, but with regard for other pieces of evidence.¹⁶

2.1.2. Some aspects of CEPA’s survey of long-term productivity evidence are consistent with regulatory precedent

As well as acting as a cross-check on the rate of productivity improvement that regulated network companies can credibly achieve, these regulatory decisions can potentially inform the following specific methodological choices that feed into Ofgem’s RIIO-T2 determination:

- **Data window:** how many years of productivity data the regulator uses to calculate a long-term average;
- **The choice of productivity measure** between Gross Output (GO) and Value Added (VA) measures;
- **Narrow vs. wide industry definition:** whether the regulator estimates productivity for industries closely related to the regulated industry (“narrow”) or for most or all of the macroeconomy (“wide”); and

¹¹ Ofgem (17 December 2012), RIIO-T1/GD1: Real price effects and ongoing efficiency appendix, para. 3.3.

¹² Ofgem (30 July 2014), RIIO-ED1: Draft determinations for the slow-track electricity distribution companies – Business plan expenditure assessment, para. 12.63.

¹³ Competition Commission (26 March 2014), Northern Ireland Electricity Limited price determination, para. 11.27.

¹⁴ (1), Utility Regulator (15 September 2016), Annex 6 Real Price Effects & Frontier Shift GD17 – Final Determination, para. 3.35; (2) Utility Regulator (30 June 2017), Annex C Frontier Shift: Real Price Effects & Productivity RP6 – Final Decision, para. 3.30.

¹⁵ CMA (10 July 2015), Bristol Water plc price determination – Provisional findings, para. 4.211.

¹⁶ Note: Ofwat also relied on estimates from KPMG and Aqua. Source: Ofwat (December 2019), PR19 final determinations, Securing cost efficiency technical appendix, p.123.

- **Approach to available range:** where necessary, how the regulator draws a single point value from the range of estimates it produces.

We summarise our findings across the three most relevant recent regulatory precedents in Table 2.1 below, with CEPA’s proposed approach added for comparison.

Table 2.1: Summary of Relevant Regulatory Precedent

	RIIO-T1/GD1	RP5 Appeal	PR19	CEPA Proposal for RIIO-T2/GD2
Date of Decision	17 December 2012	26 March 2014	07 December 2019	27 May 2020
Regulator	Ofgem	CC	Ofwat	Ofgem/CEPA
Companies Regulated	T and GD in GB	ET & ED in NI	Water in E&W	T and GD in GB
Data Window	1970 to 2007	1970 to 2007	1999-2007 – pre-crisis 2010-2014 – post-crisis	1997 to 2016
GO vs VA	Both	Both	GO, with regard to VA	VA with GO downside
Narrow vs Wide	Both	Wide	Narrow	Both
Approach to Available Range	Capex OE is taken from top-end of Construction TFP index. Opex OE is taken from within a range of 0.5-2.8% p.a.	Midpoint of lower bound (0.5%) and upper bound (1.5%)	Ofwat takes from near the top of Europe Economics' range to account for (a) VA measures; and (b) totex/outcomes benefits.	Midpoint between two industry definitions. Lower bound uses GO; Upper bound adds innovation funding adjustment.
Final Ongoing Efficiency Assumption	Capex: 1.0% Opex: 0.7%	1.0%	1.1%	Capex: 0.5-1.2% Opex: 0.5-1.4%

Like many previous regulatory decisions, CEPA estimates several different measures of TFP and labour productivity in order to calculate a range of estimates for ongoing efficiency. Many of its methodological choices are therefore very similar to the regulatory precedents listed above:

- As in all decisions listed above, CEPA has relied on the EU KLEMS dataset, which measures TFP and labour productivity in individual European countries.
- CEPA has used TFP growth to proxy capex ongoing efficiency, and labour productivity to proxy for opex ongoing efficiency. This is consistent with Ofgem’s RIIO-T1/GD1 approach and Ofwat’s PR19 approach. By contrast, the CC at RP5 used measures of TFP to estimate an ongoing efficiency target for totex.
- CEPA estimates productivity improvements across several combinations of industries, from a subset of industries related to electricity and gas transmission to a weighted average of most industries in the economy. This is consistent with Ofgem’s RIIO-T1/GD1 approach. The CC used only a “wide” industry definition while Ofwat used only

a “narrow” definition. CEPA’s approach to assessing both is therefore consistent with regulatory precedent.

- From the range of industry combinations, CEPA selects two productivity values from near the middle of the range of values estimated, based on the unweighted average of selected industries (construction; wholesale and retail trade: repair of motor vehicles and motorcycles; transportation and storage; financial and insurance activities) and the weighted average of all industries (excluding real estate, public administration, education, health and social services). CEPA takes a midpoint between the two industry definitions to define its reference value productivity estimates. There is no exact science to triangulating different pieces of evidence such as these, but other regulators have typically taken a holistic or midpoint view from a range of possibilities.

2.2. CEPA Ignores Shorter-term Dynamics in Productivity Growth

2.2.1. A long time series of TFP growth may overstate productivity growth, given recent low productivity growth

CEPA analyses data from 1997 to 2016, the longest period possible from the 2019 EU KLEMS dataset that includes only complete business cycles. In general, regulators have sometimes used the longest series possible (e.g. Ofgem at RIIO-T1/GD1 and the CC at RP5 both used data from 1970 to 2007, the longest available series from the edition of the EU KLEMS dataset available at the time).

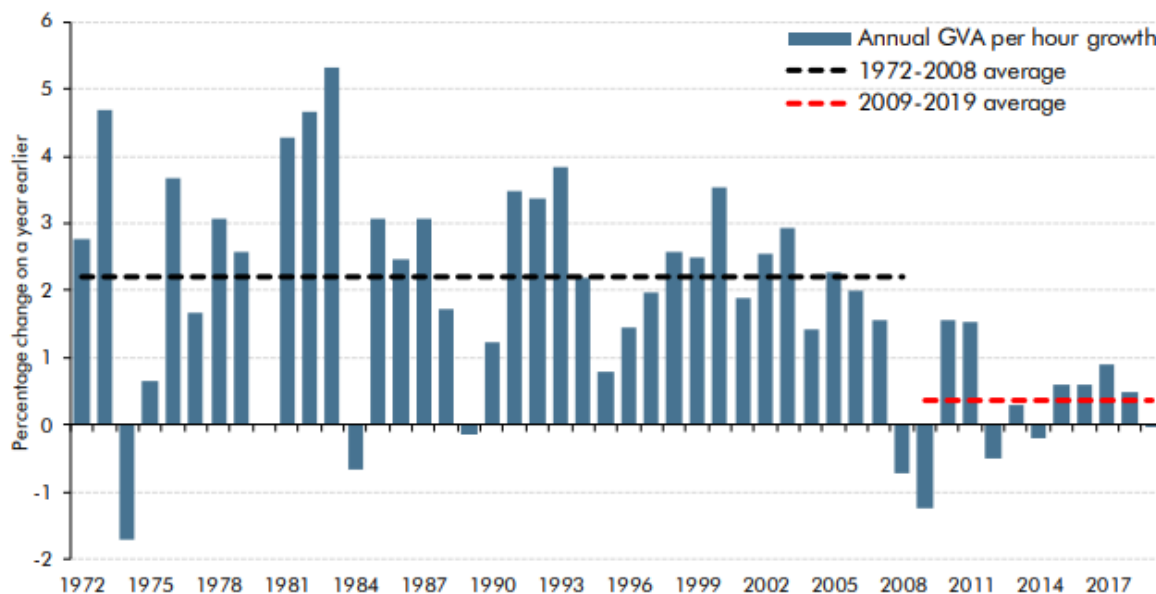
This approach is appropriate, insofar as the forward-looking period is not fundamentally different from the historical period. While indices of productivity growth can be volatile so will not exactly match the long-term average in any given year, the long-term average represents the “best guess” when setting allowances, as it captures the long-run effects of technological progress and improved working practices.

However, this approach is not appropriate if the nature of the economy has changed such that expected productivity growth in the future is no longer consistent with long-term trends.

In fact, CEPA acknowledges that, “since the global financial crisis in 2008-2009, productivity growth in the UK has been below its long-term trends. The OBR [Office for Budget Responsibility] reports that annual growth in output per worker (i.e. labour productivity) averaged around 0.3% per annum between 2008 and 2018, compared to 2.3% between 1990 and 2007”.¹⁷

Indeed, the OBR’s March 2020 Economic and Fiscal Outlook (EFO) shows annual labour productivity growth from 1972 to 2019, along with two long-term averages. We show these in Figure 2.1 below.

¹⁷ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.16.

Figure 2.1: Outturn Labour Productivity Growth

Source: OBR

2.2.2. Latest evidence suggests low productivity growth will persist

Figure 2.1 shows that the period since the financial crisis has been substantially different in terms of labour productivity than the period before it. While the data prior to 2008 exhibits upward and downward shocks, productivity growth never stayed above or below the long-term trend for more than three years at a time. Since 2008, it has stayed below the pre-2008 trend in every single year.

CEPA summarises a range of explanations for this apparent structural break: “measurement issues, lower investment, compositional effects, labour market factors and impaired financial markets”.¹⁸ Whichever of these explanations applies, the available productivity evidence indicates a downward step in measured productivity improvement using official statistics, and hence a forward-looking estimate of productivity improvement should consider this apparent structural change in productivity indices.

However, it is also reasonable to consider the available forward-looking evidence on whether this “structural break” will persist. CEPA cites recent forecasts from the OBR and the Bank of England (BoE) that show labour productivity growth of 1.15 per cent (OBR) and 1.0 per cent (BoE) on average during the RIIO-T2 years. CEPA uses these figures to corroborate the results of its long-term averages, stating that the OBR and BoE forecasts are “comparable to the reference value of 1.1% for opex from the EU KLEMS analysis”.

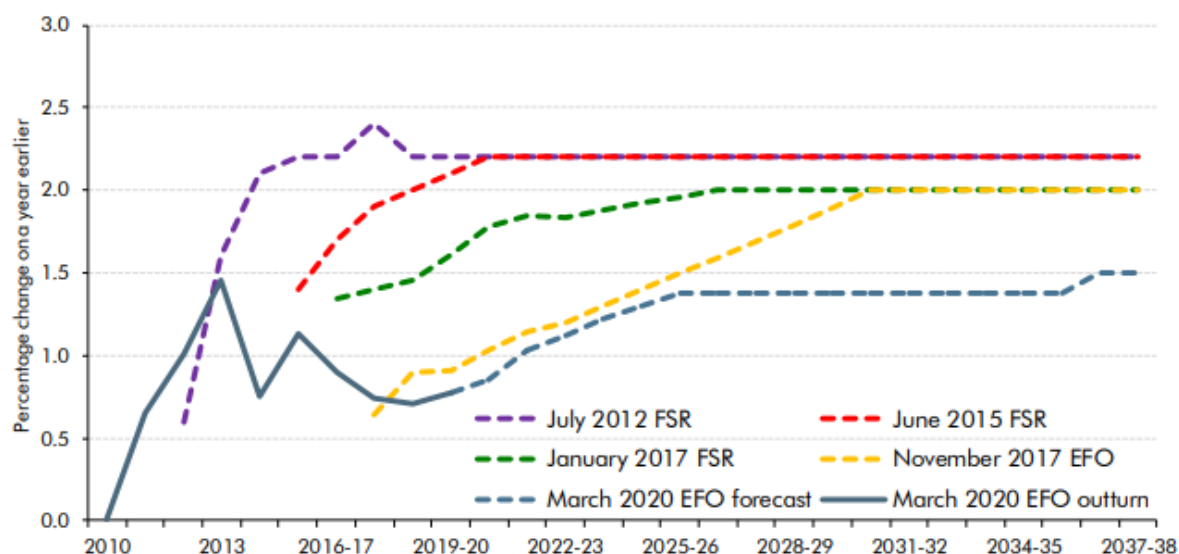
However, these forecasts may themselves be flawed, if the methodology underpinning them does not capture the existence of or reasons for a structural break in productivity growth. For instance, the OBR’s approach is to set a “steady state” productivity level and a horizon over which productivity will return to that level, and essentially draw a straight line to that point with minor medium-term adjustments. As a result, the OBR forecasts growth in productivity

¹⁸ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.16.

over RIIO-T2 simply because productivity growth is beneath what it currently determines to be the steady state level.¹⁹

If the OBR's assumptions on steady state level are not robust, then neither are its forecasts of productivity over the RIIO-T2 period. Currently, the OBR forecasts that labour productivity growth will reach a medium-term level of 1.4 per cent by 2024 and a long-term steady state of 1.5 per cent by 2036, as shown in Figure 2.2 below.

Figure 2.2: OBR Labour Productivity Growth Forecasts



Source: OBR

The figure also shows several of the OBR's previous labour productivity growth forecasts. As the figure shows, the OBR has repeatedly forecast a return to higher productivity growth which was not seen in the outturn data, causing the OBR subsequently to revise its estimates:

- Its original steady state level was 2.2 per cent, equal to the 1972 to 2008 average. As shown by the purple and red lines, the OBR predicted in between 2012 and 2015 that productivity would return to this level within only a few years;
- In January 2017, “reflecting continued weak outturn data”, the OBR lowered its steady state assumption to 2.0 per cent.²⁰
- In November 2017, “prompted once again by weak outturn data” the OBR substantially lowered its medium-term forecast, and pushed back the date at which productivity was expected to return to steady state.²¹
- In its most recent release, the OBR lowers the long-term assumption to 1.5 per cent, “bringing it broadly into line with those of institutions in other advanced economies and

¹⁹ Office for Budget Responsibility (March 2020), Economic and fiscal outlook, para. B.8.

²⁰ Office for Budget Responsibility (March 2020), Economic and fiscal outlook, para. B.8.

²¹ Office for Budget Responsibility (March 2020), Economic and fiscal outlook, para. B.8.

other bodies' projections for the UK".²² This is still above the level of labour productivity growth observed in any year since the financial crisis, so the OBR clearly still believes that the current period is an anomaly.

- The OBR's latest (March 2020) forecasts also pre-date the COVID-19 crisis, which we would also expect to have a detrimental effect on economy-wide productivity data.

In addition to the OBR's forecasts, the Bank of England (BoE) publishes labour productivity forecasts in its quarterly Monetary Policy Report. The Monetary Policy Report was only introduced in November 2019, and BoE did not include labour productivity in its predecessor (the Inflation Report), so we have not compared BoE's older forecasts against outturn levels.

CEPA cites the January 2020 Monetary Policy Report, which forecasts 0.75 per cent labour productivity growth in 2021 and 1.25 per cent in 2022 (or 1.0 per cent on average during RIIO-T2).²³ This edition is not the most current, however. The August 2020 edition now forecasts 0.75 per cent growth in *both* 2021 and 2022 (and 0.75 per cent on average during RIIO-T2).²⁴ In light of these latest estimates, it appears that the BoE no longer corroborates the 1.1 per cent "reference value" that CEPA estimates.

Additionally, both the OBR and BoE labour productivity measures are calculated as GDP or output divided by total hours worked.²⁵ Some gains in labour productivity may therefore be achieved because of a growth in the amount capital used by labour. CEPA controls for this by estimating labour productivity at constant capital. The BoE estimate is therefore not directly comparable to measure of productivity CEPA seeks to estimate, and in fact likely overstates it if the capital stock is expected to grow.

2.2.3. Recent productivity evidence justifies a lower target than CEPA's estimates based on long-term data

In conclusion, labour productivity since the financial crisis has clearly been lower than the long-term average, and latest evidence suggests this trend is likely to continue. CEPA assumes this is an anomaly that will not persist into RIIO-T2 and beyond. However, the OBR analysis that CEPA cites to support this view have consistently understated near-term productivity growth over the last decade. More up-to-date evidence from the BOE also suggests a lower rate of productivity growth than the OBR projections.

In light of this uncertainty, CEPA and Ofgem should view long-term (1997-2016) average growth rates in productivity as a high-end estimate of the achievable rate of productivity growth in the coming years. In applying this evidence to its productivity target at RIIO2, Ofgem could explicitly place weight on its shorter-term (2006-2016) average, or implicitly place weight on it by choosing a point estimate from lower in the existing range.

²² Office for Budget Responsibility (March 2020), Economic and fiscal outlook, para. B.14.

²³ Bank of England (January 2020), Monetary Policy Report, Table 1C.

²⁴ Bank of England (August 2020), Monetary Policy Report, Table 1C.

²⁵ (1) Office for Budget Responsibility (March 2020), Economic and fiscal outlook, para. B2; (2) Bank of England (August 2020), Monetary Policy Report, Table 1C, footnote t.

2.3. CEPA Misrepresents the Choice Between VA and GO Productivity Measures

2.3.1. Regulatory precedent suggests GO measures are more appropriate for setting ongoing productivity targets than VA measures

Noting a “long-standing debate over which definition of output is more relevant for measuring ongoing efficiency”, CEPA analyses TFP and labour productivity measures based on both VA and GO definitions. CEPA states that it is “good regulatory practice to consider the information provided by both methods when developing a range for ongoing efficiency estimates”.²⁶

Two of the three decisions we have examined (see Section 2.1) have indeed selected a productivity estimate based explicitly on both GO and VA measures of productivity. Ofwat/Europe Economics only estimated GO productivity, but selected a value from the upper end of the range in part to have regard for (higher) VA estimates. In other words, CEPA is correct that *standard* (though not necessarily “good”) regulatory practice is to ultimately use both GO and VA measures of productivity.

However, the debate regarding which definition of output is more relevant for measuring ongoing efficiency is more settled than CEPA suggests. Past regulatory decisions have consistently concluded that GO measures are more appropriate to measuring potential for efficiency improvement for regulated companies:

- At RIIO-T1/GD1, Ofgem concluded that “the VA measure of productivity only allows us to evaluate the impact of the use of labour and capital on outputs, and thus limiting the costs that this can be applied to. Therefore, to fully evaluate the productivity improvements that a network company can make would require making additional assumptions about the use of intermediate inputs”.²⁷ Ultimately, Ofgem did use a VA measure in addition to a GO measure, though its reasoning for doing so is not clear.²⁸
- At RP5, the CC concluded that “GO is a closer approximation of a company’s cost base. This is because it contains labour, capital and intermediate inputs (as a company’s cost base does) rather than just labour and capital”. The CC still used a VA measure in addition to a GO measure because it is less susceptible to measurement error and changes in the vertical structure of industries.²⁹
- At PR19, Europe Economics concluded that “the value added TFP measure represents frontier shift only when the production function is such that capital and labour are separable from intermediate inputs and technical progress favours capital and labour only,

²⁶ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.12.

²⁷ Ofgem (27 July 2012) RIIO-T1/GD1: Initial Proposals – Real price effects and ongoing efficiency appendix, para 3.15, p.19.

²⁸ Ofgem stated that two GDNs, NGN and SGN, argue that GO measures are susceptible to measurement error and changes in vertical structure of industries. Ofgem never explicitly stated whether it agreed with the GDNs’ argument, but instead simply stated that it uses evidence from “both GO and VA measures of productivity”. Source: Ofgem (27 July 2012), RIIO-T1/GD1: Initial Proposals – Real price effects and ongoing efficiency appendix, paras. 3.16 & 3.22.

²⁹ Competition Commission (8 November 2013), Northern Ireland Electricity Limited price determination, Appendix 11, para. 6.

which might be considered a rather implausible assumption".³⁰ Ofwat largely agreed with Europe Economics's conclusion, finding that "the gross output measure is generally preferable [though] it is not superior in all cases".³¹

To support its assertion that there is no consensus (or even a preference) regarding the choice between GO and VA productivity measures, CEPA cited (a) a submission for one GDN in RIIO-GD1 in support of a VA approach; and (b) the Dutch energy regulator's 2011 decision for Gas Transmission in support of a GO approach.³² The former does not represent regulatory precedent, as it is simply the opinion of one regulated network, and the latter appears to support the GO methodology anyway. Both pieces of evidence pre-date the three British decisions we have reviewed.

In short, while regulators have placed some weight on VA measures for practical purposes, they have all demonstrated their preference for GO on theoretical grounds. CEPA should therefore acknowledge this tendency in the "long-standing debate" rather than suggest that neither approach is more relevant than the other.

2.3.2. CEPA's decision to use a VA measure for its "reference value" is unjustified and exaggerates the potential for productivity improvement

Despite its assessment that the choice between VA and GO is not clear-cut when describing the range of evidence it considers, CEPA subsequently presents its VA values as its "reference value" and GO as its "downside" sensitivity. Economic theory and regulatory precedent do not support giving primacy to a VA measure with GO as a sensitivity – if anything, the evidence supports the opposite.

At a minimum, therefore, CEPA should present its VA and GO estimates with equal prominence, and if it wishes to align with the economic theory presented in previous decisions, it would place primacy on GO with VA as an "upside" sensitivity.

2.4. CEPA Presents only a Selective "Lower Bound" View

As mentioned above, CEPA arbitrarily and incorrectly treats GO productivity as a downside sensitivity, based on its estimate of GO TFP and LP for its "wide" industry definition (weighted average of all industries, excluding real estate, etc.), which it estimates as 0.5 per cent for both TFP and LP.

However, CEPA's "reference value" productivity measures (0.8 per cent for TFP and 1.1 per cent for LP) are based on the midpoint between the "narrow" industry definition (unweighted average of selected industries excluding manufacturing) and its "wide" industry definition.

For reasons which it does not provide, CEPA does not consider the "narrow" industry definition to be relevant to calculating the "lower bound" GO value. This is arbitrary and internally inconsistent: if *selected industries'* productivity growth are relevant to transmission

³⁰ Europe Economics (January 2018), Real Price Effects and Frontier Shift, p. 74. Emphasis added.

³¹ Ofwat (July 2019), PR19 Draft Determination, Security cost efficiency technical appendix, p. 121.

³² CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.12.

companies' ongoing efficiency when measured in VA terms, then it is also relevant when measured in GO terms.

In fact, the GO productivity growth for CEPA's "narrow" industry definition is 0.3 per cent (TFP) and 0.4 per cent (LP). In other words, CEPA's "lower bound" is not actually a lower bound: CEPA's other methodological choices, applied consistently to GO measures, suggest even lower productivity values.

2.5. There is No Basis for an Innovation Funding Adjustment

2.5.1. CEPA estimates the level of additional ongoing efficiency required for consumers to earn a return on RIIO-T1/GD1 innovation funding

On top of the "reference value" TFP estimates derived from the EU KLEMS dataset, CEPA computes an additional efficiency challenge of "up to 0.2% [that] represent[s] a reasonable return to consumers on the upfront funding they provided in the form of innovation allowances in RIIO-1" through the Network Innovation Competition (NIC) and the Network Innovation Allowance (NIA).³³

In deriving the potential upside productivity (i.e. cost-reduction) benefits from these innovation allowances, CEPA reviews a range of evidence from within the GB energy network sector (e.g. Pöyry ex-post review of DCPR5 innovation funding) and outside it (Bond & Guceri's 2016 study of the link between productivity and substantial R&D activities within large UK establishments).³⁴

After reviewing the available evidence, CEPA concludes that "both theory and the available evidences suggests that that [sic.] some degree of causality (in terms of direction) can be expected between innovation spending and ongoing efficiency improvements in the energy network sector, [but] we have not yet identified robust evidence for establishing a firm quantitative relationship".³⁵

Instead, CEPA seeks to estimate "cost savings to consumers [that] would be required in order to make providing the innovation allowances seem a reasonable investment".³⁶

- CEPA assumes companies' innovation funding during RIIO- 1 was 1 per cent of their total expenditure.
- It then assumes that the benefits of innovation allowances are realised exclusively through efficiency improvements (i.e. cost reductions).
- Then, it assumes that these benefits begin to accrue at the beginning of RIIO-2, and persist for 20 years thereafter. It calculates these benefits assuming customers would earn (i.e. in the form of cost reductions) a return of 4.2 per cent on RIIO-1 innovation funding, which CEPA deems represents "a reasonable return to consumers".³⁷

³³ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.35.

³⁴ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.21-22.

³⁵ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.35.

³⁶ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.24.

³⁷ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.35.

CEPA then back-calculates a cost reduction profile during RIIO-2 that would achieve this level of cost savings for customers. CEPA assumes these benefits reach 1 per cent per annum by the end of RIIO-2, accruing at a rate of 0.2 per cent per annum *during* RIIO-2.

CEPA has not provided sufficient detail to allow us to replicate its calculations, so we have not sought to verify they are correct. However, we note that transmission companies are required to contribute at least 10 per cent of total project costs to the NIC, so CEPA appears to have overstated the level of investment by customers.³⁸

2.5.2. CEPA’s innovation funding adjustment provides no information on the scope for cost reductions during RIIO-2

According to Ofgem, the ongoing efficiency adjustment is intended to adjust “for ongoing efficiency gains that [Ofgem] can reasonably expect companies to deliver during the RIIO-2 period”.³⁹ In other words, the term seeks to account for the reductions in efficient costs that an efficient company can reasonably achieve during the price control period, without an associated decrease in outputs delivered. If an efficient company cannot reasonably achieve the efficiency improvements that the ongoing efficiency challenge requires, then Ofgem cannot “reasonably expect” companies to do so.

CEPA’s approach to determining the innovation funding adjustment has no basis in the additional cost reductions an efficient company could reasonably achieve during RIIO-2. Instead, the target takes what CEPA deems to be a fair return to customers (4.2 per cent), and “goal seeks” an arbitrary set of *input* assumptions that yield that result, including the cost reduction profile during RIIO-2. An infinite number of other combinations of input assumptions would yield the same ultimate return to customers, and CEPA presents no evidence that it can “reasonably expect” an efficient company to achieve this combination of inputs (or any other, for that matter).

CEPA’s “analysis” of the returns on past innovation funding is therefore based on assertion about what cost savings these past investments might achieve, without any evidence that they will – or even that they are likely to – generate cost savings that have not already been captured in the TOs’ business plans:

- As CEPA acknowledges, past innovation funding projects may have been provided to achieve other objectives besides cost savings as we discuss below, such as environmental outputs, safety and quality of service;
- British energy networks are investor-owned and are free to carry out their own additional R&D if they think the ensuing cost reductions retained under the price control mechanism justify the upfront costs of conducting the research. The fact that separate pots of innovation funding are required suggests that the R&D being conducted is not already attractive to investors;
- R&D investments entail risk and uncertain payoffs, and some innovation projects (as in all industries, not just energy networks) will fail to deliver a positive return on

³⁸ Ofgem (21 March 2012), Decisions on the Network Innovation Competition and the timing and next steps on implementing the Innovation Stimulus, para. 1.8.

³⁹ Ofgem (9 July 2020), RIIO-2 Draft Determinations – Core Document, para. 5.31.

investment. CEPA's proposed adjustment assumes all innovation projects generated the same benefits (i.e. a return of 4.2 per cent), an assumption for which CEPA has no basis.

Additionally, CEPA suggests that its arbitrary 0.2 per cent target is somehow a central estimate, stating it “does not capture any of the potential upside that might accrue if innovation funding can deliver greater improvements than assumed as being required to provide a reasonable return to consumers”.⁴⁰ Because the target is an arbitrary input assumption, CEPA cannot conclude anything about the likelihood of any upsides or downsides. CEPA's statement is therefore tautological: it has assumed a cost saving benefit from innovation funding, so there is necessarily uncertainty around this unsubstantiated assumption.

2.5.3. RIIO-T1/GD1 innovation was not primarily intended to drive cost reductions

As noted above, and as CEPA acknowledges, there are some specific reasons why companies could fail to achieve the cost reductions it has assumed due to innovation funding:

- Innovation may generate benefits other than cost savings, e.g. environmental and quality of service benefits; and
- The degree of innovation-driven ongoing efficiency already included in companies' business plans.

As we describe above, if innovations were profitable purely from a cost perspective, they may have been made without the need for a separate innovation allowance. CEPA acknowledges that cost reduction benefits from innovation could be lower than it has assumed because of “benefits to consumers other than cost savings – such as environmental benefits and quality of service”.⁴¹

CEPA presents these other benefits as an abstract downside, but in reality, they are a core component of the innovation funding in question:

- **NIC:** In the opening paragraph describing the Electricity and Gas NIC, Ofgem explains that “funding will be provided for the best innovation projects which help all network operators understand what they need to do to provide environmental benefits, reduce costs, and maintain security as Great Britain (GB) moves to a low carbon economy”.⁴²
- **NIA:** The NIA is intended to (i) “fund smaller [...] projects directly related to the licensees [sic] network that have the potential to deliver financial benefits to the licensee and its customers”; and (ii) “fund the preparation of submissions to the [NIC]”.⁴³

⁴⁰ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.36.

⁴¹ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.35.

⁴² (1) Electricity NIC: <https://www.ofgem.gov.uk/network-regulation-riio-model/current-network-price-controls-riio-1/network-innovation/electricity-network-innovation-competition>; (2) Gas NIC: <https://www.ofgem.gov.uk/network-regulation-riio-model/current-network-price-controls-riio-1/network-innovation/gas-network-innovation-competition>. Note: the exact wording for this sentence for the Gas NIC is trivially different from the Electricity NIC.

⁴³ (1) Electricity NIA: [ofgem.gov.uk/network-regulation-riio-model/network-innovation/electricity-network-innovation-allowance](https://www.ofgem.gov.uk/network-regulation-riio-model/network-innovation/electricity-network-innovation-allowance); (2) Gas NIA: <https://www.ofgem.gov.uk/network-regulation-riio-model/network-innovation/gas-network-innovation-allowance>

As Ofgem describes, cost reduction is only one out of three priorities of the NIC, and even then is considered in the context of a move to a low-carbon economy, meaning that expected cost reductions relative to historical costs may not be as large as would be expected in sector that is not having to meet increased requirements to support decarbonisation. Financial benefits represent one objective of the NIA, but the other relates to preparation of NIC applications, and therefore represents the mix of objectives of the NIC.

In practice, many of the projects awarded NIC funding have been targeted at achieving objectives other than cost reduction. In Table 2.2 below, we list all transmission projects which were awarded NIC funding during RIIO-1, along with a brief description of their stated objectives and an assessment of the extent to which those objectives related to reductions in costs covered by the RIIO revenue controls.

Table 2.2: Transmission Projects Awarded NIC Funding

Year	Network	Project Name	Value (£m)	Primary Objective	Impact on TO Costs
2016	SPT	Phoenix	15.6	Trial new forms of ancillary services.	None. Ancillary services are remunerated separately.
2016	NGET	Transmission and Distribution Interface 2.0	8.0	Trial new forms of ancillary services.	None. Ancillary services are remunerated separately.
2015	SPT	Future Intelligent Transmission Network Substation	8.3	Reduce cost, risk and environmental impact through improved communications.	Cost reduction is potential benefit.
2015	SHET	New Suite of Transmission Structures	6.6	Smaller OHL which are "better for the environment and could result in financial savings for customers".	Cost reduction is potential benefit.
2015	NGET	Offgrid Substation Environment for the Acceleration of Innovative Technologies	12.0	Enable other unspecified innovations on network.	Enabled innovations could be cost reducing.
2015	NGGT	Customer Low Cost Connections	4.8	Reduce cost of connections to NTS	Cost reduction is core objective.
2014	NGET	Enhanced Frequency Control Capability	6.9	New monitoring services for deploying ancillary services.	None. Ancillary services are remunerated separately.
2014	SHET	Modular Approach to Substation Construction	2.8	Enable other unspecified innovations on network.	Enabled innovations could be cost reducing.
2014	NGGT	In Line Robotic Inspection of High Pressure Installations	5.7	Reduce unnecessary replacement and maintenance work.	Cost reduction is core objective.

Year	Network	Project Name	Value (£m)	Primary Objective	Impact on TO Costs
2013	SPT	Visualisation of Real Time System Dynamics using Enhanced Monitoring	6.5	Optimise capacity use on Anglo-Scottish interconnector	Avoided reinforcement is once benefit, but this would be captured in volume of activity, not unit costs. Congestion reduction (remunerated separately) is another potential benefit.
2013	SHET	Multi-Terminal Test Environment for HVDC Systems	11.3	Develop HVDC technology	None. HVDC costs are remunerated separately.
Total			88.5		

Key: Green = Primarily related to cost reduction; Amber = Partially related to cost reduction; Red = Not related to cost reduction. Source: Ofgem annual NIC decisions

Of the £88.5 million in NIC funding awarded to transmission companies during RIIO-1, less than £10 million was directed to projects which were primarily focused on cost reductions that are remunerated via the TOs' price controls. A further £36.2 million was directed to projects where cost reductions are an ancillary benefit to the project. The remaining £41.8 million was directed to projects which may reduce whole-system costs but outside of the scope of the RIIO revenue controls. For example, the incorporation and better utilisation of innovative ancillary services would reduce the total costs of balancing services, and customers could expect to see reduced bills through their supplier's reduced Balancing Services Use of System (BSUoS) liability. They would not affect the TOs' productivity.

We have not examined the allocation of NIA funding between smaller projects and NIC bid preparation costs, but where the funding is used for the latter, it can only be viewed as driving cost reductions where the NIC project itself yields cost reductions. Additionally, companies bear bid preparation costs for failed bids as well, which certainly could not yield cost reductions because the actual R&D was never conducted.

2.5.4. Business plans may already include the results of innovation funding

Any adjustment which accounts for the cost savings from innovation funding must consider the extent to which those benefits are already captured in business plans and/or the pre-adjusted cost allowances.

This consideration is especially pertinent because of its role in Northern Powergrid's (NPG) appeal of the RIIO-ED1 decision to the Competition and Markets Authority (CMA). The appeal focused in part on Ofgem's treatment of Smart Grid Benefits (SGB), in which Ofgem applied a negative adjustment to companies' allowances to account for the cost savings resulting from the roll-out of smart grid technology.

In its decision to uphold this ground of NPG's appeal, the CMA concluded that Ofgem had failed to establish that SGBs were not already accounted for through the general cost benchmarking exercise.⁴⁴ Drawing out lessons from this CMA precedent, CEPA highlights

⁴⁴ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.28.

“the importance of establishing the extent to which innovation benefits have already been embedded in the business plans submitted by the companies”.⁴⁵

CEPA presents only qualitative evidence about the extent of innovation benefits embedded in business plans:

- “We reviewed [...] RIIO-2 business plans to see if companies have been able to provide evidence of the impact of innovation spending in RIIO-1 [...] on [...] forecast frontier efficiency improvements in RIIO-2. However, discussion of this relationship in this [sic.] business plans is limited and mainly qualitative in nature”.
- The Customer Engagement Groups, User Groups and the Challenge Group expressed that “electricity transmission companies had linked their RIIO-1 innovation spending to their RIIO-2 business plans, but it was still unclear how previous innovations would result in ongoing efficiencies in RIIO-2”.⁴⁶

In the absence of firm, quantitative evidence to the contrary, CEPA assumes that “no additional ongoing efficiency driven by innovation funding in RIIO-1 is already embedded in the baseline spending plans submitted by the companies”.⁴⁷

However, the lack of clear quantification of the effects of RIIO-1 innovation funding on business plan cost forecasts does not mean that no such relationship exists. Companies may already have drawn on the gains from innovation projects to improve their working practices during the T1 period.

Also, in order to properly quantify the benefits, each company would effectively have had to prepare an alternative business plan assuming that past innovations had not taken place. It may be difficult to identify precisely what the counterfactual would be, i.e. what the state of technology would be in the absence of the separate innovation funding. Additionally, it may not always be clear whether cost reductions have resulted from Ofgem-funded innovation projects, improvements in technology that have occurred for other reasons, or from other improvements in working practices achieved by the TOs.

Therefore, while CEPA highlights the importance of identifying the level of innovation benefits embedded in business plans, it has not done so.

CEPA also fails to mention the importance of identifying the level of innovation benefits embedded in its allowances prior to applying the ongoing productivity adjustment. For example, Ofgem benchmarked the TOs’ Business Support Costs (BSC) and Closely Associated Indirects (CAI) using econometric models. Insofar as companies have embedded innovation benefits in their BSC and CAI cost forecasts, then companies’ allowances will contain the embedded innovation benefits of the benchmark company, rather than their own embedded benefits. Ofgem should therefore take care to remove the productivity gains actually embedded in the pre-adjusted allowances before substituting in its own.

⁴⁵ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.29.

⁴⁶ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.22.

⁴⁷ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.26.

2.5.5. The underlying EU KLEMS data already includes productivity driven by innovation

The innovation funding adjustment is intended to capture additional cost savings that companies could achieve over and above the productivity target already included as the reference value. In order to avoid double counting the benefits of innovation, CEPA should consider the extent to which reference value (as taken from the EU KLEMS dataset) already includes the benefits from innovation expenditure.

Economy-wide productivity improvements happen for many reasons, including innovation from market participants. CEPA cites extensively Bond & Guceri (2016), who find that TFP in large UK production industry establishments “is on average about 14% higher at the establishments which have substantial R&D themselves, compared to those with no R&D activity”.⁴⁸

In its review of Bond & Guceri (2016), CEPA notes that “the EU KLEMS dataset will already take into account some of the productivity growth captured in Bond & Guceri”.⁴⁹ Bond & Guceri examine data from UK production industry establishments between 1997 and 2008, so it is unclear what component of their measured productivity growth is *not* included in the EU KLEMS dataset.

Assuming network companies’ R&D is equally effective as R&D across the economy, the innovation funding adjustment can only be appropriate for levels of R&D over and above that which is carried out by the typical participant in the industries included in the EU KLEMS dataset. According to a 2020 House of Commons Library briefing paper, total UK R&D expenditure has been between 1.5 and 1.7 per cent of UK GDP in every year between 2000 and 2018.⁵⁰ The effects of this R&D is already captured in the annual productivity gains as measured by the EU KLEMS.

CEPA assumes that transmission companies’ RIIO-1 innovation allowances were around 1 per cent of total revenue allowance. Even with the dedicated RIIO-1 allowances, therefore, network companies still carry out less R&D than the economy as a whole. Therefore, if networks’ innovation yields cost reductions, this is simply necessary to keep pace with the effects of innovation already captured in the EU KLEMS dataset.

CEPA argues that, due to the regulated nature of the industry, “innovation in the energy network sector may be less sensitive to economy-wider [sic.] shocks than in competitive industries”.⁵¹ This position appears not to be supported by the House of Commons Library briefing paper, which shows that aggregate R&D spending as a proportion of GDP is not sensitive to macroeconomic shocks. CEPA also fails to show any evidence that cyclicality of R&D in other sectors diminishes its effectiveness at generating productivity improvement.

⁴⁸ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.22.

⁴⁹ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.22.

⁵⁰ House of Commons Library (17 June 2020), Briefing Paper Number SN04223, Research & Development spending, p.6.

⁵¹ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.36.

2.5.6. Conclusions on the innovation funding allowances

CEPA's proposed 0.2 per cent innovation funding adjustment is arbitrary and unjustified:

- The number itself derives from assumptions rather than the output of any analysis, and therefore bears no relation to the level of cost reduction which could actually be achieved by TOs during the RIIO-T2 control period;
- Only a fraction of RIIO-1 innovation projects were directed primarily at a reduction in regulated costs. The remainder targeted environmental outputs or reductions in costs remunerated outside of the RIIO regime;
- Even though companies have not rigorously quantified the level of innovation benefits included in their business plans, that does not imply the absence of such benefits; and
- Even with the RIIO-1 dedicated allowances, companies carried out proportionally less R&D expenditure than the economy as a whole. There is therefore no reason to believe that companies can achieve faster productivity growth than the economy as a whole simply because of their RIIO-1 R&D expenditures.

2.6. Ofgem's Use of CEPA's Report

CEPA's report ultimately does not set an ongoing efficiency challenge for transmission companies, instead presenting Ofgem with a range of possible numbers and some points of consideration for Ofgem in selecting a final number. The final range of potential numbers is as follows:

- **Low:** 0.5 per cent for opex and capex. This is the 1997-2016 average TFP and LP growth for the "wide" industry definition, measured using a GO approximation;
- **High:** 1.4 per cent for opex and 1.2 per cent for capex. This is the 1997-2016 average TFP for the average of the "narrow" and "wide" industry definition, measured using VA data, and includes the full 0.2 per cent innovation funding adjustment.

With the ambition of "set[ting] companies a stretching ongoing efficiency challenge that helps deliver value for money for consumers", Ofgem selects only CEPA's upper bound, i.e. 1.4 per cent for opex and 1.2 per cent for capex.⁵²

2.6.1. Ofgem deviates from regulatory precedent in selecting an upper bound without substantive justification

Setting a long-term ongoing efficiency requires a number of methodological choices, as we note above. To limit the risk of allowances being distorted by any single methodological choice, regulators typically set final ongoing efficiency targets based on an approximate mid-point of the range of potential outcomes:

- At RIIO-T1/GD1, for capex, Ofgem found a range of 0.3 per cent and 2.3 per cent, and set the allowance at 0.7 per cent, based on construction industry TFP growth measured in

⁵² Ofgem (9 July 2020), RIIO-2 Draft Determinations – Core Document, para. 5.36.

VA terms. For opex, Ofgem found a range of 0.5 per cent and 2.8 per cent, and set the allowance at 1.0 per cent, taken from a central point in this range.⁵³

- In the NIE RP5 appeal, the CC estimated that long-term productivity could be between 0.5 per cent (GO) and 1.5 per cent (VA), and set the actual ongoing efficiency target at the mid-point of 1.0 per cent.⁵⁴
- At PR19, Europe Economics estimated that the long-term productivity could be between 0.6 per cent (post-crisis) and 1.2 per cent (pre-crisis). Ofwat set the actual ongoing efficiency target at 1.1 per cent, near the upper end of Europe Economics' range to take into account VA measures as well as the benefits of moving to a totex and outcomes form of regulation,⁵⁵ though its initial estimate in its Draft Determination was considerably higher at 1.5 per cent.⁵⁶

Instead, Ofgem now places full weight on the upper bound of CEPA's estimate, and hence places full reliance on the methodological choices which feed into the upper bound. If these methodological choices do not reasonably reflect the conditions faced by an efficient operator, then the resulting ongoing efficiency challenge is not one that Ofgem can "reasonably expect" companies to achieve.

2.6.2. Ofgem's draft determination productivity target is above any relevant precedent

Ofgem's proposed targets are significantly higher than any of the regulatory precedent we have reviewed. The highest previous decision was 1.1 per cent by Ofwat at PR19, which is itself inflated by the potential productivity gains driven by a move to a totex and outcomes-based framework.⁵⁷

Especially considering the fact that most RIIO-T1/GD1 innovation funding targeted other objectives other than reductions in costs for regulated network companies, it is not clear how British transmission companies are fundamentally different from companies in other sectors, in terms of their ability to achieve cost reductions.

Ofgem's more aggressive challenge also coincides with the change in the inflation indexation approach. In RIIO-1, networks were indexed RPI, while Ofgem now intends to index networks to CPIH. CPIH typically increases more slowly than RPI: from 2013 to 2019 (the years of RIIO-T1/GD1 with outturn data), average RPI inflation was 2.5 per cent per annum, and average CPIH inflation was 1.7 per cent.⁵⁸

If these trends continue, then network companies can expect an additional 0.8 per cent ongoing efficiency challenge relative to RIIO-1 on cost areas not covered by RPE indexation,

⁵³ Ofgem (17 December 2012), RIIO-T1/GD1: Real price effects and ongoing efficiency appendix, para. 3.3.

⁵⁴ Competition Commission (26 March 2014), Northern Ireland Electricity Limited price determination, para. 11.27.

⁵⁵ Ofwat (December 2019), PR19 final determinations, Securing cost efficiency technical appendix, p.123.

⁵⁶ Ofwat (July 2019), PR19 draft determinations, Securing cost efficiency technical appendix, p.28.

⁵⁷ The benefits of totex regulation estimated by Ofwat were spurious, as Ofwat offered no evidence that the benefits it observed would not have happened anyway, and were based on a range of irrelevant productivity data from other sectors. See NERA (20 August 2019), Response to Ofwat's Draft Determination on Real Price Effects and Frontier Shift, Section 3.3.

⁵⁸ NERA analysis on ONS inflation data.

simply as a result of the formula change. In light of this additional challenge, Ofgem is even less justified in selecting an unprecedented ongoing efficiency challenge.

2.6.3. In selecting only an upper bound, Ofgem places full weight on unjustified input assumptions

As discussed in the previous sections, CEPA has made arbitrary methodological choices that provide an exaggerated estimate of the scope for ongoing productivity improvement:

- No rigorous evidence exists suggesting that RIIO-2 productivity trends will revert to their pre-crisis levels;
- There is no clear reason why a VA approach should be the “reference value” with GO as a lower bound;
- The additional 0.2 per cent innovation funding adjustment is arbitrary and has no basis in evidence. It probably double counts innovation benefits already included the reference value and in companies’ business plan cost forecasts.

In other areas of its analysis, where CEPA acknowledges there is no clear right or wrong approach, it limits its use of any single methodological choice by presenting a range of outcomes, and provides a set of caveats which Ofgem should consider when setting an actual allowance. However, in selecting only the upper bound, Ofgem ignores CEPA’s caveats and downside cases, and places full weight on only the following set of assumptions:

- The relevant comparator sector is the “wide” industry definition;
- Companies’ productivity growth will return to the 1997-2016 long-term average;
- The only measure of growth relevant to a network company is VA; and
- Companies can achieve the full 0.2 per cent innovation funding adjustment, with no consideration for what benefits may not be cost-related or what is already embedded in the reference value.

As we discuss below, neither economic theory nor regulatory precedent support placing full weight on these methodological decisions.

2.6.3.1. Industry definition

As we discuss in Section 2.1.2, the choice of comparator industries requires subjective judgment, and regulators generally place weight on multiple different comparator sets as CEPA has done in its report. CEPA deliberately bases its reference value on both the “narrow” and the “wide” industry definitions because the former captures trends in “the four industries seen as closest to energy networks” while the latter captures economy-wide trends.⁵⁹

By selecting only the upper bound, Ofgem places full weight on the “wide” definition and ignores the role that more directly relevant innovations and productivity improvements may

⁵⁹ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.22.

have on networks. This choice departs from CEPA’s reference value approach, which treats both the “narrow” and “wide” industry definitions as equal parts of the reference value.

2.6.3.2. Long-term vs short-term average

As we discuss in Section 2.2, the best available evidence suggests that productivity growth over RIIO-2 will remain at post-crisis levels. The OBR forecasting methodology has consistently been excessively optimistic in the post-crisis years, while the most recent BoE forecast shows lower productivity growth than the edition cited by CEPA.

CEPA’s approach assumes that productivity growth will return to the 1997-2016 average immediately from the beginning RIIO-2. However, CEPA also recommends that Ofgem place some weight on the OBR and BoE forecasts, as these “would help to capture additional insight into the scope for productivity potential beyond simply extrapolating historical trends”.⁶⁰ It is not clear that the OBR forecast provides any additional insight, but the BoE forecast likely reflects the most up-to-date thinking on the impact of Brexit and COVID-19 on macroeconomic trends like productivity improvement.

Ofgem concludes that “these forecasts are influenced by short and medium term risks to the economy such as [Brexit] and COVID-19”, and that “network companies are not exposed to these short- -term [sic.] risks (to volume and revenue) as their comparators in the wider economy and are better able to withstand any short-term shocks”.⁶¹ Accordingly, Ofgem places no weight on short-term forecasts.

Ofgem does not explain why network companies are less exposed to changes in long-term trends in productivity growth than companies in other sectors of the economy. Furthermore, Ofgem places full weight on the “wide” industry definition for setting the ongoing efficiency target, implying that economy-wide productivity trends are the most relevant to network industries.

Ofgem’s approach is selective and biased, to assume that wider trends are relevant only when they show faster productivity growth and not when they show slower growth.

2.6.3.3. VA vs GO

As we discuss in Section 2.3, CEPA misrepresents the debate between VA and GO measures of productivity, with regulatory precedent pointing more towards GO as the theoretically preferable measure. As a result, CEPA gives primacy to VA measures, with GO measures as only a downside, when economic theory and regulatory precedent point towards either giving GO primacy or treating the measures equally.

Nonetheless, in presenting its range of ongoing efficiency measures, CEPA suggests that “Ofgem should focus on considering the case for [...] giving some weight to the GO measures from EU KLEMS. [...] We would not suggest putting 100% weighting on the GO measures (i.e. completely replacing the VA values)”.⁶²

⁶⁰ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.36.

⁶¹ Ofgem (9 July 2020), RIIO-2 Draft Determinations – Core Document, para. 5.39.

⁶² CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.36.

In the draft determinations, Ofgem gives one paragraph of consideration to placing any weight on GO measures. Ofgem believes that “the practical difficulties in estimating GO (as highlighted in the CEPA report) limit the weight that can be reasonably placed on them (compared to VA measures). We therefore do not think it is appropriate to give any weight to GO measures”.⁶³ Ofgem does not provide any further explanation to this methodological decision.

Other regulators, including Ofgem at RIIO-T1/GD1, have noted the practical difficulties associated with GO measures. For these reasons, regulators have placed some (usually 50 per cent) weight on VA measures. Indeed, consistent with regulatory precedent, CEPA advises that Ofgem not place *full* weight on GO measures, but CEPA does not suggest placing *no* weight on GO measures. Ofgem also does not explain why these practical difficulties make it inappropriate to give any weight to GO measures, as opposed to simply a limited weight.

2.6.3.4. Innovation funding adjustment

As we discuss in Section 2.5, CEPA’s estimation of the benefits of innovation funding is not backed by any evidence, ignores non-cost benefits of innovation, and fails to account for double counting within the business plans and the reference value.

CEPA acknowledges some of these shortcomings and advises Ofgem to consider “the importance of benefits to consumers other than cost savings – such as environmental benefits and quality of service; [and] the degree of additional ongoing efficiency driven by innovation funding in RIIO-1 that is already embedded in the baseline spending included in the companies’ business plans”.⁶⁴

Ofgem claims to have considered the possibility that “some of the innovation funding may have resulted in quality of service improvements (rather than cost reductions).” Without any further explanation, however, Ofgem “believe[s] that there are sufficient levels of gains that are likely to come from lower costs that this should be accounted for, and this should result in them achieving at least 0.2% additional ongoing efficiency”.⁶⁵

In short, Ofgem’s consultants have derived an entirely arbitrary target for the benefits of innovation funding, but place caveats around it. While even these caveats understate the problems with using this adjustment as we explain above, Ofgem ignores them entirely and places full weight on CEPA’s arbitrary target. Ofgem presents no evidence in its support of this decision beyond asserting its “belief” that the target is appropriate.

Ofgem also sets out reasons why it believes that network companies could achieve ongoing efficiency improvements *above* the level assumed by CEPA:⁶⁶

- Ofgem states “EU KLEMS could underestimate the scope for efficiency gains within regulated sectors such as electricity and gas networks in GB [because] network companies [are] less exposed to negative shocks”.

⁶³ Ofgem (9 July 2020), RIIO-2 Draft Determinations – Core Document, para. 5.38.

⁶⁴ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.35-36.

⁶⁵ Ofgem (9 July 2020), RIIO-2 Draft Determinations – Core Document, para. 5.41.

⁶⁶ Ofgem (9 July 2020), RIIO-2 Draft Determinations – Core Document, para.5.42.

It is reasonable to believe that, because network companies are generally less exposed to macroeconomic shocks, the degree of productivity improvement possible in these sectors may be more stable than in the wider economy. However, there is no reason to expect network companies to systematically outperform the degree of productivity improvement observed in the wider economy because they are in a more stable industry. In taking a long-term average from 1997 to 2016 (itself an arbitrary assumption), CEPA already accounts for positive productivity shocks which offset negative shocks in other sectors.

- Ofgem also argues that “The lack of competitive pressure means [network companies] should be able to place greater management focus on driving high efficiency gains”.

This represents a fundamental misunderstanding of the economic theory and empirical evidence on how incentives to innovate are linked to market structure. For instance, the “replacement effect”, originally proposed by Nobel laureate economist Kenneth Arrow (1962), describes the role that market structure has on the incentives to innovate. In a competitive market, an innovative company can quickly increase its market share (and hence revenues) by innovating and “replacing” a competitor. A monopolist faces no such incentive, as it would only be “replacing” itself through its innovations.⁶⁷ This theory has been incorporated into microeconomics textbooks since then, such as Nobel laureate economist Jean Tirole’s seminal textbook on the Theory of Industrial Organization.⁶⁸

This theory also underpins the empirical work of Bond & Guceri (2016), who assume that companies in competitive sectors innovate so that they can achieve cost reductions and remain competitive.⁶⁹

Management for companies in highly competitive sectors are therefore *especially* focused on achieving high efficiency gains, compared to those in monopolistic sectors.

Ofgem has therefore presented no robust evidence that network companies can reasonably attain 0.2 per cent per annum efficiency improvement above economy-wide trends, let alone exceed that target.

2.6.4. Ofgem does not provide any justification for what it can “reasonably expect” companies to achieve

Throughout its review of CEPA’s report, Ofgem speaks in generic terms about delivering “value for money”, setting stretching, ambitious targets, and its unsupported “belief” that companies can attain greater efficiency gains than proposed by CEPA.

From these vague considerations, Ofgem selects a target which is not supported by the CEPA report, regulatory precedent or economic theory. Ofgem does not provide any reliable evidence as to why it can “reasonably expect” companies to achieve an ongoing efficiency target that is higher than any comparable precedent. The end result is therefore arbitrary, and seems to reflect Ofgem’s desired target rather than a fair and robust assessment of the available evidence.

⁶⁷ Arrow, K (1962), Economic Welfare and the Allocation of Resources for Invention

⁶⁸ See for example: Tirole, J (1988), The Theory of Industrial Organization, Seventh Printing (1994), p.391-392.

⁶⁹ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.22-23.

Ofgem's arbitrary approach to selecting a value means that it could equally select any other ongoing efficiency target it believed to be attainable and sufficiently challenging, without relying on evidence. Such subjective, arbitrary methods for setting important regulatory parameters create regulatory risk, which ultimately increases costs to consumers.

2.6.5. Ofgem fails to consider the extent of ongoing efficiency embedded into companies' business plans

Ofgem fails to account for the level of ongoing efficiency which is embedded into companies' business plans, and which drives components of the cost assessment process.

For example, as described in more detail in our accompanying report on Ofgem's approach to opex benchmarking, Ofgem sets Network Operating Cost (NOC) allowances by assessing each company's annual total cost or unit cost by NOC category. Ofgem then compares average costs for the first six years of RIIO-1 to proposed costs during RIIO-2 and sets allowances based on the lower of these, multiplied by allowed volumes as appropriate. We refer to these allowances as "pre-adjusted", in that the ongoing efficiency adjustment applies after this step.

We understand from modelling files provided by National Grid that Ofgem has not removed embedded productivity from NOCs before performing this assessment. As a result:

- Where allowances are based on RIIO-2 proposed costs (because they are lower than costs in the first six years of RIIO-1), then the pre-adjusted cost allowance already includes the effects of productivity improvement, *whether or not this is explicitly identified by companies*;
- Where allowances are based on RIIO-1 actual costs (because the effect of other cost drivers during RIIO-2 outweighs ongoing efficiency), then the pre-adjusted cost allowance does not include the effects of productivity.

Therefore, the pre-adjusted NOC allowance partially includes the effects of ongoing efficiency embedded into companies' business plans.

Similarly, Ofgem's approach to setting allowances for indirect costs uses a regression equation estimated on companies' historical cost and driver data to forecast indirect costs into the RIIO-T2 control period. To the extent that companies' historical costs include the benefits of efficiency improvement during the estimation window for the regression, the predicted costs emerging from the regression will also embed the historically achieved rate of productivity improvement into the allowances set for the T2 control period.

In order to maintain consistency between the cost assessment and frontier shift elements of the price control, Ofgem should strip out the embedded productivity *before* comparing RIIO-1 and RIIO-2 costs. Only after setting these allowances should Ofgem apply an ongoing efficiency adjustment, whether that is based on its own view or companies' views of the scope for ongoing efficiency.

2.6.6. Costs on which ongoing efficiency adjustments should apply

Ofgem proposes to apply a 1.4 per cent ongoing efficiency adjustment to opex and a 1.2 per cent adjustment to capex. Ofgem's approach fails to consider the actual dynamics of how

transmission companies carry out capex and the extent to which cost pressures are already captured by RPEs.

We understand that transmission companies typically carry out little direct capex internally, but instead outsource to contractors (as opposed to indirect capex, which may be conducted in-house).⁷⁰ As a result, transmission companies have little ability to drive efficiency gains in capex, because they do not directly carry out the work. It may still be appropriate to apply a frontier shift if Ofgem believes that the contractors themselves can achieve annual cost reductions.

However, productivity gains embedded in contractors' outputs is partially captured by the Materials RPE indices, which tracks a mixture of input and output Producer Price Indices (PPI) (as discussed in Section 3.4.4 below). Insofar as contractors are able to improve their practices in the future and drive efficiency, this will be captured by reductions in the Materials RPE index.

CEPA's report states that RPEs are intended to "capture changes in input prices" while ongoing efficiency "relates to how the network companies use the various inputs".⁷¹ In the case of capex, however, the measured "inputs" (i.e. the purchased work from contractors) are effectively equivalent to the "outputs" (i.e. the delivery of projects from contractors), with little scope for network companies to drive their own efficiency gains between the inputs and the outputs.

Therefore, Ofgem should not apply an ongoing efficiency challenge to direct capex, unless it alters its approach to setting RPEs.

2.7. Conclusion and Alternative Ongoing Efficiency Estimates

We have identified several methodological choices for which CEPA and/or Ofgem have departed from regulatory precedent and economic theory in calculating the ongoing efficiency target for the RIIO-T2 price control. We have therefore calculated a revised range of ongoing efficiency evidence that addresses these flaws:

- Previous regulatory decisions typically state that GO more accurately reflects companies' costs (which include intermediate products), but place some weight on VA measures due to practical problems with relying exclusively on GO. Therefore, in line with regulatory precedent, it would be more appropriate to place equal weight on GO measures and VA measures.
- In defining its GO "lower bound", CEPA ignores the GO estimates from the "narrow" industry definition. We see no reason not to place equal weight on both definitions.
- While it is possible that the low rates of productivity growth observed since the financial crisis will rise to their pre-crisis levels, the available evidence suggests a continuation of low productivity growth is most likely. We therefore place equal weight on 1997-2016 and 2006-2016 averaging periods.
- There is no evidence that, even if effective, innovation funding will provide cost reductions greater than those already included in economy-wide productivity measures or

⁷⁰ As advised by National Grid

⁷¹ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.38.

business plans. Furthermore, a substantial proportion of innovation funding is dedicated towards objectives which do not directly reduce RIIO-remunerated TO costs. It may also already be included in the TOs' business plan cost forecasts. Therefore, we remove the 0.2 per cent uplift entirely.

- In light of a highly uncertain macroeconomic climate (because of Brexit and COVID-19), Ofgem should have regard for short- and medium-term productivity forecasts. In this case, the August 2020 BoE Monetary Policy Report provides the most up-to-date projection. The OBR forecast pre-dates COVID-19 and is not a bottom-up forecast.
- In line with regulatory precedent, Ofgem should select a productivity estimate from the middle of the plausible estimates, thereby limiting its exposure to the flaws of any one approach. We therefore calculate productivity estimates as an unweighted average of all of the reasonable approaches we have considered.

We present our alternative estimates of TFP (capex ongoing efficiency) and LP (opex ongoing efficiency) in Table 2.3 below.

Table 2.3: Alternative Ongoing Efficiency Estimates

	TFP (Capex)		LP (Opex)	
	1997-2016	2006-2016	1997-2016	2006-2016
Narrow (GO)	0.3%	-0.1%	0.4%	-0.2%
Wide (GO)	0.5%	0.1%	0.5%	0.1%
Narrow (VA)	0.6%	-0.3%	1.0%	-0.6%
Wide (VA)	1.0%	0.2%	1.2%	-0.2%
Average by Window	0.6%	0.0%	0.8%	-0.2%
Average	0.3%		0.3%	

Source: NERA calculations from CEPA Tables 2.2 and 2.3

Note: Narrow = Unweighted average of selected industries (exc. manufacturing); Wide = Weighted average all industries (exc. real estate, etc).

The table above uses only productivity estimates as reported in CEPA's report, and only methodological choices that are supported by regulatory precedent and/or economic theory. This more balanced assessment of the available evidence suggests an ongoing efficiency target of 0.3 per cent per annum, for all cost categories.

Ofgem's interpretation of the CEPA report shows an ongoing efficiency challenge above what companies have included in their business plans. Using the same evidence but assessed in a different way, as we have done in the table, leads to the opposite conclusion.

We therefore recommend that Ofgem should accept that TOs' own ongoing efficiency targets proposed in their business plans (as it did at RIIO-ED1), as reasonable and ambitious when assessed against the available data on productivity improvement.

3. Real Price Effects

Ofgem proposes to set an RPE allowance for transmission companies that tracks movements in a set of external indices, selected on the basis that they are (i) simple; (ii) accurate; and (iii) independent. In the DD, Ofgem adopts CEPA's RPE recommendations without amendment.

In contrast to Ofgem's approach at RIIO-T1, which included fixed *ex ante* RPE allowances, companies' RPE allowances will be indexed to outturn levels of each index. In particular, companies' *ex ante* allowances will be based on the latest available forecasts, and replaced with outturn levels during the annual true-up process.

As a result, unlike at RIIO-T1, Ofgem's techniques to forecasting RPEs are only important in terms of the timing of cashflows, as each company will receive an NPV-neutral true-up to the actual level of the RPE indices. Therefore, if the selected RPE indices perfectly track companies' input cost pressures, then Ofgem's overall RPE methodology will track the changes in external efficient cost pressures.

Ofgem proposes to apply the RPE indices based on company-reported cost structures, rather than notional shares as it proposes to use in RIIO-GD2. Therefore, if the labour RPE index tracks actual labour cost pressures faced by transmission companies, then it will also track the changes in efficient labour costs, and likewise for Materials, Plant & Equipment, Transport and Other costs.

We therefore focus this chapter on Ofgem's indexation approach and the indices themselves and their ability to track TOs' costs, rather than Ofgem's short-term forecasting techniques:

- In Section 3.1, we discuss Ofgem's overall approach to indexation, and identify the risks it presents to the stability of overall revenues and bills;
- In Section 3.2, we appraise CEPA's approach to choosing input cost categories and associated indices for RPE indexation;
- In Section 3.3, we discuss the Labour RPE, comprising four (gas) or five (electricity) general and specialist labour indices;
- In Section 3.4, we discuss the Materials RPE, comprising two materials indices per company (though these differ between gas and electricity transmission); and
- In Section 3.5, we discuss the Plant & Equipment, Transport and Other RPE, for which Ofgem proposes to make no RPE adjustment for National Grid or Scottish Power Transmission.

3.1. Flaws in Ofgem's RPE Indexation Approach

3.1.1. Ofgem's indexation approach introduces risks to companies if the indices are not accurate

Ofgem's intention in introducing RPE indexation was to protect consumers from forecasting risk, particularly in the context that RIIO-T1/GD1 outturn RPEs were lower than Ofgem forecast when setting *ex ante* allowances.⁷² Indexation can reduce the forecasting risk for

⁷² Ofgem (March 2018), RIIO-2 Framework Consultation, para. 6.28.

consumers, but reduces the stability of revenues received by companies and bills paid by customers.

Additionally, if the selected indices do not accurately reflect companies' external cost pressures, then the indexation approach introduces additional revenue risk to companies. If the combined Labour or Materials RPE is an imperfect proxy for actual cost pressures faced by companies, then a negative shock to the RPE index may reduce allowances without a corresponding reduction in costs.

This additional risk has knock-on implications for companies and customers. The potential for non-cost reflective changes in allowances may increase financing costs and lead to insufficient investment in the network, to the detriment of current and future customers. Companies can hedge general inflation risk (e.g. using financial instruments like inflation swaps and including indexation in contractor contracts), but this may not be possible for these more obscure indices Ofgem is now proposing to use.

By contrast, the ex ante allowance approach insulates companies from such uncertainty, and is therefore preferable if the RPE indices track year-to-year variation in regulated companies' costs imperfectly.

3.1.2. Ofgem's indexation approach is inconsistent with its approach to setting an ongoing efficiency allowance

Ofgem's indexation approach to RPEs must be considered as part of its broader frontier shift methodology, which also includes the ex ante ongoing efficiency adjustment. In past decisions, both RPEs and ongoing efficiency have been fixed percentages ex ante, which are then netted off of each other to form a single fixed percentage frontier shift term (i.e. the "X" in an RPI-X methodology).

By deviating from this approach, Ofgem removes the stability of revenues which comes from setting the whole frontier shift term on an ex ante basis. Companies and customers alike benefit from greater stability in revenue allowances.

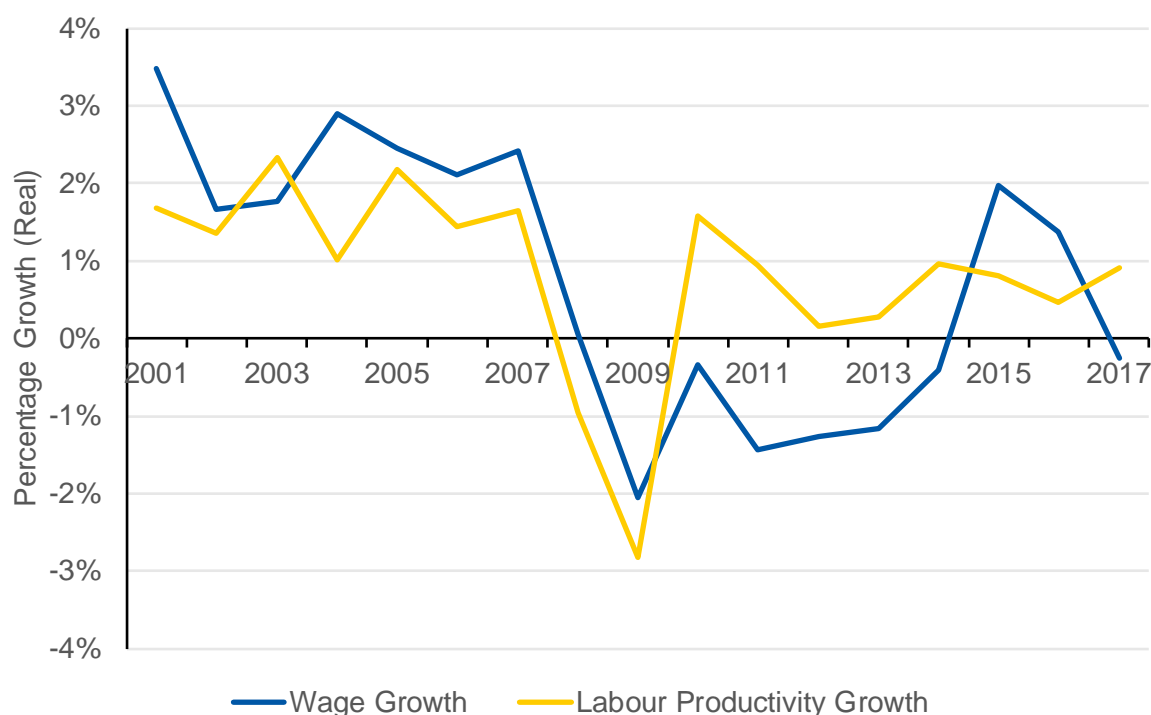
Furthermore, Ofgem's approach to indexing the RPE component of frontier shift but not the productivity component ignores the theoretical relationship between productivity and input prices. In a perfectly competitive labour market, for example, equilibrium wages equal labour productivity (i.e. output per worker). If one employer wished to pay its employees less than the level of labour productivity, then another employer would happily hire them at a higher wage. So long as that wage does not exceed the output the employer receives from the employees, the new employer is happy to increase the size of its workforce, and the employees are happy to accept the higher wage. It follows, therefore, that as labour productivity increases, so too do wages.

Additionally, economy-wide productivity (i.e. TFP) is driven in large part by aggregate demand. If aggregate demand falls, say due to a recession, then TFP will decline because some inputs are fixed (e.g. capital inputs). Recessions will also tend to reduce labour costs (high unemployment rates mean there is an excess supply of labour), as well as possibly in materials costs.

We can see evidence of this relationship by comparing growth in UK labour productivity per person, as measured by the EU KLEMS dataset, with average private sector wages, as

measured by the ONS Average Weekly Earnings (AWE) all employees series, as shown in Figure 3.1.

Figure 3.1: Wage Growth and Labour Productivity Growth



Source: NERA analysis on data from EU KLEMS and ONS

The figure shows a clear, albeit imperfect, relationship between wage growth and labour productivity growth, especially during shocks to the economy.

If a recession similar in magnitude to that following the 2007-08 financial crisis were to happen again (e.g. as a result of the COVID-19 pandemic or the effects of Brexit), we might expect another similar drop to both wages and labour productivity. Ofgem's proposal to index only RPEs but not ongoing efficiency would mean companies would be expected to pay employees less while still expecting ever-increasing levels of labour productivity. As described above, this is inconsistent with both economic theory and empirical evidence.

By contrast, if Ofgem indexed both RPEs and ongoing efficiency to external indices, its reduced RPE uplift would be largely offset by its reduced ongoing efficiency challenge. However, this is challenging in practice due to the potential for productivity indices to be volatile from year-to-year.

Alternatively, Ofgem could set *both* terms on an ex ante basis (as it has in the past). If such a downward shock occurred to both wages and labour productivity, customers would suffer the downside of forecasting risk on RPEs, largely offset by the upside of forecasting risk on labour productivity, and vice versa for network companies.

Ofgem's proposal ignores the tendency for these two terms to offset each other, and therefore places additional risk on networks and customers alike.

3.2. RPE Index Selection Process

3.2.1. Summary of CEPA's process for selecting indices

CEPA adopts a two-step approach to building up each of the RPE indices: first, it selects the cost categories which are material enough to include an RPE index for a particular company; second; it selects external data series which will feed into the RPE index.

The input cost categories CEPA examines are General Labour; Specialist Labour; Materials; Plant & Equipment; and Transport. Using company-specific cost structures for transmission companies (and a single notional structure for GDNs), CEPA assesses whether the input cost category represents at least 10 per cent of totex. If so, the category is deemed material and is included in an RPE index. If the input cost category represents less than 5 per cent of totex, CEPA deems the category immaterial and does not include it in an RPE index. The allowance will instead be indexed to CPIH inflation.

For cost categories which represent between 5 and 10 per cent of totex (Plant & Equipment for NGGT, NGET and SPT), CEPA carries out an additional materiality test. If the RPE for the cost category (using RIIO-T1 data series) is forecast to contribute to more than 0.5 per cent of totex during RIIO-2, then the category is deemed to be material. This approach allows a category which is small but whose costs increase substantially faster than inflation to still be considered material.

Once a cost category is deemed to be material, CEPA then selects which data series will be used to measure the RPE. Using only the data series used in RIIO-T1/GD1, Ofgem assesses the series against the following pass-fail criteria:⁷³

- **Simplicity:**
 - The index represents a material cost or identifiable portion thereof;
 - Movements in the index are likely to have a material impact on totex.
- **Accuracy:**
 - The index reflects movements in the respective input cost category (or a distinct portion thereof) for a notional efficient company in the sector.
- **Independence:**
 - The index has a low or no chance of being manipulated by actions of companies in the sector.

CEPA finds that all of the RIIO-T1/GD1 indices satisfy the pass-fail criteria. Therefore, CEPA does not investigate whether any other indices would be suitable for RIIO-2.⁷⁴

⁷³ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, Table 4.3.

⁷⁴ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.46.

3.2.2. CEPA does not appear to follow its stated selection approach as set out in its June 2019 report

CEPA's May 2020 report describes the criteria it follows in selecting relevant RPE data series. For reasons it does not provide, its approach is less rigorous than it suggested it would be in its June 2019 report, when it advised Ofgem on RIIO-2 cost assessment techniques:

- In its June 2019 report, CEPA proposed a two-stage process for selecting data series, starting with a “longlist [...] constructed based on a search of regulatory precedent, series proposed by stakeholders and research on series available from reputable data providers previously used by Ofgem for this purpose”.⁷⁵

In its May 2020 report, CEPA ignored this proposed process and only considered series included in one regulatory decision (albeit the one most directly relevant to RIIO-2), RIIO-T1/GD1. Other series may have been appropriate or even preferable according to CEPA's criteria, but CEPA did not consider them.

- The second part of CEPA's proposed two-stage process was to “assess those indices against a set of assessment criteria to identify a shortlist of indices”.⁷⁶

The proposed criteria included a first stage with five pass-fail criteria, four of which feature in the May 2020 report. The fifth related to the credibility of the data provider. It is unclear why CEPA no longer includes this criterion in the May 2020 report, but there is no reason to believe that the data providers under discussion are not credible, so this appears to be an immaterial omission.

The proposed criteria also included a second set of nine detailed assessment criteria for the indices which pass the pass-fail criteria. These include: ensuring that the series does not also capture ongoing efficiency; the series does not have any known statistical or methodological flaws; that the series is publicly available (or can be purchased).

In its May 2020 report, CEPA makes no mention of this second set of criteria. It is therefore unclear from CEPA's actual selection process whether, for example, some of the RIIO-T1/GD1 data series capture ongoing efficiency.

Instead, CEPA proposes to set RPEs based on the RIIO-T1/GD1 indices, which all pass the pass-fail criteria.

3.2.3. CEPA ultimately selects indices on a single criterion

As described above, CEPA discards its original proposal to examine a longlist of potential indices against a two-stage set of criteria, and instead only examines a shortlist of all indices used at RIIO-T1/GD1 against just four pass-fail criteria.

Of those four criteria, however, three are effectively meaningless as a way of distinguishing between indices:

- The two “Simplicity” pass-fail criteria appear to be a replication of CEPA's materiality tests, described in Section 3.2.1 above. It is not clear whether or how CEPA has conducted these materiality tests at an index rather than cost category level, or whether,

⁷⁵ CEPA (June 2019), RIIO-GD2 cost assessment – frontier shift, p.18.

⁷⁶ CEPA (June 2019), RIIO-GD2 cost assessment – frontier shift, p.198.

for example, it has deemed that all labour indices pass this test because labour itself is a material cost category. It is also unclear how two criteria which clearly measure materiality relate to the concept of “simplicity”.

- The “Independence” criterion is can be used to exclude companies’ own submitted labour and materials costs from the calculation of allowed RPEs. However, all of the indices under discussion are calculated from large, cross-sectoral national datasets, and this criterion is unlikely to rule out the series CEPA has considered.

Therefore, the only criterion CEPA appears to use for selecting between indices is “Accuracy”, i.e. the extent to which a particular index reflects the actual cost pressures companies face. Without providing any further explanation, CEPA finds that “the mix of indices chosen to reflect each cost area provides a good overall reflection of the movements in the costs that the companies will face”.⁷⁷

In contrast to the rigorous selection CEPA described in its June 2019, CEPA’s actual process only tested a pre-determined list of indices against a single criterion, while failing to provide any detail on how those indices actually satisfy that criterion. Therefore, it is impossible to say from CEPA’s assessment: (a) whether other indices would have been more appropriate as comparators; (b) whether each individual index actually satisfies the “Accuracy” criterion; or (c) whether the indices would satisfy other indices which CEPA deemed to be important in its June 2019 report, such as the double counting of ongoing efficiency.

As we describe in Section 3.1, the indexation approach means that choice of individual indices is more important now Ofgem proposes to use an indexation approach, than when setting ex ante RPE allowances. Therefore, the selection process should incorporate a higher standard of evidence. That standard of evidence has not been met in this case.

3.3. Labour RPE

In this section, we consider whether Ofgem’s proposed indices for Labour RPEs are likely to track changes in the TOs’ efficient labour costs.

3.3.1. Summary of index selection

In choosing the indices which would feed into the Labour RPE index, CEPA considers the following five indices which it used in RIIO-1 against its criteria:

- ONS Average Weekly Earnings (AWE) private sector;
- ONS AWE construction;
- ONS AWE transport & storage;
- BCIS PAFI civil engineering; and
- British Electrical Allied Manufacturers Association (BEAMA) electrical engineering (electricity transmission only).

CEPA selects all five of these indices, and does not consider any others. For the electricity transmission companies, each of the five indices receives 20 per cent weight; for NGGT, each

⁷⁷ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.46.

of the first four indices receives 25 per cent weight, as electrical engineering labour is not relevant in the gas sector.

3.3.2. CEPA has adequately not considered whether the selected indices track changes in the TOs' costs

CEPA has not presented any evidence that movements in any of the selected indices reflect movements in cost pressures faced by transmission companies, as would be necessary to meet the "Accuracy" criterion.

In the case of the Labour RPE, CEPA makes no attempt to link any one index to any component of companies' costs, instead applying all of them in aggregate (using an unweighted average) to companies' labour costs.

However, as we show in Figure 3.2 and Table 3.1 below, each of these indices moves differently, with real annual growth rates from 2000 to 2019 ranging from 0.85 per cent to 1.88 per cent above CPIH inflation. Assessing the extent to which these indices track the TOs' real labour cost pressures, which CEPA has neglected to do, would be necessary to assess the risk that the new indexation approach over or under compensates TOs' for changes in the market cost of labour during the T2 control period.

Figure 3.2: Annual Real Labour Index Level (Jan 2000 = 100)

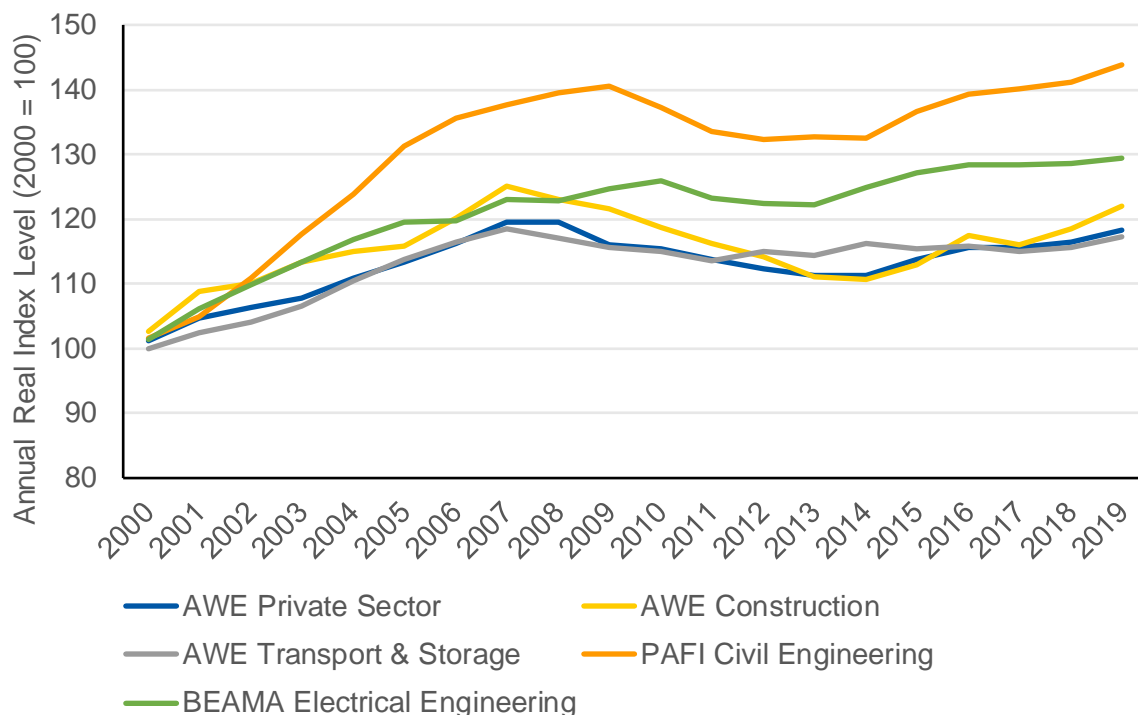


Table 3.1: Average Annual Real Labour Index Growth Rate

Data Series	2000-2019 Annual Real Growth Rate
ONS AWE Private Sector	0.85%
ONS AWE Construction	0.95%
ONS AWE Transport & Storage	0.86%
BCIS PAFI Civil Engineering	1.88%
BEAMA Electrical Engineering	1.30%

Source: ONS, BCIS, BEAMA

In applying equal weight to the four or five labour indices that define the Labour RPE index, CEPA implicitly assumes that each series represents 20 or 25 per cent of companies' labour costs.

However, CEPA makes no attempt to justify that these are the appropriate weights, simply stating that "the overall Labour RPE is constructed as an unweighted average of the indices".⁷⁸ Without any assessment of the nature of companies' labour costs, it is highly unlikely that each of these labour series would correspond to a 20 or 25 per cent subset of labour costs.

This is especially unlikely considering that CEPA was able to distinguish between companies' general and specialist labour costs when assessing which cost areas were material enough to justify having an RPE. CEPA has redacted the actual general vs specialist labour shares, but lists that specialist labour makes up at least 10 per cent of totex for NGGT, NGET, SPT and all GDNs, while it makes up less than 5 per cent of totex for SHET.⁷⁹

At RIIO-ED1, the two BCIS and BEAMA indices were used to track specialist labour.⁸⁰ Assuming they continue to reflect specialist labour for transmission companies, then at least 40 per cent (for electricity) and 50 per cent (for gas) of the Labour RPE is tracked by specialist series. CEPA has plainly made no attempt to tie these shares to the actual specialist share in companies' business plans.

3.3.3. Selected indices may be more susceptible to COVID-related declines than companies' actual labour costs

CEPA's "accuracy" criterion requires that the indices should reflect the movements in efficient costs that a company will face during RIIO-2 (though as noted above it has made no attempt to test this criterion). If an index responds more or less to external events than companies' actual cost pressures, then the company will be arbitrarily rewarded or penalised, even with an ex post adjustment based on outturn RPE index levels.

As Figure 3.2 shows, all five index levels have been relatively stable since 2000 on an annual basis, with all experiencing a decline in the aftermath of the Global Financial Crisis, especially the general labour series.

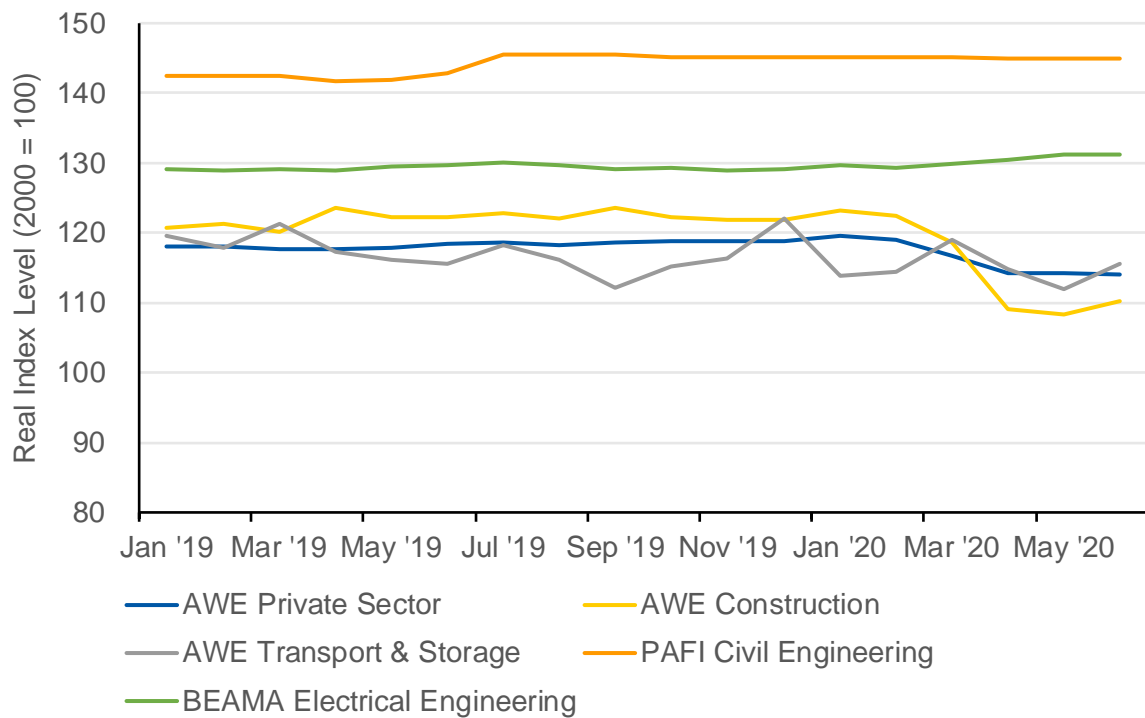
⁷⁸ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.48.

⁷⁹ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, Table 4.2.

⁸⁰ Ofgem (28 November 2014), RIIO-ED1: Final Determinations for the slow track electricity distribution companies – Business plan expenditure assessment, Table 12.2.

However, the figure only shows annual growth through to 2019, before the COVID-19 outbreak in the UK. If these indices provided a reasonable proxy for the long-term pressures facing companies' labour costs before 2020, they may no longer do so in the near-term due to the nature of the shock to the economy that has occurred. In Figure 3.3 below, we show the five indices (in real terms) on a monthly basis from the beginning of 2019.

Figure 3.3: Recent Trends in Labour Indices



Source: NERA analysis on data from ONS, BCIS, BEAMA

As Figure 3.3 shows, both the AWE Private Sector and the AWE Construction series have declined sharply since February 2020, by 4 per cent and 10 per cent to June 2020, respectively. The other three series have not yet exhibited such declines.

Indexing companies' allowances to these indices can only be appropriate if Ofgem believes that 40 (electricity transmission) or 50 per cent (gas transmission) of companies' actual labour costs will experience the same pressures.

This is unlikely to be the case for the ONS AWE indices. In its August statistical bulletin, the ONS notes that "the earnings estimates are not just a measure of pay rises as they also reflect changes in the number of paid hours worked".⁸¹ Further, the ONS notes that "the pattern of pay growth is closely linked to the proportion of employees who are furloughed".⁸² As of 26

⁸¹ Office for National Statistics (11 August 2020), Average weekly earnings in Great Britain: August 2020, p.4.

⁸² Office for National Statistics (11 August 2020), Average weekly earnings in Great Britain: August 2020, p.6.

July, 13.5 per cent of construction sector employees remain on furlough leave, although this is down from 46.2 per cent as of 19 April.⁸³

In short, therefore, the ONS indices have exhibited a drop at least in part because of a reduction in hours worked on average (especially in the construction sector). These recent trends are not relevant to transmission companies if they have not furloughed their staff at similar rates, for instance if staff were deemed to be essential.

It is not clear whether the BCIS and BEAMA series control for changes in hours worked, but they do not exhibit a COVID-related dip. Either this is because they do control for changes in hours (e.g. they measure hourly wages rather than weekly wages) or because average hours have not changed significantly for the specialist labour sectors covered by these indices.

Ofgem has not specified in the Draft Determinations exactly how it will apply the RPE indexation relative to the pre-adjusted revenue allowances. We assume that, if the ONS AWE series return to their pre-COVID trends before the beginning of the price control period in April 2021, then revenue allowances will be the same as they would be in the absence of the downward shock. However, there are reasons to believe that this will not be the case, and the ONS AWE indices will continue to understate companies' efficient labour costs:

- The share of construction workers on furlough leave declined from 46.2 per cent as of 19 April to 21.1 per cent as of 28 June.⁸⁴ In the same period, as shown by Figure 3.3, the AWE Construction index did not change significantly. This suggests that average weekly earnings may not rebound as quickly as furlough rates decline, potentially because employees are accepting pay cuts in order to return to work.
- The medium-term outlook on the pandemic and associated economic effects is highly uncertain. A second outbreak, followed by more reductions in hours worked and a decline in average weekly earnings in general labour segments, is possible during the RIIO-2 period.

If either of the above occurs, there is a risk that Ofgem's approach will reduce the TOs' allowed revenues, even though they do not enjoy a commensurate reduction in labour costs.

It is conceivable that wages paid by the TOs will re-align with the ONS series in the medium- to long-term, as network companies will be able to offer lower pay to new employees than they would have if weekly wages in the wider economy were higher. In the short-term, however, wages are "sticky", staff turnover is low, and labour contracts likely do not allow network companies to unilaterally impose pay cuts that would track economy-wide trends.

⁸³ (1) Office for National Statistics (13 August 2020), Coronavirus and the Economic impacts on the UK: 13 August 2020, Figure 6; (2) Office for National Statistics (7 May 2020), Coronavirus and the Economic impacts on the UK: 7 May 2020, Figure 7.

⁸⁴ (1) Office for National Statistics (7 May 2020), Coronavirus and the Economic impacts on the UK: 7 May 2020, Figure 7; (2) (1) Office for National Statistics (16 July 2020), Coronavirus and the Economic impacts on the UK: 16 July 2020, Figure 4.

3.4. Materials RPE

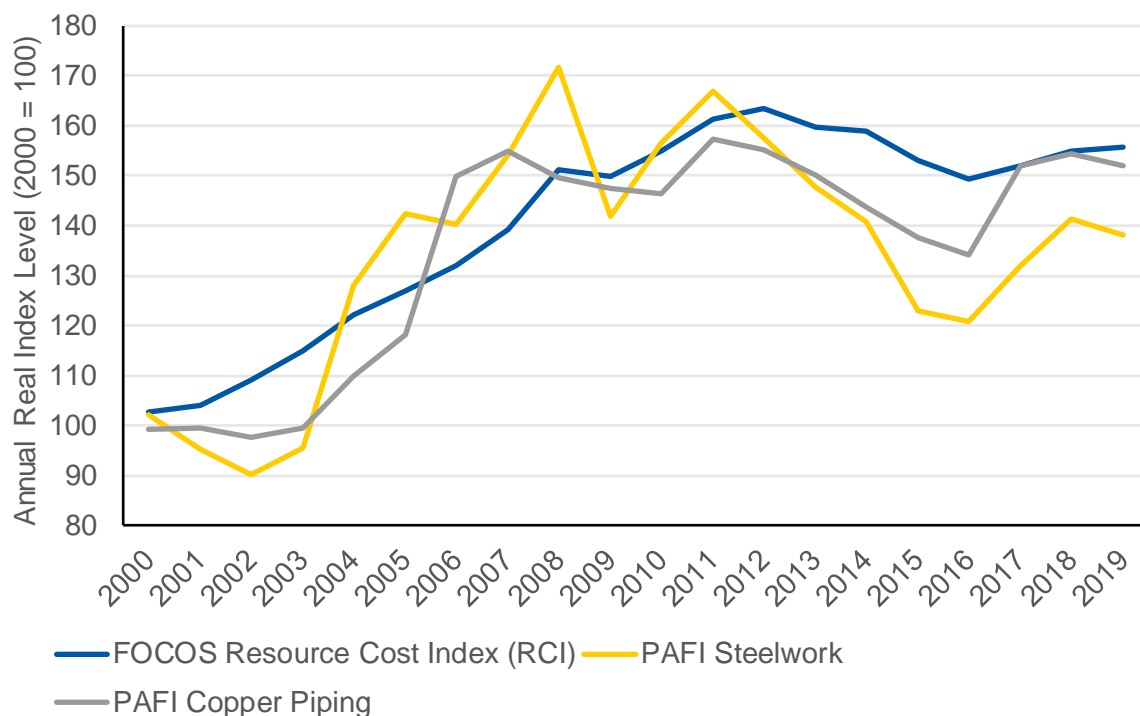
3.4.1. Summary of index selection

In choosing the indices which would feed into the Materials RPE index for transmission companies, CEPA considers the following indices which it used in RIIO-1 against its criteria:

- BCIS PAFI Copper pipes and accessories (capex materials for electricity transmission companies);
- BCIS PAFI Structural Steelwork Materials: Civil Engineering Work (capex materials for gas transmission companies); and
- BCIS FOCOS Resource Cost Index of Infrastructure: Materials (opex materials for all transmission companies).

We show the evolution of these indices in real (CPIH-adjusted) terms since 2000 in Figure 3.4 below.

Figure 3.4: Annual Real Materials Index Level (Jan 2000 = 100)



Source: BCIS

Figure 3.4 shows that the series have grown similarly since 2000 (between 2.19 per cent for PAFI Steelwork and 2.54 per cent for PAFI Copper Piping), but the two capex materials (PAFI) series are more volatile than the opex materials (FOCOS).

CEPA determines that “the cost structure for materials for most of the network companies leads to a weighting for materials of 25% for opex-and [sic.] 75% for capex (and repex). SPT’s business plan implies a slightly greater use of materials in opex activities. As such, for

SPT, the copper piping index is giving a weight of 65% rather than 75% in the composite RPE”.⁸⁵

3.4.2. CEPA’s materials weights may be arbitrary

CEPA does not provide any details on how it calculates weights for the materials series, so we cannot assess whether its assumptions are reasonable – i.e. whether companies (except for SPT) do indeed use 75 per cent of their materials for capex and 25 per cent for opex.

However, the capex share for companies’ materials is unlikely to be exactly 75 per cent for all companies (including GDNs, which are outside the scope of this report), and exactly 65 per cent for SPT. If CEPA has understated the opex share of materials costs, then the materials RPE index will likely be more volatile than companies’ actual costs, and customers will face unnecessary volatility in their bills.

However, at least relative to the Labour indices, the long-term average growth rates for the different series are similar, and so companies’ allowances *in expectation* are not highly sensitive to this weighting factor. Additionally, although the final weights appear to be over-simplified, CEPA has tied the weights to an approximation of companies’ cost structure rather than simply an unweighted average.

3.4.3. CEPA has not considered whether the selected indices are the most appropriate

As described in Section 3.1, CEPA considers only the indices which Ofgem used to track RPEs at RIIO-T1/GD1, and selects all of them. CEPA states that the indices satisfy the “Accuracy” criterion, but does not provide any detail on how any one index satisfies it. It is therefore difficult to have confidence that the selected indices accurately reflect companies’ costs, especially in comparison to alternative indices.

In particular, it is not apparent why electricity transmission companies’ materials costs would be particularly driven by the cost of copper piping, a material input which likely does not feature prominently in transmission companies’ construction plans.

The BCIS dataset contains several other indices that appear to be equally or more appropriate to electricity transmission companies’ costs, including:

- Electrical Cables (4/CE/EL/03);
- Electrical Engineering Materials (4/CE/EL/02);
- Electrical Installations – Cost of Materials (2/E2);
- Steelwork – Cost of Materials (2/S2); and
- Metal structures (4/CE/26).

We have not appraised these indices against CEPA’s criteria (either its more rigorous June 2019 criteria or its pared down 2020 criteria), and so do not necessarily recommend them for inclusion. However, CEPA’s failure to even consider indices which appear to be more

⁸⁵ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.49.

directly relevant to electricity transmission companies' costs than the cost of copper piping demonstrates the arbitrariness of its selection process.

As described in Section 3.1, the use of inaccurate indices introduces the risk that the index (and associated revenue allowances) will move independently of companies' efficient costs.

3.4.4. The materials indices appear to capture productivity improvements

The PAFI indices, which make up 75 per cent of the materials RPE, appear to capture the effects of productivity improvements. Furthermore, the FOCOS index, which makes up the remaining 25 per cent of the materials RPE, is itself compiled as a weighted average of 21 PAFI series, and so likely captures the effects of productivity improvements as well.⁸⁶

According to BCIS, "material price movements are based on Office for National Statistics Producer Price Indices".⁸⁷ This is confirmed by the Department for Business, Energy and Industrial Strategy (BEIS), in describing the Construction Material Price Indices which BCIS used to conduct on BEIS's behalf but now conducts for its own purposes: "the materials content of the PAFI are, in the main, based on ONS PPIs. PPIs measure the price of goods bought and sold by UK manufacturers".⁸⁸

More specifically, the PPIs themselves comprise both input price indices (price movements of goods bought by UK manufacturers) and output price indices (prices of goods produced by UK manufactures and sold within the UK).⁸⁹

Because Output PPIs measure the prices of goods manufactured in the UK from raw (or intermediate) outputs, and then sold in the UK, they also capture trends in productivity. If UK manufacturers of a certain product are able to improve their productivity in the manufacturing process (and assuming that the market for that product is sufficiently competitive), this will be reflected through lower unit costs than in the absence of such productivity gains.

Therefore, to the extent to which that the relevant PAFI indices (the two which are directly used as well as the 21 PAFI indices which inform the FOCOS index) are based on ONS Output PPIs (rather than Input PPIs), then Ofgem should not separately apply an ongoing efficiency target for the segment of costs to which they are indexed (i.e. direct capex materials). Its current approach is double-counting the scope for ongoing productivity improvement.

3.5. Plant & Equipment, Transport and Other RPE

3.5.1. Summary of index selection

Ofgem does not apply an RPE for any other cost category for transmission companies (except for SHET), because it does not find these cost categories to be sufficiently material. In

⁸⁶ Department for Business, Energy & Industrial Strategy (February 2017), Construction Material Price Indices Methodology, p.8.

⁸⁷ BCIS (25 April 2018), Price Adjustment Formulae Indices, p.1.

⁸⁸ Department for Business, Energy & Industrial Strategy (February 2017), Construction Material Price Indices Methodology, p.9.

⁸⁹ Office for National Statistics (December 2014), Producer Price Indices – Methods and Guidance

particular, it finds that Plant & Equipment is between 5 and 10 per cent of costs for NGET, NGGT (TO) and SPT, but the cost category does not pass the second materiality test. For SHET, Plant & Equipment exceeds 10 per cent and so it is included. For NGGT (SO), Plant & Equipment falls beneath 5 per cent, so CEPA does not conduct a second materiality test.

Transport costs fall beneath 5 per cent for all companies and so is not included in CEPA's RPE index, and remaining costs (i.e. Other RPE) are also assumed to track inflation.

3.5.2. Materiality thresholds are arbitrary and unnecessary

CEPA's 10 per cent materiality threshold is arbitrary, unjustified and unnecessary.

In its June 2019 Frontier Shift paper, CEPA considered the relative costs and benefits of applying a materiality threshold for RPE categories. It noted that there was "no hard-and-fast rule" to setting a threshold, and that "it is not clear that there is a set numeric threshold that Ofgem should set to consider evidence put forward by companies (as Europe Economics did in analysis for Ofwat for PR19 [set at 10 per cent])".⁹⁰

In its 2020 report, CEPA sets its first materiality threshold at "10% of totex, as proposed in the June 2019 Frontier Shift paper".⁹¹ CEPA made no such proposal in its 2019 report. In fact, CEPA only mentioned a 10 per cent threshold when describing Ofwat's PR19 approach, but concluded that it was not clear that this was the correct approach. CEPA provides no explanation as to why this now is the correct approach.

In its 2019 report, CEPA suggested there was some value to reducing the number of series included in order to reduce the "indexation mechanism's complexity [...] because of the risk of unintended consequences, and the level of resources needed to design and maintain it".⁹²

However, CEPA (and Ofgem) proposes to apply a Plant & Equipment RPE for SHET. It would introduce no extra complexity to apply this same index to all transmission companies, and would, if anything, reduce complexity as Ofgem would not need to calculate separate RPE indices for all transmission companies.

Additionally, there is no reason to believe that a Plant & Equipment RPE for NGGT, NGET and SPT would introduce unintended consequences, while the same would not occur for SHET. Therefore, if Ofgem applies a Plant & Equipment RPE to one company, it should apply it to all companies.

3.5.3. If a materiality test is to be conducted, it should be based on cost allowances rather than a business plan

CEPA's materiality threshold is based each cost area's share of a company's totex. It is not clear exactly how totex is defined, but the CEPA report was presumably written before Ofgem had completed other parts of its cost assessment. Therefore, we assume that CEPA assessed materiality based on companies' business plan submissions.

⁹⁰ CEPA (June 2019), RIIO-GD2 cost assessment – frontier shift, p.15.

⁹¹ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.43.

⁹² CEPA (June 2019), RIIO-GD2 cost assessment – frontier shift, p.15.

If Ofgem does maintain its approach to assessing materiality, it should re-assess materiality based on *allowed* costs, as this is the measure that actually determines companies' totex. For instance, if Plant & Equipment costs are 8 per cent of a company's business plan, but then a large volume of works are disallowed, then Plant & Equipment costs may comprise more than 10 per cent of the company's RIIO-2 totex.

3.5.4. Other costs track inflation, but the inflation definition has changed

For cost areas which do not receive RPE indexation, Ofgem assumes that they will grow with inflation, which is consistent with Ofgem's past RIIO-1 decisions.

However, the definition of inflation has changed since RIIO-1. RIIO-1 price controls were indexed to RPI while RIIO-2 price controls are indexed to CPIH. In its RIIO-2 Sector Specific Methodology Decision, Ofgem estimated that the wedge between RPI and CPIH was 1.049 per cent.⁹³

By changing the inflation indexation approach, Ofgem therefore assumes that cost categories without an explicit RPE index will grow by 1.049 per cent more slowly than they did in RIIO-T1/GD1. CEPA argues that RPI likely overstates economy-wide inflation by up to 0.7 per cent, due to a "formula effect" in how averages are calculated.⁹⁴

However, even if RPI overstates economy-wide inflation, CEPA does not explain the further 0.35 per cent not explained by the formula effect. In effect, CEPA and Ofgem reduce companies' allowances by indexing costs to a lower measure of inflation, without discussing the merits of the choice. One solution would be to take adopt a lower ongoing efficiency target (as proposed in Section 2.6.1); another solution would be to apply RPE indices to more cost categories, lowering the share of costs which are exposed to the change in inflation methodology.

3.6. Conclusions

While Ofgem has introduced the concept of RPE indexation as a way to insulate customers from the risk of forecasting error, its approach inadvertently introduces new risks to transmission companies' revenue allowances, which will ultimately harm customers.

The selected indices may have been adequate for setting ex ante RPE allowances in previous decisions, because they were only intended to capture the long-term tendency for some input costs to rise faster or slower than general inflation. Using them for indexation, however, has wider consequences (e.g. financeability), and so requires a higher standard of evidence. Companies can hedge general inflation risk (e.g. using financial instruments like inflation swaps and including indexation in contractor contracts), but this may not be possible for these more obscure indices Ofgem is now proposing to use.

The additional risks arise for several reasons:

- In a period of high macroeconomic uncertainty due to COVID-19 and Brexit, shocks to selected indices are more likely than they have been previously, and according to

⁹³ Ofgem (24 May 2019), RIIO-2 Sector Specific Methodology – Core document, para. 12.62.

⁹⁴ CEPA (27 May 2020), RIIO-GD2 and T2: Cost Assessment – Frontier shift methodology paper, p.53-54.

Ofgem's proposal, network companies will now be exposed to these shocks for the first time.

- In practice, macroeconomic shocks will have offsetting effects on input price pressure and productivity improvement, at least partially insulating companies from the full shock on either component individually. By indexing only RPEs and not ongoing efficiency, Ofgem removes that offsetting effect.
- Ofgem has not carried out a rigorous assessment of the relevance of the included indices, or, if it has, it has not provided more than a few high-level statements on its process. As a result, it is impossible to have confidence that the indices it selects for indexation actually track changes in companies' efficient input costs.
- Some of the data series, in particular the ONS AWE series, appear to be highly sensitive to the short-term effects of the COVID-19 pandemic and associated response. The dynamics underpinning this shock (primarily furloughed workers) are unlikely to be relevant to network companies. Given the risk of further constraints on economic activity due to COVID-19 restrictions, network companies could see future revenue allowances reduced because *other* companies furlough their workers, whilst the network companies themselves do not.
- Ofgem has applied arbitrary weightings to each index which feeds the larger RPE for each cost category. Although Ofgem has applied the overall labour and materials RPE indices to companies' own cost structures, it makes little attempt to tie individual indices to subsets of labour and materials costs, in particular for the labour RPE. As the included labour indices grow at different rates, it is highly likely that the growth in the labour RPE will not match growth in the relevant input costs it seeks to track.
- Ofgem has used an arbitrary and unnecessary materiality threshold to avoid controlling for Plant & Equipment RPEs for most companies. Because it proposes to include it for one company, there is no reason not to include it for all companies.

Given the risks that an indexation approach creates, especially in the current macroeconomic climate, Ofgem could reduce revenue risks (and costs associated with those risks) by returning to its previous practice of setting an ex ante RPE allowance.

4. Conclusion

In conclusion, Ofgem's Draft Determinations approach to setting a frontier shift is based on a flawed assessment of the available evidence, introduces new risks, and will tend to reduce companies' ability to recover their efficient costs.

As we describe in Chapter 2, CEPA's approach report presents an exaggerated assessment of the degree to which transmission companies can improve ongoing productivity. In fact, a more reasonable reading of the evidence suggests a lower recommended range. This flaw in CEPA's report is compounded by Ofgem's selective use of the top-end of the CEPA range, the basis for which seems grounded in Ofgem's belief that a high productivity target is appropriate, not any evidence that it is achievable. Ofgem's inclusion of an innovation adjustment in the determination is particularly poorly justified.

As we describe in Chapter 3, Ofgem's proposal to index RPEs introduces undue revenue risk to companies, exacerbated by the current macroeconomic climate and the fact that any shocks to RPEs will not be offset by changes in the ongoing efficiency challenge. Furthermore, Ofgem has not carried out a rigorous assessment of the indices included, and it is unlikely that the selected indices actually track short-term movements in companies' efficient input costs. These revenue risks feed through into higher financing costs and insufficient incentives to invest, both of which are costly to companies and customers alike. Ofgem could remove these risks by returning to an ex ante approach to controlling for RPEs.

We recommend a pragmatic solution, in which Ofgem sets an ex ante productivity target and an ex ante RPE allowance that offset each other, in effect indexing the price control to CPIH inflation. The current outlook for RPEs is within the range of evidence on long-term productivity growth, which suggests this approach is reasonable, and significantly simplifies the regulatory process.

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ECONOMIC CONSULTING

NERA Economic Consulting
Marble Arch House
66 Seymour Street
London, UK W1H 5BT
+44 207 659 8500
www.nera.com