



Response to RIIO-ED2 Draft Determination on Ongoing Efficiency

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Executive Summary

NERA Economic Consulting (NERA) was commissioned by the Energy Networks Association (ENA) to respond to Ofgem's draft determinations on Ongoing Efficiency (OE) at RIIO-ED2. NERA was asked to review documents released by Ofgem as well as supporting analysis prepared by Ofgem's consultants, CEPA.

Ofgem has set an OE target of 1.2 per cent equal to the highest of three alternatives proposed by CEPA. In turn, CEPA's recommended value is equal to the upper bound it estimates across 48 estimates in its analysis of the 2019 EU KLEMS data. It is also at least 20 basis points above regulatory precedent and – critically – above CEPA's own interpretation of the same evidence and its recommendations in previous price control reviews. CEPA does not provide any material justification for adjusting its interpretation of the same evidence it previously reviewed and concluded supported OE assumptions of 1 per cent or less.

CEPA's Methodological Choices Bias its TFP Estimates Upwards

CEPA arrives at its upper bound assumption for OE by making a series of individually unjustified decisions which increase its OE estimates. Collectively, those decisions compound to exaggerate the top end of the OE range to a level that cannot be justified by any objective reading of the economic evidence. The chief flaws in CEPA's analysis and its subsequent use by Ofgem are:

- **Use of Value Added:** CEPA relies on Value Added (VA) Total Factor Productivity (TFP) measures to inform its recommendations on the OE challenge and specifically its upper bound. The use of raw, unadjusted, VA TFP is incorrect because Ofgem intends to apply the OE assumption to total expenditure, including intermediate inputs. Use of VA estimates result in TFP measures which are approximately twice as high as the conceptually correct measure of productivity growth based on Gross Output (GO). The use of VA TFP is not a matter of analytical discretion: VA and GO use the same data on Gross Output, Capital (K), Labour (L) and Intermediate Inputs (X) and therefore concerns about measurement error of any of the components apply to both. The ratio between VA and GO measures is not a matter of sampling or volatile over time but systematic and a function of the relative share of intermediate inputs, capital and labour in production. VA measures are consistently higher because, in effect, they are expressed in different units.
- **Construction of the EU KLEMS sample:** CEPA has made a series of methodological choices that biases the EU KLEMS results upwards relative to its previous analysis. It has extended the time-period considered in the analysis to include 1995/96 from its RIIO-GD2/T2 assessment of the same data set when it instead relied on the last two complete business cycles. CEPA does not point to any new evidence that would cause it to revise its sample period and reveals no new information that would cause it to change its method. Further, it has expanded the set of comparator sectors to include Information and Communications Technology (ICT). ICT is an outlier in terms of productivity growth, especially over the sample period which includes the internet and communications boom of the late 1990s and early 2000s. As a result, inclusion of ICT is likely to exaggerate OE over RIIO ED2.
- **Use of the maximum of the range:** CEPA's recommended reference points for Ofgem's OE target are underpinned by quantitative analysis of the 2019 EU KLEMS database. In

its report, CEPA presents a total of 30 estimates from the 2019 EU KLEMS dataset for VA and GO TFP growth using different time-periods.¹ Moreover, CEPA also presents a further 18 estimates for a different sample period following the Global Financial Crisis (GFC). Of these 48 estimates, Ofgem OE target for RIIO ED2 is equal to the highest estimate in the entire sample of estimates rather than a balanced metric such as the median or mean statistic.

CEPA's Qualitative Arguments Do Not Justify an OE Target at the Top-end of its Range

Despite the coincidence between its upper bound recommendation, Ofgem's selection and its highest VA TFP estimate, both Ofgem and CEPA state that the ultimate decision or recommendation is not dependent on one specific EU KLEMS result. Instead, they argue that their conclusions take a range of qualitative factors into account in interpreting the quantitative evidence from the EU KLEMS data.

The CEPA analysis of qualitative factors that informs Ofgem's reasoning is partial and unrepresentative. CEPA assesses seven categories of qualitative factors (shown in Table 1, below). We identify three key errors in CEPA's assessment of qualitative factors:

- **Unbalanced assessment:** Of the qualitative factors, CEPA disregards or downplays five with no evidence beyond a cursory rule-of-reason assessment. Each of those factors would, if held to be true, tend to indicate that Ofgem should select an OE assumption lower than the quantitative analysis would indicate (in both CEPA's and our assessment). These disregarded factors include regulatory precedent, proposals in business plans, economy wide productivity forecasts incorporating recent events such as Brexit and Covid, the slowdown in productivity growth following the Global Financial Crisis (GFC) and evidence on historical productivity growth for DNOs prepared by NERA.
- **Inconsistent use of criteria:** CEPA dismisses three qualitative factors that would point to selecting a lower OE assumption (economy wide productivity forecasts, the post-GFC productivity puzzle and historical DNO productivity growth) as too uncertain for consideration. Nonetheless, CEPA recommends Ofgem considering two factors which it believes would tend to increase Ofgem's OE assumption: (1) the RIIO ED2 context of innovation funding and net zero transition and (2) the possibility for failing to count embodied technical change. In practice the impact of both of these factors is uncertain and less well evidenced and documented than, for instance, the slowdown in productivity growth following the GFC. The impact of both qualitative factors on which CEPA does rely on the potentially achievable rate of OE at RIIO ED2 is also ambiguous rather than necessarily positive as CEPA alleges. For instance, it is far from clear that the transition to net zero will lead to higher (measured) productivity growth for DNOs than has historically been the case.
- **Unsubstantiated claims of positive impact:** CEPA argues that both the RIIO-ED2 context and embodied technical change are qualitative factors that motivate selecting an OE challenge of 1.2 per cent. CEPA does not substantiate why this is the case. For the RIIO-ED2 context, CEPA simply asserts that (a) the ambition for transformational change will create scope for increased productivity, and (b) past innovation funding should lead

¹ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, Table A.1, Table A.3.

Ofgem to expect higher productivity growth in the electricity distribution sector than in the competitive sectors. For embodied technical change, CEPA does not provide any evidence of the scale and sign of impact of adjusting the EU KLEMS estimates. The impact of both these factors on productivity is ambiguous, and CEPA is wrong to recommend them as factors that definitively motivate a higher OE challenge.

Table 1: Ofgem and CEPA Disregard Qualitative Evidence that Points Toward a Lower OE Assumption

Qualitative Factor	Impact on OE - CEPA	Error in Assessment				CEPA
		Unbalanced Assessment	Inconsistent Use of Criteria	Unsubstantiated Impact		
RIIO ED2 Context	Aim Up	Yes	Yes	Yes		Includes
Embodied Technical Change	Aim Up			Yes		Includes
Post-GFC slowdown	Aim Down	Yes	Yes			Disregards
Recent Regulatory Precedent	Aim Down	Yes				Disregards
Business Plan Proposals	Aim Down	Yes				Disregards
Economy Wide Productivity (inc. Brexit, Covid)	Aim Down	Yes	Yes			Disregards
Historical DNO productivity	Aim Down	Yes	Yes			Disregards

Source: NERA Analysis

Conclusion

The economic evidence at hand (both from within the electricity distribution industry and from competitive sectors of the economy) supports an OE target of between 0.1 and 0.5 per cent, as explained in our previous report.² Some DNOs' ED2 business plan proposals include OE assumptions of 1 per cent, which is in line with regulatory precedent. In principle, Ofgem could take the view that for those DNOs at least, productivity improvement for the relevant portion of the production function could be as high as 1 per cent per annum.

However, Ofgem's proposed OE assumption in the Draft Decision of 1.2 per cent exceeds the range of reasonable estimates from the data available. Concluding in favour of 1.2 per cent is only possible based on a flawed and biased interpretation of the data and is not consistent with allowing recovery of efficient costs.

² NERA (30 April 2021), Ongoing Efficiency Improvement at RIIO-ED2, Table 1.

1. Introduction

NERA Economic Consulting (NERA) was commissioned by the Energy Networks Association (ENA) to provide support in responding to Ofgem's Draft Determination (DD) on Ongoing Efficiency (OE).

In preparing our response, we have reviewed review documents released by Ofgem as well as supporting analysis prepared by Ofgem's consultants, CEPA.

The report proceeds as follows:

- Chapter 2 describes CEPA's analysis and the OE challenge selected by Ofgem in the RIIO-ED2 DD;
- Chapter 3 explains the methodological errors in CEPA's quantitative analysis that bias its estimates of OE; and
- Chapter 4 reviews CEPA's qualitative analysis, used by both Ofgem and CEPA to interpret the quantitative analysis and identify a point estimate for OE for RIIO ED2.

2. Overview of Ofgem's Draft Determination and CEPA Analysis of OE

For the ED2 Draft Determination, Ofgem commissioned CEPA to prepare a report that surveys productivity evidence from other sectors of the economy (henceforth referred to as CEPA's report).³ In the subsequent sections, we describe CEPA's methodological choices, results and recommendations to Ofgem. Moreover, we summarise Ofgem's decision on the OE challenge for the RIIO-ED2 DD.

2.1. CEPA Surveys a Range of Evidence on the Long-term Growth Rates for Productivity in Other Sectors

In its report, CEPA presents several different estimates of long-term, historical growth rates in Total Factor Productivity (TFP). Whilst CEPA considers that there can be benefits to considering a wide range of productivity estimates (including both TFP and Labour Productivity), it advises that Ofgem rely on TFP measures only. This is because Ofgem applies the OE challenge to totex for ED2, "*which is therefore consistent across both opex and capex/repex*".⁴

All of CEPA's estimates rely upon United Kingdom TFP measures collected in the EU KLEMS database. When using this dataset to compute long-term trend growth rates in TFP, CEPA makes several methodological choices, which we summarise in the subsequent sections.

2.1.1. Choice of EU KLEMS database and time period

CEPA considered two EU KLEMS datasets for its growth accounting analysis:

1. The EU KLEMS 2011 dataset, which covers the period 1970 to 2007 and includes productivity data based on both Gross Output (GO) and Value Added (VA) output; and
2. The EU KLEMS 2019 data set, which covers 1997 to 2016 and only includes VA measures of productivity.⁵

CEPA ultimately bases its analysis on the 2019 EU KLEMS dataset, as it considers "*that the growth accounting should account for the most recently available evidence on UK productivity growth*".⁶

CEPA aims for the time-period to include complete business cycles, as productivity growth tends to be higher in periods of economic expansion, compared to periods of economic downturn. CEPA reviews alternative business cycle definitions, which it defines based on the 'output gap', and notes challenges with defining and identifying complete business cycles.⁷

³ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper.

⁴ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.15.

⁵ Technically, the 2019 EU KLEMS dataset contains data for 1995 to 2016.

⁶ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 11.

⁷ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.12.

However, to avoid subjectivity around the definition of the business cycle, CEPA ultimately recommends estimating TFP growth over the full sample in the 2019 EU KLEMS database (1995 to 2016).⁸

2.1.2. Productivity metrics

CEPA considers two alternative measures of TFP for its analysis: Value Added TFP and Gross Output. CEPA argues that there is no consistent view on which measure the most relevant for setting an OE challenge:

“both GO and VA measures of productivity have their advantages and disadvantages and no consistent view has emerged from previous regulatory decisions over which measure is more relevant when setting the OE challenge”⁹

CEPA lists a series of advantages and disadvantages associated with each TFP measure (see Table 2.1). CEPA states that GO is “the most appropriate industry-level measure of technical change which reflects the business decisions which are taken by firms”.¹⁰ However, CEPA claims that GO TFP requires careful treatment of inter-industry flows of intermediate products. Without such careful considerations, CEPA argues that GO measures may “double-count” some intermediary inputs as outputs in an economy wide measure of productivity. As VA TFP does not include intermediate outputs, CEPA argues it is a more robust TFP measure when using aggregated data. Moreover, CEPA highlights that VA is directly available in the 2019 EU KLEMS data set, whilst it derives GO measures through an approximation from VA TFP.¹¹ CEPA estimates both VA and GO TFP for its EU KLEMS analysis. As noted above, as CEPA uses the 2019 EU KLEMS data, its GO measures are converted from VA measures.

⁸ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 36.

⁹ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.14.

¹⁰ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.14.

¹¹ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 14.

Table 2.1: Summary of CEPA's comparison of GO and VA TFP measures

Advantages and disadvantages	Value Added (VA)	Gross Output (GO)
Impact of vertical integration	<ul style="list-style-type: none"> VA TFP measures of productivity are shown to be more sensitive to outsourcing decisions and the degree of vertical integration between industries. 	<ul style="list-style-type: none"> GO TFP measures of productivity are less sensitive to outsourcing decisions (i.e., substituting labour for intermediate inputs) and the degree of vertical integration between industries.
Technical progress	<ul style="list-style-type: none"> VA TFP is shown to be a better measure of productivity in cases where technical progress operates on primary inputs. 	<ul style="list-style-type: none"> GO TFP is a better measure of productivity where technical progress affects all factors of production proportionately.
Inter-industry flows	<ul style="list-style-type: none"> VA measures of productivity are robust to using aggregated data as intermediate inputs are omitted from consideration. 	<ul style="list-style-type: none"> GO measures of productivity may be problematic when aggregated data is used because it may double-count intermediary products as outputs (for producers) and as inputs (for firms using intermediary inputs).
Data availability	<ul style="list-style-type: none"> VA measures of productivity are published directly in the 2019 EU KLEMS publication. 	<ul style="list-style-type: none"> GO measures of productivity are not directly available in the most recent 2019 EU KLEMS release.³¹ The growth in GO TFP using this calculation must be calculated using an approximate conversion.

Source: CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, Table 2.2.

2.1.3. Comparator sets

CEPA considers two types of comparator sets for its analysis:

- **Narrow Set of Comparator industries:** containing sectors chosen for having comparable activities to DNOs (one narrow set, and wider set),
- **Economy-wide Comparator Set:** sample of competitive industries to capture broader productivity trends.

CEPA selects three comparator groups for its analysis (as shown in Table 2.2).

Table 2.2: CEPA's Comparator Sets

Comparator Set	NACE 2 comparator industries	Reason for Selection
Narrow Set	'Construction', 'Wholesale and Retail Trade: Repair of Motor Vehicles and Motor Cycles', 'Transportation and Storage', 'Financial and Insurance Activities'. This comparator set is unweighted.	This is the same comparator set CEPA used at RIIO-GD2/T2.
Expanded Set	In addition to the Narrow Set, CEPA includes 'Professional, Scientific, Technical, Administrative and Support Service Activities', and 'Information and Communication'. This comparator set is unweighted, meaning that	CEPA includes Admin and support service activities, as DNOs incur these costs and it is used in the water sector
Economy Wide Set	Includes historical productivity growth for all sectors (with certain exceptions), ¹³ weighted by the contribution of the sectors to GDP.	CEPA includes information and communication to ensure the estimates reflects DNOs potential for " <i>increased innovation and productivity growth due to the digital transformation of the electricity distribution sector which the network companies expect to deliver during ED-2</i> ". ¹²

Source: CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.16.

2.1.4. Growth Accounting Results

Based on the above methodological decisions, CEPA calculates TFP productivity targets ranging from 0.2 per cent to 1.2 per cent (see Table 2.3). The top of CEPA's range (1.2 per cent) is set by its VA estimate for the period 1995 to 2016, using its expanded comparator set. The bottom of CEPA's range for this sample of 0.4 per cent results from its GO estimates using the narrow comparator set.

¹² CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.16.

¹³ The sample excludes the following sectors: Real Estate, Renting and Business Activities (K), Public Admin and Defence, Compulsory Social Security (L), Education (M); Health and Social Work (N), Other Community, Social and Personal Services (O), Private Households with Employed Persons (P) and Extra-Territorial Organisations (Q)). Source: CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.16-17.

Table 2.3: CEPA's average historic TFP growth based on the 2019 EU KLEMS database (1995-2016)

Average TFP growth (%)	VA	GO
Unweighted average of narrow comparator set 1 ('RIIO-GD2/T2')	0.8%	0.4%
Unweighted average of expanded comparator set 2	1.2%	0.6%
Market economy (all industries excluding L, O, P, Q, T and U)	0.8%	0.4%

Source: CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, Table 2.3.

2.2. CEPA's Qualitative Arguments

In interpreting the quantitative results, CEPA considers several qualitative factors.¹⁴

- **The RIIO-ED2 Context:** CEPA recommends that Ofgem considers the ambition to deliver transformational change to enable the transition to Net Zero, and the implication on opportunities for productivity growth in the electricity distribution sector. Further CEPA recommends that Ofgem considers the impact of innovation funding on productivity improvements qualitatively.
- **Embodied Technical Change:** EU KLEMS intends to measure disembodied technical change, and as a result embodied technical change may not be accounted for. CEPA recommends that Ofgem considers the potential underestimate of GO TFP resulting from this.
- **Impact of the time-period limitations of the 2019 EU KLEMS dataset:** CEPA does not consider that there is sufficient evidence to support a qualitative factor accounting for the slower productivity growth post-GFC.
- **Recent UK Regulatory Precedent:** Recent decisions on OE in UK regulated sectors, including appeal decisions by the CMA, which tend to cluster around 1 per cent.
- **Company's Business Plan Proposals for OE:** the OE assumptions included in the DNO's business plans reflecting the productivity growth the DNOs believe they can achieve at RIIO-ED2. CEPA recommends that all DNOs should be able to meet the OE challenge of the most ambitious companies (1 per cent)
- **Forward Looking Productivity Estimates:** the relevance of short-term forecasts by the OBR and BOE on the productivity of the UK economy. This qualitative factor also includes a discussion of the impact of macro-economic factors like Brexit and Covid-19 on the productivity growth potential in the electricity distribution sector. CEPA concludes that the relevance of these factors to the OE challenge at RIIO-ED2 is limited.
- **Historical Productivity improvements by DNOs:** analysis of TFP growth achieved in the GB electricity distribution sector specifically. CEPA recommends that Ofgem

¹⁴ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 36-39.

exercises caution in interpreting this form of analysis, claiming that it produces a wide range of results.

CEPA does not specify the weight it gives to these factors in making its ultimate recommendations to Ofgem or the precise implications of these factors for the level of likely productivity growth at RIIO-ED2.

2.3. CEPA Recommends that Ofgem Sets the OE target Between 0.5 and 1.2 per cent

CEPA relies on the EU KLEMS productivity estimates, and its qualitative assumptions, to recommend three reference points for Ofgem's OE challenge for RIIO-ED2:¹⁵

- 0.5 per cent, consistent with the ongoing efficiency challenge proposed by the least ambitious companies.
- 1.0 per cent, consistent with the ongoing efficiency challenge proposed by the most ambitious companies.
- 1.2 per cent, representing a more stretching outlook for the frontier efficiency achievements possible in RIIO-ED2. CEPA does not specify the weights applied to qualitative factors used to motivate this reference point, but specifically references embodied technical change and the RIIO-ED2 context as motivating factors for this reference point.¹⁶

Whilst CEPA notes that “*none of these reference points should be seen as being equivalent to directly taking any single value from the set of core EU KLEMS analysis*”,¹⁷ its highest recommendation (1.2 per cent) matches to the top of its TFP growth estimates from EU KLEMS. CEPA arrives at 1.2 per cent by estimating an unweighted VA TFP estimate for the expanded comparator set for the period 1995 to 2016.

2.4. Ofgem's Draft Determination

Ofgem restates that a growth accounting approach using EU KLEMS “*is a useful source of information on productivity trends in the UK*”,¹⁸ but argues that there are limitations in an approach that exclusively relies on historical productivity growth rates to set an OE challenge for future periods. Ofgem therefore considers a range of factors:¹⁹

- The ambition to deliver transformational change in electricity distribution, which Ofgem states “*may provide additional opportunities for productivity growth in RIIO-ED2 above and beyond what has been set in the past or what has been set in other regulated sectors.*”²⁰

¹⁵ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 39.

¹⁶ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 39.

¹⁷ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 40, footnote 101.

¹⁸ Ofgem (29 June 2022), RIIO-ED2 Draft Determinations - Core Methodology Document, p. 365.

¹⁹ Ofgem (29 June 2022), RIIO-ED2 Draft Determinations - Core Methodology Document, p. 365-366.

²⁰ Ofgem (29 June 2022), RIIO-ED2 Draft Determinations - Core Methodology Document, p. 365.

- Potential for both embodied and disembodied technical change. Ofgem considers that GO estimates from EU KLEMS may understate the potential for cost savings, as it does not intend to capture quality improvements in the factor inputs (i.e., embodied technical change).
- The time period used in CEPA's analysis covers the slower UK productivity growth since 2009. Ofgem does not consider that there is strong evidence for this slow productivity growth should impact ongoing productivity gains in RIIO-ED2.
- The relevance of forward-looking, economy-wide productivity forecasts influenced by short-term macroeconomic factors is relevant for assessing potential OE improvements at RIIO-ED2. Ofgem considers that such forecasts have limited relevance to OE improvements at RIIO-ED2.
- The DNO's Business Plan (BP) assumptions, which range from 0.5 per cent to 1 per cent per annum. Ofgem considers that DNOs should have similar scope for productivity gains and as a result that all DNOs should be able to achieve the most ambitious business plan assumption of 1 per cent.
- Ofgem considers regulatory precedent where EU KLEMS growth accounting analysis has been used to inform the OE challenge. Ofgem notes that these OE decisions have tended to cluster around 1 per cent.²¹
- Ofgem considers DNO evidence on the degree to which past innovation funding could lead to further efficiency gains beyond those achieved in competitive sectors at RIIO-ED2, and the extent to which the comparative benchmarking already captures these efficiencies.

Ofgem selects the highest reference point recommended by CEPA to set an OE challenge of 1.2 per cent. Ofgem argues that this stretching OE target is justified based on the results and context of CEPA's growth accounting analysis, the ambition for transformational change in the electricity distribution sector over the RIIO-ED2, and the available evidence.²² As noted above, this OE challenge matches exactly the CEPA's unweighted VA TFP estimate for the expanded comparator for the period 1995 to 2016.

²¹ Ofgem (29 June 2022), RIIO-ED2 Draft Determinations - Core Methodology Document, p. 366.

²² Ofgem (29 June 2022), RIIO-ED2 Draft Determinations - Core Methodology Document, p. 366-367.

3. CEPA's Methodological Choices Contains Errors that Bias the TFP Estimates Upwards

In its DD, Ofgem has selected CEPA's "stretching"²³ reference point of 1.2 per cent as the OE challenge. Whilst CEPA claims that this result cannot be equated to any of its TFP estimates, it happens to perfectly match the very top of the 48 TFP growth estimates from the 2019 EU KLEMS data set in CEPA's report.²⁴

To estimate TFP growth of 1.2 per cent, CEPA has made a series of methodological choices which are either erroneous or directly contradict its analysis at the recent RIIO-GD2/T2 price control (which used the same quantitative evidence base):

- **Use of VA TFP:** CEPA relies on VA TFP measures to inform its recommendations on the OE challenge and specifically its upper bound. The use of raw, unadjusted, VA TFP is incorrect because Ofgem intends to apply the OE assumption to total expenditure, including intermediate inputs.
- **Use of the maximum of the range:** CEPA extends the time-period considered in the analysis to include 1995/96 from its RIIO-GD2/T2 assessment of the same data set when it instead relied on the last two complete business cycles. CEPA does not point to any new evidence that would cause it to revise its sample period and reveals no new information that would cause it to change its method.
- **Inclusion of Information and Communications Technology (ICT) in the comparator set:** CEPA has expanded the set of comparator sectors relative to its RIIO-GD2/T2 recommendations to include ICT. ICT is an outlier in terms of productivity growth, especially over the sample period which includes the internet and communications boom of the late 1990s and early 2000s, and its inclusion likely to exaggerate OE over RIIO ED2.

In this chapter, we review these methodological choices in turn and explain the 1.2 per cent TFP estimate does not provide a solid basis for Ofgem's OE challenge at RIIO-ED2.

3.1. CEPA's Reliance on VA TFP is an Error that Results in an Upwardly Biased Requirement when Applied to Totex

As described in Section 2, CEPA estimates both VA and GO measures of productivity to inform its recommendations for the ED2 OE challenge. CEPA's highest TFP estimate (1.2 per cent) is an estimate based on the VA measure of productivity, which informs the highest reference point it recommends to Ofgem and which Ofgem ultimately adopts. CEPA's use of VA TFP measures is an error, which bias its results upwards. In our first report, we explained that VA and GO are not independent estimates of productivity, but they are in fact scaled measures of the same estimates (in any given year).²⁵ The text is sufficiently pertinent, given CEPA's continued reliance on VA estimates, that it bears repeating:

²³ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.40.

²⁴ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, Table A.1, Table A.3.

²⁵ NERA (30 April 2021), Ongoing Efficiency Improvement at RIIO-ED2, p.30.

“There are two different measures of productivity and productivity growth: Gross output (GO) and value added (VA). The measures differ in that they use two separate measures of outputs, but also two separate measures of inputs. The difference is in their treatment of intermediate inputs, i.e. inputs other than capital and labour:

- **GO:** Productivity measured as the ratio of all outputs to all inputs;
- **VA:** Productivity measured as the ratio of outputs after subtracting the value of intermediate inputs, to the sum of capital and labour inputs only.

In other words, GO measures include intermediate inputs in the cost base against which TFP is calculated. VA measures exclude intermediate inputs both from the measure of output and from the measure of inputs. In simplified algebraic terms, the productivity measures are calculated as follows:

$$GO\ TFP = \frac{Index\ of\ GO}{Index\ of\ (K + L + X)} \quad VA\ TFP = \frac{Index\ of\ (GO - X)}{Index\ of\ (K + L)}$$

Where GO is gross output, VA is value-added, K is capital inputs, L is labour inputs, and X is intermediate inputs.

While GO and VA are different measures of TFP growth, they are not independent estimates. They can be calculated using the same data and rely on the same modelling assumptions. As the simplified equations above show, they simply combine the same components using a different calculation. There is therefore a set mathematical relationship between growth in GO TFP and VA TFP:²⁶

$$\Delta GO\ TFP = \frac{VA}{GO} \times \Delta VA\ TFP \approx \frac{K + L}{K + L + X} \times \Delta VA\ TFP$$

,,27

The mathematical relationship between GO and VA TFP measures has three important implications:

1. VA and GO estimates are alternative estimates of outputs and costs. Which measure is appropriate depends on whether the result will be used on gross outputs and costs (i.e., GO is appropriate), or value-added outputs and primary costs (i.e., VA is appropriate). For RIIO-ED2, Ofgem applies the OE challenge to totex which is a gross measure of cost that includes intermediate inputs (i.e., it is not a measure of primary costs). As a result,

²⁶ This is an approximation. To be precise, “gross output TFP growth rate is equal to the value added TFP growth rate multiplied by a simple magnification factor. The magnification factor is the share of primary inputs (capital and labour) in total input use multiplied by the ratio of the growth factor of primary inputs to the growth factor of all inputs”. As the growth factors of both primary and all inputs are close to one, and their ratio is therefore also close to one, using the share of capital and labour in all inputs is a close approximation.

Calver, M. (2015), “On the relationship between gross output-based TFP growth and value added-based TFP growth: An illustration using data from Australian industries”, *International Productivity Monitor*, vol. 29, p. 69.

See also OECD (2001), “Measuring Productivity, Measurement of aggregate and industry level productivity growth”, *OECD manual*, p. 26.

²⁷ NERA (30 April 2021), Ongoing Efficiency Improvement at RIIO-ED2, p.29.

CEPA's decision to use VA TFP measures to inform its recommendations is inaccurate, let alone placing primary emphasis on this measure of TFP.

2. VA estimates will always be higher than GO measures (in absolute terms) by a factor approximately equal to the share of primary inputs in total inputs.²⁸ By relying VA TFP to inform the OE challenge for ED2, CEPA is erroneously biasing the result upwards. This can be clearly seen from CEPA's results (see Table 2.3), as CEPA's VA results are between 0.4 and 0.6 percentage points higher than the commensurate GO results (i.e., the VA is results twice that of the GO results).
3. Because VA and GO measures both rely on the same measure of output (GO) and inputs (K, L and X) insofar as concerns around data quality affect the use of GO TFP measures (e.g., because of inter-sector flows) they must also affect VA. In particular, if one were to hold that intermediate inputs (X) were mismeasured, that mismeasurement would affect both GO TFP measures (through the denominator) and VA TFP measures. Mismeasurement of any of the constituent components does not therefore discriminate between GO and VA TFP measures.

In its assessment of the usefulness of VA measures for setting an OE assumption, CEPA lists a series of supposed advantages of VA TFP which are spurious, as VA is a multiple of GO TFP. Each of these supposed advantages are flawed for the following reasons:

- **Value Added Measures Suffer from a Units Problem:** CEPA asserts that VA TFP is a better measure of productivity where technical progress occurs through improved use of primary inputs. CEPA's assertion is factually inaccurate in the present circumstances. Ofgem applies the OE challenge to totex at ED2, which is a cost measure that includes both primary and intermediate inputs. As totex includes intermediate inputs, using a VA measure of TFP expresses the productivity estimate in the wrong units and biases the OE challenge upwards by a predictable amount based on the relative share of intermediate inputs in the input index.
- **Impacts of inter-industry flows are hypothetical and unquantified:** CEPA argues that VA TFP is more robust than GO TFP when utilising aggregated data, as intermediate inputs are omitted from VA. Specifically, CEPA is concerned that inter-industry flows could lead to a "double-count" of intermediate inputs as outputs when using economy wide measures of productivity. CEPA does not demonstrate that double-weighting some industries would be problematic in its sample or identify which industries would be double-weighted. A purely hypothetical and unquantified measurement problem cannot alone provide the basis for overriding a certain and material bias (c. 100 per cent overstatement) of estimated productivity growth. Moreover, the are three key reasons for why inter-industry flows is not a valid argument to favour VA over GO TFP:
 - For inter-industry flows to bias TFP growth estimates from the EU KLEMS dataset, changes in productivity of intermediate outputs need to affect prices. In principle, if the prices of the intermediate outputs did not change, productivity in sectors using intermediate inputs would not be affected. The EU KLEMS dataset weights inputs by expenditure shares, assuming that the price paid for each input reflect its productive

²⁸ As explained in our first report, see: NERA (30 April 2021), Ongoing Efficiency Improvement at RIO-ED2, p. 29.

value.²⁹ Therefore, if productivity in other sectors is material and affect prices TFP measures will overstate productivity. Conversely, if productivity in other sectors is low or falling and affect prices, the estimates of TFP growth may be understated. CEPA does not demonstrate that (a) there are inter-industry flows between its comparator sectors for the Narrow and Expanded sets; and (b) the scale and direction of the bias it is concerned about. As result, it is not clear why Ofgem should place any weight on this argument.

- As explained above, GO and VA TFP are functions of each other, and as a result any bias to one measure will affect the other. If intermediate outputs (X from the formulae above) is mismeasured due to inter-sector flows, it would affect the VA TFP measure as well. In fact, as VA TFP is larger than GO, the scale of the bias will be higher for VA due to the multiplicative factor applying across the two measures. This can also be seen by comparing the absolute value of the derivative of VA and GO with respect to X in our simplified expression above, which is larger for VA TFP.³⁰
- CEPA’s concern over inter-industry flows is only relevant for measures of total productivity of an economy as a whole. CEPA substantiates its concern about inter-sector flows by citing an OECD paper that discusses how to accurately measure the aggregate productivity of multiple sectors (e.g., what is the aggregate productivity of the leather and shoe industry, where leather is the intermediate output/input affecting productivity of each individual sector).³¹ CEPA’s quantitative analysis does not intend to measure the total productivity of the comparator sectors. Instead, it seeks to measure the average productivity in sectors that undertake similar activities to DNOs. By analogy, parts of the electricity distribution business are like construction, transport, financial services etc. If that assertion is correct, there should be no concern over “double counting” of inter-industry flows. It does not matter if intermediate outputs from transport are utilised in construction, as parts of the business that are similar to construction will benefit from transport more broadly, and parts of business that are like transport will benefit from productivity growth like transport.
- **Estimates for GO TFP and VA TFP are closely related, and both would suffer from any misestimation of intermediate inputs:** CEPA highlights the fact that VA TFP can be estimated directly in the 2019 release of the EU KLEMS database as an advantage relative to GO TFP, which can only be derived through a conversion from VA TFP. CEPA argues that any “*mis-measurement in the flow of intermediate inputs across industries*” may cause this relationship not to hold.³² CEPA does not provide any evidence of this concern biasing its GO results. Since intermediate inputs feature in the formulae for both GO and VA TFP measures, its criticism will apply to the use of VA

²⁹ O’ Mahony, M. and Timmer, M.P. (2009), “Output, Input and Productivity Measures at the Industry Level: The EU KLEMS database”. *The Economic Journal*, vol. 199, Issue 538, pp. F374-F403.

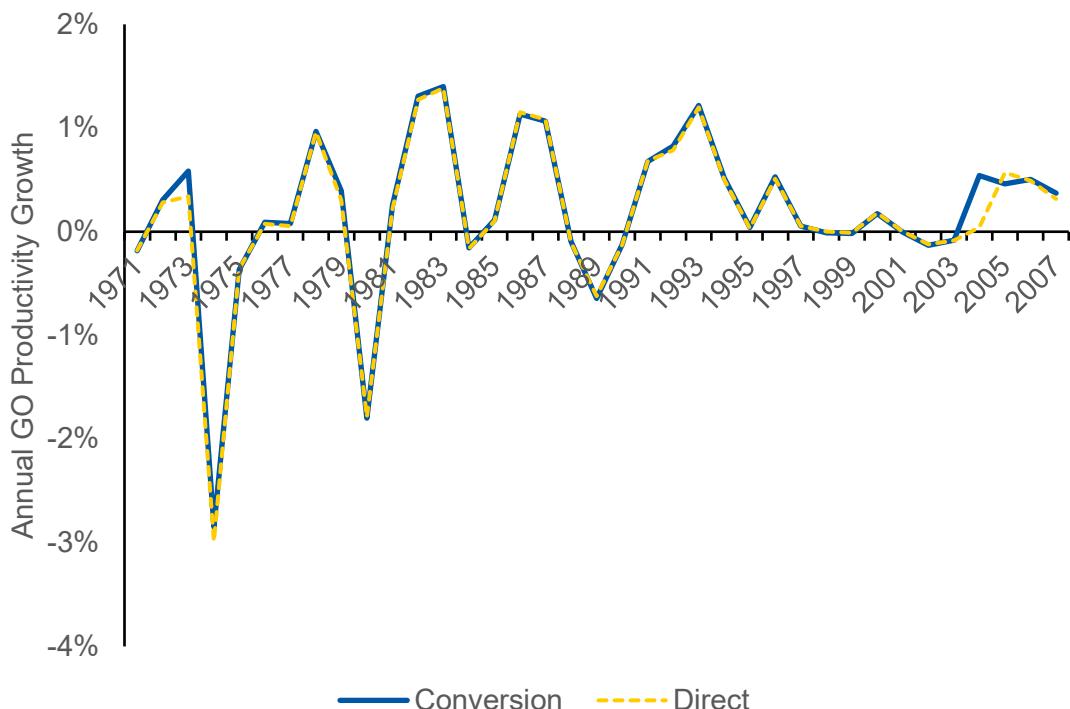
³⁰ Based on the simplified expression above, the derivative of GO TFP with respect to X is a function of $\frac{k+l}{(k+l+x)^2}$, while the derivative of VA TFP growth with respect to X is a function of $\frac{1}{k+l}$.

³¹ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.15; OECD (2003) Measuring Productivity – Measurement of Aggregate and Industry-Level Productivity Growth, p.93-94.

³² CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.14.

estimates directly as well. To assess whether this is a valid concern, we have analysed the difference between direct estimation and conversion of VA to GO TFP using the 2011 EU KLEMS database. We find that the conversion is less than 0.03 percentage points higher than the direct estimate on average across the period 1970 to 2007 (as shown in Figure 3.1). While this analysis cannot be replicated on the 2019 release of EU KLEMS, it indicates that the problem CEPA identifies is unlikely to bias its converted GO estimates materially, based on the available evidence.

Figure 3.1: Comparison of direct estimation of GO TFP and conversion from VA to GO TFP growth for the Economy-wide sample using the 2011 EU KLEMS dataset



Source: NERA Analysis of EU KLEMS data.

Based on the above points, it is clear that growth in VA is not an appropriate measure of TFP to inform the OE challenge at RIIO-ED2. Raw, unadjusted VA TFP is only appropriate when applied in a framework based on value-added outputs and primary costs, which is not the case at ED2 since the OE challenge is applied to totex. We explain above why the relative advantages CEPA attributes to VA over GO TFP has no merits. However, even if they did, it is manifestly unreasonable to equate mismeasurement of inter-industry flows of intermediate outputs to applying a TFP measure to an incompatible set of outputs and costs. CEPA does not quantify the former (our analysis suggests the problem is immaterial), while the latter effectively doubles the TFP estimates.³³

On that basis, CEPA should only have considered its GO TFP results when recommending OE reference points to Ofgem. A balanced reading of the GO TFP evidence would be to take the average of the range of estimates (0.4 to 0.6 per cent using the 1995-2016 sample), which is equal to c. 0.5 per cent and CEPA's lowest recommended reference point. This result is

³³ We estimate the impact of using VA TFP by comparing the relative size of the TFP growth in CEPA's results for VA and GO.

aligned with the recommended range from the EU KLEMS analysis in our first report of 0.3 per cent to 0.8 per cent.³⁴

We also note that CEPA's focus on VA TFP contradicts its recommendations in past regulatory decisions. Both in its past work for the Civil Aviation Authority (CAA) and the Office for Rail and Road (ORR), CEPA recommends GO over VA.³⁵ In these reports, CEPA favours GO due to:

- “*[G]ross output TFP is more appropriate than value-added TFP for comparisons to a specific company’s productivity improvements as it better reflects how a company is managed and records its inputs and outputs*”,³⁶
- “*While we present both measures [VA and GO TFP] we consider that the gross output measure is more appropriate as it better reflects the business decisions made by the companies.*”³⁷

As this justification also apply to setting the OE challenge for DNOs at RIIO-ED2, it is unclear why CEPA has adopted diametrically opposite conclusions on the usefulness of VA measures in its recommendations for RIIO-ED2.

3.2. CEPA’s Selection of the Full 2019 EU KLEMS Sample Increases the Result Relative to and is Inconsistent with its Previous Work

As explained in Section 2.1.1, CEPA estimates TFP growth for the full time-period of the 2019 EU KLEMS dataset (1995 to 2016), resulting in a from 0.4 to 1.2 per cent. CEPA also estimated TFP growth using four definitions of business cycles to set the time period for analysis, which gave range of 0.2 to 1 per cent.³⁸

In its recommendations, CEPA argues that the results from the full sample should be given most weight. Specifically, CEPA argues that using the full sample “*will help to reduce the dependency of our analysis on a particular technical business cycle definition*”.³⁹ Practice varies with regards to selection of the time period for growth accounting analysis. However, we note that by selecting the entire period rather than business cycles CEPA is making yet another methodological choice that increases the TFP estimate and consequently the OE challenge.

The selection of full sample as the time-period of estimation is another departure from CEPA’s approach at RIIO-GD2/T2. At RIIO-GD2/T2, CEPA selected the time-period 1997 to 2016 because it “*captures two complete business cycles, which is the maximum contained in the 2019 EU KLEMS data set*”, and that the length of the time period reduces sensitivity to

³⁴ NERA (30 April 2021), Ongoing Efficiency Improvement at RIIO-ED2, p.40, Table 3.3.

³⁵ CEPA (April 2013), Scope for Efficiency Gains at Heathrow, Gatwick and Stansted Airports, p. 46.

CEPA (June 2013), Scope for Improvement in the Efficiency of Network Rail’s Expenditure on Support and Operations: Supplementary Analysis of Productivity and Unit Cost Change, p. 29.

³⁶ CEPA (June 2013), Scope for Improvement in the Efficiency of Network Rail’s Expenditure on Support and Operations: Supplementary Analysis of Productivity and Unit Cost Change, p. 29.

³⁷ CEPA (April 2013), Scope for Efficiency Gains at Heathrow, Gatwick and Stansted Airports, p. 46.

³⁸ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, Table 2.3.

³⁹ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 36.

measurement error.⁴⁰ CEPA does not explain why it has decided to refine its approach, which was recently adopted by Ofgem and not deemed erroneous by the CMA. Indeed, CEPA does not explain whether it now disowns all of its historical and recent work which relies on selecting complete business cycles or advance any explanation of the change in its practice. The arguments on which CEPA relies now to justify the use of the full sample of years

The impact of this unexplained inconsistency in CEPA's regulatory recommendations, i.e., the sudden inclusion of 1995 and 1996 in the sample, results in higher TFP estimates. In Table 3.1 below, we show a replication of CEPA's results using the two time periods: 1997 to 2016, which was the time-period used at RIIO-GD2/T2, and 1995 to 2016, which is the time-period CEPA selects for ED2. As the results show, the inclusion of 1995 and 1996 increases both the VA and GO TFP for the Narrow and Expanded comparator sets by c. 0.2 to 0.3 and c. 0.03 to 0.1 percentage points respectively.

Table 3.1: Comparison of TFP Estimates using CEPA's RIIO-GD2/T2 and RIIO-ED2 Time-periods

TFP Measure	VA TFP		GO-TFP	
	ED2	GD2/T2	ED2	GD2/T2
Time-Period	1995-2016	1997-2016	1995-2016	1997-2016
Narrow Comparator Set	0.8%	0.5%	0.4%	0.2%
Expanded Comparator Set	1.2%	1.1%	0.6%	0.6%
Economy-Wide	0.8%	0.9%	0.4%	0.4%

Source: NERA Analysis of EU KLEMS data.

3.3. CEPA's Inclusion of 'Information and Communication' in the comparator set biases the TFP estimates upwards

As described in Section 2.1.3, CEPA estimates TFP growth for three comparator sets:

- A **Narrow set** of comparable sectors, which includes the same sample of sectors used at RIIO-GD2/T2.
- An **Expanded set**, which includes the sectors in the Narrow Set, as well as 'Professional, Scientific, Technical, Administrative and Support Service Activities', and 'Information and Communication' (henceforth referred to as ICT); and

⁴⁰ CEPA (27 November 2020) RIIO-GD2 and T2: Cost Assessment – Advice on Frontier Shift policy for Final Determinations, p.17.

- An **Economy-wide sample**, which includes historical productivity growth for all sectors (with certain exceptions),⁴¹ weighted by the contribution of the sectors to GDP.

In this section, we explain why CEPA's Expanded comparator set does not provide an appropriate benchmark for the RIIO-ED2 OE challenge. Specifically, we focus on the inclusion of the ICT sector.

CEPA motivates its Narrow comparator set by referring to its use in the RIIO-GD2/T2 price control. At RIIO-GD2/T2, CEPA stated that these sectors "represent a reasonable proxy" for the activity carried out by network companies.⁴² We agree with relevance of this comparator set and included the same set in the growth accounting analysis in our first report.

CEPA motivates the inclusion of 'Professional, Scientific, Technical, Administrative and Support Service Activities' and ICT in its Expanded set as follows:

- CEPA includes 'Professional, Scientific, Technical, Administrative and Support Service Activities' as it includes technical and administrative activities, which DNOs routinely undertake. Moreover, CEPA refers to Europe Economics (Ofwat's advisors at PR19) use of this comparator sector in the water sector.⁴³
- CEPA includes the ICT sector to better reflect "potential for increased innovation and productivity growth due to the digital transformation of the electricity distribution sector".⁴⁴

It is unclear why CEPA believes these sectors to be relevant for the electricity distribution sector, but did not believe they were relevant at GD2/T2 – especially as it relates to the electricity transmission sector. The same arguments CEPA uses to include these sectors for electricity distribution would presumably apply to electricity transmission as well.

The inclusion of ICT, in particular, drives up the TFP measures CEPA produces. In fact, the top-end of CEPA's range, 1.2 per cent, which matches its highest reference point, is produced using the Expanded comparator set. To illustrate how ICT biases CEPA's results upwards, we have estimated VA and GO TFP by comparator sector, as well as the economy wide set.

As shown in Table 3.2 below, ICT is clearly an outlier in TFP growth compared the sectors considered, with c. 2 and 1.2 percentage points higher than for the economy wide sample for VA and GO TFP respectively. The high growth in ICT can be explained by the fact that it includes telecoms, which experienced rapid growth in the late 1990s and early 2000s (see Figure 3.2). It is unreasonable to expect that this growth rate is representative of what

⁴¹ The sample excludes the following sectors: Real Estate, Renting and Business Activities (K), Public Admin and Defence, Compulsory Social Security (L), Education (M); Health and Social Work (N), Other Community, Social and Personal Services (O), Private Households with Employed Persons (P) and Extra-Territorial Organisations (Q)).

⁴² CEPA (27 November 2020), RIIO-GD2 and T2: Cost Assessment – Advice on Frontier Shift policy for Final Determinations, p.28.

⁴³ CEPA (27 November 2020), RIIO-GD2 and T2: Cost Assessment – Advice on Frontier Shift policy for Final Determinations, p. 16.

⁴⁴ CEPA (27 November 2020), RIIO-GD2 and T2: Cost Assessment – Advice on Frontier Shift policy for Final Determinations, p. 16.

electricity distribution networks can achieve in RIIO-ED2, and as such it is not an appropriate benchmark industry to include in the comparator set.

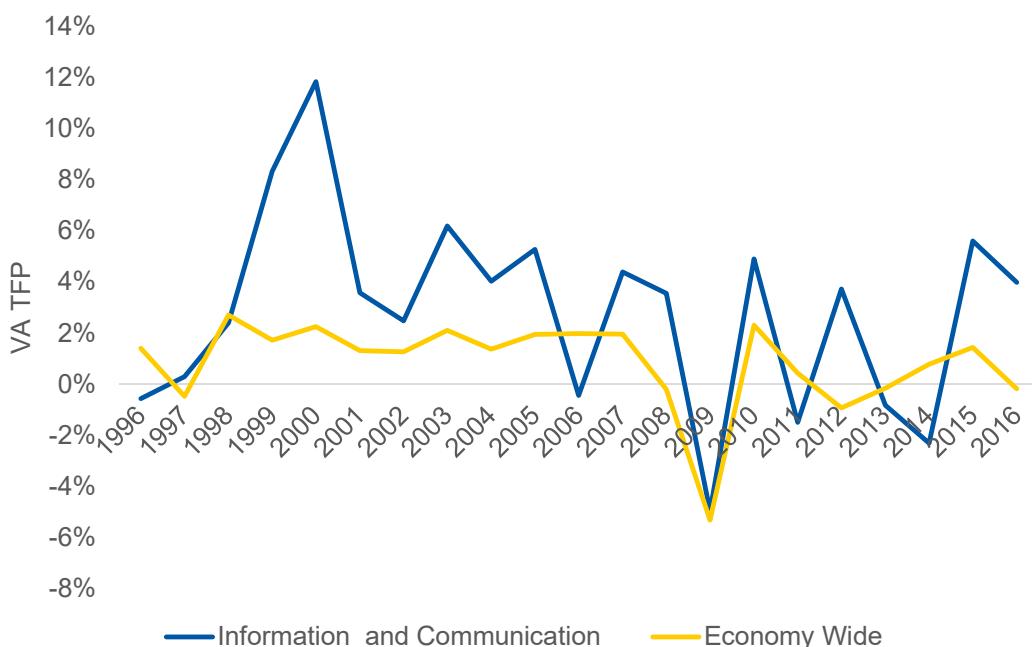
As with the decision to focus on VA TFP, the expansion of the comparator set to include ICT is a methodological choice which biases CEPA's TFP estimates upwards.

Table 3.2: TFP Estimates by Comparator Sector

Sector	VA TFP	GO TFP
Construction	0.48%	0.20%
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.64%	0.35%
Transportation & storage	0.43%	0.20%
Financial and insurance activities	1.57%	0.71%
Information and Communication (ICT)	2.79%	1.59%
Professional, scientific, technical, administrative and support service activities	1.30%	0.76%
All Industries, excl real estate, public admin, education, health and social services	0.83%	0.39%

Source: NERA Analysis of EU KLEMS data.

Figure 3.2: The TFP growth in the ICT sector was on average 3 percentage points higher than in the wider economy between 1996 and 2000



Source: NERA Analysis of EU KLEMS data.

3.4. CEPA's Methodological Choices Consistently Bias the Result Upwards and Is Inconsistent with Its RIIO-GD2/T2 Approach

Whilst Ofgem and CEPA do not necessarily need to adhere to regulatory precedent if the available evidence points to a different conclusion, the inconsistency between CEPA's

recommendations at the ED2 DD and its recent recommendations at RIIO-GD2/T2 is stark. At RIIO-GD2/T2, CEPA conducted the similar analysis of the 2019 EU KLEMS productivity data and recommended stretching, base OE challenge of c. 1%.⁴⁵ The CEPA study was published in late 2020, and CEPA defended it in the CMA appeal in 2021. For the RIIO-ED2 DD, CEPA finds TFP growth as high as 1.2 per cent from its analysis of the same EU KLEMS dataset it used at RIIO-GD2/T2, increasing its stretching recommendation to Ofgem by 20 per cent, and to one supported by a single point estimate out of 48 presented. We find this change in conclusion inconsistent as CEPA's evidence base has not changed and CEPA has not advanced arguments that would justify interpreting the evidence differently.

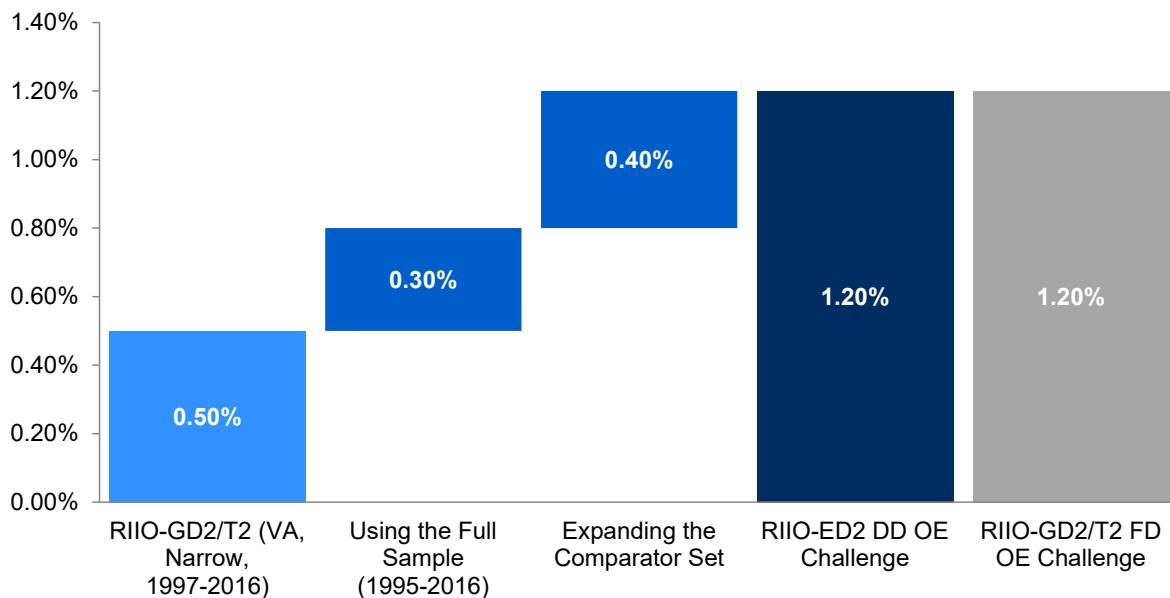
CEPA arrives at the higher TFP estimates by making two changes in its growth accounting methodology compared to RIIO-GD2/T2:

- **CEPA extends the time period of its analysis:** CEPA's revised the time-period for its analysis from 1997 to 2016, to 1995 to 2016. CEPA does not justify this change in its report, and selects the full sample in its analysis for both GD2/T2 and ED2. This change increases the TFP estimates, as growth was higher for the comparator sectors between 95/96 compared to the rest of the sample period.
- **CEPA considers an “Expanded comparator set”:** in addition to the comparator set considered at RIIO-GD2/T2, CEPA adds a second set of comparable industries (the Expanded set). The Expanded set includes ‘Professional, scientific, technical, administrative and support service activities’ and ICT, which have substantially higher TFP growth in the sample period than the other comparators and the economy as a whole (see Section 3.3). CEPA does not explain why these sectors are relevant for electricity distribution, but were not relevant for the electricity transmission sector at T2. As set out in Section 3.3, ICT in particular (and most especially the growth in productivity in the ICT sector in the late 1990s and early 2000s) is not likely to be a relevant comparator for electricity distribution companies over RIIO ED2.

Figure 3.3 shows how CEPA's revision of its RIIO-GD2/T2 methodology more than doubles its VA TFP growth estimate for relevant comparator sectors (from 0.5 per cent to 1.2 per cent). We note that the sum of these changes enables CEPA to match the RIIO-GD2/T2 OE challenge (of 1.2 per cent including an innovation uplift), which was subsequently revised to down to c. 1 per cent following the CMA appeal.

⁴⁵ Specifically, CEPA recommended 0.95% OE challenge for Capex and Repex, and a 1.05% challenge for Opex. CEPA's TFP estimates ranged from 0.2% to 0.9%. Source: CEPA (27 November 2020), RIIO-GD2 and T2: Cost Assessment – Advice on Frontier Shift Policy for Final Determinations p. 6-7.

Figure 3.3: CEPA's revised methodology increases the VA estimate for relevant comparator sectors by 0.7 percentage points



Source: NERA Analysis of EU KLEMS data, CEPA,⁴⁶ and Ofgem.⁴⁷

CEPA does not provide any substantive evidence to justify the two changes in approach described above. The combined impact of these changes enables CEPA to include an estimate of 1.2 per cent TFP estimate based on the VA measure of productivity growth within its range. CEPA then advocates this estimate at the very extreme of its widened sample as a suitable “stretching” target at RIIO ED2,⁴⁸ which target Ofgem ultimately adopts for RIIO ED2.

⁴⁶ CEPA (27 November 2020), RIIO-GD2 and T2: Cost Assessment – Advice on Frontier Shift policy for Final Determinations, Table 1.

⁴⁷ Ofgem (3 February 2021), RIIO-2 Final Determinations – Core Document (revised), para. 5.20.

⁴⁸ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.40.

4. CEPA's Qualitative Arguments are Insufficient to Motivate an OE Target at the Top-end of its Range of Recommendations

CEPA considers a range of qualitative factors in interpreting the EU KLEMS results and making its recommendations to Ofgem, and on which Ofgem relies to justify the selection of the single highest point estimate in CEPA's range.⁴⁹

We identify three key errors in CEPA's evaluation of qualitative factors:

- **Unbalanced assessment:** CEPA consistently accepts qualitative factors that increases the OE target and rejects qualitative factors that indicate that a lower OE challenge is appropriate. This leads to an unbalanced assessment of both the qualitative and the quantitative evidence.
- **Inconsistent use of criteria:** CEPA relies on the same arguments to recommend that Ofgem considers certain qualitative factors and discourage Ofgem from considering others. Specifically, CEPA uses uncertainty and difficulty of quantifying the impact of factors as reasons to both accept and reject factors.
- **Unsubstantiated claims for upward adjustment:** CEPA argues that both the RIIO-ED2 context and embodied technical change are qualitative factors that motivate selecting an OE challenge of 1.2 per cent. CEPA does not substantiate why this is the case, and in fact the impact of these factors is ambiguous.

The remainder of this Chapter proceeds as follows:

- Section 4.1 explains why CEPA the RIIO-ED2 context and DNOs' innovation funding cannot motivate picking the highest EU KLEMS estimate of 1.2 per cent, highlighting the uncertainty and limited nature of these factors;
- Section 4.2 sets out why embodied technical change is unlikely to materially impact productivity estimates and the uncertainty surrounding the sign of the factor;
- Section 4.3 sets out why CEPA is wrong to assume that the "productivity puzzle" does not impact DNOs, and highlights the inconsistency in CEPA's criteria for qualitative factors;
- Section 4.4 compares CEPA's recommendation to OE challenges from regulatory precedent and evidence provided DNOs to show the unreasonableness of CEPA's recommendations and Ofgem's DD;
- Section 4.5 reviews CEPA's recommendation to not consider macroeconomic events (e.g., Covid-19, Brexit, the invasion of Ukraine and the disruptions from the cost-of-living crisis) in setting the OE challenge.
- Section 4.6 reviews CEPA's recommendation to ignore the evidence provided by the ENA and Energy Policy Research Group (EPRG) on historical productivity growth in the

⁴⁹ Ofgem (29 June 2022), RIIO-ED2 Draft Determinations - Core Methodology Document, p. 365.

electricity distribution sector, highlighting the inconsistency of these conclusions with CEPA's conclusions elsewhere.

- Section 4.7 concludes.

4.1. CEPA Does Not Justify Why the RIIO-ED2 Context and DNOs' Innovation Funding Supports a 1.2 per cent OE Challenge

CEPA considers the RIIO-ED2 context, and the innovation funding companies have received in the past as arguments for a higher OE target (and inclusion of ICT in the comparator set). In this section, we explain why these factors cannot motivate picking the highest EU KLEMS estimate of 1.2 per cent, highlighting the uncertainty and limited nature of these factors.

4.1.1. CEPA is wrong to conclude that the RIIO-ED2 context motivates selecting its highest EU KLEMS estimate

CEPA states that Ofgem and the DNOs have a clear ambition “*to deliver transformational change in the electricity distribution sector over the RIIO-ED2 period to enable the network companies to respond to Net Zero*”.⁵⁰ CEPA points to the step change in allowances to enable this transformational change, and asserts that “*it is likely that there are benefits which the network companies have not yet been able to factor into their submitted costs for RIIO-ED2*”.⁵¹ Based on this CEPA concludes that these alleged benefits, which may or may not have been factored into DNO’s submitted costs, may provide additional opportunities for TFP growth at ED2 “*above and beyond what has been set in the past or what has been set in other regulated sectors*”.⁵²

From our review of CEPA’s report, we cannot find any evidence (quantitative or otherwise) which substantiates its assertion that DNOs at RIIO ED2 will be able to achieve that higher TFP growth due to this context. Nevertheless, CEPA provides a clear recommendation to Ofgem on this qualitative factor: “*This context should inform a forward-looking OE challenge*”.⁵³ In its DD, Ofgem refers to this qualitative factor in motivate setting the OE challenge at 1.2 per cent.⁵⁴

Whilst it is probable that the transition to Net Zero will require DNOs to change and evolve its practices, the impact on productivity growth of these changes at RIIO-ED2 is highly uncertain. In fact, it would not be unreasonable to assume that productivity growth could fall in the short term due to:

- The transition to Net Zero requiring DNOs to improve in outputs that are not measured/remunerated within the price control. As a result, it will not appear as productivity growth. For instance, in Australia DNOs experienced a sharp decline in

⁵⁰ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 36.

⁵¹ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 36.

⁵² CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 37.

⁵³ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 37.

⁵⁴ Ofgem (29 June 2022), RIIO-ED2 Draft Determinations - Core Methodology Document, p. 365.

productivity in following new requirements to increase standards to deal with bushfires, followed by an increase in productivity thereafter.⁵⁵

- It is not certain that the new practises/innovations that DNOs introduce will be successful, in particular over the RIIO-ED2 period. The transition will likely involve a degree of trial and error, as DNOs adjust to the new context. We do not know for certain that innovation/new practises will create productivity growth.

We therefore conclude that CEPA's assessment of the RIIO-ED2 (as a qualitative factor) is unbalanced, as it takes an overly optimistic view of productivity growth resulting from the transition to Net Zero.

Moreover, the RIIO-ED2 context is one example where CEPA does not let uncertainty around the impact to reject a qualitative factor. In other circumstances, CEPA rejects qualitative factors on uncertainty alone. It is not clear why it is no disqualifying in the case of the RIIO-ED2 context. We explain CEPA's use of "uncertainty" to dissuade Ofgem from considering other qualitative factors below (see sections 4.3 and 4.5).

4.1.2. CEPA does not provide any evidence to suggest innovation funding leads to productivity growth higher than in competitive sectors

CEPA argues that the innovation funding provided to DNOs in past price controls should lead drive productivity growth over time.⁵⁶ CEPA acknowledges that the CMA had concerns about Ofgem's quantification of the innovation uplift at RIIO-GD2/T2: "*We recognise that while the CMA agreed with the principle that past innovation funding may lead to additional cost savings in the future, a range of concerns were identified with Ofgem's approach to direct quantification of the impact on the OE challenge*".⁵⁷

However, despite the issues with quantifying the supposed impact of innovation funding on productivity over and above what is observed in competitive sectors in the economy, CEPA recommends that Ofgem considers the presence of innovation funding, as a qualitative factor that justifies an uplift to the OE assumption.⁵⁸

Innovation funding does not warrant a higher OE target, as the EU KLEMS analysis already accounts for the impact of R&D spending on productivity growth. One of the CMA's concerns at the RIIO-GD2/T2 appeal was precisely that Ofgem did not provide evidence that innovation funding led to productivity growth over and above what can be observed from competitive sectors. Specifically, the CMA concluded that Ofgem "*erred when it assumed*

⁵⁵ In its assessment of productivity growth in the electricity distribution sector in Australia, the Australian Energy Regulator (AER) found large reductions in observed productivity in the years 2006 to 2012. The reduction in productivity was driven by Distribution Network Service Providers (DNSPs) needing to react to new regulation for network planning and expansion (in part to mitigate bushfires). As the AER could not measure the outputs that corresponded to the increased level of cost, namely performance against higher regulatory standards, the DNSPs' productivity appeared to experience a negative step change between 2006 and 2012. Source: AER (March 2019), Final decision paper: Forecasting productivity growth for electricity distributors, Appendix B.

⁵⁶ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 23.

⁵⁷ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 37.

⁵⁸ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 37.

that the innovation uplift was entirely incremental”⁵⁹. As explained in our first report, the EU KLEMS analysis already includes productivity growth resulting from R&D spending in competitive sectors. There is no evidence to suggest that regulated sectors receiving innovation funding are consistently able to produce cost savings from innovation over and above the levels accounted for in the EU KLEMS analysis.

Nevertheless, CEPA uses innovation funding as an argument to recommend its highest TFP estimates, 1.2 per cent to Ofgem. CEPA notes that this recommendation is more closely aligned with productivity growth in “*closer to more dynamic competitive sectors*”, which we interpret as a recommendation to consider the results from the Expanded comparator set that includes ICT.⁶⁰ As explained in section 3.3, we conclude that ICT is an outlier in terms of TFP growth which should not be included in the comparator set. CEPA has not demonstrated why innovation funding suggests that DNOs should create productivity growth incremental to TFP growth indicated in 47 of CEPA’s 48 productivity estimates from the 2019 EU KLEMS dataset.

Finally, even though CEPA does not argue for a quantitative uplift to OE challenge to reflect benefits from innovation funding, using it as qualitative factor to stretch the OE target is still a clawback which will reduce DNOs incentives to apply for innovation funding not targeted towards (measured) efficiency gains.

4.1.3. Even if innovation funding was a relevant qualitative factor, its impact would likely be small

Ofgem raises questions regarding the consistency in treatment of productivity gains from innovation funding in DNOs BPs:

- “*Our analysis of the BPs suggests that the basis on which the DNOs claim to have embedded cost efficiencies from previous innovation funding is inconsistent. Based on the DNOs' submissions, we have been unable to quantify the extent to which any such efficiencies are already captured to some degree in the comparative benchmarking.”*⁶¹

Productivity growth resulting from past innovation funding can be separated into three categories, where only one warrants consideration for setting the OE challenge for RIIO-ED2:

1. **Productivity growth which has already materialised:** In principle, benefits from historical (sunk) innovation funding may either have materialised already in predictable efficiencies over RIIO ED2, may materialise over the course of RIIO ED2 or materialise thereafter. Those benefits from innovation funding in the first category, i.e. which have already materialised, will be accounted for in the comparative benchmarking analysis. If past innovation funding resulted in a permanent improvement in productivity, it will be baked into companies’ baseline cost forecasts. There is no need to adjust the OE

⁵⁹ CMA (2021), Energy Licence Modification Appeals 2021 – Final determination Volume 2B: Joined Grounds B, C and D, para 7.552.

⁶⁰ CEPA describes its inclusion of ICT as an “*industry to ensure that the overall comparator set better reflects the potential for increased innovation and productivity growth due to the digital transformation of the electricity distribution sector which the network companies expect to deliver during ED-2.*” Source: CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 16, 40.

⁶¹ Ofgem (29 June 2022), RIIO-ED2 Draft Determinations - Core Methodology Document, p. 368.

challenge to account for benefits in this first category as they will be accounted for in the catch-up efficiencies resulting from the comparative benchmarking.

2. **Unrealised productivity growth which will materialise in RIIO-ED3 and beyond:** innovation funding may return unrealised benefits in beyond RIIO-ED2. These benefits are not relevant for setting the OE challenge nor for the comparative benchmarking at RIIO-ED2, and can therefore be ignored.
3. **Unrealised productivity growth which will materialise in RIIO-ED2:** Finally, there may be unrealised productivity gains which materialise in the RIIO-ED2 period.

Only the third category of productivity gains from innovation funding is relevant to Ofgem's assessment of the RIIO-ED2 OE challenge. These benefits, which materialise over RIIO ED2, should arguably feature in companies' OE assumptions. However, if the treatment of innovation funding in DNOs' BPs justifies an uplift to the OE assumption, the following conditions must be met:

- Innovation funding will return unrealised benefits in the future over and above the productivity gains from innovation observed in competitive sectors of the economy **materialising in RIIO-ED2.**
- This benefit has not been captured in companies' OE assumptions (i.e., the true OE achievable for DNOs is higher than the stated assumptions).

We understand from the DNOs that their OE assumptions capture all expected OE for the RIIO-ED2 period, which was a requirement set out in the ED2 BPDT RIGs. However, even if this was not the case, the share of benefits (materialising exclusively in the RIIO-ED2 period) is likely a small share of total benefits from innovation funding, and therefore do not provide sufficient basis for aiming up to the top of CEPA's TFP estimates.

CEPA also quotes the CMA's conclusion that "*Ofgem had erred in relying on the assumption that all innovation funding received by the network companies could result in cost reduction*".⁶² Specifically, the RIIO-GD2/T2 appeal revealed that only a minority of innovation funding was directly targeted as cost reduction. CEPA cites that DNOs claimed this also applies to the innovation funding in the electricity distribution sector: "*[p]revious innovation funding was not targeted towards efficiency gains and thus would not necessarily result in greater efficiency in RIIO-ED2*".⁶³ Therefore, the scale of productivity growth in RIIO-ED2, which arose due to past innovation funding is likely to be even smaller.

Considering that the share of benefits from innovation funding materialising in RIIO-ED2 will likely be small, that DNOs' business plan assumptions reflect all or at least the majority of these benefits, and that innovation funding was not specifically targeted at cost reduction, this qualitative factor should only be given limited weight in the assessment of the EU KLEMS analysis.

⁶² CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 24.

⁶³ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 23.

4.2. CEPA Does Not Provide Evidence of the Sign and Scale of the Embodied Technical Change Factor

In this Section, we set out why embodied technical change is unlikely to materially impact productivity estimates and the uncertainty surrounding the sign of the factor

As explained in our first report, technological change can either take the form of:

- **Embodied technical change**, or input quality change: productivity gains from employing new inputs over and above the gains obtainable from a comparable amount of pre-existing inputs; or
- **Disembodied technical change**: improvements in the process by which firms use inputs of any given quality to produce outputs.

CEPA argues that “*productivity measured [sic.] developed using EU KLEMS data only may underestimate the total potential for cost savings that can be achieved when quality improvements embedded within factor inputs are considered*”.⁶⁴ On that basis, CEPA recommends that Ofgem considers increasing the OE assumption from the levels implied by its quantitative evidence to account for the potential for both embodied and disembodied technical change when reviewing CEPA’s EU KLEMS analysis.

Whilst CEPA’s review of the evidence is an arguable position, it represents yet another example where CEPA has dismissed inconvenient evidence that would result in a lower OE assumption without engaging with the arguments presented.

From a purely theoretical perspective, EU KLEMS and similar growth accounting frameworks seek to control for the quality of inputs used when estimating productivity growth. If they could do so perfectly, estimates of TFP growth derived from EU KLEMS data would identify that the tendency to use higher-quality inputs over time explains part of the growth in output and result in a commensurately lower estimate.

In practice, it is well documented that EU KLEMS and similar growth accounting frameworks systematically mismeasure and understate improvements in input quality.⁶⁵ As a result, the EU KLEMS data will likely include embodied technical change due to measurement error, and as a result any additional adjustment risks “double-counting”. Whilst CEPA refers to our arguments as to why it is inappropriate for Ofgem to make an additional adjustment for embodied technical change, it dismisses the argument by stating that “*it is not possible to conclude from their analysis that the evidence would support Ofgem placing significant weight on their concerns*”.⁶⁶ CEPA does not provide any reasoning for why it dismisses our argument, including references made to papers drafted by the academics responsible for the EU KLEMS data, out of hand.

CEPA acknowledges that our first report included a criticism of the PR19 quantification of the impact of embodied technical change on productivity growth, but does not engage with

⁶⁴ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 22.

⁶⁵ NERA (30 April 2021), Ongoing Efficiency Improvement at RIIO-ED2, Sections 2.4.2 and 3.2.2.

⁶⁶ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 22.

the argument.⁶⁷ This is presumably because CEPA does not put forward a quantitative factor itself. However, in the absence of quantitative assessment of what an appropriate adjustment for embodied technological change should be, CEPA cannot claim that (a) the factor is material enough for Ofgem to place significant weight on it in its assessment; and (b) that embodied technical change motivates a higher OE challenge (as compared to the EU KLEMS results). As we explain in our first report, the analysis Europe Economics conducted at PR19 could easily have led to a zero or negative adjustment for embodied technical change with slight variations in the underlying assumptions.⁶⁸ In the absence of reliable evidence, there cannot therefore be a presumption that there must be a positive adjustment.

In our first report, we point the lower results we obtain from our Tornquist index analysis than the EU KLEMS analysis.⁶⁹ If there were a discrepancy between these two results due to embodied technical change, one would expect the opposite. This raises further questions around the appropriate sign of this adjustment. CEPA does not refer to this argument in its report.

4.3. CEPA is Wrong to Assume DNOs are Not Affected by the “Productivity Puzzle”

In this section, we set out why CEPA is wrong to assume that the “productivity puzzle” does not impact DNOs, and highlights the inconsistency in CEPA’s criteria for qualitative factors

CEPA argues that the recent slowdown UK productivity growth (referred to as the “productivity puzzle”) does not warrant special consideration or adjustments when interpreting the quantitative evidence. CEPA argues that the underlying causes for the slowdown remains open for debate and that its potential causes such as weak recovery of business investment should not have a major impact on DNOs with regulated revenue streams. Additionally, CEPA notes that its EU KLEMS analysis includes the post-GFC period.

Whilst there may be uncertainty surrounding the degree to which DNOs will be affected by the productivity slowdown at RIIO-ED2, there is no firm basis to exclude it as a qualitative factor: CEPA’s suggestion that it should not apply to regulated networks is pure supposition. Indeed, the existence of a productivity puzzle and its substantial quantum is much more heavily documented and evidenced than other qualitative factors which CEPA argues should be considered as a factor which motivates a higher OE challenge (such as CEPA’s position on the RIIO-ED2 context). However, this does not stop CEPA from recommending it as qualitative factor in respect of those much more weakly-evidenced qualitative factors. CEPA’s analysis of the slowdown in productivity is a further example of how CEPA’s assessment is unbalanced.

It is unreasonable to expect regulated networks to systematically outperform the wider economy as well as specifically the benchmark sectors CEPA has selected as most representative of DNOs, absent evidence to the contrary. CEPA has not presented any

⁶⁷ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 22.

⁶⁸ NERA (30 April 2021), Ongoing Efficiency Improvement at RIIO-ED2, p. 73.

⁶⁹ NERA (30 April 2021), Ongoing Efficiency Improvement at RIIO-ED2, p. 73.

evidence that the DNOs can outperform the rest of the economy in a persistent productivity slowdown, while keeping up in periods of higher productivity growth.

4.4. Neither Regulatory Precedent nor DNOs' BP Proposals Can Justify an OE Challenge of 1.2 Per Cent

Two of the qualitative factors CEPA considers when interpreting its quantitative results are from (1) regulatory precedent, and (2) DNOs' business plan and expert opinion. In this section we compare CEPA's recommendation to OE challenges from regulatory precedent and evidence provided DNOs to show the unreasonableness of CEPA's recommendations and Ofgem's draft determination

In Figure 4.1, we display the range of quantitative evidence in CEPA's report. As discussed in Section 2.3, CEPA recommends three reference points for Ofgem to consider in setting the OE challenge. Ofgem selects the OE challenge at the very top of this range (1.2 per cent), as illustrated by the red line in the figure.

As this below comparison shows, CEPA's recommendations, and Ofgem's selected OE challenge is an outlier compared the quantitative evidence available. From all the sources considered, which have relevance for the ED2 decision, the TFP estimates do not exceed 1 per cent (or CEPA's second highest reference point).

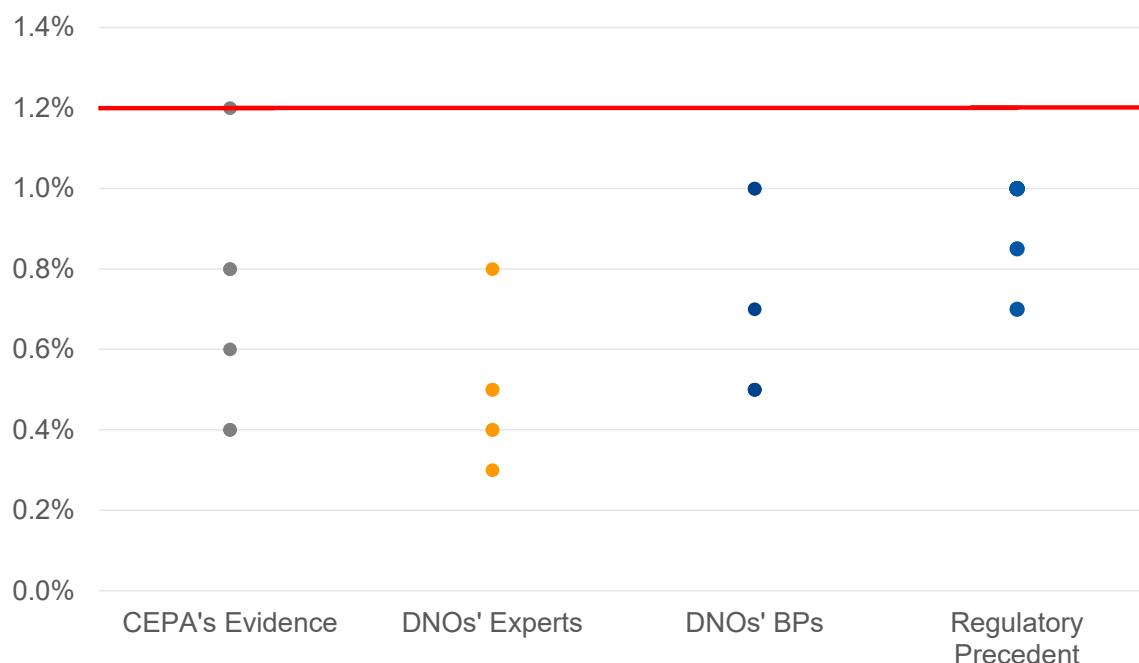
Even if one were to accept CEPA's quantitative analysis at face value, which we do not, selecting an OE target of 1.2 per cent is clearly an unbalanced reading of the evidence.

Relying on regulatory precedent risks repeating past errors and in principle, in the face of new evidence it may be reasonable to depart from previous decisions. However, CEPA and Ofgem's OE assumption of 1.2 per cent is unreasonable because:

- CEPA has not identified new evidence on prior reviews, merely reinterpreted the same evidence in order to select a higher number; and
- CEPA and Ofgem rely on regulatory precedent to support much of their argument (e.g., for justifying the consideration of embodied technical change) but discard regulatory precedent when it leads to lower numbers.

It is clear from Figure 4.1. that the 1.2 per cent OE challenge an outlier compared to all other estimates, including CEPA's other EU KLEMS analysis.

Figure 4.1: Ofgem set the ED2 at the very top of the range of quantitative evidence available



Source: NERA Analysis.⁷⁰

4.5. CEPA is Incorrect to Not Recommend Brexit and Covid-19 as (Negative) Qualitative Factors for Ofgem to Consider

In section we review CEPA’s recommendation to not consider macroeconomic events (e.g., Covid-19, Brexit, the invasion of Ukraine and the disruptions from the cost-of-living crisis) in setting the OE challenge

4.5.1. Brexit

CEPA acknowledges that Brexit could impact DNOs’ productivity at RIIO-ED2 through a number of channels. Specifically, CEPA cites the OBR’s estimate that the “*Trade and*

⁷⁰ ‘CEPA’s Evidence’ includes the TFP estimates for the 1995-2016 time period, as CEPA places primary emphasis on these results. Source: CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, Table 17 and p. 36.

‘DNO’s Experts’ includes the range of EU KLEMS TFP growth estimates showed in our first report for the ENA, as well as Oxera’s recommended estimate of 0.4% for SSEN. Source CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.63.; NERA (30 April 2021), Ongoing Efficiency Improvement at RIIO-ED2, p.40, Table 3.3.

‘DNO’s BPs’ includes the OE assumptions stated in the DNO’s Business Plans. Source CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 20.

‘Regulatory Precedent’ includes the OE challenges summarised in CEPA’s report with the exception of the PR19 and RIIO-GD2/T2 OE targets at Final Determination, which were subsequently rejected by the CMA, nor the RIIO-ED1 as Ofgem’s Final Determination OE targets, as Ofgem accepted the assumptions in DNOs’ business plans rather than calculate a common OE requirement. CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 19, Table 3.1.

Cooperation Agreement (TCA) reached between the UK and the EU in 2021 will lead to a 4% reduction in UK productivity growth over the long-run".⁷¹

CEPA does not consider there to be “sufficient evidence” to support a Brexit adjustment to the OE challenge. We interpret this conclusion to mean CEPA does not advocate for a quantitative adjustment to account for the impact of Brexit, which we also do not argue for in our report. However, CEPA also drops Brexit as a possible qualitative factor. Aside from the difficulty of quantifying the impact of Brexit on DNOs, the only argument we can see in support for dropping it as a qualitative factor is that CEPA believes primary mechanism through which DNOs would be impacted, trade, is likely to have a limited impact.

Whilst trade is an important channel through which Brexit will impact UK productivity growth, it is not the only one. As explained in our first report Brexit will likely impact productivity growth electricity distribution through other channels that trade:⁷²

- DNOs may be affected by supply chain disruptions and trade barriers for any imported inputs, which require additional resources for international procurement and increased administrative costs;
- DNOs may have to divert management resources away from productive activities to preparing for and adapting to Brexit. A Bank of England Staff Working Paper found that the Brexit process has already reduced UK productivity by between 2 per cent and 5 per cent, much of the impact due to a diversion of management resources to Brexit planning.⁷³; and
- Brexit may slow diffusion of innovations over a longer time horizon, reducing opportunities for spill-over effects and learning from other industries. This could occur both through lower incentives and ability to innovate in other sectors,⁷⁴ and through reduced integration with the EU leading to slower spread of innovations from abroad.

Other than stating that DNOs are unlikely to be significantly impacted by the productivity loss caused by trade, following Brexit, CEPA does not engage with the above arguments.

As with CEPA’s assessment of the “Productivity Puzzle”, CEPA is inconsistent between the assessment of the impact of Brexit and qualitative factors motivating an uplift to the OE challenge (e.g., RIIO-ED2 context and Embodied Technical Change). If uncertainty around the impact on DNOs was a sufficient condition for rejecting a qualitative factor, CEPA would also have to reject the RIIO-ED2 context and embodied technical change as qualitative factors.

⁷¹ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p.26, or OBR (3 March 2021), Economic and Fiscal Outlook, p. 34.

⁷² NERA (30 April 2021), Ongoing Efficiency Improvement at RIIO-ED2, p. 59-60.

⁷³ Bloom et al. (August 2019), The Impact of Brexit on UK Firms, Bank of England Staff Working Paper No. 818, p. 2 and p. 17.

⁷⁴ Broadbent et al. (15 November 2020), “The Brexit Vote, Productivity Growth and Macroeconomic Adjustments in the United Kingdom”, pp. 31-32.

4.5.2. COVID-19

CEPA does expect DNOs to have experienced “*some supply chain disruption and issues with sub-contractor availability during the pandemic, as well as increased costs for the provision of PPE.*”⁷⁵

CEPA asserts that whatever additional costs the DNOs’ have faced it is expecting the impact to be marginal relative to totex, and that Covid-19 may impact other sectors more materially than the DNOs.⁷⁶ CEPA does not provide any evidence in support of these claims.

CEPA states that “[i]t is not immediately clear how the COVID-19 crisis will affect ongoing opportunities for innovation and efficiencies for network companies during the ED2 period”, and concludes “*that there is insufficient evidence to support making even a qualitative adjustment*” for the impact of Covid-19 on productivity growth.⁷⁷

As with Brexit and the “Productivity Puzzle”, CEPA is inconsistent in how it applies its criteria for accepting qualitative factors. It is not immediately clear what the impact of the Net Zero transition will have on the DNOs over and above the impact on the competitive sectors. However, CEPA recommends that Ofgem does not make a qualitative adjustment for Covid-19 on the basis of uncertainty, while in the case of Net Zero CEPA recommends a qualitative adjustment despite acknowledging uncertainty.

4.5.3. Russia’s invasion of Ukraine and the cost-of-living crisis

At the time of writing our first report, Covid-19 and Brexit were the major macroeconomic events impacting the OE challenge for RIIO-ED2. However, with Russia’s invasion of Ukraine in 2022, as well as disruptions the cost-of-living crisis (e.g., strike action), UK productivity growth is likely to be negatively impacted. CEPA mentions the invasion of Ukraine as a short-term macroeconomic factor which may reduce productivity in the UK economy, but as with Brexit and Covid, CEPA concludes that:

“In our view, the relevance of such factors to the potential for ongoing efficiency improvements in the electricity distribution sector over the ED2 period is limited, difficult to quantify, and likely to be outweighed by the stability of the price control framework and five-yearly control periods which provide the network companies with longer and more stable planning horizons than other, more competitive sectors of the economy, and enables them to drive continual innovation and efficiency improvements through their supply chains.”⁷⁸

As with the “productivity puzzle”, it is manifestly unreasonable to assume that DNOs are insulated from lower productivity growth in the wider economy (like the invasion of Russia and disruptions caused by the cost-of-living crisis).

⁷⁵ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 29.

⁷⁶ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 29.

⁷⁷ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 29.

⁷⁸ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 38.

4.6. CEPA's Assessment of Historical Productivity Growth of Companies is Unbalanced

CEPA's recommends that Ofgem exercises caution in interpreting the evidence provided by the NERA for the ENA, and the EPRG on historical productivity growth in the electricity distribution sector. CEPA bases this recommendation on three main conclusions:

- **CEPA considers that the OE challenge should be “primarily” based on productivity growth achieved in competitive sectors.**⁷⁹ Even with CEPA's stated objective of “primarily” relying on productivity growth estimates from competitive sectors, CEPA (and by extension Ofgem) are not precluded from considering the productivity growth the electricity distribution sector as a qualitative factor.
- **CEPA considers that setting the OE challenge based on historical productivity growth distorts incentives for DNOs to outperform cost targets.**⁸⁰ As noted in our first report, relying on individual Törnqvist model specifications or results from an individual or a small number of DNO(s) carries several risks, including distorting incentives for achieving productivity improvements.⁸¹ However, we have estimated a wide range of models for the industry as a whole, which reduces this risk. Moreover, we note this conclusion seems inconsistent with CEPA's evaluation of innovation funding as a qualitative factor. CEPA does not appear to consider the risk of distorted incentives for productivity improvement a sufficient condition for cautioning against a qualitative factor in the case of innovation funding.
- **CEPA's cautions Ofgem against relying on this evidence because it finds the results to be highly variable.** Specifically, CEPA states “*the evidence on historic productivity growth in the electricity distribution sector is highly variable and appears dependent on the assumptions and variables used*”.⁸² CEPA is wrong draw a direct comparison between the results from our study, and EPRG's as the studies are based on different methodologies. As **Figure 4.2** shows, our results have a materially lower range than the EPRG results, and even CEPA's main EU KLEMS analysis.

Overall, we find the CEPA's assessment of historical productivity growth to be another example of its unbalanced reading of the evidence. Our Törnqvist analysis suggests that an OE challenge towards the bottom of CEPA's EU KLEMS results would be appropriate. CEPA cautions Ofgem against relying on this evidence based on arguments that are insufficient, inconsistent with how CEPA has evaluated other factors or incorrect.

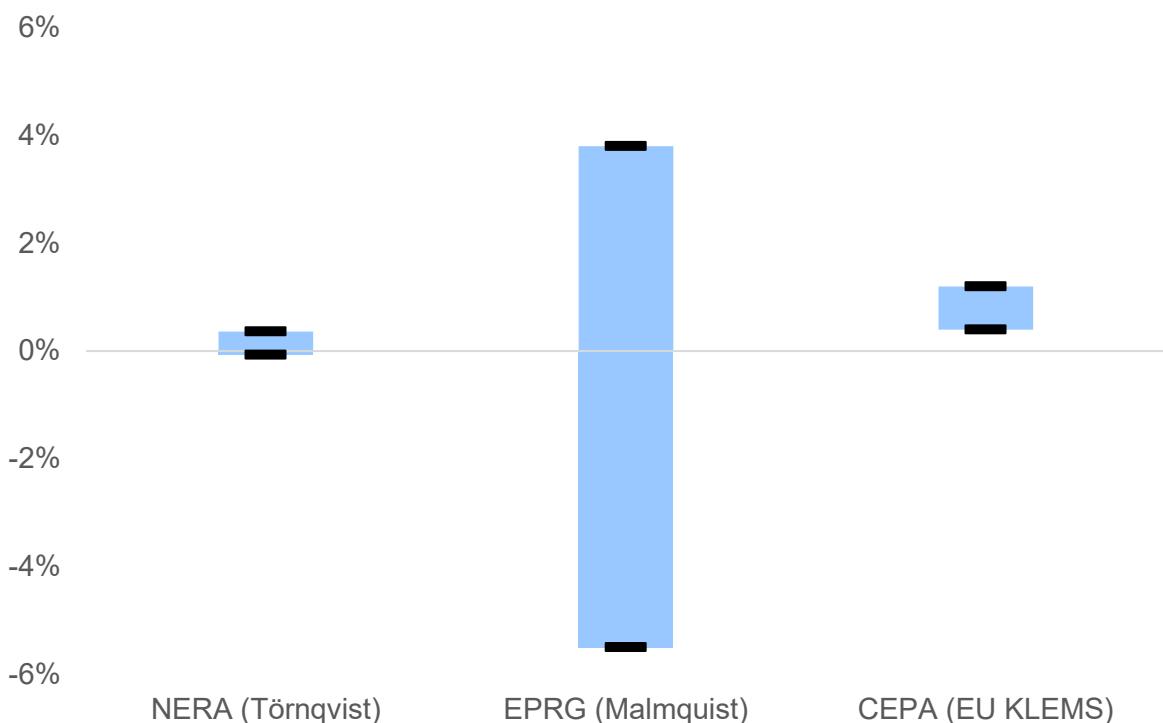
⁷⁹ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 39.

⁸⁰ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 39.

⁸¹ NERA (30 April 2021), Ongoing Efficiency Improvement at RIIO-ED2, p.47.

⁸² CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 39.

Figure 4.2: Our analysis of historical productivity growth by the DNOs has a smaller range than both EPRG and CEPA's quantitative analysis



Note: 'NERA (Törnqvist)' displays the range of TFP growth rates from our Törnqvist analysis of DNO productivity growth over the period 2010/11 to 2019/20; 'EPRG (Malmquist)' displays the range of estimates from the Malmquist analysis in Ajayi et al. (2021) of productivity growth in the electricity distribution sector between 1991/92 and 2018/19;⁸³ CEPA (EU KLEMS) displays the range of TFP estimates in CEPA's EU KLEMS analysis for the sample 1995-2016.⁸⁴

4.7. Conclusion

It is unclear what weight CEPA gives to its qualitative factors in making its ultimate recommendations or the precise implications of these factors for the level of likely productivity growth at RIIO-ED2. However, it is clear that CEPA's discussion of these qualitative discussion of these factors is one sided and taken in the round these factors do not support Ofgem's Draft Decision.

We identify three key errors in CEPA's assessment of qualitative factors: (1) the assessment is unbalanced; (2) the use of criteria is inconsistent; and (3) claims of need for upward adjustment is substantiated. As shown in Table 4.1, CEPA commits one of these errors in its assessment of each of the qualitative factors. At a high level, it appears that for CEPA, a qualitative factor must only be arguable to be taken into consideration if it suggests that OE is higher but must be "definitive" if it suggests OE is lower.

In addition to rectifying the quantitative assessment discussed in Chapter 3, we recommend that Ofgem and CEPA revises its qualitative assessment to ensure that the OE challenge for the RIIO-ED2 final determination represents a balanced reading of the available evidence.

⁸³ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, p. 34.

⁸⁴ CEPA (17 June 2022), RIIO-ED2: Cost Assessment – Frontier Shift methodology paper, Table 2.3.

Table 4.1: Ofgem and CEPA Disregard Qualitative Evidence that Points Toward a Lower OE Assumption

Qualitative Factor	Impact on OE - CEPA	Error in Assessment			CEPA
		Unbalanced Assessment	Inconsistent Use of Criteria	Unsubstantiated Impact	
RIIO ED2 Context	Aim Up	Yes	Yes	Yes	Includes
Embodied Technical Change	Aim Up			Yes	Includes
Post-GFC slowdown	Aim Down	Yes	Yes		Disregards
Recent Regulatory Precedent	Aim Down	Yes			Disregards
Business Plan Proposals	Aim Down	Yes			Disregards
Economy Wide Productivity (inc. Brexit, Covid)	Aim Down	Yes	Yes		Disregards
Historical DNO productivity	Aim Down	Yes	Yes		Disregards

Source: NERA Analysis

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