Review of Approach to Inflation and Input Prices taken by Network Rail

March 2023

Final Report

Europe Economics
5 Chancery Lane
London EC4A 1BL

Tel: (0) 20 3862 9252

www.europe-economics.com

Contents

Executive Summary

This is Europe Economics' review of the inflation and input price methodology that Network Rail intends to use for its next control period. ORR commissioned this work in late 2022 to gain an understanding of the company's views on the basis for any real price effects (RPEs). The next control period is Control Period 7 (CP7), which will run from April 2024 to March 2029.

The macroeconomic context

The review begins with an analysis of the current macroeconomic context. In particular, we identify important implications of the current high inflationary period, looking at outturn data and forecasts of overall price inflation and measures of wage inflation. This context has caused considerable uncertainty, and it complicates the task of identifying whether a difference exists between movements in input prices and general inflation (the "wedge").

Figure 0.1: Bank of England and OBR quarterly CPI inflation forecasts and the 2% target rate (%)
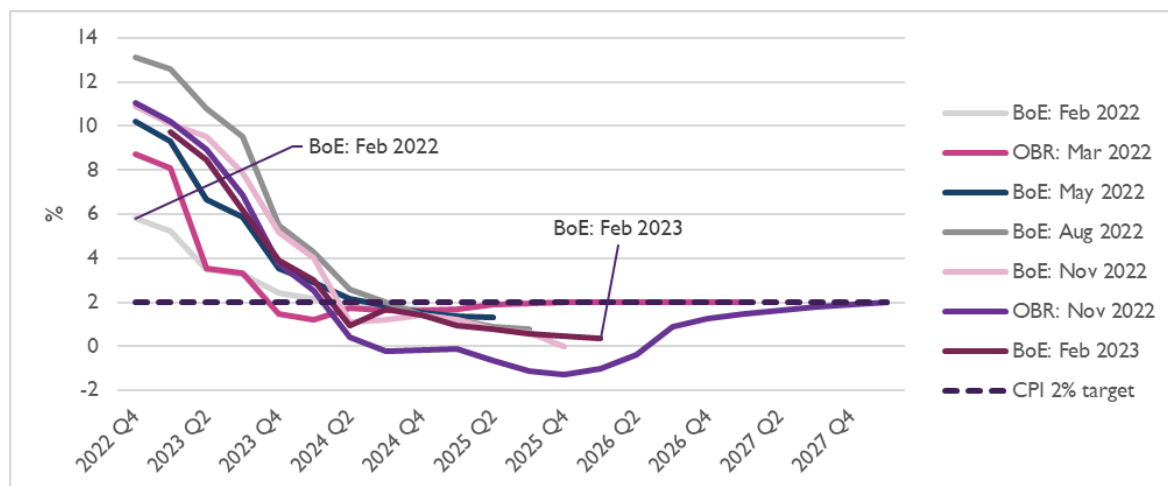
Source: Bank of England and OBR

Analysis of the approaches in other comparable sectors

The review then considers the approaches taken to identify RPEs in other comparable sectors. We review the approaches in the following sectors: energy in Great Britain; water in England and Wales; aviation – specifically Heathrow airport; telecommunications in the UK – specifically BT; and water in Northern Ireland.

For each sector, we systematically approached the following questions to gain a view of the overall approach and its relevance for Network Rail.

1) Is the approach applicable to the rail context?
2) Is the approach sufficiently up-to-date?
3) Do we consider the approach to be valid?
4) What is the geographical coverage of the sector?
5) What is the overall relevance of the approach?

We identified a number of key lessons from this analysis which informed the rest of our review. The most important of these are:

- There is merit in applying a materiality threshold/criterion to input price inflation analysis to ensure that the complexity of calculating suitable RPE adjustments is only undertaken when there is a material need to do so.
- Ofwat's approach provides a useful framework that has been endorsed by the CMA. With suitable adjustments, this framework can be used in the assessment of the approach taken by Network Rail.
- For historical data analysis, it is important to carefully consider the selection of the historical data period and to have awareness of potential structural breaks.
- The challenge of estimating input price inflation in the current macroeconomic environment has been acknowledged in other sectors conducting price reviews in 2022 (energy and aviation). However, the ability to use ex post indexation mechanisms in those sectors mitigates the problem of having highly uncertain forecasts, whereas ex post indexation is not feasible in the rail sector.

Assessment of Network Rail's approach

Next, the review focuses on the approach taken by Network Rail. We received the written summary and working spreadsheet containing its RPEs analysis, and proceeded to critique its methodology. We then sought to apply our RPEs framework to Network Rail.

Europe Economics' RPEs framework

We developed a framework to assess the case for RPEs in a robust and transparent manner. Given the informational advantages that Network Rail possesses, the framework was designed so that an RPE mechanism would only be recommended if there were a sufficient and convincing case for including such a mechanism.

Our analytical framework assesses whether there are any RPEs that are material, not already captured in CPI, and outside management control.[1] This is used to identify those cost categories for which there may be a case for providing an RPE allowance.

The criteria for our assessment are:

Criterion 1: Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the control period? We assess cost categories against this criterion by analysing whether the historical wedges between relevant input prices for that cost category and CPI are statistically significantly different from zero, as well as considering forecast data where available. If this criterion is passed then there may be a case for an RPE allowance if other criteria are also met.

Criterion 2: Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price? To assess cost items against this criterion, we compare the share of a cost item in expenditure with the share of the most comparable cost item(s) in the CPI basket. The logic is that if the share of a cost item in the company's cost base is similar to the share of that cost item in CPI, then CPI inflation should already capture any input price inflation for that cost category.

Criterion 3: Is the input price and exposure to that input price outside management control for the duration of the control period? This criterion asks whether the regulated company's management could make changes to mitigate the risk of RPEs for different cost items.

Further, we consider the materiality of cost categories in our RPEs assessment. Drawing on regulatory precedents, we consider that an RPE allowance should only be applied for cost categories accounting for between 5 and 10 per cent of costs if there is very strong evidence of a material wedge between input price

---

[1] This framework is an adaptation of the framework we applied to water companies' costs at PR19. See Europe Economics (2019), 'Real Price Effects and Frontier Shift – Final Assessment and Response to Company Representations' [online]

inflation for that cost category and CPI inflation, and should not be provided for cost categories accounting or less than 5 per cent of costs. This is the "**materiality test**".

A summary of the approach we took is illustrated below.

Figure 0.2: Illustration of our approach to this review
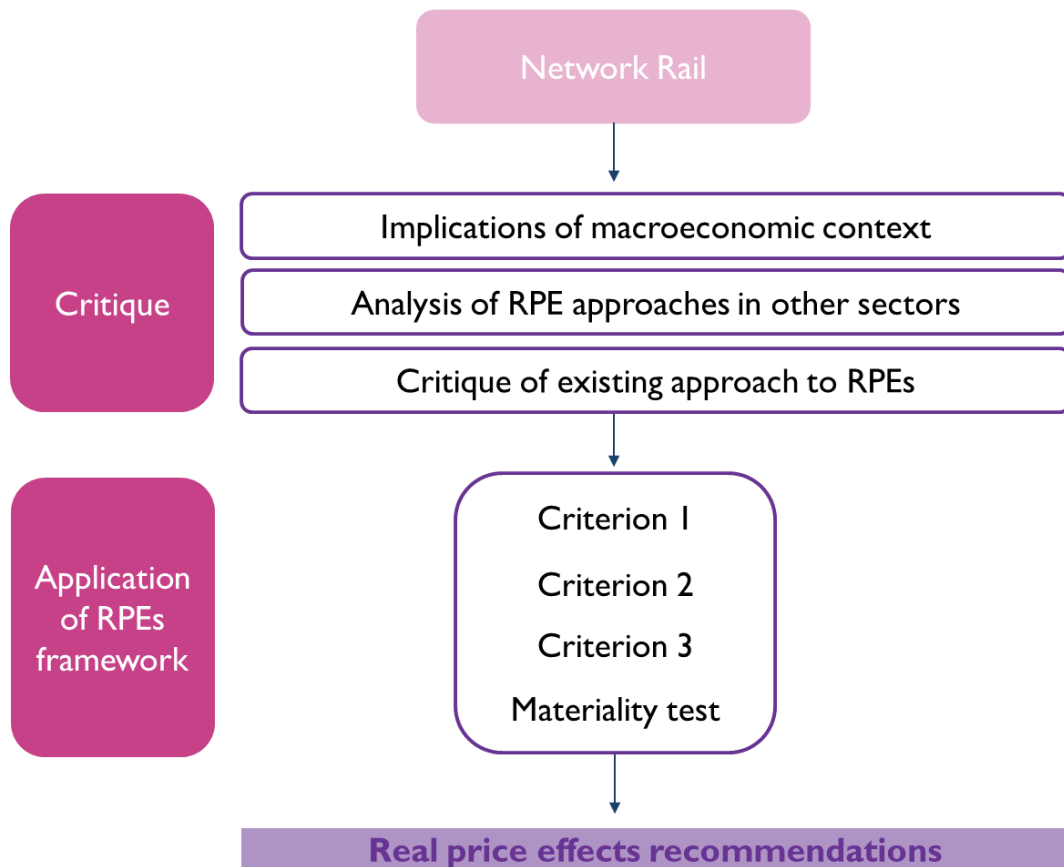
RPE recommendations for Network Rail

RPE recommendations for each cost category

Our recommended RPEs for each cost category are derived from our analysis carried out in criterion 1. The table below summarises the criterion 1 results for each Network Rail cost category.

Table 0.1: Wedges implied by criterion 1 analysis for Network Rail in CP7 (%)

	Opex		Renewals	
	If weight placed on OBR forecasts (for staff) and BCIS data (for materials and contractors)	If weight is not placed on these things	If weight placed on OBR forecasts (for staff) and BCIS data (for materials and contractors)	If weight is not placed on these things
Staff	Use March 2023 OBR forecast	0	Use March 2023 OBR forecast	0
Plant	0	0	0	0
Materials	0	0	1.35	0
Contractors*	0 (-0.5)	-0.5 (-1.0)	0.6	0
Electricity	Use latest central scenario of electricity price projections from BEIS (which we calculate to be –8.8 per cent per annum on average over CP7)			
Other	0	0	0	0

* Assuming electricity is 5% of opex; results assuming electricity is 10% of opex are shown in parentheses. We have assumed that there are no electricity costs in renewals. See text for description.
Europe Economics analysis.

Illustrative scenarios for overall RPE for opex and renewals

The proportion of each cost category within opex and renewals can then be used to form a view on Network Rail's overall RPEs for opex and renewals. This is done by weighting the cost category wedges presented in the table above by the share of opex and renewals that each category accounts for. The results are shown in the following two tables.

As we applied our criterion 1 analysis to electricity, but did not have data from Network Rail on the proportion of costs it represents, we present the overall RPEs under two illustrative scenarios. One scenario assumes that electricity represents 5 per cent of opex (deducted from "other" costs), and another assumes that electricity accounts for 10 per cent of opex. In both scenarios, electricity is assumed to be 0 per cent of renewals. For the purpose of these illustrative scenarios, we assumed an RPE for staff of 0.87 based on average real wage growth in the final two years of the latest Bank of England forecast. The final column in each table shows the overall Network Rail RPE calculated by weighting the RPEs for opex and renewals by the expected breakdown of Network Rail's expenditure in CP7.

Table 0.2: Weighted average RPEs for Network Rail in CP7 if electricity is 10% of cost base (%)

	Opex	Renewals	Overall
RPE if weight placed on OBR forecasts (for staff) and BCIS data (for materials and contractors)	-0.5	0.6	0.1
RPE if weight is not placed on these things	-1.0	0.0	-0.4

Europe Economics analysis.

Table 0.3: Weighted average RPEs for Network Rail in CP7 if electricity is 5% of cost base (%)

	Opex	Renewals	Overall
RPE if weight placed on OBR forecasts (for staff) and BCIS data (for materials and contractors)	0.0	0.6	0.3
RPE if weight is not placed on these things	-0.5	0.0	-0.2

Europe Economics analysis.

1 Introduction

This is Europe Economics' review of the inflation and input price methodology that Network Rail intends to use for its next control period. ORR commissioned this work in late 2022.

1.1 Background

ORR regulates Network Rail, the rail infrastructure manager. ORR is currently carrying out its periodic review 2023 (PR23) that will determine the funding and outputs required of Network Rail in the next control period (CP7, April 2024 to March 2029). Network Rail is in the process of preparing its delivery plans for CP7, in which it will set out what it proposes to deliver over the five years of CP7 and how much this will cost.

At the time of writing, Network Rail is nearing the final year of the current control period, CP6, and is preparing for the submission of its Strategic Business Plan (SBP) in February 2023. A core aspect of the periodic review process is for ORR to scrutinise Network Rail's plans to ensure it delivers what funders require in an efficient manner.

1.2 The role of this report

This report provides an independent analysis of the approach to inflation and input prices that Network Rail is taking for CP7.

1.3 Structure of this report

The report is structured as follows:

- Section 2 provides our views on the current macroeconomic context.
- Section 3 summarises key regulatory precedents in this area from other sectors.
- Section 4 provides our assessment of Network Rail's approach to inflation and input prices.
- Section 5 concludes.

A series of Appendices outlines our research on the regulatory precedents and other relevant areas.

2 The Current Macroeconomic Context

Current macroeconomic developments have implications for the appropriateness of Network Rail's inflation forecasting methodology. This chapter considers the drivers of current general price and wage inflation and how different organisations have forecasted that they will evolve. The information reported in this chapter covers the forecasts in the Bank of England's Monetary Policy Reports,[2] the Office for Budget and Responsibility's (OBR's) Economic and Fiscal Outlook[3] and HM Treasury's consolidated annual forecasts of the UK economy collected from independent forecasters.[4]

The chapter considers in turn general price inflation and wage inflation, and for each outlines the key drivers and uncertainties associated with forecasts.

2.1 General price inflation

2.1.1 Inflation forecasts

The past two years can be considered, by recent historical standards, a high inflationary period. This has caused rapid revisions in short- to medium- term general price inflation forecasts. The most recent forecast (Bank of England, February 2023) indicates that inflation expectations have since fallen. To illustrate this, Figure 2.1 shows the rapid changes in inflation projections that have occurred throughout 2022 and the beginning of 2023, as demonstrated by the Bank of England's and the OBR's evolving forecasts.

Figure 2.1: Bank of England and OBR quarterly CPI inflation forecasts and the 2% target rate (%)
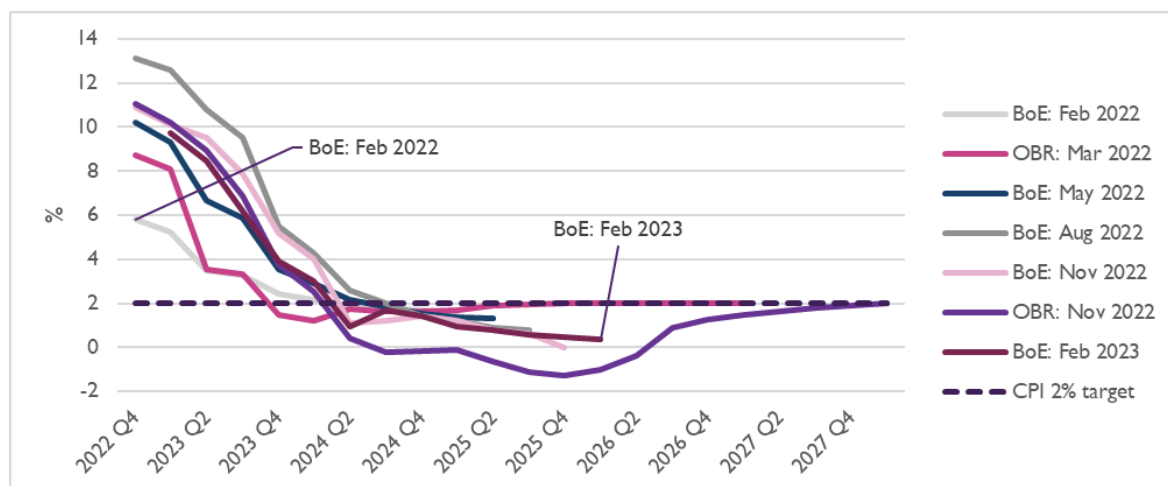
Source: Bank of England and OBR

---

2   The Bank of England releases a Monetary Policy Report every quarter. All reports released in 2022 and the latest in 2023 have been used. Feb 2022 [online]; May 2022 [online]; Aug 2022 [online]; Nov 2022 [online] and Feb 2023 [online].

3   The OBR releases An Economic & Fiscal Outlook report twice a year. Both reports released in 2022 have been used. March 2022 [online] and Nov 2022 [online].

4   HM Treasury releases a comparison of independent forecasts for the UK economy every month. Given that four of the monthly releases contain a medium-term projection of price levels, we use four selected reports in 2022. Feb 2022 [online]; May 2022 [online]; Aug 2022 [online] and Nov 2022. [online]

Table 2.1 and Table 2.2 summarise the annual inflation forecasts made by the Bank of England and the OBR.[5] Table 2.3 shows the average of independent forecasts compiled by the HM Treasury panel of forecasters. As we saw above, the Bank of England's expectation for annual inflation in 2022 nearly doubled, from 5.8 per cent as at its February forecast to 10.8 per cent as at the November forecast, incorporating a downwards revision from the 13 per cent expected in August. The OBR's forecast and the average of independent forecasts (as reported by HM Treasury) followed a similar pattern. In the months since, the Bank of England's inflation forecast for 2023 has fallen to 4 per cent. This is 1.2 and 1.5 per cent lower than expected inflation in Q3 and Q4 of 2022, respectively, and is closer to the OBR's March 2022 outlook.

Looking at the medium-term outlook, the Bank of England's and the OBR's forecasts are notable for their suggestion that general price inflation will fall below 2 per cent, the Bank of England's official target, in 2024 (1.5 and 0.6 per cent, respectively). The OBR forecasts imply a year of deflation in 2025 (-0.8 per cent) and that inflation will remain subdued until 2027. In contrast, the average of recent (i.e. November 2022) independent forecasts reported by HM Treasury implies that CPI inflation will be 3.2 per cent in 2024, with price growth remaining above the official target through to 2026 (the last year for which the forecasts are available).

Table 2.1: Bank of England's CPI inflation forecasts (latest in bold) (%)

	2022	2023	2024	2025
Feb 2022	5.8	2.5	1.8	n/a
May 2022	10.3	3.5	1.5	n/a
Aug 2022	13.0	5.5	1.5	n/a
Nov 2022	10.8	5.3	1.5	0.0
Feb 2023	n/a	4.0	1.5	0.5

Source: Bank of England. Forecast conditioned on market rates.

Table 2.2: OBR's CPI inflation forecasts (latest in bold) (%)

	2022	2023	2024	2025	2026	2027
Mar 2022	7.4	4.0	1.5	1.9	2.0	n/a
Nov 2022	9.1	7.4	0.6	-0.8	0.2	1.7

Source: OBR economy forecasts.

Table 2.3: Average of independent forecasts for CPI inflation, as reported by HM Treasury (latest in bold) (%)

	2022	2023	2024	2025	2026	2027
Feb 2022	5.5	2.8	2.0	2	2	n/a
May 2022	7.5	4.2	2.5	2.6	2.5	n/a
Aug 2022	9.3	6.0	2.5	2.6	2.5	n/a
Nov 2022	9.0	7.4	3.2	2.6	2.7	n/a
Feb 2023	n/a	7.0	3.0	2.2	1.9	2.1

Source: HM Treasury.

The OBR notes that its forecast for 2024 (see Table 2.2) is significantly lower than the Bank of England's forecast and the average of independent forecasts reported by HM Treasury,[6] and it attributes this difference to two factors. Firstly, the OBR's forecast is in line with the precise path of Energy Price Guarantee (EPG) plans announced in the Autumn Statement on 17 November 2022. The Autumn Statement stated that the

---

[5] We present the forecasts for calendar years as reported by each organisation. We recognise that Network Rail may use forecasts for different time periods in its own approach (e.g. forecasts for financial years).

[6] Office for Budget and Responsibility, 'Economic & fiscal outlook - November 2022', p.30. [online]

EPG would provide continued support capping energy bills at around £3,000 a year from April 2023.[7] Thus the inflation-reducing effect of the EPG has been captured in OBR forecasts. The OBR considers that other forecasters are unlikely to have anticipated this change in fiscal policy perfectly. Indeed, the Bank of England's November 2022 report was published on 3 November, two weeks before the Autumn Statement, and it assumed support would last until September 2024. Secondly, the OBR adjusted the weights in the CPI basket to account for high gas and electricity prices impacting their shares of consumption, noting that this change might not feature in other organisations' predictions.

The Bank of England in its February 2023 report acknowledges that "the differences between the EPG policy announced in the Autumn Statement and the assumptions used in the November Report have a direct impact on the CPI forecast in certain quarters".[8] The EPG is lower than previously assumed and is expected to reduce household energy bills, so CPI is expected to fall by 0.8 percentage points in Q2 2023.

The forecasts compiled by HM Treasury represent a consensus view of the expectations of various industry forecasters. The range of forecasts for Q4 2023 and Q4 2024, and how they compare against the consensus view, is presented in Figure 2.2. The consensus view is for CPI to increase year-on-year by 4.5 per cent in Q4 2023 and by 2.5 per cent in Q4 2024. This offers a materially different perspective from that of the OBR, which in November 2022 expected CPI inflation of -0.1 per cent in Q4 2024.

Figure 2.2: The range of independent CPI forecasts made Dec 2022 to Feb 2023 for Q4 2023 and Q4 2024
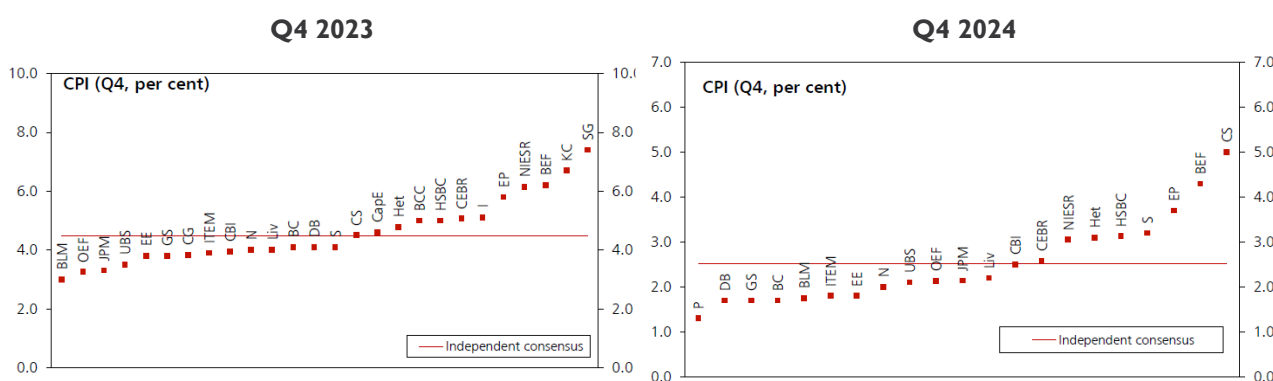
Note: Different scales. Source: HM Treasury, Feb 2022.

2.1.2   The key drivers

Drivers in 2022 and the short term

The Bank of England and the OBR attributed the high inflation observed and expected over 2022 mostly to 'external factors'. Chief among these were Russia's invasion of Ukraine and the resulting increases in wholesale gas prices. Since 2021, household energy bills have lurched upwards as the energy price cap increased to account for higher wholesale energy costs. The Bank estimates that energy prices have directly accounted for over 3.5 percentage points of the 9.5 percentage point rise in CPI inflation since the start of 2021.[9] This effect is expected to be limited somewhat in the short term by the Energy Bills Support Scheme[10] implemented in October 2022, and indeed the EPG contributed to the Bank's reduced inflation projections between its August and November reports.[11] A similar energy support scheme has also been put in place for firms. Similarly, the OBR's Q4 2022 forecast would have been 13.6 per cent, instead of the stated of 11.1 per

---

7   The EPG limits the average annual household bill to £2,500 for the next year and to £3,000 for the following year. Continued support by EPG after April 2023 was announced in 2023 in the Autumn Annual Statement [online].
8   Bank of England, 'Monetary Policy Report – February 2023', p.64 [online]
9   Bank of England, 'Monetary Policy Report - November 2022', p.75 [online]
10   The Energy Bills Support Scheme provides £400 support to all households in the UK over a six-month period.
11   Bank of England, 'Monetary Policy Report - November 2022', p.8 [online]

cent, in the absence of the EPG.[12] The OBR also expects the increase in the cap provided by the EPG from £2,500 to £3,000 in April 2023 to increase CPI inflation by 1 percentage point in Q2 2023 (to 8.9 per cent).[13,14] However, the Bank of England reported in its February 2023 reports that European wholesale gas prices have since fallen significantly, by around 50 per cent.[15] The gas futures curve has also fallen, whilst lower gas consumption has reduced concerns about gas shortages. Given the interlinked nature of EU and UK gas markets, the previously discussed movements in the EU market have led to UK gas prices falling significantly since the November 2022 outlook, lowering inflation expectations for 2023 (see Table 2.1).

Prices of non-energy commodities have been increasing as a result of i) Russia's invasion directly (limiting certain food supplies), ii) Russia's invasion indirectly through the increased energy costs, and iii) through sterling's depreciation relative to major currencies. The Bank of England notes that a 10 per cent increase in global agricultural prices typically translates into a 0.2 percentage point rise in UK CPI inflation after three quarters.[16] Given that it imports approximately half of its food,[17] the UK is susceptible to exchange rate fluctuations affecting the price of food. Annual outturn UK food price inflation in the CPIH measure rose to 16.4 per cent in October 2022.[18] Further, global backlogs and delays experienced as economies rebounded from the pandemic have led to significant inflation for other tradable goods and services in 2022 (contributing 2.5 percentage points to inflation in 2022).[19] Food prices is making an increasingly large contribution to CPI inflation, with food price inflation having reached a historical peak of 16.8 per cent in December. This was primarily led by supply constraints and rising energy and fertiliser costs in food production caused by the war in Ukraine and poor weather.[20] Agricultural commodity prices have levelled since mid-2022, which the Bank of England expects will moderate price pressures in 2023.

The Bank of England and the OBR have also highlighted certain domestic drivers of CPI inflation. The inflation expectations of firms and households are a key driver of near-term inflation. When households and firms expect future prices to increase, they may demand higher wages and prices for their goods, respectively, in order to retain a certain level of real income. In November, the Bank of England's Decision Maker Panel (DMP) survey indicated that firms had raised prices as a result of high past and expected future inflation.[21] Firms' inflation expectations of 3-year-ahead CPI have since fallen from a peak of 4.8 per cent in September to 3.7 per cent in January.[22] Furthermore, a Bank of England / Ipsos Mori survey indicated that 12 per cent of households expect inflation to be above 10 per cent in five years' time, compared with 7 per cent in August 2021.[23] Evidence suggest that such household expectations have also fallen, as a YouGov/Citigroup survey indicates that household expect inflation five to ten years ahead to fall back to 3.5 per cent, 1.3 percentage points lower than the August peak. These expectations for the longer term mean that although inflation expectations seem to be gradually falling, expectations remain above historical averages and so there is a risk that inflation becomes entrenched such that price inflation and wage inflation become mutually sustaining.

[12] Office for Budget and Responsibility, 'Economic & fiscal outlook – November 2022', p.15. [online]
[13] Office for Budget and Responsibility, 'Economic & fiscal outlook – November 2022', Chart 4: Contributions to CPI inflation. p.17. [online]
[14] Office for Budget and Responsibility, 'Economic & fiscal outlook – November 2022', p.15. [online]
[15] Bank of England, 'Monetary Policy Report – February 2023', p.35 [online]
[16] Bank of England, 'Monetary Policy Report – May 2022'. p.71. [online]
[17] Office for Budget and Responsibility, 'Economic & fiscal outlook – November 2022', p.16 [online]
[18] ONS (2022) 'Consumer price inflation, UK: October 2022', table 2 [online].
[19] Office for Budget and Responsibility, 'Economic & fiscal outlook – November 2022', p.16. [online
[20] Bank of England, 'Monetary Policy Report – February 2023', p.54 [online]
[21] Bank of England, 'Monetary Policy Report - November 2022', p.81 [online].
[22] Bank of England, 'Monetary Policy Report – February 2023', p.62 [online]
[23] Bank of England, 'Monetary Policy Report - November 2022', p.86 [online]

Services inflation is a recent contributor to CPI inflation, having risen to a 30-year high of 6.8% in December 2022.[24] Services inflation is expected to continue strong, consistent with service-sector firms facing upwards wage pressure (they are more exposed to labour costs) and other costs such as energy.[25]

Drivers in the medium to longer term

The OBR expects the impact of sterling depreciation and supply bottlenecks to ease in 2023 before turning negative in 2024. It also anticipates food price inflation to 'ease significantly' in 2023 and then to contribute only modestly again to CPI inflation in 2025.[26] Similarly, the price growth of other tradeables is expected to abate in 2023 and become negative in 2024 as supply bottlenecks ease.

The Bank of England expects a broadly similar pattern for the main drivers. However, the Bank's Monetary Policy Committee (MPC) continues to judge that the balance between declining global factors and more sustained domestic pressures means that CPI is more likely to overshoot than undershoot the central forecast.[27] [28]

2.1.3   The key uncertainties

We have identified some key uncertainties surrounding the general price inflation forecasts set out in this section. First, it is not clear whether the government's energy support measures will remain as currently stated after April 2023. The end of the Energy Bill Support Scheme[29] and a colder Spring could lead many households to see a sharp rise in their monthly energy bills. Second, there is a risk that disruptions to the supply of gas from Russia to Europe are greater than that implied by wholesale gas futures prices, which informed the Bank of England's November 2022 forecast.[30] It is also possible that disruptions to the supply of agricultural products as a result of Russia's war persist. The Bank of England considers that these factors would put more upward pressure on global inflation, especially if firms respond to declining commodity prices by rebuilding profit margins. But another interpretation is that the risk is symmetrical: there could be developments that lead these factors to contribute less to inflation than expected.

Third, the tightening of both monetary and fiscal policy will have an uncertain effect on inflation and other economic outcomes. The Bank of England's interest rate increases aim to reduce domestic spending to ease pressure on scarce supply and in turn this may reduce inflation expectations. However, it is clear that many of the drivers of recent inflation are external, over which interest rate increases have little influence (except, to an extent, through sterling depreciation). The tax band freezes and other announcements in the Autumn Statement may also depress spending but risk interacting with tighter monetary policy to prolong an economic downturn. This would be likely to put downward pressure on domestic sources of inflation.

Fourth, outturn price inflation could differ from forecasts if interest rates take a different path from current expectations. The Bank of England's central CPI forecasts were informed by the market's then-expectations of future interest rate movements. Figure 2.3 compares its central forecast with a forecast informed by the alternative assumption of constant interest rates. For comparison, we have included forecasts from the November 2022 report (left panel) and the February 2023 report (right panel).

In its November 2022 report, the Bank of England noted that if interest rates are assumed to remain fixed at 3 per cent to 2025, then CPI inflation could be 0.75 percentage points higher than in its forecast conditioned

---

24   Bank of England, 'Monetary Policy Report – February 2023', p.6 [online]
25   Bank of England, 'Monetary Policy Report – February 2023', p.55 [online]
26   Office for Budget and Responsibility, 'Economic & fiscal outlook – November 2022', p.16. [online]
27   Bank of England, 'Monetary Policy Report - November 2022', p.19 [online].
28   Bank of England, 'Monetary Policy Report – February 2023', p.20 [online]
29   The Energy Bills Support Scheme provides a £400 non-repayable discount to eligible households to help with their energy bills over winter 2022-23. It is due to have been fully implemented by April 2023.
30   Bank of England, 'Monetary Policy Report - November 2022', p.23 [online].

on market rates.[31] In its February 2023 report, however, the Bank of England projections of CPI inflation with a fixed interest rate assumption of 4 per cent to be 0.8 per cent and 0.2 per cent in two years' and three years' time, respectively, slightly lower than its forecasts for the same dates conditioned on market rates.[32]

Figure 2.3: Bank of England's CPI forecast 2023 Q1 – 2025 Q4 under different interest rate assumptions
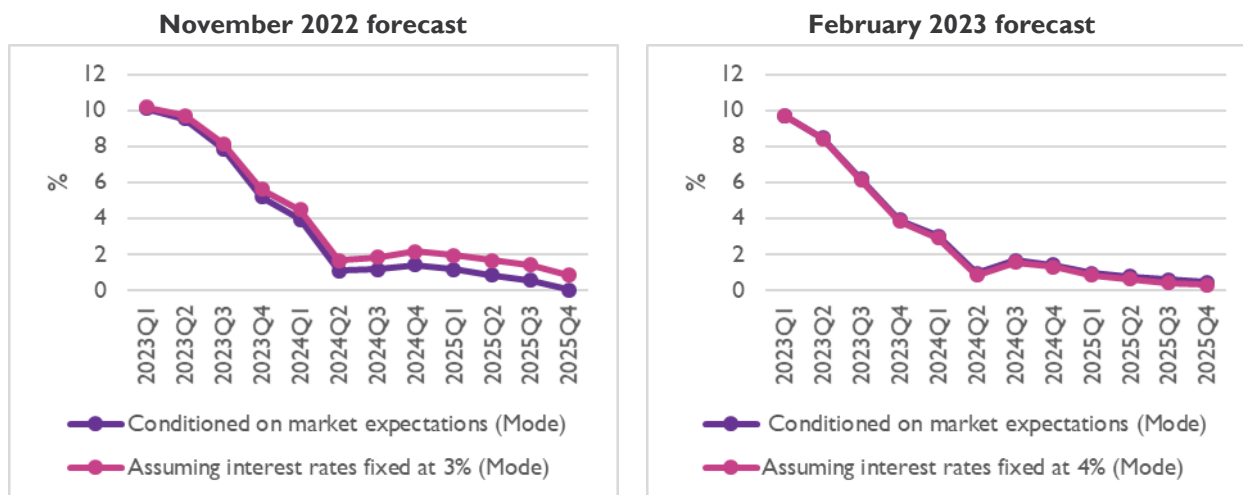
Source: Bank of England. The mode projection represents the MPC's view of the single most likely outcome (Inflation Report, May 2002 [online]).

We note that the Bank's November 2022 forecast conditioned on market interest rates was widely interpreted as an attempt by the Bank to signal to the market that its expectations of future interest rate rises were wrong and that rates would not rise as rapidly as market prices implied.[33] The implication was that the Bank's November inflation projection based on market-implied interest rates should be understood as under-stating its actual expectations for inflation. The Bank expected inflation to be higher than its November projection, because it expected not to raise interest rates as far as market prices at the time implied that it would.

Since November, the peak Bank Rate expected by the markets has declined, and the Governor of the Bank of England is no longer suggesting that the market is out of line. In January 2023, the Governor was quoted remarking that a "corner had been turned" and that in making such a statement:[34]

> "the Bank was not trying to change market expectations that interest rates will peak at 4.5%."

This suggests that future official forecasts based on the market-implied path of interest rates – including the February 2023 release – may be a better representation of what the Bank of England actually expects to happen. This is reflected in the minimal difference in CPI forecast in the right panel of Figure 2.3.

Fifth, there is some evidence that the feedback loop between price and wage inflation can reach a limit. Sources contributing to the Bank's November forecast reported that some firms are reaching the limit to the extent to which they can pass on higher costs in prices, including in sectors such as hospitality (where labour accounts for a high proportion of costs) and durable goods.[35] This, in turn, would mean that inflation could be tempered if more firms believe that they, too, are reaching such a limit. As demand is expected to

---

[31] Bank of England, 'Monetary Policy Report - November 2022', p.22 [online].
[32] Bank of England, 'Monetary Policy Report – February 2023', p.23 [online]
[33] The Monetary Policy Committee minutes were explicit that the interest rate peak required to return inflation to target would be lower than the peak priced into financial market. See: Bank of England, 'Monetary Policy Summary and minutes of the Monetary Policy Committee meeting ending on 2 November 2022', paragraph 52 [online].
[34] BBC News, 19 January 2023, 'Bailey: Inflation 'likely to fall rapidly' this year' [online].
[35] Bank of England, 'Monetary Policy Report - November 2022', p.84 [online].

grow more slowly over the coming years, and unemployment to rise steadily,[36] cost pass-through may not be an option for some firms.

2.2 Wage inflation

2.2.1 Wage forecasts

Wages are a significant cost input for Network Rail, and hence forecasts of future wage growth are important when thinking about the future input price pressures that it faces. This section outlines the wage inflation data and forecasts provided by the Bank of England, the OBR and HM Treasury. The Bank of England reports nominal annual private sector regular pay growth (private sector wage costs divided by private sector output at constant prices) as well as growth in nominal average weekly earnings (whole-economy total pay).[37] The OBR reports growth in nominal average earnings (wages and salaries divided by the number of employees).[38] HM Treasury reports the averages of independent forecasts for earnings growth, but it is not clear how this is defined or whether the independent forecasts define it in the same way.[39] The annual forecasts cover the period 2022-2027 and are in nominal terms.

Table 2.4 summarises the Bank of England's forecasts for nominal annual private sector regular pay growth made at different points in 2022 and the first quarter of 2023. As with general price inflation, expectations for wage growth in 2022 have shifted dramatically, more than doubling from 3 per cent in February 2022[40] to 7.3 per cent in the November forecast.[41] This increase is even more pronounced when looking at wage growth expectations for 2023, with the February 2023 outlook forecasting wage growth of 7.9 per cent (more than 3 times higher than the forecast made a year ago in the February 2022 report). The Bank of England's forecasts show wage growth falling back to lower levels in 2024 and 2025, in line with its CPI forecast. In 2025, private sector regular pay growth falls to 1.8 per cent, which could reflect the easing of inflationary pressures faced by households and firms.

Table 2.4: Bank of England's forecasts for annual private sector regular pay growth (latest in bold) (%)

Forecast date	2022	2023	2024	2025
Feb 2022	3.0	2.5	1.5	n/a
May 2022	4.8	5.0	2.3	n/a
Aug 2022	7.5	6.5	2.0	n/a
Nov 2022	7.3	6.8	2.8	1.8
Feb 2023	n/a	7.8	2.3	1.3

Source: Bank of England. Four-quarter growth in private sector regular pay-based unit wage costs in Q4.

The Bank of England's forecasts for average weekly earnings growth – which includes the public sector – have changed less, although they still reflect the increase in inflation expectations that has occurred in 2022. The Bank currently expects average weekly earnings growth to peak at 4 per cent in 2023, before falling back to 1.5 per cent by 2025.

---

[36] Bank of England, 'Monetary Policy Report - November 2022', pp.82-3 [online].
[37] Bank of England, 'Monetary Policy Report - November 2022', Table 1.D: indicative projections consistent with the MPC's forecast. p.28, [online]
[38] The OBR also reports growth in 'wages and salaries', which measures total wage costs in the economy. Employment growth is an important driver of wages and salaries growth (source) and so this is not a 'pure' measure of wage growth. Office for Budget and Responsibility, 'Economic & fiscal outlook - November 2022', Table A.1: Detailed summary of our November 2022 forecast. p.55. FN (5) [online]
[39] HM Treasury, 'Forecasts for the UK economy: November 2022' [online].
[40] Bank of England, 'Monetary Policy Report – February 2022', Table 1.C: Indicative projections consistent with MPC's forecast. [online]
[41] Bank of England, 'Monetary Policy Report - November 2022', Table 1.D: indicative projections consistent with the MPC's forecast. [online]

Table 2.5: Annual average weekly earnings growth forecasts (latest in bold): Bank of England (%)

Forecast date	2022	2023	2024	2025
Feb 2022	3.8	3.0	2.3	n/a
May 2022	5.8	4.8	2.8	n/a
Aug 2022	5.3	5.3	2.8	n/a
Nov 2022	5.8	4.3	2.8	2.0
Feb 2023	**n/a**	**4.0**	**2.3**	**1.5**

Source: Bank of England. Four-quarter growth in whole-economy total pay in Q4.

Table 2.6 and Table 2.7 summarise the OBR's forecasts for growth in nominal average earnings at November 2022. The 'economy forecast' – the OBR's central annual forecast for calendar years – implies that earnings will increase by 5.9 per cent in 2022. The 'fiscal forecast' (regarding the changes between financial years) is slightly lower, at 5.4 per cent.

Table 2.6: OBR's forecasts for annual wage growth (%)

Wage metric	2022	2023	2024	2025	2026	2027
Average earnings	5.9	4.2	1.7	1.7	1.9	2.7

Source: OBR (November 2022). Average earnings are wages and salaries divided by employees.

Table 2.7: Annual wage growth forecasts: OBR fiscal forecasts (%)

Wage metric	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Average earnings	5.4	3.5	1.6	1.7	2.1	2.7

Source: OBR (November 2022). Average earnings are wages and salaries divided by employees.

Table 2.8 shows HM Treasury's average of forecasts from independent forecasters. Earnings growth in the February 2023 report of 4.3 per cent is expected for 2022, falling to 3.1 per cent in 2023 (both based on just four independent forecasts). Further, they suggest that nominal average earnings growth will settle at a higher level of 3.2-3.4 per cent from 2024 through to 2026.

Table 2.8: Average of independent forecasts of annual average earnings growth, as reported by HM Treasury (latest in bold) (%)

Forecast date	2022	2023	2024	2025	2026
Feb 2022	4.0	3.0	3.2	3.3	3.3
May 2022	4.7	3.5	3.4	3.3	3.5
Aug 2022	5.8	4.3	3.6	3.4	3.4
Nov 2022	5.9	4.6	3.7	3.4	3.2
Feb 2023	**4.3**	**3.1**	**3.3**	**3.2**	**3.4**

Source: HM Treasury. Average of independent forecasts.

2.2.2 Key drivers

Both the Bank of England and the OBR state that the main drivers of earnings growth in 2022 are tight labour markets and inflationary pressures.

The Bank of England and the OBR note the impact of domestic price inflation on earnings growth in 2022. The cost of living squeeze has led to many workers seeking pay increases in an attempt to maintain a certain level of real disposable income. This is supported by results from the Agents' pay survey which expected inflation to be the top factor driving pay settlements this year.[42] One of the reasons for lower earnings growth forecasts after 2024 is the expected reduction in general price inflation. But whilst inflation begins to fall, it is expected to become a relatively more important driver of wage inflation as the labour market loosens. It is reportedly contributing more to pay negotiations, and increases in the National Living Wage and Real Living

---

[42]   Bank of England, 'Monetary Policy Report – February 2023', p.57 [online]

Wage are expected to support earnings growth.[43] If CPI inflation is materially above the Bank of England's 2 per cent target in 2023, it is likely that many workers will persist in their wage demands to bolster nominal wage growth.

A tightening of the labour market has characterised the 'post-pandemic' UK economy. Unemployment in the three months to November stood at 3.7 per cent.[44] Various recruitment data suggest that an excess supply of jobs, coupled with a reduction in labour force participation, has been driving low unemployment.[45] In such a context, firms are likely to raise wages in an attempt to retain current employees and to make vacancies more attractive. However, contributing to the Bank of England's assessment of future wage inflation is that a growing number of its industry sources have reported that they are pausing recruitment or allowing headcount to fall due to heightened uncertainty and increased costs.[46] The Bank of England recently suggested that there has been a deterioration in the efficiency of matching jobs to job-seekers, evidenced by a detachment of the vacancy-to-unemployment ratio and the hiring rate of the unemployed.[47]

Low labour force participation is also important in explaining longer-term wage growth expectations. A rise in economic inactivity has largely been concentrated among people aged 50 to 64, and partly reflects those people leaving the labour force due to long-term sickness. The number of non-participants that report long-term sickness has risen by 378,000 since before the pandemic and 169,000 in the three months to November.[48] Many of these people may not re-enter the workforce, suggesting that participation will remain limited unless other mitigating factors (e.g. migration) can relieve the pressure. A fifth of adults aged 50-65 surveyed by the ONS in August that had left or lost their job since the pandemic, and had not returned, were on an NHS waiting list.[49] It is possible that some of these workers may re-enter the labour market if government policy leads to a meaningful reduction in waiting lists.

2.2.3   The key uncertainties

As noted above, hiring activity cooled in late-2022 given the heightened uncertainty and increased costs faced by firms. Whilst tight labour markets have largely been responsible for the high nominal pay growth experienced up to now, it appears that general inflation will be a more important driver going forward. In particular, the Bank of England's industry sources suggest that the cost-of-living crisis is likely to be a bigger factor than recruitment and retention issues in determining pay awards in 2023,[50] which suggests that pay growth will depend in part on how the crisis plays out.

The extent to which firms can continue to pass on higher costs in their prices might also affect pay growth. Unable to maintain profit margins in this way, firms may be less responsive to requests for pay increases from workers and hence pay awards could be at lower levels.

The contribution to pay growth of households' inflation expectations is typically difficult to distinguish from pay growth driven by past price rises.[51] Both can drive workers to demand pay increases. The Bank's central projection assumes that households base their expectations largely on recent outturn inflation,[52] rather than on anticipated future price rises. So, there is a risk that wage inflation will rise more than expected if households' inflation expectations turn out to be more entrenched and continue to drive pay renegotiations. A survey cited by the Bank of England in November 2022 found that households' one-year-ahead inflation

---

43 Bank of England, 'Monetary Policy Report - November 2022', p.73 [online]
44 Bank of England, 'Monetary Policy Report - February 2023', p.17 [online]
45 Bank of England, 'Monetary Policy Report - November 2022', pp.65-66 [online]
46 Bank of England, 'Monetary Policy Report - November 2022', p.72 [online]
47 Bank of England, 'Monetary Policy Report – February 2023', p.82 [online]
48 Office for Budget and Responsibility, 'Economic & fiscal outlook - November 2022', p.28 [online]
49 Bank of England, 'Monetary Policy Report - November 2022', p.66 [online]
50 Bank of England, 'Monetary Policy Report - November 2022', p.82. [online]
51 Bank of England, 'Monetary Policy Report - November 2022', p.84 [online].
52 Bank of England, 'Monetary Policy Report - November 2022', p.84 [online].

expectations were at around 8.5 per cent in September and October.[53] Since then, measures of household inflation expectations have declined, whilst longer-term household and firm expectations remain elevated relative to historical averages.[54]

2.3   Relevance of current inflationary environment to CP7

As has been discussed above, inflation is currently elevated compared with the norms of recent decades. A key question is the extent to which currently elevated inflation is an aberration or blip rather than reflecting some sustained change in conditions whereby inflation will be higher in future. Specifically, the next rail period is 2024-2029. Should we expect inflation to have reverted to historical norms by that period?

First, we note what the forecasters we have quoted expect. The Bank of England's forecast conditioned on market interest rates is for inflation to be 0.5 per cent in 2025. The OBR projects deflation of 0.8 per cent in 2025, with inflation still being only 1.7 per cent by 2027. The Treasury panel of economic forecasters, by contrast, projects inflation of 2.2 per cent in 2025 and 1.9 per cent in 2026.

The natural default assumption is perhaps that inflation will revert to its historic norms: the Bank of England will raise interest rates until monetary growth drops and aggregate demand drops enough to bring inflation down; once that reduction is achieved inflation might be expected to average about 2 per cent as has been the norm for the past couple of decades. Is there any good reason to expect any other outcome?

We could think of there as being two classes of reason why that benign outcome may not come to pass. First, it could be more complicated to reduce inflation than is hoped. Interest rate rises could trigger a marked recession before they reached a level high enough to induce a sustained reduction in monetary growth. Alternatively, factors inducing inflation persistence (such as perhaps wage rises or the pound weakening if international interest rates rise more rapidly than those in the UK) could themselves induce recession. If the recession were severe enough to deter interest rates from rising to the level consistent with inflation returning to 2 per cent, that could mean inflation staying above target well into the recovery phase.

Our second class of reason to question the benign scenario is that there could be factors that either continue to place upwards pressure on prices or deter policy action that gets inflation down. One such might be the currently very elevated levels of public debt. According to the Public Finances Databank[55], public sector net debt, which was 35.6 per cent of GDP in 2007/08 and had risen to 80.3 per cent of GDP in 2018/19, was 97.3 per cent of GDP in 2021/22, is scheduled to rise to 106.7 per cent of GDP in 2023/24 and is still projected to be 100.0 per cent of GDP in 2026/27. Economists typically regard a greatly elevated level of government debt as a risk factor for inflation. Partly that is because it constitutes a barrier to the raising of interest rates, since at higher interest rates the costs of servicing and rolling over government debt rise. But it also creates incentives for governments to allow inflation to rise and persist, so as to inflate the real value of government debts away.

The challenges of getting inflation down and the incentives to allow inflation to rise and persist in future might suggest that inflation over the price control period will be elevated compared with the past. However, we consider the main scenario still to be that the Bank of England brings inflation back down to target in line with the official forecasts. Indeed, it would not be a surprise if inflation were to undershoot the target or even go negative for a time, as per the Bank of England and OBR projections. UK monetary growth has already turned and evidence from the US suggests inflation is falling quite rapidly, down from 9.1 per cent in June 2022 to 7.1 per cent in November. This in turn has led to some revision of the expected relative path of UK and US interest rates, resulting in a marked strengthening in the pound-dollar exchange rate, which at

---

[53]   Bank of England, 'Monetary Policy Report - November 2022', pp.84-5 [online].
[54]   Bank of England, 'Monetary Policy Report – February 2023', p.24 [online]
[55]   OBR Public Finances Databank – November 2022 [online] downloaded on 14 December 2022.

the time of writing is $1.20 to £1,[56] up from near-parity only a few months ago. A stronger pound in turn reduces the price of imports, bearing down on inflation.

At the same time, the outlook for energy prices has also become less inflationary. Whereas the April 2023 gas futures contract was trading at 759p/therm in late August, at the time of writing it is trading at a significantly lower level. Further falls in energy prices could also help to reduce inflation.

On the other hand, whilst it is perhaps most likely that inflation will fall back to historic norms (or even a little below) over the period of the forthcoming price controls, the outlook for wages may be different. The UK continues to face widespread industrial action as workers attempt to recover the value of their real wages (or at least to mitigate the loss in that value) in the face of high inflation. One plausible scenario may be that workers are unable to secure a high degree of mitigation in the short-term, because the pressures of the recession will mean firms are unable to cover inflation-matching wage rises. However, once we get to the period after the recession, with firms' profits recovering, firms seeking to retain their best staff may be forced to raise wages to allow those staff to catch up on losses they made in earlier inflationary periods. That could mean that the period of the forthcoming price controls sees national wages outstripping inflation to a degree not witnessed in recent decades.

---

[56] Bank of England 'Daily spot exchange rates against Sterling' [online] accessed on 21 February 2023.

3   Lessons from Other Sectors

We have investigated a number of sectors in which regulators have analysed real price effects. The sectors are:

- Energy in Great Britain
- Water in England and Wales
- Aviation – specifically Heathrow airport
- Telecommunications in the UK – specifically BT
- Water in Northern Ireland

We provide detailed case studies of the comparator sectors in the Appendices. In this section, we summarise for each sector our research and the key lessons that we have identified and applied when critiquing Network Rail's methodology for forecasting input price inflation. We conclude the section with our overall set of key findings from across the case studies.

3.1   Approach taken by Ofgem in the GB energy sector

Ofgem sets price controls for the gas and electricity network companies of Great Britain. We have reviewed Ofgem's approach to RPEs for four price controls.

- RIIO-T1 and GD1, the price control for the gas distribution, gas transmission and electricity transmission networks for the period 2013-2021;
- RIIO-ED1, the price control for the electricity distribution network for the period 2015-2023;
- RIIO-T2 and GD2, the price control for the gas distribution, gas transmission and electricity transmission networks for the period 2021-2026; and
- RIIO-ED2, the price control for the electricity distribution network for the period 2023-2028.

3.1.1   RIIO-T1 and GD1

The allowed revenues Ofgem determined for RIIO-1 were indexed by RPI. To account for forecasted differentials between RPI and input price inflation, RPEs were estimated for labour, materials and equipment & plant, from which fixed ex-ante RPE allowances were set for the full control period. The RPEs were mostly based on the real average historical annual growth rate of Ofgem's chosen input price indices.

For labour, Ofgem estimated the real average historical annual growth of its selected wage inflation indices[57] using twenty years of historical data. It then took the average of these estimates as its labour RPE for the years 2014/15 – 2020/21. The labour RPE assumption for the first two years of the control period were derived from HM Treasury's consensus forecast for whole economy wage growth.

For the remaining two cost categories (materials and equipment & plant) the RPE assumption for 2012/13 was based on outturn data for Ofgem's chosen indices[58] for the first six months of 2012/13. The RPE

---

[57]   The selected indices were ONS Average Weekly Earnings (AWE) private sector, ONS AWE construction, ONS AWE transport and storage, BCIS PAFI civil engineering and British Electrotechnical and Allied Manufacturers Association (BEAMA) electrical engineering. The BEAMA index was only included in the RPE assumption for electricity transmission.

[58]   The full set of chosen indices used by Ofgem for RIIO-T1 and GD1 can be found in the Appendices.

assumptions for the remaining years of the control period were based on the long-term historical average for the chosen indices.

3.1.2   RIIO-ED1

As with RIIO-T1 and GD1, Ofgem granted DNOs ex ante RPE allowances to account for the expected difference between input price inflation and RPI over the eight-year control period. In its determination, Ofgem forecasted RPEs for labour (general and specialist), materials and plant and equipment. Subsequently, two companies appealed Ofgem's RIIO-ED1 determination to the CMA, with Northern Powergrid including Ofgem's RPE methodology in its grounds for appeal.

For 2014/15, Ofgem used available outturn input price indices and RPI data to forecast RPEs. For labour, both specialist and general, the RPEs for 2015/16 were based on HM Treasury's consensus forecast for Average Weekly Earnings for the whole economy, with an uplift of 0.15 per cent applied to reflect the fact that DNOs are private sector employers.[59] For all other inputs, no short-term forecasts were available so the 2015/16 RPEs were based on historical averages for Ofgem's selected indices.[60] RPEs for the remaining years for all inputs were based on historical real growth rates.

CMA appeal

One of Northern Powergrid's (NPg) grounds of appeal submitted to the CMA concerned Ofgem's approach to calculating labour RPEs for the year 2014/15, which was to base RPEs on the outturn from actual price indices for general and specialist labour for that year.[61]

NPg's main contention was that Ofgem unnecessarily rejected data from DNOs' own pay settlements for its 2014/15 RPE, and that NPg's workforce had more specialist labour specific to the electrical engineering sector whereas the Ofgem's chosen indices had a greater focus on manufacturing and construction activities. Ofgem responded by arguing that RPEs should be set so as to represent trends in efficient costs to provide incentives to DNOs to pursue cost efficiency in the absence of competitive market forces, and that the purpose of RPEs was not to match DNOs' actual costs. [62]

The CMA supported Ofgem's position and did not uphold NPg's appeal. The CMA shared Ofgem's unwillingness to accept assertions that DNO pay settlements are necessarily efficient. Moreover, NPg did not, in the CMA's view, provide sufficient evidence for the CMA to conclude that Ofgem's chosen indices were the wrong indices to use.

3.1.3   RIIO-T2 and GD2

Ofgem's approach to RPEs for RIIO-2 was significantly different from RIIO-1, a decision influenced by the fact that the outturn value of the indices used to set RPEs for RIIO-T1 and GD1 were lower than the forecasts Ofgem used when setting fixed ex ante allowances.[63] Ofgem decided to introduce RPE indexation for RIIO-2, such that RPE allowances would be updated annually during the control period using the latest available

---

[59]   RIIO-ED1 expenditure assessment, paragraph 12.6
[60]   The full set of chosen indices used by Ofgem for RIIO-ED1 can be found in the Appendices.
[61]   Northern Powergrid (Northeast) Limited and Northern Powergrid (Yorkshire) plc v the Gas and Electricity Markets Authority (publishing.service.gov.uk) p.76
[62]   Northern Powergrid (Northeast) Limited and Northern Powergrid (Yorkshire) plc v the Gas and Electricity Markets Authority (publishing.service.gov.uk) paragraph 5.17
[63]   https://www.ofgem.gov.uk/sites/default/files/docs/2018/03/riio2_march_consultation_document_final_v1.pdf paragraph 4.7.

figures for relevant indices.[64] Another key change was the use of CPIH, rather than RPI, as the measure of general inflation for RIIO-2.[65] Ofgem also introduced a materiality threshold for applying RPEs.[66]

Ofgem applied RPEs to labour (general and specialist), materials and, for one company, plant and equipment. Ofgem proposed to use the same indices as were used for RIIO-1, but some revisions to the selection were made following stakeholder consultation.[67] Forecast RPEs were based on the unweighted average of the forecasted indices within each cost category, net of general inflation. For labour, OBR's forecasts for average earnings were used where available, which was up to and including 2023/24.[68] Longer-term forecasts for labour RPEs were based on the historical average for the selected subsector indices. All of the RPEs for materials and for plant and equipment were based on the long-term average of the chosen indices.

3.1.4 RIIO-ED2

Ofgem published its final determinations for RIIO-ED2 on 30 November 2022. As with RIIO-T2 and GD2, Ofgem included a notional RPE allowance for DNOs to account for forecast differences between changes in CPIH and input prices, with within-period true-ups each year of the control period based on outturn indices.

RPE allowances were included for general labour, specialist labour and materials. The approach largely mirrored RIIO-T2 and GD2. In selecting relevant indices, an independence criterion was included where a chosen index should have little or no chance of being influenced by the actions of the DNOs.

The labour RPE assumption up to 2006 was based on the difference between OBR's forecast for earnings growth and its CPI forecast. For all other indices, RPE forecasts were based on the long-term historical average RPE for the period 2000 to 2021. The data from the years 2009/10, 2010/11 and 2020/21 were excluded from the calculations, as they were considered to be affected by the financial crisis and the COVID-19 pandemic.[69]

There was consideration of whether the high and uncertain inflationary environment in the UK at present justified changing the RPE forecasting approach.[70] Analysis of previous inflationary spikes found that inflationary spikes tend to fall out of the data the following year, resulting in a one-time step change in the level of the index. It was determined that the existing RPE approach remained reasonable given the information available and the mitigation provided by the indexation mechanism.

3.1.5 Key lessons from the energy sector

Ofgem's approach offers some useful insight into how the rail infrastructure sector might go about forecasting input price inflation. The relevance of Ofgem's approach is limited in some respects, in part due to the different characteristics of the energy sector, particularly Ofgem's ability to adjust RPE allowances ex post.

Ofgem's experience shows that typically only short-term independent forecasts for input prices are available, and potentially only for indices relating to economy-wide inflation or labour cost inflation. Ofgem's approach for forecasting RPEs for later years in the control period used the long-term historical average growth rate of relevant input price indices. Its experience for RIIO-1, for which Ofgem's forecasts turned out to

---

64 https://www.ofgem.gov.uk/sites/default/files/docs/2018/03/riio2_march_consultation_document_final_v1.pdf paragraph 6.28.
65 RIIO-2 Sector Specific Methodology – Core document (ofgem.gov.uk) p.132.
66 RIIO-2 Final Determinations - Core Document (REVISED) (ofgem.gov.uk) 7.51.
67 See the Appendices for details
68 As with economy-wide inflation, this approach was revised between draft and final determinations. At draft determination, CEPA used HM Treasury's consensus forecast for whole economy earnings. The change to using OBR forecasts was to ensure consistency with the general inflation approach.
69 RIIO-ED2 Draft Determinations Core Methodology FN 248.
70 CEPA (2022) "RIIO-ED2 Final Determination: Frontier Shift methodology paper" p.49

significantly inaccurate, may indicate that this approach can cause problems, particularly if there is not a mechanism for adjusting expenditure allowances during the control period. However, in the absence of suitable forecast, we consider this to be the best approach available. Ofgem's RIIO-1 experience highlights the importance of selecting the appropriate historical period and having awareness of potential structural breaks.[71]

We consider Ofgem's introduction of a materiality assessment for deciding whether to include RPEs for each cost category to be valid. This approach could be adopted in the rail context to ensure that the complexity of calculating suitable RPE adjustments is only undertaken when there is a material need to do so.

Ofgem's most recent determination is very up-to-date (November 2022). The challenges associated with input price inflation forecasting at this time are acknowledged by Ofgem's consultants, CEPA. CEPA's approach of checking the persistency of historical inflation "spikes" is something that could be applied to rail. Unfortunately, the option of using ex post RPE indexation mechanisms (which significantly mitigate the challenge of input price forecasting at times of uncertainty) is not applicable.

3.2   Approach taken by Ofwat in the water and wastewater sector

Ofwat sets price controls for water and wastewater companies in England and Wales. We focus on the approach taken for PR19, the most recent price review Ofwat has carried out, and the subsequent CMA appeals by four of the water companies. PR19 covers the period 2020-2025.

3.2.1   PR19 final determination

Ofwat commissioned Europe Economics to assess whether there was a robust case for any RPEs for the control period. We developed a framework to assess the case for RPEs with three criteria which all needed to be passed for an RPE adjustment to be considered necessary. The three criteria were:

- Is there a significant likelihood that the value of the wedge between the input price and CPIH will differ substantially from zero over the period of the price control?
- Are there compelling reasons to think that CPIH does not adequately capture the input price?
- Is the input price and exposure to that input price outside management control for the duration of the price control?

The case for RPEs was assessed using the above framework for the major wholesale cost areas in the PR19 Business Plan data tables, which were; labour, energy, chemicals, materials, plants and equipment (MPE) and other costs. An RPE for labour was judged only to be justified *if* reliance was placed on OBR wage forecasts, and an RPE for energy was judged only to be justified *if* reliance was placed on BEIS energy price forecasts and pre-2010 data. An RPE allowance was not deemed appropriate for the remaining categories as they did not pass the first criterion.

Ultimately, Ofwat determined that labour was the only input cost category for which an RPE allowance was justified. Ofwat set an ex ante RPE allowance based on OBR hourly wage forecasts from March 2019 (converted to a real wage forecast using CPI), with a true-up mechanism based on the ASHE hourly manufacturing wages index that would be applied at the end of the control period to account for any over- or under-estimation by the OBR.[72]

---

[71]   Ofgem set its RIIO-1 RPE allowances shortly after a structural break in real wage growth in the UK economy, caused by the global financial crisis in 2008.

[72]   PR19-final-determinations-Securing-cost-efficiency-technical-appendix.pdf (ofwat.gov.uk) p.196

3.2.2 CMA Appeal

Four water companies appealed Ofwat's PR19 price control determinations to the CMA. In its redetermination, the CMA reviewed the RPE assessment framework we developed for Ofwat and the companies' criticisms of the framework. The CMA decided that our approach provided a balance between using RPEs when the evidence clearly demonstrated that it is necessary and not over-complicating the assessment. It therefore used the same approach in its redetermination. The CMA considered adding an additional materiality criterion as an improvement to the framework to simplify the assessment of RPEs. It applied the materiality criterion to expenditure at the level of the water and wastewater sector as a whole, rather than at company-level. Ultimately this materiality assessment did not affect its RPE decisions, but it noted that a materiality criterion could improve the Europe Economics framework.

In applying the framework, the CMA reached the same decisions as Ofwat for each cost category. For labour, it mirrored Ofwat's approach to setting an RPE allowance, using the March 2019 OBR forecasts for annual wage growth with an ex post mechanism using the ASHE manufacturing index. At the time of redetermination, more recent OBR forecasts were available (March 2020 and November 2020) than had been used for Ofwat's final determination (March 2019). However, the CMA agreed with Ofwat's position that the March 2019 forecasts remained the most appropriate to use for an RPE adjustment due to furlough impacts on the more recent forecasts.

3.2.3 Key lessons from the water sector

Ofwat's approach provides a useful framework that, with suitable adjustments, could aid in the assessment of the approach taken by Network Rail. The fact that the CMA reached the same conclusions on RPEs for each cost category as Ofwat demonstrates that the framework can provide consistent results when applied by different parties. The CMA's final report noted that the framework might be improved by the addition of a materiality criterion.

The combining of materials, plant and equipment into one category for PR19 was based on the business plan template water companies were required to use, and it appears the broad nature of the category made it difficult to identify appropriate indices for wedge analysis.

An interesting point to take from the CMA appeals is that the latest input cost forecast is not necessarily the correct one to use. The OBR wage cost forecast used in the initial RPE analysis had been superseded by two subsequent OBR forecasts by the time the CMA appeals were underway, but these later forecasts were not used because of a consensus view that they overestimated real wage growth and incorporated unusual developments that would produce implausible results when applied to the control period (due to the impact of furlough on the data). This highlights the important point that the date of a forecast must be understood in conjunction with the macroeconomic context at the time.

3.3 The CAA's approach in the aviation sector

The Civil Aviation Authority (CAA) sets price controls for Heathrow Airport Limited (HAL). We cover the CAA's approach to input price inflation for two price controls: the Q6 price control (originally covering the period 2014-2018 and since extended to 2023) and the ongoing H7 price control determination.

3.3.1 Q6

The input price inflation analysis presented by the CAA for Q6 was fairly limited, focusing on construction price inflation. Although at previous price controls the CAA had included additional allowances to provide

for the tendency of construction prices to rise faster than RPI,[73] the CAA did not consider that an additional allowance for construction inflation was appropriate for Q6 based on forecasts by the CAA's consultants.[74] HAL opposed this conclusion and argued that the CAA should use BCIS tender price indices (TPIs) to forecast construction price inflation.

The CAA rejected the idea of using TPIs to forecast construction inflation because TPIs only measure the prices that construction firms bid, not the price paid by clients. It referred to the view taken at Q5 by both the CAA and the Competition Commission, noting an academic study that found TPI's to generally overestimate inflation trends.[75] Therefore, the CAA maintained its initial position and did not grant any allowance for construction price inflation.

3.3.2 H7

The H7 final determination has not been reached. There is currently a one-year holding price cap in place until December 2023. There have been significant revisions in the CAA's input price inflation analysis between its Initial Proposals and its Final Proposals for H7.

Initial Proposals

In determining its input price inflation forecasts, the CAA's consultants, CEPA and Taylor Airey (CTA), followed the assessment framework that Europe Economics developed for Ofwat during PR19, with a materiality criterion added. [76] The framework was applied to five cost categories: people, operational costs, facilities and maintenance, utilities, and general expenses....Cost categories that passed the assessment were deemed to require a "bespoke price series" to project nominal inflation for that category, rather than CPI indexation. These bespoke series were:

- People costs – CTA used OBR forecasts of economy-wide wage growth, but assumed that wages would stay constant in nominal terms in 2020 and 2021 based on a pay constraint implemented by HAL.
- Utilities – CTA used BEIS forecasts (BEIS Energy and Emissions Projection 2019), inflated using projected CPI (rather than projected RPI, as used by HAL) to obtain a nominal series.
- Facilities and maintenance – CTA used a blended input price inflation rate based on giving equal weight to CPI and the OBR's wage forecasts.

Final Proposals

The CAA's final proposals included significant revisions to CTA's initial conclusions, based on new evidence submitted in response to the initial proposals. The new evidence led CTA to change which cost categories it applied a bespoke series to, and to change how it constructed the bespoke series. The materiality criterion was dropped from the assessment framework.

The assessment of operational costs was revised to a pass, based on evidence from HAL regarding its existing RPI-linked contracts, including HAL's long-term contract with National Air Traffic Services (NATS). Similarly, a new cost category was added for HAL's electricity distribution contract.[77] HAL's distribution contract, like its NATS contract, is linked to RPI and is long-standing.

---

[73] CAP 1151: Economic regulation at Heathrow from April 2014: Notice granting the licence (caa.co.uk) Paragraph C53

[74] CAP 1151: Economic regulation at Heathrow from April 2014: Notice granting the licence (caa.co.uk) Paragraph C55

[75] Fitzgerald & Akintoye (1995) The accuracy and optimal linear correction of UK construction tender price index forecasts: Construction Management and Economics: Vol 13, No 6 (tandfonline.com).

[76] CTA did not apply a precise materiality threshold, but generally considered costs that made up more than 10 per cent of opex to be material, and costs of between 5 per cent and 10 per cent of opex to be partly so.

[77] A contract with UK Power Networks relating to the leasing of the electricity distribution network at Heathrow airport.

The bespoke series for people costs was revised so that it converged with the OBR forecasts for the H7 period. The new series assumed zero growth in 2020 and 2021 and above-average wage growth in 2022 and 2023, so that by 2024 cumulative wage growth from 2019 is in line with the levels implied by the OBR's most recent forecast. The choice of wage index also changed, from OBR's "Wages and Salaries", which estimates the economy-wide wage bill, to OBR's "Average Earnings" which divides the former by the number of employees.

Other bespoke series were changed based on evidence submitted by HAL. For utilities, CTA accepted new evidence from HAL in the form of a forecast inflation series for electricity and gas commissioned by HAL from the Energy Intelligence Centre (EIC).[78] For facilities and maintenance, CTA accepted new evidence from HAL that cleaning costs are linked to staff costs and so should be indexed to wage inflation. For operational costs, CTA accepted HAL's evidence and used a bespoke price index with a 25/52/23 split between labour, CPI and RPI inflation, based on a bottom-up analysis of HAL's contracts. A summary of the input price inflation adopted by CAA for its final proposals is given in Table 3.1.

Table 3.1: Revised price series assumptions from CAA final proposals

Cost item	Price series
People	Bespoke wage series: zero growth in 2020 and 2021; with above-average wage growth in 2023 and 2024; OBR-implied wage growth thereafter.
Operational	52/23/25 blend of CPI/RPI/labour
Insurance	CTA bespoke series
Facilities and Maintenance	86/14 blend of CPI/labour
Rates	CPI
Utility	HAL bespoke series
Distribution contract	RPI
General expenses	CPI
Other	CPI

Source: CTA report Table 9.2

3.3.3   Key lessons from the aviation sector

We do not wholly agree with the approach that the CAA has taken for H7. In particular, the reliance on HAL's existing contracts and internal expenditure data as inputs for a number of the bespoke price series is an area where the approach could be improved, for example by analysing external indices and forecasts. Nonetheless, the CAA's approach is relevant for the purposes of this review. It is up-to-date, and its ongoing H7 price review is dealing with similar challenges to PR23.

The criticism levelled at the use of tender price indices (TPIs) by the CAA during Q6, and previously by the CC, is potentially applicable to rail, given that TPIs are often used by Network Rail. We have reviewed this critique and recent changes to the BCIS TPI methodology, including the introduction of a Delphi method.

The treatment of long-term RPI-linked contracts HAL is tied into with NATS and distribution providers may or may not provide a relevant precedent for Network Rail. However, we tentatively suggest that Network Rail may have greater bargaining power when negotiating supply chain contracts than HAL does when negotiating with NATS.[79] The issue of a lack of bargaining power may be more relevant in the context of Network Rail's labour cost inflation.

---

[78]   EIC (2021) Delivered Electricity Price Forecast.

[79]   Heathrow Airport has no choice of alternative provider when negotiating with NATS and hence may have limited bargaining power. This kind of situation is less likely to apply when Network Rail is putting work out to tender. However, our study does not conduct a formal test of market power, hence we make this point tentatively.

3.4 Approach taken by Ofcom in the telecoms sector

Ofcom sets charge controls for the UK telecommunications sector. Our case study focuses on its regulation of British Telecoms (BT). Ofcom has maintained a consistent approach to input price inflation in three recent market reviews, which we summarise in this case study.

To forecast costs over each control period, Ofcom made assumptions about the inflation of operating costs and asset prices.[80] Ofcom forecasted inflation for pay opex, non-pay opex and assets separately.

To forecast pay cost inflation, Ofcom considered four sources of evidence:

- Historical and forecast pay cost data from BT's management accounts
- Historical pay cost data from BT's Annual Reports
- Public reports of BT's discussions on future pay awards with its Trade Unions
- Economy-wide studies of historical and forecast changes in pay costs

Ofcom's proposed pay cost inflation rate for the control period was based on its assessment of the evidence as a whole.[81]. For 2017/18, 2018/19 and 2019/20 pay inflation, Ofcom gave most weight to BT's forecasts of its pay costs, whilst also stating that it considered the trade union agreements and external forecasts for the economy as a whole. For 2020/21, Ofcom used BT's forecasts of total labour cost (TLC) and the OBR's forecasts of average earnings growth. It is not clear exactly how Ofcom synthesised these various sources to derive its pay forecast, but its final decision was a geometric mean (i.e. CAGR) pay cost inflation assumption of 2.8 per cent per annum between 2017/18 and 2020/21.

For non-pay operating cost inflation, Ofcom considered separately cost inflation estimates for energy, accommodation and all other non-pay operating costs. It then weighted the forecasts using information from BT's regulatory accounts to reflect the different cost mix of different BT service groups. Ofcom used the latest available electricity price forecasts produced by BEIS for its energy cost inflation assumptions. Ofcom assumed that all of BT's accommodation costs (except for its business rates costs, which were excluded from the estimate of non-pay inflation) would increase at 3 per cent per year over the control period.

Ofcom used OBR's RPI forecasts up to 2020/21 to set forecast asset price inflation for duct and copper assets over the control period, consistent with how they were revalued for current cost accounting purposes in BT's Regulatory Financial Statements. All other asset prices were assumed to stay flat in nominal terms.

3.4.1 Key findings from the telecoms sector

There are two key disadvantages to applying Ofcom's approach to rail. Firstly, it is not sufficiently up-to-date and therefore caution would be required in applying it to the current high-inflation environment. Secondly, we consider that certain aspects of Ofcom's approach to forecasting input price inflation may not necessarily lead to efficient cost allowances. Ofcom makes some use of external, independent data sources, but its reliance on internal data and forecasts provided by the company it regulates – without describing whether and how it challenged this analysis – could potentially be improved.

3.5 The Utility Regulator's approach in the water sector in Northern Ireland

The Utility Regulator sets price controls for Northern Ireland Water, the most recent of which was PC21, which covers the six-year period 2021-2027.

For PC21, the Utility Regulator's input price inflation analysis was a component of its frontier shift methodology. The Utility Regulator combines nominal input price forecasts with productivity expectations

---

[80] 2018 WLA statement, Annexes 17-27, paragraph A17.4
[81] 2018 WLA statement, Annexes 17-27, paragraph A17.6

and a general inflation forecast (measured using RPI forecasts from the OBR) to determine the "frontier shift in real terms" to be applied to the PC21 opex and capex targets for NI Water.

The Utility Regulator undertook analysis of the macroeconomic outlook as part of its input price inflation forecasting process. It analysed forecasts from the OBR, the International Monetary Fund (IMF) and the Ulster University Economic Policy Centre (UUEPC) for GDP and GVA. All three sources gave similar projections – following a large contraction in 2020/21 (reflecting the impacts of the COVID-19 pandemic on the economy), strong economic growth was projected for 2021 and 2022, with the growth rate levelling off subsequently.

For both opex and capex, the Utility Regulator based its input price inflation analysis on the cost structure of a hypothetical water company. For opex, it estimated RPEs for labour, materials and equipment, chemicals and power. For capex, additional RPEs were estimated for construction materials and plant and equipment.

For labour, the Utility Regulator analysed historical data from three ONS indices[82] and OBR projections of average earnings growth. It noted that typically OBR average hourly earnings are preferable, but at the time of PC21 these were significantly influenced by the impacts of the pandemic. OBR's projected hourly earnings growth rate swung significantly from double digit growth in 2020/21 to a contraction of 8 percent in 2021/22. The RPE assumptions for the remaining cost categories were largely based on historical averages of selected ONS indices, though for chemicals it took the view that future chemical prices may be more closely linked to global growth than to the long-term trend growth rate of the ONS PPI. For power, the Utility Regulator focused on electricity and used the average of two sets of forecasts for electricity prices: BEIS Updated Energy and Emissions Projections and the Department for Energy and Climate Change (DECC) estimates for electricity price growth up to 2035.

All costs outside of those in categories noted above were assumed to move in line with RPI.

3.5.1 Key lessons from the Northern Irish water sector

The Utility Regulator's approach is of limited relevance, due to it not being sufficiently up-to-date and because the level of detail provided in the Utility Regulator's published documents is lower than that for the other sectors we have analysed. The use of RPI as the default measure of general inflation is not an approach we consider to be valid.

The Utility Regulator's analysis of the wider macroeconomic outlook, including an assessment of UK GDP and global GDP forecasts, could be applied in the rail context. The difficulty at present revolves around the uncertainty of economic forecasts, and therefore the usefulness of drawing conclusions from such forecasts may be more limited now than when the Utility Regulator conducted its analysis. Nonetheless, it is possible that it might offer some insight into trends for the prices of specific inputs that are affected by global demand (e.g. steel).

3.6 Overview of key findings from across the case studies

The key findings we have identified from the case studies and applied to our critique of Network Rail's methodology for forecasting input price inflation are:

- Typically, only short-term independent forecasts for input prices are available, and potentially only for economy-wide inflation, wage inflation and energy price inflation. Estimating RPEs over a longer period or for other cost categories requires a different approach, such as historical data analysis.
- For historical data analysis, it is important to carefully consider the selection of the historical data period and to have awareness of potential structural breaks.

---

[82] Details on all indices used by the Utility Regulator for PC21 can be found in the Appendices.

- There is merit in applying a materiality threshold/criterion to input price inflation analysis to ensure that the complexity of calculating suitable RPE adjustments is only undertaken when there is a material need to do so.
- The challenges of estimating input price inflation in the current macroeconomic environment has been acknowledged in other sectors conducting price reviews in 2022 (energy and aviation). However, the ability to use ex post indexation mechanisms in those sectors mitigates the problem of having highly uncertain forecasts, whereas ex post indexation is not feasible in the rail sector.
- Ofwat's approach provides a useful, CMA-endorsed framework that, with suitable adjustments, could aid in the assessment of the approach taken by Network Rail.
- The most recent input cost forecast is not necessarily the correct one to use. The date of a forecast must be understood in conjunction with the macroeconomic context at the time.
- There may be inherent limitations in the method used to estimate Tender Price Indices that make them inappropriate to use to forecast input price inflation for regulatory purposes.

4 Assessment of Network Rail's Approach

This chapter reviews Network Rail's approach to forecasting inflation and input prices in CP7. It begins by describing Network Rail's approach in this area. It then assesses Network Rail's approach to forecasting CPI inflation, followed by a critique of its approach to forecasting real price effects (i.e. any changes in input price growth that differ from CPI inflation). Based on this critique, the chapter outlines our proposed framework for determining whether a RPE should be applied to a cost category, and then applies this framework to high-level cost categories for Network Rail. The chapter concludes with RPE recommendations.

4.1 Summary of Network Rail's approach

From discussion with Network Rail, we understand that its strategic business plan (SBP) will use the OBR's November 2022 forecast of CPI, with additional input price inflation (i.e. over and above CPI) assumed respectively for renewals and opex. We understand that Network Rail is likely to update its headline SBP figures for updated official CPI forecasts from OBR and/or the Bank of England that become available during 2023.

Network Rail's assumptions for input price inflation over CP7 are based on analysis of the historical wedge between selected input price indices and CPI. This analysis was carried out before the large rise in inflation that took place in 2022, and hence does not consider whether historical relationships have continued to hold during the current period of high inflation.

Network Rail's modelling is very disaggregated, in that it considers input price movements for a large number of detailed cost items. For renewals, Network Rail has first broken down its expenditure into the following cost elements:

- track;
- signalling;
- civils;
- buildings;
- telecoms;
- electrification;
- IT;
- plant & machinery; and
- other.

Each of these higher-level cost elements is then broken down further into detailed cost items. By way of example, track renewals has been broken down into 21 cost items, while signalling renewals has been broken down into nine cost items. In total, there are 72 detailed cost items for renewals.

For opex, it has broken down its expenditure into the following cost elements:

- Maintenance
- Non Route Support & Operations
- Route Support & Operations
- Telecoms Support
- Industry costs (excluding BTP and EC4T).

Each of these cost elements is again broken down into more detailed cost items. In total there are 30 detailed cost items for opex.

For each of these detailed cost items, Network Rail then identifies one or more input price indices (and the relative weighting to place on them) that it considers to be the best reflection of movements in input prices for that cost item.

The average historical growth of each series is calculated as the five-year compound average growth rate (CAGR) between financial years 2015-16 and 2020-21. These historical averages are used as the basis for Network Rail's forecasts of RPEs. In discussions with Network Rail, it acknowledged that basing forecasts on historical data is not necessarily the optimum method in the current inflationary context, given the difficulty in extrapolating historical trends.

To calculate an aggregate RPE for renewals and opex respectively, Network Rail applies weights to the detailed cost items (and hence to the CAGRs of the corresponding input price indices) based on the share of each cost item in its cost base. In the spreadsheet that Network Rail sent to us, this yielded input price inflation assumptions of CPI +0.6 per cent for opex and CPI +1.8 per cent for renewals.

4.2   Critique of Network Rail's approach to forecasting inflation

While it is appropriate for Network Rail to use official forecasts of CPI inflation in its SBP, as discussed in section 2 neither the OBR nor the Bank of England forecasts published in November 2022 are likely to represent the future path of CPI over CP7. This is because both forecasts were based on the market-implied path of interest rates, and the Bank of England stated explicitly at the time that it did not expect to raise interest rates by as much as was then implied by financial markets. Consequently, both the OBR and the Bank of England forecasts from November 2022 are likely to understate future CPI inflation. Given this, it would seem unwise for Network Rail's budgeting for CP7 to be based on the forecasted deflation implied by the OBR's November forecasts.

In the light of this, we consider that it will be important for Network Rail to update its SBP figures using more up-to-date official forecasts that become available during 2023. As explained in section 2, market expectations of the peak interest rate have fallen since November 2022, and the Governor of the Bank of England is no longer suggesting that the market expectation is out of line. Hence, we consider future CPI forecasts by the OBR and/or the Bank or England may provide a better basis on which to plan Network Rail's expenditure over CP7.

4.3   Critique of Network Rail's approach to forecasting RPEs

In this sub-section, we set out our critique of Network Rail's approach to forecasting RPEs under the following two headings:

- the framework used by Network Rail; and
- the weightings used by Network Rail.

4.3.1   The framework used by Network Rail

In our view, Network Rail's analysis is done at a much too disaggregated level, using cost categories which do not always relate in a clear way to different types of input price. To illustrate the high level of disaggregation that Network Rail is using, an input price indices are identified for detailed cost items as small as 'contaminated/used ballast', which represents 0.2 per cent of renewals, and for 'net material costs for route support and operations', which represents 0.1 per cent of opex. While it may be useful for Network Rail to understand the detailed breakdown of its cost base for other management purposes, for the purpose of

analysing RPEs we consider that it should use higher level cost categories that relate more closely to different types of input (e.g. labour, plant, materials).

The very disaggregated approach being used by Network Rail is out of line with precedents in other sectors. Other sectors consider higher-level cost categories in their RPE analysis, as we demonstrate in Section 3 and Appendices 2 to 6. For example, at PR19 Ofwat considered four high-level cost categories in its RPEs analysis (labour, energy, chemicals, and materials, plant and equipment) along with an "other" category. The use of higher-level categories clearly linked to different types of input improves the tractability of the analysis and generally improves transparency.

Network Rail's approach is also inconsistent with the suggestion that has been made in other sectors that RPEs should only be allowed for material cost items. In its final redeterminations of PR19, the water industry's most recent price control, the CMA suggested that materiality thresholds would improve the approach taken to RPEs.[83] It explored the application of a materiality threshold whereby RPE analysis would not be allowed for cost items that represent less than 10 per cent of totex. In the aviation sector, the CAA took some account of whether cost items passed a materiality threshold of 5 per cent of totex in carrying out its RPEs analysis. Applying a materiality threshold would mean that RPEs are only investigated for categories of costs that comprise a meaningful share of expenditure.

There are number of serious disadvantages to the very disaggregated approach that Network Rail has employed:

- First, it makes the analysis less transparent, as the high level of disaggregation can obscure the main drivers of the conclusions reached in the RPE analysis. As explained in the next section, Network Rail's estimated RPEs are driven by the very high weight it has placed on two particular indices (RPI and the BCIS TPI). However, this fact is not immediately obvious from Network Rail's spreadsheet, as the input assumptions that in aggregate place such a high weight on these indices are distributed among many lines of assumptions for different detailed cost items.

- Second, it requires a disproportionate amount of resource. It is clearly disproportionate for Network Rail and the regulator to spend resource debating the right input price indices to use for items such as "design and track bed investigation" for track renewals (representing 0.3 per cent of total renewals expenditure) or "possession management" (again representing 0.3 per cent of total renewals expenditure). Further, where different cost items relate to the same kind of input (e.g. staff for track renewals and staff for signalling renewals), it makes sense to consider them together rather than separately.

- Third, it creates greater scope for Network Rail to use information asymmetry to its advantage. Network Rail has more information about its cost drivers than the regulator. The use of a very disaggregated approach based on cost items that are not always clearly linked to a particular type of input makes it difficult for ORR to apply effective scrutiny. ORR will have limited regulatory resource to review the assumptions that have been made about the best input price indices to use for each detailed cost element. Network Rail will also have an information advantage in any discussions that take place about these assumptions.

4.3.2 The weightings used by Network Rail

The method of assigning weights to detailed cost elements and thus to the indices selected for each one could lead to a situation in which a wide range of indices underpin the RPE analysis. We find the opposite is

---

[83] CMA (2021) "Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations – final report", paragraphs 4.675-4.679 [online]

the case in Network Rail's analysis: our calculations show that Network Rail is placing a very large weight on just two price indices.

This is illustrated in the figure below. In the renewals area, the BCIS TPI with a one-year lag is being applied to 44 per cent of the cost base, and RPI to 20 per cent. For opex, RPI is being applied to nearly 85 per cent of the cost base.

Figure 4.1: The effective weights applied to different indices for renewals and opex
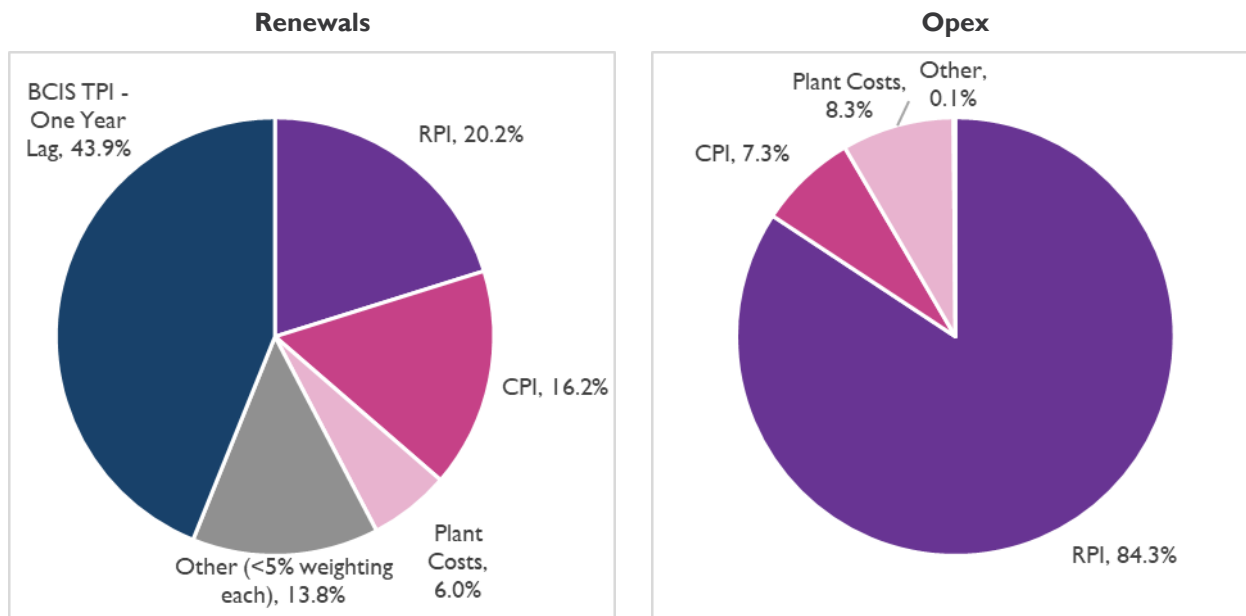
Source: Europe Economics analysis of Network Rail data.

We consider that the use of RPI as a proxy for movements in any input price is wholly unjustifiable (with the possible expectation of inputs purchased under any long-term contracts which include RPI indexation and which cannot be changed). The status of RPI as an inflation measure has diminished over the last decade, and it is no longer recognised by the ONS as a valid measure of inflation. The use of RPI is also out of line with what other regulators and regulated entities do. Network Rail uses RPI as a proxy for the growth in wages of certain types of staff, but the considerable growth in real wages that this implies is out of line with historical real wage growth across the economy and hence this does not represent efficient cost control by Network Rail (see later analysis of input price movements for staff).

The high reliance on the BCIS TPI may also be a cause for concern. The analysis of comparator sectors has highlighted that the CAA, the aviation regulator, and the Competition Commission (CC; precursor to the CMA) have previously identified issues with the forecasts constructed for the BCIS TPI. This criticism is not relevant for our purposes, given that Network Rail relies on a CAGR of historical BCIS TPI values, rather than a BCIS TPI forecast. However, the CC also considered that TPIs in general only measure the prices that construction firms bid, not the price paid by clients.[84] This would suggest that TPIs may not capture the actual prices Network Rail faces. The methodology used to produce the BCIS TPI currently involves the submission of data by a panel of cost consultants, which is then analysed and used to inform a panel discussion which leads to an agreed consensus on the increase in the index.[85] This BCIS process uses the Delphi survey approach. However, academic literature suggests that the Delphi approach can sometimes lead to biases, as set out in Appendix 7.

---

84 CAA (2013) 'CAP 1151: Economic regulation at Heathrow from April 2014: Notice granting the licence', Paragraph C57 [online]
85 https://bcis.co.uk/insight/bcis-tender-price-index-panel/#:~:text=The%20BCIS%20Tender%20Price%20Index,the%20last%20quarter%20is%20completed

Moreover, Network Rail applies a one-year lag to the BCIS TPI, which in our view is inappropriate. Our understanding is that Network Rail would seek to justify this lag with reference to the time it takes for tender prices to work through into actual prices paid by Network Rail after tenders have been procured. However, we note that this choice increases the CAGR from 3.97 per cent to 5.15 per cent, and we cannot see any clear rationale why the period 2014-15 to 2019-20 should be seen as a better representation of likely movements in this price index over CP7 than the period 2015-16 to 2020-21 that Network Rail uses for other input price indices. Indeed, given the length of the historical BCIS TPI series Network Rail has access to, and that it uses a single growth rate in its RPE framework, calculating an overall growth rate from the full data series available would in our view make better use of the available historical data.

4.4 Our proposed framework

Given the drawbacks of the very disaggregated approach to assessing RPEs used by Network Rail, we have carried out our own RPEs analysis using much higher-level cost categories. In our analysis, we have analysed a number of input price indices that we consider to be relevant for each of the higher-level cost categories. We have rejected any use of RPI (given that it is not recognised by the ONS as an accurate measure of inflation) and we have made clear where our conclusions depend on the weight that is placed on BCIS data.

Our analytical framework assesses whether there are any RPEs that are material, not already captured in CPI, and outside management control.[86] This is used to identify those cost categories for which there may be a case for providing an RPE allowance.

4.4.1 The criteria for assessment

The criteria for our assessment are:

1. **Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the control period?** We assess cost categories against this criterion by analysing whether the historical wedges between relevant input prices for that cost category and CPI are statistically significantly different from zero.[87] We also consider forward-looking evidence from forecast data where available, and recognise that prices for some inputs (e.g. electricity) may come down in the future from their current elevated levels. If this criterion is passed then there may be a case for an RPE allowance if other criteria are also met.

2. **Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?** To assess cost items against this criterion, we consider the share of a cost item in Network Rail's opex and renewals expenditure with the share of the most comparable cost item(s) in the CPI basket. The logic is that if the share of a cost item in Network Rail's cost base is similar to the share of that cost item in CPI, then CPI inflation should already capture any input price inflation for that cost category. A cost item fails this criterion if there is no conclusive evidence that CPI does not adequately capture the input price, while a cost item partially passes this criterion if the input price is partly, but not fully, captured by CPI.

3. **Is the input price and exposure to that input price outside management control for the duration of the control period?** This criterion asks whether Network Rail's management could make changes to mitigate the risk of RPEs for different cost items. To assist our analysis of whether input costs are outside management control, we have developed the following typology of hypothetical ways in which Network

---

[86] This framework is an adaptation of the framework we applied to water companies' costs at PR19. See Europe Economics (2019), 'Real Price Effects and Frontier Shift – Final Assessment and Response to Company Representations' [online]

[87] This is done by applying a t-test of statistical significance to the wedge, using a significance level of 95 per cent.

Rail might limit its exposure to increases in input prices. (Note that these are only hypothetical possibilities; what Network Rail can actually do in response to increases in input prices is discussed later when we assess each input cost area against this criterion. We also acknowledge that there may be lags before some of these actions can be taken e.g. due to existing contracts or investment lead times.)

A. Network Rail may be able to control the level of the price paid for the input, either because:

- It has buyer power in that market for that input, perhaps because the market for that input is local and it is a major local purchaser; or
- Due to inefficient management, it was initially paying above the competitive market price and is now able to reduce the price it pays down towards the competitive level.

B. Network Rail reduce the volume of the input that it uses. That could be achieved by:

- Greater efficiency in the use of that input. The increase in the input price will incentivise greater investment (e.g. in new processes) that will reduce the use of that input. We would still expect an increase in overall cost as such investment will not be costless, but the cost increase would be lower than if Network Rail paid the increased input price on the initial volume of the input.
- Substitution to other inputs as Network Rail re-optimises its mix of inputs in response to the change in relative input prices. Again, in this case total costs are still likely to increase since, with at least one input price being higher and other input prices being unchanged, the efficient cost must have gone up. However, the increase in total cost will be less than would be the case if Network Rail had kept its input mix fixed and been exposed to the full effect of the increase in the price of the input.

In cases where Network Rail has the ability to avoid input price pressure by reducing the volume of the input it uses (for example, by substituting on a significant scale to other inputs), we would consider this a 'partial pass' against this criterion.

In addition to assessing cost categories against the above three criteria, we also give some attention to the materiality of cost categories in our RPEs assessment. Drawing on regulatory precedents, we consider that it is disproportionate to apply an RPE allowance for cost categories that account for less than 5 per cent of opex or renewals expenditure. We consider that an RPE allowance should only be applied for cost categories accounting for between 5 and 10 per cent of costs if there is very strong evidence of a material wedge between input price inflation for that cost category and CPI inflation.

In analysing the existence and magnitude of historical wedges for criterion 1, we focus on years that are not affected by the current period of high inflation. In most cases, this involves analysing years up to and including 2020, after which historical relationships between CPI and input prices may break down. As a sensitivity, we show the impact of including the current inflationary period by also reporting the results using the full historical period (i.e. including the years 2021 and 2022).

4.4.2   The cost elements

We apply the above criteria to five categories of costs that are defined in Network Rail's RPEs model (but which do not seem to be used as the categories to which RPEs analysis is applied in Network Rail's approach). These categories are: staff, plant, materials, contractors, and "other". A summary of the breakdown of Network's opex and renewals expenditure into these cost categories is provided in the table below.

Table 4.1: Network Rail's total planned expenditure for CP7 broken down by cost element

Cost category	Expenditure (£m)		Percentage share (%)	
	Opex	**Renewals**	**Opex**	**Renewals**
Staff	8,974	1,870	51.9	7.8
Plant	1,615	1,327	9.3	5.6
Materials	708	3,387	4.1	14.2
Contractors	1,362	13,241	7.9	55.5
Other	4,635	4,031	26.8	16.9
Total	**17,293**	**23,856**	**100.0**	**100.0**

Source: Europe Economics analysis of Network Rail CP7 input price analysis

While the above categorisation of costs is useable for the purpose of RPEs analysis, it could potentially be improved. The categories of staff, plant, and materials are in line with the kind of cost categories used by other regulators and do not need to be adjusted.[88] However, it is not ideal to have "contractors" as a cost category, as it does not relate to a specific type of input. Instead, it would be better to decompose the costs of contractors into the underlying inputs used by contractors (e.g. staff, plant, materials) and to include these costs within the other categories. It is necessary to include an "other" category to capture costs that do not fit within the other categories, but as this category is hard to analyse it is ideal if this category does not account for too large a proportion of costs. Finally, we suggest that in the current context Network Rail should give consideration to splitting electricity (or energy) costs into a separate category. This reflects the fact that electricity is likely to account for a significant proportion of the opex associated with running the railways given its use for traction, and the fact that it is a key a driver of current inflation (and the anticipated fall in inflation over the next couple of years).

For the purpose of this contract, however, we have carried out the analysis using these existing cost categories, as this reflects the data that are currently available.

4.5 Our RPEs assessment

In this section, we assess each cost category in turn against the criteria in our proposed RPE framework. In each case, we set out the evidence that we use in assessing the cost item against the criterion, and conclude by stating whether the criterion is passed or failed. A table at the end of the section summarises the results of this analysis.

4.5.1 Staff

As discussed previously, Network Rail's approach of using RPI to forecast a large share of its wage inflation is not an approach we consider appropriate. In this section we use our RPE framework to determine whether or not there is compelling evidence that efficient wage rates for Network Rail's staff change at a different rate from CPI.

We analysed wage indices for the period 2012-22 (the period for which data are available) for three specific occupational categories published by the ONS as parts of its Annual Survey of Hours and Earnings (ASHE) dataset – "Professional Occupations", "Skilled Trades" and "Process, plant and machine operatives". We selected these three occupational groups because between them they seem likely to capture a significant portion of Network Rail's staff base. An alternative approach would have been to select sector-specific wage indices, such as construction sector wage indices or manufacturing sector wage indices, but in our view the SIC classifications do not map well onto Network Rail's infrastructure management activities. This appears

---

[88] For example, at PR19 the cost categories considered by Ofwat in its RPEs analysis included "labour" and "materials, plant and equipment".

to be a view shared by Network Rail, as in its own input price inflation analysis it identifies the same three occupation-specific indices and does not use any sector-specific ONS wage indices.

We find evidence of moderate correlation between the Skilled Trade index and CPI and between the Process, Plant and Machine Operatives index and CPI. In both cases, the correlation coefficient between the ONS index and CPI is slightly over 0.5 for the period 2012-2022. For the Professional Occupations index, there is weaker evidence of correlation with CPI, with a correlation coefficient of 0.23.

We also consider evidence on whole-economy wage inflation from the ONS Average Weekly Earnings (AWE) dataset. We do not find strong evidence that the AWE index is correlated with CPI (correlation coefficient of 0.18).

Is the expected value of the wedge between the input price and CPI materially different from zero?

To assess staff costs against this criterion, we consider evidence on the relationship between movements in wage rates and movements in CPI. We have considered evidence on general wage inflation and on occupation-specific wage inflation.

Figure 4.2 presents the annual growth rates for the three wage indices and CPI. Wage data for 2020-22 are likely to have been distorted by reduced wages during the furlough scheme and the subsequent rebound in wages when the furlough scheme came to an end.[89] As a result, we have excluded data from 2020 and 2021 from our wedge analysis.

Figure 4.2: Growth rates of occupation-specific ASHE indices and CPI (2012-2022)
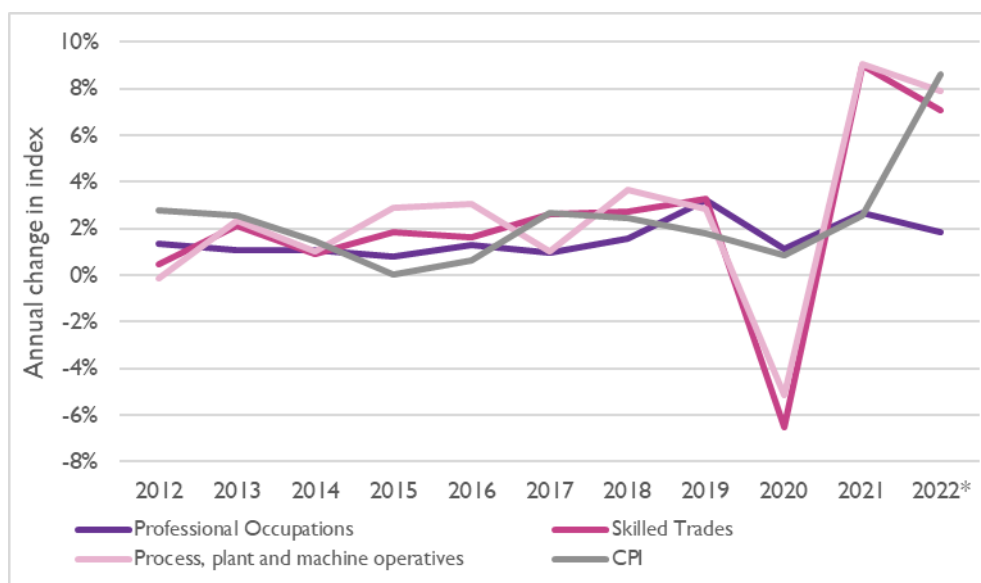
*2022 data for ASHE indices is provisional.
Source: ONS data

The average wedge between changes in the Professional Occupations index and changes in CPI over the period 2011-2019 is -0.4 per cent, though the wedge is not statistically significantly different from zero at the 5 per cent significance level.[90] The Skilled Trades – CPI wedge is 0.1 per cent while the Process, Plant and Machine Operatives – CPI wedge is 0.3 per cent, and in both cases the wedge is not significantly different

---

[89] This distortion to earnings growth data during 2020 and 2021 is acknowledged by the ONS in the following article: How furlough and changes in the employee workforce have affected earnings growth during the coronavirus (COVID-19) pandemic, UK: 2020 to 2021 - Office for National Statistics (ons.gov.uk)

[90] We perform a two-tailed t-test on the wedge to assess whether it is significantly different from zero. All statistical significance tests in this report are carried out at the 5 per cent significance level.

from zero in statistical terms. Therefore, the occupation-specific wage evidence does not indicate there is a material wedge between wage inflation and CPI.

As well as considering occupation-specific evidence, we consider if there is evidence that general wage inflation differs from CPI. To do this, we compare historical data on whole economy wages from the ONS Average Weekly Earnings (AWE) dataset with CPI over the period 2001-2022. The AWE Total Pay index measures growth in weekly nominal total pay (i.e. inclusive of bonuses) in Great Britain. As shown in Figure 4.3, changes in CPI are not a reliable predictor of changes in whole economy wages. The figure also shows that the AWE index is affected by the furlough scheme in 2020 and 2021, as noted by the ONS.[91] Therefore, our wedge analysis excludes data from those years.

Figure 4.3: Growth rates of AWE Total Pay index and CPI (2001-2022)
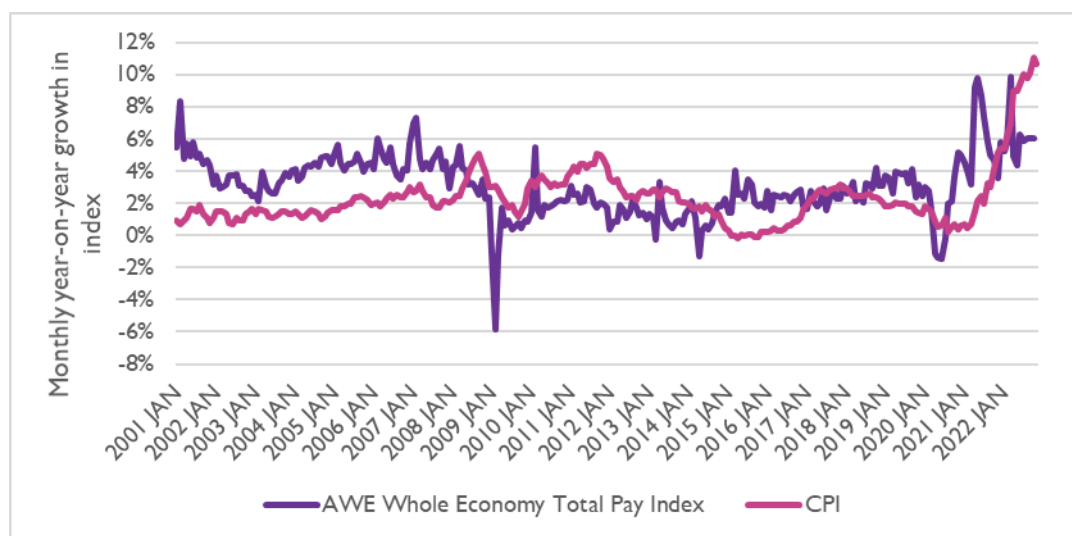
Source: ONS data

While there is evidence of a wedge between wage inflation and CPI prior to the 2008 financial crisis, in the years since then the wedge has not been significantly different from zero. Table 4.2 presents the average wedge between the growth of the two indices over various time periods. Over the full historical period (2001-2019), there is a positive wedge between the changes in the AWE index and changes in CPI of 0.8 per cent, but it is not statistically significant at the 5 per cent level. If the dataset is restricted to data from after the 2008 financial crisis (2010-2019), the wedge between the AWE index and CPI is -0.1 per cent, and is not statistically significant. Given the financial crisis represents a structural break in the UK economy and the UK labour market, we place more weight on the wedge analysis that only uses post-2009 data (though the conclusions from the wedge analysis are the same for either historical period). Therefore, the historical AWE index data indicates that we should not expect a material difference between changes in whole economy wages and changes in CPI.

Table 4.2: Average wedge between growth rates for AWE Total Pay index and CPI over different time periods, with T-statistics

	2001-2019	2010-2020
Average wedge (%)	0.8	-0.1
T-statistic	1.80	-0.17

Note: T-statistic refers to the two-tailed test that the average wedge is not significantly different from zero.

Finally, we have also investigated the case for an RPE based on relevant forecast data. The only independent forecasts available for wage inflation are those published by the OBR and the Bank of England. We use OBR's

---

[91] How furlough and changes in the employee workforce have affected earnings growth during the coronavirus (COVID-19) pandemic, UK: 2020 to 2021 - Office for National Statistics (ons.gov.uk)

most recent forecasts (from November 2022) for nominal average earnings growth for our analysis, as they are the most up-to-date at the time of writing. We compare the OBR forecasts with forecasts for CPI (also published by the OBR). In the case of both average earnings growth and CPI, the OBR currently forecasts growth out to 2027. These forecasts are presented in Table 4.3. We have reported the forecast figures for calendar years, but we recognise that Network Rail would need to use figures for financial years (i.e. 1 April to 31 March) in its analysis.

Table 4.3: OBR forecasts for CPI and nominal average earnings growth (%, 2023-2027)

	2023	2024	2025	2026	2027
Nominal growth in average earnings (%)	4.2	1.7	1.7	1.9	2.7
CPI (%)	7.4	0.6	-0.8	0.2	1.7
Real growth in average earnings (%)	-3.0	1.1	2.5	1.8	0.9

Source: OBR Economic and Financial Outlook (November 2022)

The average wedge between the forecast annual growth in CPI and the forecast annual growth in earnings over the period 2023-2027 is 0.6 per cent, Excluding the 2023 forecasts (which are not relevant to wage inflation in CP7) leads to a positive wedge of 1.6 per cent between earnings growth and CPI. The forecasted compound annual growth rate (CAGR) for average earnings for the period 2024-2027 is 2.1 per cent, which is 1.7 percentage points higher than the CAGR for CPI over the same period. This indicates that, if OBR's forecast were to materialise, real wages will rise from the start of CP7 onwards. Given the sharp decline in real wages in 2022, which is likely to continue in 2023 based on the above forecasts, it is not surprising that a catch-up in real wages is forecasted from 2024 onwards. Therefore, the OBR forecasts do suggest a positive wedge in wage growth over CPI growth in CP7.

In addition to the OBR forecast, we have analysed the most recent (February 2023) Bank of England forecasts for wage inflation. These forecasts only extend to 2025. We compare the Bank's forecasts for average weekly earnings growth with its own forecasts for CPI. These forecasts are presented in the table below.

Table 4.4: Bank of England forecasts for CPI and nominal average earnings growth (%, 2023-2025)

	2023	2024	2025
Nominal growth in average earnings (%)	4.0	2.3	1.5
CPI (%)	4.0	1.5	0.5
Real growth in average earnings (%)	0.0	0.8	1.0

Source: Bank of England MPC report (February 2023)

The Bank of England's implied forecast for real wage growth in 2024 and 2025 is lower than the corresponding forecasts from OBR, but still suggests a positive wedge in wage growth over CPI growth in the first two years CP7. The wedge between the associated CAGRs is 1 per cent.

Overall, whether or not one expects there to be a material wedge between staff costs and CPI depends upon how much weight is given to the OBR forecasts for 2024-2027. The evidence from historical data suggests that there is no material wedge between Network Rail's staff costs and CPI, but this data may not be a reliable predictor of the wedge in the future if the current inflationary spike represents another structural break in the UK economy. The OBR's forecasted catch-up in economy-wide real wages from 2024 onwards, if it materialises, would mean that the value of the wedge between staff costs and CPI will be materially larger than zero in CP7.

Historically, however, OBR forecasts of CPI and earnings growth have been unreliable. This is clear from Figure 4.4, which plots historical OBR earnings growth forecasts against outturn earnings growth and shows that OBR has had a general tendency to overestimate earnings growth in its forecasts. For example, OBR's forecasts for 2014 earnings growth made in 2010 and 2011 were 2.4 and 2.3 per cent higher, respectively, than outturn earnings growth in 2014. (OBR forecasts underestimated earnings growth in 2021, but that may largely reflect the rebound in earnings following the end of the furlough scheme.)

Figure 4.4: OBR average earnings growth forecasts versus actual outturn earnings growth (2011-2021)
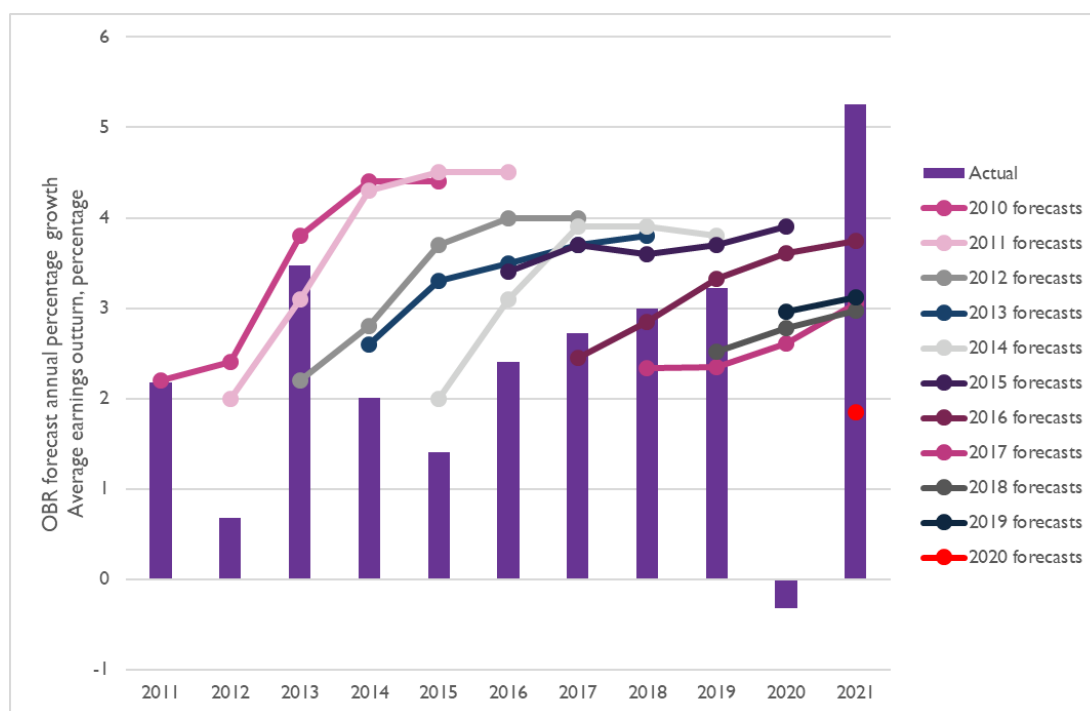
Source: Various OBR sources. Forecasts are taken from the OBR Autumn/Winter Economic and Fiscal Outlook for each year, with the exception of 2019 where only a March outlook was published.

Further, as discussed in Section 2, the OBR's November forecast was based on the market-implied path of interest rates, even though the Bank of England made clear at the time that it did not consider it would need to raise interest rates by as much as the market was then assuming. This suggests that CPI inflation may not be pushed down as much as suggested by the OBR forecast, and hence it is unclear that the wedge between earnings growth and CPI inflation implied by the OBR forecasts will materialise.

The market-implied peak in interest rates has fallen since November, and the Bank of England is no longer suggesting that the market is out of line. This suggests that future forecasts of CPI and wage inflation by the OBR and the Bank of England that employ the market-implied path of interest rates may be more reliable. The February 2023 forecasts from the Bank of England suggest a smaller wedge than the November 2022 OBR forecasts, though the Bank's forecast only cover the first two years of CP7. Hence, we would advise ORR to wait for updated official forecasts from the OBR before reaching a final view on whether an RPE should be allowed for labour.

Whether the criterion is passed or failed depends on how much weight is given to OBR forecasts.

Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?

Staff costs account for slightly over a half of Network Rail's opex (51.9 per cent) and 7.8 per cent of its renewals expenditure. There is no discrete item for labour in the CPI basket,[92] and hence we conclude that CPI does not directly capture changes in labour costs. Therefore, this cost category passes this criterion.

Criterion passed.

---

[92] We note that labour costs will feed indirectly into the price of consumer goods and services that comprise CPI. However, the inclusion of such indirect effects would require ORR, for consistency, to net off productivity growth in other sectors when doing its frontier shift analysis, as CPI reflects both input price growth and productivity growth in comparator sectors. We therefore consider that the inclusion of such indirect effects is not appropriate.

Is the input price and exposure to that input price outside management control for the duration of the price control?

To assess staff costs against this criterion, we consider each of the two hypothetical ways in which Network Rail might limit its exposure to increases in input prices.

A. Controlling the level of the price paid for the input.[93] A recent benchmarking study into the rail industry's employment costs found that total remuneration for head office and operation roles at Network Rail was in line with market comparators.[94] This would imply that Network Rail has little scope to limit increases in wage rates for these roles if wages for similar jobs are increasing in the rest of the economy. Failure to increase wages in such circumstances could see employees move to roles with similar skill requirements in other sectors, as well as creating difficulties in attracting new personnel. In contrast, total remuneration for maintenance roles at Network Rail was found to be significantly above market rates – 18 per cent higher than the market median[95] – indicating that it may be possible for Network Rail to reduce the real value of wages for these roles. This implies that if real pay increases across the economy, Network Rail may have scope to limit wage increases for these roles to less than that observed in the rest of the economy. Hence, this cost category partially passes this sub-criterion.

B. Reducing the volume of the input. Network Rail might be able to respond to increases in labour costs by reducing the volume of labour it uses by substituting capital for labour. This could also change the composition of the workforce, by reducing the number of low skilled roles and increasing the number of high skilled roles. Given the possible scope for Network Rail to substitute capital for labour and thus reduce the volume of labour, this cost category partially passes this sub-criterion.

Criterion partially passed.

4.5.2 Plant

We have analysed three producer price indices (PPIs) published by the ONS relating to plant costs. We provide the correlation coefficients for our chosen indices' correlation with CPI in Table 4.5. The "machinery and Equipment" index is positively correlated with CPI, while indices relating to repair work are not strongly correlated with CPI.

Table 4.5: Correlation between plant cost indices and CPI

Index	Correlation coefficient
ONS Repair and Maintenance Services of Other Transport Equipment (2000-2020)	0.19
ONS Machinery and Equipment (2000-2021)	0.63
ONS Repair and Installation of Machinery and Equipment (2000-2021)	-0.10

Source: ONS data

Is the expected value of the wedge between the input price and CPI materially different from zero?

To assess plant costs against this criterion, we consider evidence on the wedge between growth in plant input prices and CPI inflation. The analysis relies solely on historical data as we are not aware of any independent published forecasts relevant to plant cost inflation.

Analysis of changes in the ONS PPI "Repair and Maintenance Services of Other Transport Equipment" (hereafter "Repair and Maintenance") provides some evidence of a positive wedge between changes in plant costs and changes in CPI. This index is used by Network Rail when constructing its bespoke Plant Costs

---

[93] As we are advising on efficient changes in input prices, this discussion abstracts away from any leverage that trade unions have over the price that Network Rail pays for labour.

[94] Data Research (IDR) and Steer (2022). 'Review of rail industry employment costs'. p.12 [online]

[95] Data Research (IDR) and Steer (2022). 'Review of rail industry employment costs'. p.12 [online]

index. The historical dataset analysed for Repair and Maintenance covers the period January 2000 – October 2020 (the ONS has not published any more up-to-date data for this series). The average wedge between annual growth in the Repair and Maintenance index and CPI growth over that period is 2.4 per cent, and it is statistically significant. The wedge between the CAGR for Repair and Maintenance and the CAGR for CPI for the same period is 2.3 per cent.

However, this conclusion is reliant on the inclusion of data that appears to be impacted by the global financial crisis. As shown in the highlighted section of Figure 4.5, the Repair and Maintenance index had extremely volatile growth rates in 2009 and 2010 (ranging from 45 per cent to minus 13 per cent), which appear atypical and potentially implausible. The growth rate then reverts back from 2011 to around its pre-2009 level. Excluding data from 2009 and 2010 from the analysis, we estimate a statistically insignificant average wedge of 1.4 per cent.

Figure 4.5: 12-month growth rate for ONS Repair and Maintenance Index (2000-2020)
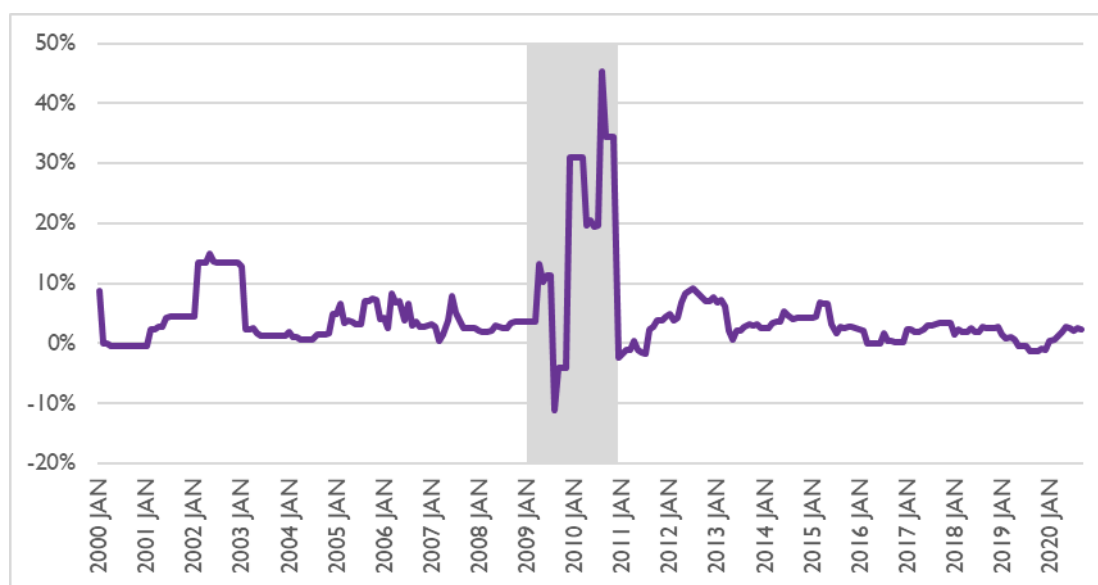
Source: ONS data

Analysis of the two other ONS indices does not provide any evidence of a positive wedge between plant cost inflation and CPI. The average wedge between annual growth in the Machinery and Equipment PPI and annual growth in CPI is -0.3 per cent over the period 2000-2020, but this is not statistically significant. The average wedge between annual growth in the Repair and Installation of Machinery and Equipment PPI and annual growth in CPI is 0.5 per cent over the period 2000-2020, and is not statistically different from zero. In both cases, the analysis indicates that there is not a material wedge between plant cost inflation and CPI

Two of the indices analysed for this category (Machinery and Equipment PPI and Repair and Installation of Machinery and Equipment PPI) are available up to 2022. We have excluded 2022 and 2021 data from our wedge analysis on the basis that 2022 and the latter half of 2021 have been atypical years macroeconomically. However, we have tested the sensitivity of our results to the inclusion of 2022 and 2021 data. In the table below, we compare the wedge estimates when 2022 and 2021 data is excluded/included. As shown, our conclusions our not impacted by the inclusion of 2022 and 2021 data.

Table 4.6: Average wedge between ONS indices and CPI when excluding and including 2021 and 2022 data (%)

Index	Excluding 2022 and 2021 data	Excluding only 2022 data	Including 2022 and 2021 data
ONS Machinery and Equipment PPI	-0.3	-0.3	-0.2
ONS Repair and Installation of Machinery and Equipment PPI	0.5	0.3	0.1

* represents statistically significant wedges. Figures without a * are not statistically significant.

Overall, there is mixed evidence of a material wedge between plant cost inflation and CPI. The Repair and Maintenance index data suggests a material positive wedge exists, but the Machinery and Equipment index and the Repair and Installation of Machinery and Equipment index both suggest there is no wedge. Given that two of the three indices suggest that there is not a positive wedge we consider that there is insufficient evidence to conclude that input price inflation for plant can be expected to be materially different from CPI inflation.

Criterion failed.

Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?

Plant costs account for 9.3 per cent of Network Rail's opex and 5.6 per cent of its renewals expenditure. There is no direct read across from plant to items in the CPI basket. The closest parallel that can be drawn is with items such as housing, vehicle purchase and operation, household appliances, tools and equipment, and audiovisual equipment. Collectively, items such as these compose 25.6 per cent of the CPI basket (see Table 4.7).

Table 4.7 : Share of items potentially comparable to plant in CPI basket

Code	Cost item	Share of CPI in 2022 (%)
CJVC	04.1 Actual rentals for housing	8.7
L8A7	05.1.1.3 Lighting equipment	0.1
CJVI	05.3 Household appliances, fitting and repairs	1.4
CJVK	05.5 Tools and equipment for house and garden	0.7
CJVM	07.1 Purchase of vehicles	5.0
CJVN	07.2 Operation of personal transport equipment	7.2
L8C2	08.2.0.1 Fixed telephone equipment	0.0
L8C3	08.2.0.2 Mobile telephone equipment	0.3
CJVQ	09.1 Audio-visual equipment and related products	2.3
	Plant	**25.6**

Source: Europe Economics analysis of ONS data

Given that the share of plant costs in Network Rail's opex and renewals is significantly lower than the share of the closest equivalent items within CPI, we consider that this cost category fails this criterion.

Criterion failed.

Is the input price and exposure to that input price outside management control for the duration of the price control?

To assess plant costs against this criterion, we consider each of the two hypothetical ways in which Network Rail might limit its exposure to increases in input prices.

   A. Controlling the level of the price paid for the input. We are unaware of any evidence to suggest that Network Rail has control over market prices for plant and hence we do not consider that it can control the prices that it pays for this input. Therefore, this cost category passes this sub-criterion.

B. Reducing the volume of the input. We are unaware of evidence to suggest that Network Rail has the ability to substitute away from plant if the relative price of plant were to increase. Therefore, this cost category passes this sub-criterion.

Criterion passed.

4.5.3 Materials

Our analysis of this cost element covers historical data from a number of indices relating to materials used by Network Rail in its activities, which are also used by Network Rail to various degrees in its own input price inflation analysis:

- ONS "Basic Iron and Steel and of Ferro-Alloys for Domestic Market" which is relevant to steel for rail tracks;
- ONS "Concrete products for Construction purposes" which is relevant to sleepers;
- ONS "Computer, Electronic & Optical products" which is relevant to signalling materials;
- ONS "GSI Sub-section - Inputs of Manufacture of Basic Metals & Fabricated products" which is another steel index;
- World Bank "Commodity Price Data - Copper";
- BCIS "Resource Cost Index of Building Non-housing: Materials (NOCOS)"; and
- BCIS "Resource Cost Index of Infrastructure: Materials (FOCOS)"

The ONS indices all show a moderate positive correlation with CPI. There is no correlation between the World Bank copper index and CPI. There is weak negative correlation between CPI and the two BCIS indices.

Is the expected value of the wedge between the input price and CPI materially different from zero?

To assess materials cost inflation against this criterion we have analysed the indices listed above. We are not aware of any independently published forecasts available to analyse for materials cost inflation. In assessing the historical materials price indices above, we found the following:

- For the ONS Basic Iron and Steel index, there is not a statistically significant wedge.
- For the ONS Concrete index, there is a statistically significant positive wedge averaging 1.2 per cent per annum for the period 2000-2020. The wedge between the CAGR for the ONS Concrete index and the CAGR for CPI for that period is 1.3 per cent.
- For the ONS Computer index, there is a statistically significant wedge averaging -3.9 per cent per annum for the period 2000-2020. The wedge between the CAGR for the ONS Computer index and the CAGR for CPI for that period is -4 per cent.
- For the ONS GSI Sub-section index relating to "Inputs of Manufacture of Basic Metals & Fabricated products", there is not a statistically significant wedge.
- For the World Bank Copper index, there is not a statistically significant wedge.
- For the BCIS NOCOS materials index, there is not a statistically significant wedge.
- For the BCIS FOCOS materials index, there is a statistically significant positive wedge averaging 2.1 per cent per annum for the period 1999-2020. The wedge between the CAGR for the FOCOS index and the CAGR for CPI for that period is 2.1 per cent.

As with the plant category, we have performed sensitivity checks for the indices with data available for 2022 and 2021, reported in the table below. Our conclusions are not impacted by the inclusion of 2022 and 2021 data, although the wedge for the BCIS NOCOS materials index becomes statistically significant when the full dataset is included.

Table 4.8: Average wedge between input indices and CPI when excluding and including 2021 and 2022 data (%)

Index	Excluding 2022 and 2021 data	Excluding only 2022 data	Including 2022 and 2021 data
ONS Basic Iron and Steel	2.1	4.0	5.4
ONS Concrete index	1.2*	1.4*	2.0*
World Bank Copper index	7.6	7.9	6.9
BCIS NOCOS materials index	1.1	1.7	2.1*
BCIS FOCOS materials index	2.1*	2.5*	3.1*

* represents statistically significant wedges. Figures without a * are not statistically significant.

Given the mixed results, there is a judgment to be made as to whether there is sufficient evidence of a wedge for materials. Interpreted in the round, the evidence from the four ONS indices and the World Bank Copper do not support the hypothesis that there is a positive wedge. In particular, two of the ONS indices and the World Bank Copper index show no statistically significant wedge, and of the other two ONS indices, one has a positive wedge and the other has a negative wedge. By contrast, one of the BCIS resource cost indices (which are composite indices of materials input prices) shows a statistically significant positive wedge while the other is very close to a statistically significant positive wedge. Hence, whether there is wedge for materials depends on the weight that ORR places on the BCIS resource cost indices as opposed to the ONS indices.

Whether the criterion is passed depends on weight placed on BCIS resource cost indices.

Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?

Materials costs account for 4.1 per cent of Network Rail's opex and 14.2 per cent of renewals expenditure. There is no direct read across from materials to items in the CPI basket. The closest parallel that can be drawn is with a maintenance and repair product that feeds into CPI. In the CPI basket, item '04.3.1 Materials for maintenance and repair' has a weight of 0.2 per cent. We therefore conclude that CPI does not capture changes in materials costs and thus materials passes this criterion.

Criterion passed.

Is the input price and exposure to that input price outside management control for the duration of the price control?

To assess materials costs against this criterion, we consider each of the two hypothetical ways in which Network Rail might limit its exposure to increases in input prices.

A. Controlling the level of the price paid for the input. We are unaware of evidence to suggest that Network Rail has control over materials input prices and hence we do not consider that it can control the market prices it has to pay for materials. Therefore, this cost category passes this sub-criterion.

B. Reducing the volume of the input. There may be some scope for Network Rail to substitute between different materials if their relative prices change, but it is unlikely to be able to switch away from materials altogether. Therefore, this cost category passes this sub-criterion.

Criterion passed.

4.5.4 Contractors

Our understanding is that this category relates to costs associated with construction contractors. To assess contractor costs, we consider evidence from the BCIS resource cost indices for Infrastructure (FOCOS), Building Non-housing (NOCOS) and Maintenance for Building Non-housing (NOMACOS), the BCIS Tender Price Index for Public Sector Building Non-Housing (PUBSEC) and two Construction Output Price indices

(COPIs) published by the ONS. As previously noted, we are sceptical of the validity of using BCIS TPI data for the purpose of forecasting future construction costs.

We find no evidence that changes in the BCIS PUBSEC TPI are significantly correlated with changes in CPI – the correlation coefficient between the indices over the period 2000-2021 is -0.06. We find moderate evidence of positive correlation between changes in the BCIS resource cost indices and changes in CPI. We find some evidence that changes in the COPIs are positively correlated with changes in the CPI, although the strength of the correlation depends on the inclusion or exclusion of 2022 data. As shown in Figure 4.6, all three indices grew sharply in 2022 and this contributes to the high correlation coefficient for the historical period that includes 2022. We report the correlation coefficients for all indices in Table 4.9 and Table 4.10.

Figure 4.6: Growth rates for ONS COPIs and CPI
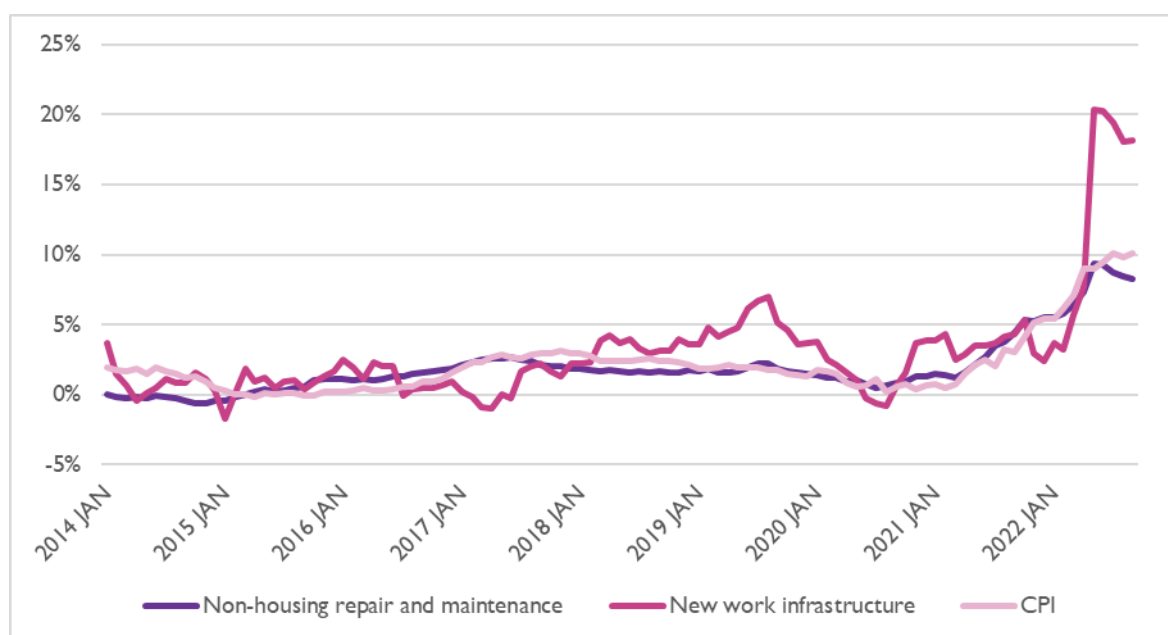
Source: ONS data

Table 4.9: Correlation coefficients for ONS COPIs with CPI

ONS Indices	2014 - 2022	2014-2021
ONS: Non-housing repair and maintenance	0.92	0.72
ONS: New work infrastructure	0.80	0.33

Source: ONS data.

Table 4.10: Correlation coefficients for BCIS indices with CPI

BCIS Indices	2000-2021
BCIS: FOCOS Combined	0.52
BCIS: NOCOS Combined	0.37
BCIS: NOMACOS Combined	0.31
BCIS: PUBSEC	-0.06

Source: BCIS data.

Is the expected value of the wedge between the input price and CPI materially different from zero?

We analysed the BCIS PUBSEC TPI dataset mentioned above. The dataset was published in December 2022 and consists of both historical data (back to 1985) and forecasts of TPI out to August 2024. We have analysed quarterly historical data for the period 2000-2020. We do not find evidence of a statistically significant wedge between changes in the PUBSEC TPI and changes in CPI over the full historical data period 2000-2020.

The historical data for the same period from the BCIS resource cost indices indicates a positive real price effect for contractors. There is a statistically significant positive wedge between changes in all three indices

and changes in CPI. For FOCOS, the average wedge over the period is 1.6 per cent, and the wedge between the CAGR for FOCOS and the CAGR for CPI is 1.6 per cent. For NOCOS, the average wedge is 1.3 per cent, and the CAGR wedge is 1.3 per cent. For the NOMACOS index the average wedge is 1.4 per cent, while the CAGR wedge is 1.4 per cent. These three indices provide evidence of a material difference between changes in the input prices faced by contractors and changes in CPI.

We have also analysed data from construction output price indices published by the ONS for the period 2014-2020, specifically for the series "Non-housing repair and maintenance" and "New work, infrastructure" as we consider these to be the COPIs most closely related to Network Rail's activities. For both indices, we do not find a statistically significant wedge between changes in the index and changes in CPI. We note that the data period available does not cover a full economic cycle.

As with previous cost categories, we report sensitivity checks for indices where 2022 data is available in the table below. Again, the inclusion of 2022 and 2021 data does not impact upon our conclusions.

Table 4.11: Average wedge between input indices and CPI when excluding and including 2021 and 2022 data (%)

Index	Excluding 2022 and 2021 data	Excluding only 2022 data	Including 2022 and 2021 data
ONS: Non-housing repair and maintenance	0.0	0.1	-0.2
ONS: New work infrastructure	0.7	0.7	1.1
BCIS: PUBSEC	2.1	1.9	1.8
BCIS: NOCOS Combined	1.3*	1.5*	1.5*
BCIS: NOMACOS Combined	1.4*	1.5*	1.4*
BCIS: FOCOS Combined	1.6*	1.9*	2.2*

* represents statistically significant wedges. Figures without a * are not statistically significant.

Overall, the evidence is mixed. The evidence from the ONS COPIs suggests that there is not a statistically significant wedge for contractor costs, while the BCIS resource cost indices indicates that a material difference between changes in contractor costs and CPI is a reasonable expectation. Hence, whether there is wedge for materials depends on the weight that ORR places on the BCIS resource cost indices as opposed to the ONS indices.

Whether the criterion is passed depends on weight placed on BCIS resource cost indices.

Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?

Contractor costs account for 7.9 per cent of Network Rail's opex and over half of its renewals expenditure (55.5 per cent). As mentioned earlier, this is not an ideal category to use for assessing RPEs – ideally contractor costs would be broken down into the same cost elements as Network Rail's own costs (e.g. labour, materials).

There is no clear item for contractor costs in the CPI basket as a large proportion of Network Rail's costs in this category involve hiring staff. The closest parallel that can be drawn is removal and other service products that feed into CPI. Collectively, these items compose 2.2 per cent of the CPI basket (see Table 4.12).

Table 4.12 : Share of items potentially comparable to contractor in CPI basket

Code	Cost item	Share of CPI in 2022 (%)
CJVC	04.3.2 Services for maintenance and repair	0.2
L8A7	07.3.6.2 Removal and storage services	0.3
CJVI	12.7 Other services (nec)	1.7
	Contractors	**2.2**

Source: Europe Economics analysis of ONS data.

We conclude that CPI therefore does not capture changes in contractor costs and thus passes this criterion.

Criterion passed.

Is the input price and exposure to that input price outside management control for the duration of the price control?

To assess contractor costs against this criterion, we consider each of the two hypothetical ways in which Network Rail might limit its exposure to increases in input prices.

A. Controlling the level of the price paid for the input. We are unaware of evidence to suggest that Network Rail has control over the market price for the services provided by contractors and hence we do not consider that it can control the market prices it pays. Therefore, this cost category passes this sub-criterion.

B. Reducing the volume of the input. If the price of services provided by contractors were to increase at a quicker rate than the input prices paid for equivalent in-house work, Network Rail could respond by reducing the volume of services that it hires using contractors and doing more of the work in-house. Therefore, given Network Rail's potential ability to substitute in-house work for contractor services, and given the lack of evidence, we consider that this cost category only partially passes this sub-criterion.

Overall, given the above we believe that Network Rail may be able to partially limit its exposure to increased contractor prices.

Criterion partially passed.

4.5.5 Other costs

In addition to the four cost elements (staff, plant, materials and contractors) analysed above against our framework for assessing RPEs, we have also considered the "other" cost element.

Costs defined as "other" do not lend themselves easily to input price inflation analysis, as it is difficult to determine price indices that may be relevant for this category. Unless Network Rail provides clear evidence to the contrary, we consider it reasonable to assume that costs under this category do not warrant an RPE allowance.

However, we note from Network Rail's own analysis that electricity costs are included in "other" opex costs. Given that energy costs are a major driver of current high inflation (and also a driven of the expected fall in inflation over coming years), we consider that it may be appropriate to give specific consideration to electricity costs at the current time. Therefore, we have assessed the evidence on the relationship between movements in electricity prices and movements in CPI.

To assess movements in electricity prices, we have analysed historical data from the Department of Business, Energy and Industrial Strategy (BEIS) on energy prices for non-domestic customers.[96] This dataset contains the prices of fuels purchased by non-domestic customers in the UK. We have analysed the price series for

---

[96] BEIS (2022) 'Gas and electricity prices in the non-domestic sector' [online].

electricity purchased by "extra large" customers excluding the Climate Change Levy for the period 2007-2021. We have excluded outturn data from 2022 given the high volatility in energy prices this year, driven by the conflict in Ukraine, which is unlikely to be representative of typical energy price movements. We have also analysed forecasts of energy prices, published by BEIS, as we do not consider that past movements in electricity prices are necessarily a reliable predictor of how electricity prices will move during CP7 as the inflationary spike in energy prices resulting from the Ukraine conflict unwinds

We find evidence of weak positive correlation between movements in electricity prices and movements in CPI, with a correlation coefficient of 0.34 for the period 2007-2021.

Is the expected value of the wedge between the input price and CPI materially different from zero?

The average wedge between changes in electricity prices and changes in CPI over the period 2007-2020 was 4.6 per cent, and it is statistically significant. The wedge between the CAGR for the electricity index and the CAGR for CPI over the historical period is 4.4 per cent. Therefore, there is evidence from the historical data of a substantial wedge between electricity price movements and CPI movements.

Changes in electricity prices in CP7 are unlikely to be predicted by historical changes in electricity prices. While we observe a positive wedge over the period before 2021, the conflict in Ukraine led to an enormous spike in energy prices in 2022. By 2024, the start of CP7, this "Ukraine effect" on energy prices is likely to have started to unwind and energy prices are likely to fall in real terms over CP7. To illustrate this point, we have analysed electricity price forecasts published by BEIS in January 2023.[97] The forecasts presented in Table 4.13 are for retail electricity prices for industrial customers, in real terms, for the period 2024-2029. The forecasts cover three scenarios for future electricity prices – low, central and high. The table shows that electricity prices are forecast to fall in real terms on average over the course of the control period in all three scenarios, ranging from an average annual fall of 4.3 per cent in the low scenario to an average annual fall of 17.6 per cent in the high scenario.

Table 4.13 BEIS electricity price projections for high, central and low scenarios (2021 prices)

	Electricity price (real 2021 p/kWh)			Percentage change (%)		
	Low	Central	High	Low	Central	High
2023	13.14	26.83	67.19	-	-	-
2024	11.5	20.9	49.6	-12.7	-3.3	-20.5
2025	10.5	11.9	14.9	-8.8	-43.3	-69.9
2026	10.2	11.3	13.0	-2.4	-4.4	-13.0
2027	10.1	11.2	12.8	-1.3	-1.3	-1.3
2028	9.9	10.9	12.5	-2.3	-2.3	-2.3
2029	10.0	11.1	12.7	1.4	1.4	1.4
Average percentage change 2024-2029				**-4.3**	**-8.8**	**-17.6**

Source: BEIS data (January 2023), Europe Economics analysis

The evidence from BEIS forecasts indicates that ORR should expect a negative RPE for electricity over CP7. Assuming that the high prices for electricity in 2023/24 will be covered by the CP6 exit costs, this negative wedge should be accounted for when setting funding allowances. We consider evidence from the BEIS forecast data to supersede the evidence of a positive wedge from the historical BEIS data, because the historical prices are not representative of how electricity prices will change in CP7, as that period is very likely to be characterised by energy prices falling from the spike caused by the Ukraine conflict.

Criterion passed for electricity (for a negative RPE), but not for the rest of the "other" category.

---

[97] BEIS (2023) "Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal" Data table 4 [online]

Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?

"Other" costs account for just over a quarter of Network Rail's total opex (26.8 per cent) and 16.9 per cent of total renewals. Given that the high-level Network Rail cost categories that we are using for our RPEs analysis do not break down "other" costs further, it is not possible to know which items within CPI are the most comparable, and hence we cannot be sure that comparable items account for a lower share of CPI. Hence, for "other" costs as a whole, we do not have sufficient and convincing reasons to think that CPI does not adequately capture relevant input prices.

As mentioned above, however, it does appear that electricity costs have been included within the "other" category. For electricity costs, there is a clear parallel with the item "electricity, gas and other fuels" that feeds into CPI. This item has a weight of 3.6 per cent in the CPI basket. The exact share of electricity in Network Rail's CP7 modelling is unclear, but it appears to be one of the main drivers in at least two cost lines that together account for 18.4 per cent of opex.[98] This suggests that CPI may not fully capture the impact of changes in electricity prices on Network Rail's cost base, and hence this element of "other" costs passes this criterion. We suggest that Network Rail is asked to provide data on the percentage of its opex and renewals expenditure, respectively, that electricity accounts for, to enable ORR to finalise its assessment against this criterion.

Criterion passed for electricity, but failed for the rest of "other" costs.

Is the input price and exposure to that input price outside management control for the duration of the price control?

As the "other" cost category is not broken down further, in general it is unclear what input prices may be relevant for this category, and hence we are unable to conclude that the input price and exposure to that input price is outside management control.

To assess electricity costs against this criterion, we consider each of the two hypothetical ways in which Network Rail might limit its exposure to increases in input prices.

A. Controlling the level of the price paid for the input. We consider that Network Rail is unlikely to have any control over the market price that it has to pay to purchase electricity. Therefore, this cost category passes this sub-criterion.

B. Reducing the volume of the input. Network Rail may be reduce the volume of electricity which it purchases if input prices increase by investing in more energy efficient equipment and seeking to adopt operational procedures which reduce energy consumption. Network Rail could also reduce the amount of electricity which it purchases by investing in self-generation (e.g. by installing PV or other renewables generation on its buildings or land).[99] We therefore consider that electricity only partially passes this sub-criterion.

Criterion partially passed for electricity, but failed for the rest of "other" costs.

---

[98] This figure is calculated as the sum of the following two cost items in Network Rail's spreadsheet:
- "Other operating costs" for "Non Route Support and Operations", which accounts for 10.5 per cent of opex and is mainly driven by "other maintenance costs, electricity and other staff costs"; and
- "Other operating costs" for "Route Support and Operations", which accounts for 7.9 per cent of opex and is mainly driven by "electricity and other staff costs".

[99] We recognise that Network Rail may not be able to borrow to invest in energy efficiency and self-generation, which may mean that it is limited to investments with short payback periods that pay for themselves within the price control period.

4.5.6 Summary of our RPEs assessment

The results of our assessment are shown in Table 4.14.

Table 4.14: Summary of RPEs assessment

Criteria	Staff	Plant	Materials	Contractors	Other costs
1. Is the expected value of the wedge between the input price and CPI materially different from zero?	Depends on weight placed on OBR forecasts	Fail	Depends on weight placed on BCIS resource cost indices	Depends on weight placed on BCIS resource cost indices	Pass for electricity (for a negative RPE); Fail for the rest of category
2. Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?	Pass	Fail	Pass	Pass	Pass for electricity; Fail for the rest of category
3. Is the input price and exposure to that input price outside management control for the duration of the price control?	Partial pass	Pass	Pass	Partial pass	Partial Pass for electricity; Fail for the rest of category
Overall	**Depends on weight placed on OBR forecasts**	**Fail**	**Depends on weight placed on BCIS resource cost indices**	**Depends on weight placed on BCIS resource cost indices**	**Pass for electricity only (for a negative RPE)**

We also assess the materiality of different cost categories, as shown in the table below.

Table 4.15: Network Rail's total planned expenditure for CP7 broken down by cost element

Cost category	Percentage share (%)		Assessment of materiality	
	Opex	Renewals	Opex	Renewals
Staff	51.9	7.8	Pass	Fails 10% threshold
Plant	9.3	5.6	Fails 10% threshold	Fails 10% threshold
Materials	4.1	14.2	Fails 5% threshold	Pass
Contractors	7.9	55.5	Fails 10% threshold	Pass
Other	26.8	16.9	Pass	Pass
Total	**100.0**	**100.0**		

Source: Europe Economics analysis of Network Rail CP7 input price analysis

4.6 RPE recommendations for Network Rail

Our criterion 1 results provide a basis for identifying an appropriate level of RPEs for Network Rail. Below, we outline our recommended RPEs for each of Network Rail's cost categories, and then present illustrative scenarios for what this might mean for the RPEs that should be applied to Network Rail's opex and renewals overall in CP7.

RPE recommendations for each cost category

Table 4.16 summarises the criterion 1 results for each Network Rail cost category. We note that Network Rail's own analysis includes electricity costs in the "other" cost category for opex. Since energy costs have been a major driver of the high inflation seen recently, and is also a driver of the expected fall in inflation, we also applied the criterion 1 analysis to electricity costs as a separate cost category.

Table 4.16: Wedges implied by criterion 1 analysis for Network Rail in CP7 (%)

	Opex		Renewals	
	If weight placed on OBR forecasts (for staff) and BCIS data (for materials and contractors)	If weight is not placed on these things	If weight placed on OBR forecasts (for staff) and BCIS data (for materials and contractors)	If weight is not placed on these things
Staff	Use March 2023 OBR forecast	0	Use March 2023 OBR forecast	0
Plant	0	0	0	0
Materials	0	0	1.05	0
Contractors*	0 (-0.5)	-0.5 (-1.0)	0.5	0
Electricity	Use latest central scenario of electricity price projections from BEIS (which we calculate to be –8.8 per cent per annum on average over CP7)			
Other	0	0	0	0

* Assuming electricity is 5% of opex; results assuming electricity is 10% of opex are shown in parentheses. We have assumed that there are no electricity costs in renewals. See text for description.
Europe Economics analysis.

For staff, our analysis found that whether a wedge applies to labour costs depends on whether weight is placed on the OBR's forecast:

- If weight is placed on the OBR's forecasts, then our recommendation is to apply the real wage growth forecast for each year of CP7 implied by the OBR's March 2023 forecasts for CPI and wages. (For the reasons given earlier, we would advise against using the OBR's November 2022 forecasts.) The final year of CP7 that would not be covered by the forecast (2029) would require a different approach. For example, Network Rail could apply the average wedge implied by the available forecast CP7 years.

- If weight is not placed on OBR forecasts, then we recommend an RPE of zero. This is based on historical data showing no statistically significant wedge since the financial crisis.

For plant, our analysis found no evidence of a wedge and hence the recommended RPE is zero.

For materials, our analysis found that whether there is evidence of a positive wedge depends on the weight placed on BCIS indices. If some weight is placed on BCIS indices, then we recommend an RPE of 1.05 per cent for renewals, representing the average of the CAGR wedge of the FOCOS materials series (2.1) and the zero wedge implied by our analysis of the ONS and World Bank input price series. For opex, materials fails the materiality test and so we recommend an RPE of zero for opex.

For contractors, we first reiterate that this cost category would ideally be split into the other cost categories to better represent the input prices faced by contractors. In the absence of this evidence, our recommended RPEs are informed by an assumption that the breakdown of contractor costs between the other categories is equal to the breakdown of Network Rail's inhouse cost base.[100] We hence consider that the average of Network Rail's RPEs for the other categories – weighted according to their share of the cost base (excluding contractor costs) – represents a reasonable upper limit on the RPE that should be used for contractor costs. Given that we do not have data on the share of Network Rail's costs that electricity accounts for, we have proceeded on the basis of illustrative scenarios in which electricity accounts for 5 or 10 per cent respectively of Network Rail's opex (and none of its renewals expenditure). Thus the contractors RPE is the lower of this weighted average RPE and the wedge from our contractors analysis. This gives the following results:

---

[100] If Network Rail considers this assumption to be inaccurate, we suggest that it provides ORR with data on how contractor costs break down between the other cost categories, to allow the calculation to be improved.

- If weight is placed on the BCIS price series and electricity represents 5 per cent of costs, we recommend an RPE of 0 per cent for opex and 0.5 for renewals. If electricity represents 10 per cent of costs, the recommended RPEs are -0.5 for opex and 0.5 for renewals.
- If weight is not placed on the BCIS price series and electricity represents 5 per cent of costs, we recommend an RPE of -0.5 per cent for opex and zero for renewals. If electricity represents 10 per cent of costs, the recommended RPEs are -1.0 for opex and zero for renewals.

For electricity, our criterion 1 analysis identified a negative wedge of -8.8 per cent (based on the central BEIS forecast for years covered by CP7).

For other costs (excluding electricity), our criterion 1 analysis found no evidence of a wedge and hence the recommended RPE is zero.

Illustrative scenarios for overall RPE for opex and renewals

The proportion of each cost category within opex and renewals can then be used to identify a view of Network Rail's overall RPEs for opex and renewals. This is done by weighting the cost category wedges presented in Table 4.16 by the share of opex and renewals that each category accounts for.

Given that the March 2023 OBR forecast was not available at the time we carried out our calculations, we used an illustrative assumption that the RPE for staff is 0.87 per cent for both opex and renewals. This is the average of the real wage growth figures for the two years of CP7 for which forecasts are available in the Bank of England's February 2023 Monetary Policy Report (2024 and 2025). ORR needs to update this with the real wage growth implied by the OBR's March 2023 forecasts.

As we applied our criterion 1 analysis to electricity, but did not have data from Network Rail on the proportion of costs it represents, we present the overall RPEs under two illustrative scenarios. One scenario assumes that electricity represents 5 per cent of opex (deducted from "other" costs), and another assumes that electricity accounts for 10 per cent of opex. In both scenarios, electricity is assumed to be 0 per cent of renewals.

The final column in each table shows the overall Network Rail RPE calculated by weighting the RPEs for opex and renewals by the expected breakdown of Network Rail's expenditure in CP7.

Table 4.17: Weighted average RPEs for Network Rail in CP7 if electricity is 10% of cost base (%)

	Opex	Renewals	Overall
RPE if weight placed on OBR forecasts (for staff) and BCIS data (for materials and contractors)	-0.5	0.5	0.1
RPE if weight is not placed on these things	-1.0	0.0	-0.4

Source: Europe Economics analysis

Table 4.18: Weighted average RPEs for Network Rail in CP7 if electricity is 5% of cost base (%)

	Opex	Renewals	Overall
RPE if weight placed on OBR forecasts (for staff) and BCIS data (for materials and contractors)	0.0	0.5	0.3
RPE if weight is not placed on these things	-0.5	0.0	-0.2

Source: Europe Economics analysis

5 Conclusions

This report has reviewed the inflation and input price methodology that Network Rail intends to use for the forthcoming control period.

We obtained information from Network Rail, ORR, and public and proprietary data sources. We used this information to review the approaches in the light of the current high-inflation, and highly uncertain, environment, to form a view as to the appropriateness of the approach.

5.1 Approach to review

Our critique centred on the drawbacks of the highly-disaggregated framework Network Rail uses to assess RPEs and the (in our view) disproportionate weight that it places on two specific price indices (RPI, and the BCIS TPI with a one-year lag).

Our research into regulatory precedents shows that approaches which take a more aggregated approach to RPE analysis are viewed favourably by oversight bodies (e.g. the CMA), and that a more high-level yet transparent approach has been taken in multiple sectors.

This view led to us proposing an alternative approach which would improve the proportionality of the RPEs analysis and align Network Rail's RPEs approach with regulatory precedents. This approach takes higher-level cost categories and identifies input price indices that are deemed to be appropriate for each. We established three criteria that would all need to be passed in order for an RPE to be applied in CP7:

- Is the expected value of the wedge between the input price and CPI substantially different from zero?
- Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?
- Is the input price and exposure to that input price outside management control for the duration of the price control?

We apply these criteria to the cost categories of staff, plant, materials, contactors and other costs. We also take account of the materiality of each cost category as a share of Network Rail's opex and renewals expenditure.

Statistical tests of significance were used to identify the materiality of the wedges.

5.2 Conclusions on whether RPEs are appropriate in each cost category

Whether labour costs qualify for an RPE depends crucially on whether reliance is placed on OBR forecasts of CPI and wage inflation. For its SBP submission, Network Rail was required by government to use the OBR's November 2022 forecast, which was the latest available at the time. We note that the November OBR forecasts were based on the (then) market-implied path of interest rates, and the Bank of England made clear at the time that it believed markets were (then) over-stating the likely future Bank Rate. Hence, even if weight is placed on OBR forecasts we consider that it is necessary to use future updated official forecasts for which this problem with market expectations does not apply.[101] Given the problems associated with the November 2022 forecasts, we suggest that Network Rail engages with government to propose using more recent forecasts. At the time of preparing this report, the March 2023 OBR forecasts are close to publication.

---

[101] The peak interest rate implied by markets has fallen since November, and the Governor of the Bank of England is no longer suggesting that the market is out of line. This suggests that future official forecasts based on the market-implied path of interest rates may be more reliable.

Further, given evidence suggesting that the wage rates that Network Rail pays maintenance staff are above market comparators, it can be argued that any RPE allowed for labour should be scaled back in the case of maintenance roles to allow wage rates to converge to the level of market comparators (unless the issue is being addressed elsewhere in ORR's analysis e.g. through catch-up efficiency assumptions). We also note that the staff cost category fails the 10 per cent materiality test for renewals.

For plant costs, our framework unambiguously suggests that there is not a sufficient and convincing case for including an RPE. Further, this cost category does not pass a 10 per cent materiality threshold for either opex or renewals.

Whether materials qualifies for an RPE depends on the weight placed on BCIS FOCOS materials resource cost indices. Analysis of this BCIS indices is suggestive of the existence of a wedge. However, applying criterion 1 to other relevant indices produced by the ONS and the World Bank suggests, in the round, that there is not a case for an RPE for materials. We also note that the materials category fails a 5 per cent materiality threshold for opex.

Whether contractors qualifies for an RPE again depends on the weight placed on BCIS resource cost indices. Applying criterion 1 instead to ONS COPIs suggests that there is not a case for an RPE for contractors. Ideally, Network Rail's contractor costs would be split between the other cost categories to best identify the input price pressures. In the absence of this analysis, we recommend that if an RPE is allowed for contractors it should be limited to no more than the weighted average RPE (including any zero or negative RPEs) allowed across all of the other cost categories, given that this reflects the overall RPE allowed for Network Rail's in-house costs. We also note that this cost category fails the 10 per cent materiality test for opex.

For other costs, we split the category to consider separately costs related to electricity and the rest. This choice was driven by the importance of electricity prices in the current inflation uncertainty and its expected contribution to how inflation is expected to evolve over the coming years. We found that the electricity element passes the three criteria and qualifies for a negative RPE. An RPE is not warranted for the rest of the other costs category.

Appendices

Appendix 1: Introduction to Case Studies on Comparator Sectors

The following five appendices consist of case studies of sectors in which other regulators have analysed real price effects. The sectors are:

- Energy in Great Britain
- Water in England and Wales
- Aviation – specifically Heathrow airport
- Telecommunications in the UK – specifically BT
- Water in Northern Ireland

For each sector, we first summarised the approach to input price inflation taken at the latest periodic reviews. We then considered several questions to guide our analysis of the lessons that can be applied to the rail context:

1) Is the approach applicable to the rail context?
2) Is the approach sufficiently up-to-date?
3) Do we consider the approach to be valid?
4) What is the geographical coverage of the sector?
5) What is the overall relevance of the approach?

Appendix 2: Case Study on Energy in Great Britain

This case study covers the approach taken to real price effects (RPEs) in the regulation of Great Britain's energy sector. Ofgem sets price controls for the gas and electricity network companies of Great Britain. One aspect of Ofgem's price controls is to estimate RPEs for network companies that reflect deviations between input price inflation and general inflation over a control period.

Overview of Ofgem's RPE approach

Ofgem's approach to estimating and applying RPE's has changed over the last 10 years. In this case study we cover Ofgem's RPE methodology for the following price controls:

- RIIO-T1 and GD1, the price control for the gas distribution, gas transmission and electricity transmission networks for the period 2013-2021;
- RIIO-ED1, the price control for the electricity distribution network for the period 2015-2023;
- RIIO-T2 and GD2, the price control for the gas distribution, gas transmission and electricity transmission networks for the period 2021-2026; and
- RIIO-ED2, the price control for the electricity distribution network for the period 2023-2028.

RIIO-T1 and GD1

RIIO-T1 and GD1 were the first price controls Ofgem conducted under its RIIO (Revenue = Incentives + Innovation + Outputs) model. The price controls covered the eight gas distribution networks (GDNs) in Great Britain, National Grid Electricity Transmission (NGET) and National Grid Gas Transmission (NGGT) for the eight-year period 2013-2021.[102]

The allowed revenues Ofgem determined for RIIO-1 were indexed by RPI. To account for forecasted differentials between RPI and input price inflation, Ofwat granted ex ante RPE allowances to the GDNs and the transmission companies. RPEs were estimated for the following inputs:

- labour
- materials
- equipment and plant

Ofgem set RPEs by forecasting the real growth rate of its chosen indices. Ofgem made use of outturn data (for later years of the existing price control period) and short-term independent forecasts where possible. To forecast RPEs for the years of the control period where short-term forecasts were not available, Ofgem used the real average historical annual growth rate for its chosen input price indices. To convert RPE assumptions into a monetary allowance, the RPE forecasts were multiplied by the network companies' expenditure allowances, which were set in 2009/10 prices.

---

[102] RIIO-T1: Final Proposals for National Grid Electricity Transmission and National Grid Gas (ofgem.gov.uk) and RIIO-GD1: Final Proposals

Labour

For labour, Ofgem estimated an RPE for 2011/12 using an unweighted average of indices for relevant subsectors of the economy, based on actual outturn data for those indices in that year.[103] The same indices were also used to calculate the historical real average labour RPE using twenty years of historical data, which was then applied for the years 2014/15 to 2020/21. The indices Ofgem used were:

● ONS Average Weekly Earnings (AWE) private sector
● ONS AWE construction
● ONS AWE transport and storage
● PAFI civil engineering[104]
● British Electrotechnical and Allied Manufacturers Association (BEAMA) electrical engineering[105]

For the years 2012/13 and 2013/14, Ofgem used HM Treasury's consensus forecast for whole economy wage growth as its labour RPE assumption. National Grid opposed this approach, arguing that the OBR private sector wage forecast was a better proxy for expected wage growth for National Grid's labour force.[106] National Grid claimed that public sector wage growth was lagging private sector wage growth, and thus HM Treasury's consensus forecast was likely to understate network companies' wage inflation.

Ofgem preferred HM Treasury's consensus forecast because it represented a robust survey of forecasts as opposed to the forecast of a single organisation (OBR), and because HM Treasury's consensus forecast was more up to date at the time of determination. Ofgem also felt that the difference in the impact on labour RPEs of using the two forecasts was marginal. It found no evidence that a private sector wage forecast is a better proxy for network companies than an all economy forecast.[107]

Ofgem's labour RPE assumptions for RIIO-T1 and GD1 are presented in Table 0.1.

Table 0.1 Labour RPEs for RIIO-T1 and GD1 (year-on-year change, %)

Basis for RPE	Relevant subsector indices, outturn	HMT's consensus forecast		Relevant subsector indices, historical average
Period	**2011/12**	**2012/13**	**2013/14**	**2014/15 – 2020/21**
GDN	-2.9	-0.8	-0.2	1.3
NGET	-3.0	-0.8	-0.2	1.5
NGGT	-2.9	-0.8	-0.2	1.5

Source: RIIO-T1/GD1: Real price effects and ongoing efficiency appendix Table 1.4.

Non-labour (materials and equipment & plant)

For non-labour inputs, Ofgem incorporated outturn data for its chosen indices for the first six months of 2012/13 into its RPE assumptions, and assumed the same growth rate would hold for the rest of 2012/13. The RPE assumptions for the remaining years of the control period were based on the long-term historical average for the chosen indices. The chosen indices are given in Table 0.2.

---

[103] RIIO-T1/GD1: Real price effects and ongoing efficiency appendix paragraph 2.8
[104] Price adjustment formula index (PAFI) for labour published by Building Cost Information Service (BCIS).
[105] This index was only included in the RPE assumption for NGET
[106] RIIO-T1/GD1: Real price effects and ongoing efficiency appendix paragraph 2.14
[107] RIIO-T1/GD1: Real price effects and ongoing efficiency appendix paragraph 2.19

Table 0.2: Materials and equipment & plant indices used for RIIO-T1 and GD1 (year-on-year change, %)

	2011/12 outturn	2012/13 outturn	Long-term historical average (basis for forecast from 2013/14)
FOCUS RCI infrastructure materials	2.9	1.5	1.5
PAFI steel works	1.8	-7.7	1.7
PAFI plastic pipes	-1.3	0.7	1.2
PAFI copper piping	4.4	-2.3	2.2
PAFI plant and road vehicles	-2.9	-1.6	0.5
Machinery and equipment output PPI	-1.6	-1.2	-0.9
Machinery and equipment input PPI	-0.4	-3.2	-1.6

FOCUS RCI stands for the infrastructure resource cost index. PPI stands for the producer price index.

RIIO-ED1

RIIO-ED1 is the current price control for the six electricity distribution companies in Great Britain (DNOs). It covered the eight-year period 2015-2023. One of the six companies, Western Power Distribution (WPD), was "fast-tracked" – Ofgem judged that its business plan showed sufficient value for customers and settled WPD's price control early in 2014. The final determinations for the five "slow-track" DNOs, including Ofgem's decision regarding RPEs, were published in late 2014.[108]

Ofgem's approach to RPEs for RIIO-ED1 was largely similar to its approach for RIIO-T1 and GD1, but there were some changes. As for RIIO-T1 and GD1, Ofgem granted DNOs ex ante RPE allowances to account for the expected difference between input price inflation and RPI over the eight-year control period.

Ofgem set 2013/14 as a base year, using DNOs' actual costs for that year. For 2014/15, Ofgem used available outturn input price indices and RPI data to forecast RPEs. Where possible, RPEs for 2015/2016 were derived from independent short-term forecasts (these were only available for labour). RPEs for the remaining years were based on the historical real growth in relevant price indices. Ofgem also made an adjustment to RPEs to account for the step-change in RPI in 2010 relative to underlying inflation.[109]

RPEs were forecasted for the following inputs:

- general labour
- specialist labour
- materials (opex and capex)
- plant and equipment

Ofgem's chosen indices for each input are given in the table below.

---

[108] RIIO-ED1 final determinations for the slow-track electricity distribution companies | Ofgem
[109] RIIO-ED1 expenditure assessment, paragraph 12.9 explains the adjustment process.

Table 0.3: Ofgem's input price indices for RIIO-ED1 and estimated percentage growth rates

Cost category	Source	Index	Historical series	Historical average real growth rate	Real growth rate 2014-15
General **labour**	ONS	LNKY AEI private sector including bonus	1990-2000	0.7	N/A
General labour	ONS	K54V AWE private sector including bonus	2000-2014	0.7	-1.9
Specialist labour	BEAMA *	Electrical labour	1987-2014	1.6	1.7
Specialist labour	BCIS	70/1 Labour and supervision in civil engineering	1987-2014	1.1	-1.1
Capex materials	BCIS	3/58 Copper pipes and accessories	1991-2014	1.7	-5.8
Capex materials	BCIS	3/59 Aluminium pipes and accessories	1991-2014	0.3	-2.4
Capex materials	BCIS	3/S3 Structural steelwork materials: civil engineering work	1991-2014	1.5	-4.4
Opex materials	BCIS	FOCOS RCI infrastructure: materials	1990-2014	1.6	-0.7
Plant and equipment	ONS	K389 Machinery and equipment output PPI	1996-2014	-1.2	-1.2
Plant and equipment	BCIS	70/2 Plant and road vehicles: providing and maintaining	1987-2014	-0.2	-1.8

Source: RIIO-ED1 expenditure assessment, Table 12.2. * A UK trade association for manufacturers.

For labour, both specialist and general, the RPEs for 2015/16 were based on HM Treasury's consensus forecast for Average Weekly Earnings for the whole economy, with an uplift of 0.15 per cent applied to reflect the fact that DNOs are private sector employees.[110] For all other inputs, no short-term forecasts were available so the 2015/16 RPEs were based on historical averages for the relevant indices.

CMA appeal

Two companies appealed Ofgem's RIIO-ED1 determination to the CMA, with one of the companies including Ofgem's RPE methodology in its grounds for appeal. The two companies were Northern Powergrid (a DNO) and British Gas Trading (an electricity supplier).[111] This section focuses on the appeal by Northern Powergrid, as it was this appeal that specifically mentioned Ofgem's RPE methodology.

Northern Powergrid's (NPg) second ground of appeal concerned Ofgems's approach to calculating RPEs, specifically labour RPEs.[112] NPg did not agree with Ofgem's approach to labour RPEs for the year 2014/15. The 2014/15 assumption was to be based on the outturn from actual price indices for general and specialist labour for that year. NPG argued that:

- Ofgem unnecessarily rejected data from DNOs' own pay settlements for 2014/15, which were available to Ofgem at the time of its decision.
- The external indices Ofgem used had been affected by the recession to an extent that was not comparable with the effect of the recession on the DNOs' labour costs.
- Ofgem preferred the external data sources over what NPg described as 'manifestly more accurate data' from DNO wage settlements, and in doing so Ofgem relied on arguments alleged to be entirely speculative and unsubstantiated. NPg also argued that its workforce had more specialist labour specific

---

[110] RIIO-ED1 expenditure assessment, paragraph 12.6
[111] CMA grants permission for electricity distribution network price controls appeals - GOV.UK (www.gov.uk)
[112] Northern Powergrid (Northeast) Limited and Northern Powergrid (Yorkshire) plc v the Gas and Electricity Markets Authority (publishing.service.gov.uk) p.76

to the electrical engineering sector whereas the external indices (BEAMA and BCIS) had a greater focus on manufacturing and construction activities.

- By not 'reality-checking' its results against DNOs' actual pay settlements, Ofgem failed to take steps that would have led a reasonable authority to question the output from its chosen approach.

NPg also argued that the basis of the 2015/16 calculation would also fail to reflect properly the labour cost pressures faced by the DNOs, as the inadequacies of Ofgem's method would apply equally to 2015/16, and by the time its appeal was determined the pay settlements for 2015/16 would be available.[113] NPg did not challenge the approach for the forecasts for 2016/17 to 2022/23.

In response, Ofgem argued that that it would have been inappropriate for it to have relied on actual DNO pay settlement data to determine labour RPEs.[114] It considered that RPEs should be set so as to represent trends in efficient costs to provide incentives to DNOs to pursue cost efficiency in the absence of competitive market forces, and that the purpose of RPEs was not to match DNOs' actual costs. Ofgem argued that the separation of 'specialist' labour provided an appropriate balance between identifying cost pressures from the electricity sector yet not fully adopting actual pay data or indices heavily influenced by DNOs. NPg pushed back on the point that it would be inappropriate to rely on actual DNO pay settlement data, arguing that it had strong incentives to pursue efficient pay deals.[115]

Ofgem also defended the robustness of its data sources. It contended that the indices adopted (ONS, BCIS, and BEAMA) 'constituted a range of reputable and appropriate data sources'.[116] Ofgem's position was broadly supported by Citizens Advice in its submission as an interested third party.[117]

The CMA supported Ofgem's position. It acknowledged NPg's argument that NPg had incentives to pursue pay deals with its employees that were efficient at least relative to other DNOs. However, the CMA noted that there are differences between the incentives from a relative process comparing a set of monopoly companies and the workings of a competitive product market. The use of RPEs based on data outside the industry is one way of introducing cost incentives at the industry level. The CMA shared Ofgem's unwillingness to accept assertions that DNO pay settlements are necessarily efficient compared with companies operating in the wider labour market. The CMA also argued that pay awards are not the only drivers of the annual change in employment costs since other factors (such as staff numbers and structure, overtime pay and bonuses) will influence the outturn level.

NPg did not, in the CMA's view, provide sufficient evidence for the CMA to conclude that Ofgem's chosen indices were the wrong indices to use. NPg had argued that Ofgem's indices were not consistent with recent DNO pay settlements and that DNOs were to some extent immune from the effects of the recession on the wider labour market, providing evidence in the form of a report by Frontier Economics. The CMA did not find that any of NPg's supporting evidence addressed that core point that the DNOs should have been able, on average, to manage labour cost inflation (as measured by RPEs) to a level comparable with other industries.

The CMA also found that Ofgem was not obliged to "reality-check" its results against actual pay settlements. The CMA agreed with Ofgem that this argument was essentially a reiteration of NPg's arguments that actual DNO pay settlements should have been used.

---

[113] Northern Powergrid (Northeast) Limited and Northern Powergrid (Yorkshire) plc v the Gas and Electricity Markets Authority (publishing.service.gov.uk) paragraph 5.11

[114] Northern Powergrid (Northeast) Limited and Northern Powergrid (Yorkshire) plc v the Gas and Electricity Markets Authority (publishing.service.gov.uk) paragraph 5.17

[115] Northern Powergrid (Northeast) Limited and Northern Powergrid (Yorkshire) plc v the Gas and Electricity Markets Authority (publishing.service.gov.uk) paragraph 5.22

[116] https://www.gov.uk/cma-cases/energy-price-control-appeal-northern-powergrid#responses-to-the-notice-of-appeal paragraph 195

[117] https://www.gov.uk/cma-cases/energy-price-control-appeal-northern-powergrid#responses-to-the-notice-of-appeal

As a result of the above conclusions, the CMA did not uphold NPg's appeal.

RIIO-T2 and GD2

The RIIO-2 price control period covers the 5-year period from 2021 to 2026 and covers gas and electricity transmission, gas distribution, and the Electricity System Operator (ESO).

Ofgem's approach to RPEs for RIIO-2 was significantly different from RIIO-1, a decision influenced by the fact that the outturn value of the indices used to set RPEs for RIIO-T1 and GD1 were lower than the forecasts Ofgem used when setting fixed ex ante allowances.[118] The result of this was that the RPE allowances became a source of additional returns for the regulated companies during the RIIO-1 control period. Ofgem decided to introduce RPE indexation for RIIO-2, such that RPE allowances would be updated annually during the control period using the latest available figures for relevant indices, to manage the risk of inaccurate RPE forecasts.[119] Another key change was the use of CPIH, rather than RPI, as the measure of general inflation for RIIO-2.[120]

Ofgem also introduced a materiality threshold for applying RPEs.[121] This involved two tests in which an RPE for a given cost category would be deemed material if it:

- made up at least 10 per cent of a company's totex[122]; or
- made up at least 5 per cent of a company's totex and the expected impact of real price movements in the category represented at least 0.5 per cent of totex.

Based on this materiality assessment, Ofgem applied RPEs to the following cost categories:

- labour (general and specialist) for all companies;
- materials for all companies; and
- plant and equipment for one transmission company only (other company cost submissions did not pass the materiality test for this cost category).

In terms of its chosen indices for these cost categories, Ofgem proposed to use the same indices as were used for RIIO-1. Based on stakeholder responses to its draft determination, Ofgem ultimately made the following adjustments to its choice of indices from RIIO-1:

- "AWE: transport and storage" was removed on the basis it does not reflect a material portion of costs for network companies.
- "BCIS 3/58 copper pipes and accessories" was removed on the basis it does not reflect a material portion of costs for network companies.
- For electricity transmission, "BCIS 3/58 copper pipes and accessories" was replaced with BCIS 4/CE/EL/02 electrical engineering materials, which was identified as a more accurate measure of electricity transmission's material costs.
- The ONS "Machinery and Equipment" input PPI was removed on the basis that network company machinery and equipment costs are more likely to reflect output producer prices, not input producer prices.

---

[118] https://www.ofgem.gov.uk/sites/default/files/docs/2018/03/riio2_march_consultation_document_final_v1.pdf paragraph 4.7.
[119] https://www.ofgem.gov.uk/sites/default/files/docs/2018/03/riio2_march_consultation_document_final_v1.pdf paragraph 6.28.
[120] RIIO-2 Sector Specific Methodology – Core document (ofgem.gov.uk) p.132.
[121] RIIO-2 Final Determinations - Core Document (REVISED) (ofgem.gov.uk) 7.51.
[122] For GDNs, the materiality assessment is based on a notional cost structure rather than the cost structure of each individual GDN.

Ofgem commissioned CEPA to forecast RPEs. CEPA's approach was to produce forecasts for input price indices (in nominal terms) and general inflation and to the combine those forecasts to determine forecasts for RPE adjustments for each cost category.[123] In line with Ofgem's previous approaches, where possible independent forecasts for a given index were used, and the long-term historical average was applied where independent forecasts were not available.

For economy wide inflation, CEPA used OBR's forecast for CPI where available, without applying any adjustment for the difference between CPI and CPIH.[124] This was in order to align with Ofgem's policy on inflation indices and forecasts for RIIO-2. Beyond the years where OBR forecasts of CPI were available, CEPA used the long-term historical average of CPIH as its forecast of general inflation.

Forecast RPEs were based on the unweighted average of the forecasted indices within each cost category, net of general inflation. For labour, OBR's forecasts for average earnings were used where available, which was up to and including 2023/24.[125] Longer-term forecasts for labour RPEs were based on the historical average for the selected subsector indices. All of the RPEs for materials and for plant and equipment were based on the long-term average of the chosen indices.

RIIO-ED2

RIIO-ED2 is the price control for electricity distribution for the period April 2023-2028. Ofgem published its final determinations for RIIO-ED2 on 30 November 2022, having published its draft determinations in June 2022.

For RIIO-ED2, Ofgem has opted to move away from fixed ex ante allowances for RPEs and instead intends to use RPE indexation to mitigate forecast risk.[126] As with RIIO-T2 and GD2, Ofgem intends to include a notional RPE allowance for DNOs to account for forecast differences between changes in CPIH and input prices, along with within-period true-ups each year of the control period based on outturn indices. Ofgem has also stated that it intends to set a high materiality threshold and high evidence bar for RPEs.

Ofgem's draft and final determinations included papers by CEPA with its RPE methodology recommendations,[127] which Ofgem has followed.[128] Prior to draft determination, the Energy Networks Association (ENA), representing the DNOs, commissioned two reports by NERA on RPEs for RIIO-ED2.[129] NERA's analysis was then used by the DNOs in their business plan submissions. The approaches taken by CEPA and NERA differ in a number of important ways.

CEPA's analysis for draft determinations applied the same materiality tests as for RIIO-T2 and GD2 to a notional company cost structure, finding that only labour and materials costs justified RPEs. NERA recommended applying RPEs to the DNOs' entire cost base, outside of the "other" cost category, without materiality tests.[130] Following draft determination, NERA opposed CEPA's application of materiality tests on

---

[123] CEPA, RIIO-GD2 and T2: Cost Assessment - Frontier shift methodology paper (May 2020).

[124] This was a revised approach. Initially, CEPA used HM Treasury's collated forecasts for CPI, and applied a 0.1 per cent downwards adjustment to account for the difference between CPI and CPIH, based on the three latest available years. The long-term forecasts were based on the historical average of CPIH, which was from 2000 but excluded 2009/10 and 2010/11 due to concerns around the impact of the financial crisis.

[125] As with economy-wide inflation, this approach was revised between draft and final determinations. At draft determination, CEPA used HM Treasury's consensus forecast for whole economy earnings. The change to using OBR forecasts was to ensure consistency with the general inflation approach.

[126] RIIO-ED2 Sector Specific Methodology, Annex 2 "Keeping Bills Low", Chapter 4.

[127] CEPA (2022) "RIIO-ED2 Draft Determination: Cost Assessment – Frontier Shift methodology paper" and CEPA (2022) "RIIO-ED2 Final Determination: Frontier Shift methodology paper"

[128] RIIO-ED2 Final Determinations Core Methodology paragraph 7.606.

[129] NERA (June 2021) "Price Effects for the RIIO-ED2 Price Control Review" and NERA (November 2021) "Price Effects for the RIIO-ED2 Price Control Review – Addendum".

[130] NERA (June 2021) "Price Effects for the RIIO-ED2 Price Control Review", page 11.

the grounds it was arbitrary and that the absence of RPE's for the "immaterial" category would be a breach of Ofgem's statutory duties.[131] However, CEPA (and Ofgem) maintained its position for final determination, which it viewed as striking a balance between transferring onto customers significant risks which are external to the companies, and the complexity of calculating RPE adjustments. CEPA did, however, decide to change its approach by considering general and specialist labour as separate categories rather than using a combined labour category, following criticism from NERA that CEPA's initial analysis had overstated the degree of variation of general and specialist labour across companies.[132]

Another difference between NERA's approach and CEPA's approach was the process for selecting relevant indices. One of the criteria used by CEPA in selecting indices was whether a given index can be considered independent. That is, the index has little or no chance of being influenced by the actions of the DNOs. NERA did not apply this criterion when selecting indices for each cost category.

CEPA's revised assessment identified two indices for general labour and three for specialist labour. At draft determination, CEPA favoured ONS' AWE Private Sector index over the ONS ASHE Median Hourly Earnings, on the grounds that public sector pay was less relevant to DNO costs. This was criticised by National Grid, and CEPA changed its approach for final determinations by using both ONS indices with a 50 per cent weighting on each. CEPA acknowledged that the two ONS indices both had advantages and disadvantages, as while the ASHE index includes both public and private sector workers, the AWE index does not differentiate between part-time and full-time workers.

For specialist labour there were three indices identified by CEPA for Ofgem's final determinations, each receiving a 33 per cent weighting. These were:

- BCIS PAFI civil engineering (4/CE/01)
- BCIS 4/CE/EL/01 Electrical Engineering Labour
- BEAMA Electrical Engineering Labour

For materials, CEPA selected four indices:

- BCIS 3/58 PAFI Pipes and Accessories: Copper
- BCIS 3/59 PAFI Pipes and Accessories: Aluminium
- BCIS 3/S3 Structural Steelwork - Materials: Civil Engineering Work
- BCIS FOCOS Resource Cost Index of Infrastructure: Materials

Developing forecasts

Using its own selection of indices, NERA calculated the average historical RPE for each proposed index for the period 2000-2021. NERA then applied an uplift adjustment to RPEs based on the average historical difference between the chosen indices and the unit costs faced by DNOs in each cost category. CEPA did not consider this uplift to be appropriate, arguing it went against the principle that RPEs should reflect changes in input prices which are independent of, and therefore beyond the control of, the network companies.

For its own RPEs analysis, CEPA wished to mirror its approach for RIIO-T2 and GD2, but there was only an independent forecast available for one input price index at the time of draft determination: OBR's forecast of average earnings growth, used for the index 'AWE Private Sector Index: Seasonally Adjusted Total Pay Excluding Arrears'. For this index, the RPE up to 2026 was based on the difference between OBR's forecast for earnings growth and its CPI forecast. For all other indices, RPE forecasts were based on the long-term historical average RPE for the period 2000 to 2021, in line with the approach taken by NERA. This resulted in an RPE forecast that is constant across the control period. The data from the years 2009/10, 2010/11 and 2020/21 were excluded from the calculations, as they were considered to be affected by the financial crisis

---

[131] CEPA (2022) "RIIO-ED2 Final Determination: Frontier Shift methodology paper" p.40
[132132] CEPA (2022) "RIIO-ED2 Final Determination: Frontier Shift methodology paper" p.39

and the COVID-19 pandemic.[133] CEPA did not apply an uplift to any RPEs relating to historical unit costs faced by DNOs. CEPA took the unweighted average of the indices in a cost category to get an RPE for each cost category, and then calculated an overall RPE for totex by combining the RPEs for each cost category based on a notional cost structure.

Following draft determinations, CEPA slightly changed its approach to reflect the way in which Ofgem indexed company allowed revenues over the forecast period.[134] Specifically, the Price Control Financial Model (PCFM) used RPE measures to inflate revenues during the ED1 forecast years (2021/22 and 2022/23). ED1 allowed revenues were based on RPI indexation, meaning that the totex RPE calculated by CEPA for ED2 was being applied on top of RPI and not CPIH. Therefore, CEPA adjusted its RPEs for the final determinations to ensure they were calculated relative to the relevant measure of general inflation for each year. The RPE forecasts were also updated to use the latest available data on general economy inflation and for the selected price indices.

CEPA also considered if the high and uncertain inflationary environment in the UK at present justified changing its RPE forecasting approach.[135] CEPA looked at historical trends in growth rates for the materials indices for evidence that inflationary spikes tend to persist across multiple years. CEPA found that over the last 20 years, inflationary spikes tend to fall out of the data the following year, resulting in a one-time step change in the level of the index. CEPA therefore determined that its existing approach remained reasonable given the information available, and noted that "the challenge of fixing inflation and input price forecasts in the current inflationary environment is mitigated by the indexation mechanism".

Assessing Ofgem's methodology for forecasting input price inflation

In this section, we assess Ofgem's approach to input price inflation for the four price controls summarised in the previous section. Our assessment answers the following questions:

- Is Ofgem's approach applicable to the rail context?
- Is Ofgem's approach sufficiently up-to-date?
- Do we consider Ofgem's approach to be valid?
- What is the geographical coverage of the sector?
- What is the overall relevance of Ofgem's approach?

Is Ofgem's approach applicable to the rail context?

Ofgem's approach is partly applicable to rail. The methodology Ofgem has taken to forecasting input price changes relative to general inflation and the rationale it has used for choosing its methodology offers useful insight for rail, but some aspects of the subsequent process for transforming forecasts into revenue allowances are not applicable, particularly the ex-post indexation mechanism applied in recent price controls.

For RIIO-T2, GD2 and ED2, Ofgem's objective was/is to forecast input price inflation over a five-year period. This is the same length of control period that Network Rail forecasts input prices for. Ofgem's experience shows that it is unrealistic to expect that there will be independent forecasts covering the entirety of a five-year control period for all input price categories, or even for general inflation. In fact, Ofgem's experience shows that typically only short-term independent forecasts are available, and potentially only for indices relating to economy-wide inflation or labour cost inflation. For the later years in a control period and for other inputs, a different approach is required. Ofgem's preferred approach has been to assume that the long-term historical average growth rate of relevant input price indices is the best available predictor of future

---

[133] RIIO-ED2 Draft Determinations Core Methodology FN 248.
[134] CEPA (2022) "RIIO-ED2 Final Determination: Frontier Shift methodology paper" p.48
[135] CEPA (2022) "RIIO-ED2 Final Determination: Frontier Shift methodology paper" p.49

input price growth. Its experience for RIIO-1, where Ofgem's forecasts turned out to significantly inaccurate, may indicate that this approach is not optimal, particularly if there is not a mechanism for adjusting expenditure allowances during the control period (as is the case for the majority of Network Rail's funding).

Ofgem's selection of indices could be applicable to rail for some cost categories. General labour costs are common to the energy companies Ofgem regulates and Network Rail, even if the share of general labour costs in total expenditure is likely to vary between them. Indices used by Ofgem for specialist labour, materials and equipment may be somewhat less applicable to rail, although indices relating to civil engineering or infrastructure materials could be applicable. However, the most useful insight in relation to index selection could be the independence criterion applied for RIIO-2 when identifying suitable indices for each cost category. If Network Rail were to propose to use input price indices specific to some subcategory of the transport sector that it can influence through its purchasing decisions, then this would pose a risk to the independence of those indices.

There are differences in the funding and ownership models of the companies that ORR and Ofgem regulate that mean that parts of Ofgem's approach are not applicable to the rail context. For RIIO-2, Ofgem has made a fundamental change to the way it adjusts network companies' allowances for RPEs. Instead of fixed upfront allowances being set for an entire control period, Ofgem has introduced annual within-period adjustments to "true-up" RPE allowances based on outturn differences between input price indices and CPIH. This change was made in the light of its experience of the RIIO-1 price controls, which involved fixed RPE allowances based on forecasts that turned out to overestimate input price inflation. Introducing annual within-period adjustments reduces the risk that inaccurate forecasting will lead to allowed revenues being either too low or too high. However, the majority of Network Rail's funding is fixed for the duration of a control period, meaning that this aspect of Ofgem's approach is not applicable to the context of this review. It also allows Ofgem to be somewhat less concerned than ORR about current macroeconomic uncertainty as it determines RPE allowances for the RIIO-ED2 price control, because it can adjust RPE allowances on an ongoing basis during the control period if the volatile macroeconomic environment means that its initial RPE forecasts prove to be inaccurate.

Is Ofgem's approach sufficiently up-to-date?

The RIIO-T2 and GD2 determinations were published in December 2020. This predates the current inflationary and volatile macroeconomic environment and therefore the approach is not necessarily applicable to the challenges that ORR and Network Rail currently face in attempting to forecast input price inflation amid macroeconomic uncertainty.

The most recent price control for which Ofgem has made its final determinations is RIIO-ED2. This is more applicable to the current macroeconomic environment. Ofgem's draft determinations for RIIO-ED2 were published in June 2022, and its final determinations were published on 30 November 2022. The draft determination seems to be somewhat outdated, as its CPI forecast for 2022/23 is only 6.6 per cent. However, the final determination has been published during the current period of high and uncertain inflation, with a general inflation rate of 10.9 per cent used to calculate Ofgem's 2023 RPEs. The challenges associated with input price inflation forecasting at this time are acknowledged by Ofgem's consultants, CEPA. CEPA's approach of checking the persistency of historical inflation "spikes" is something that could be applied to rail. Unfortunately, the option of using ex post RPE indexation mechanisms (which significantly mitigate the challenge of input price forecasting at times of uncertainty) is not applicable. It is likely that CEPA's decision to maintain its existing approach to RPE forecasting was influenced by the fact that the indexation mechanism exists.

One of the reasons Ofgem gave for selecting a whole-economy wage growth forecast over a private sector wage growth forecast at RIIO-T1 and GD1 was that there was only a marginal difference between the two.[136] This was an appropriate remark at the time, as pay growth was generally low (see Table 0.1) and there were small absolute differences between different indices. In its final determinations for RIIO-ED2, Ofgem has incorporated both a private-sector pay index and a whole-economy pay index to track general labour input cost pressures (with each given equal weighting).[137] This suggests that there may be differences between these two indices. This is an issue for ORR to consider in its assessment of the appropriate forecast for wage costs in today's climate of exceptionally high nominal pay growth but negative real pay growth. Ofgem's experience shows that incorporating up-to-date data in RPE analysis requires careful consideration of whether the arguments underlying previous approaches still hold; in the current context, differences between wage indices may be more material (in absolute terms) and hence imply very different labour RPEs.

Do we consider Ofgem's approach to be valid?

We consider some aspects of Ofgem's approach to be valid, but we have reason to question the validity of other aspects. Ofgem's approach to disaggregating total costs into input cost categories and its process for identifying relevant price indices are both valid, in our view. This is a view shared by the CMA, which supported Ofgem's approach to selecting indices for labour RPEs after this was appealed by Northern Powergrid. We also consider valid Ofgem's introduction of a materiality assessment for deciding whether to include RPEs for each cost category. This approach could be adopted in the rail context to ensure that the complexity of calculating suitable RPE adjustments is only undertaken when there is a material need to do so.

Ofgem's reliance on extrapolating forward the long-term historical average growth rate of indices to generate forecasts is a valid approach in the absence of suitable forecasts. It identified years deemed to be outliers and removed their data so that the atypical developments occurring in them would not affect RPEs. However, its experience from RIIO-1 highlights the importance of selecting the appropriate historical period when taking this approach, particularly if RPE allowances are set ex ante and fixed for the control period. Ofgem set its RIIO-1 RPE allowances shortly after a structural break in real wage growth in the UK economy, caused by the global financial crisis in 2008. At the time, Ofgem assumed, incorrectly, that real wage growth would return to the pre-financial crisis level and based its forecasts on the historical average growth rate of wage indices prior to 2008, and consequently set RPE allowances that were too high. This shows the need to be aware of potential structural breaks and to consider carefully which historical periods are most relevant to the next price control period. There are now enough years of data following this structural break to calculate a post-financial crisis average for real wage growth. However, it must be carefully considered if the recent macroeconomic shifts represent another structural break which would render the historical data from 2009-2020 unsuitable for the purposes of forecasting input prices beyond 2024.

What is the geographical coverage of the sector?

This case study has covered four sectors regulated by Ofgem; gas distribution, gas transmission, electricity distribution and electricity transmission. These sectors cover all of Great Britain, though each sector is structured differently, ranging from a single regulated company in the case of gas transmission, to having fourteen in the case of electricity distribution.

---

[136] RIIO-T1/GD1: Real price effects and ongoing efficiency appendix paragraph 2.15
[137] CEPA (2022) 'RIIO-ED2 Final Determinations: Frontier Shift methodology paper', p.45. [online]

In recent determinations Ofgem has decided to apply regional labour cost adjustments (including the RIIO-ED2 final determinations[138]), whereby regional labour indices are created for each of London, the South East and elsewhere.[139] This 'three-region' approach was also applied in RIIO-ED1 and RIIO-GD2.

What is the overall relevance of Ofgem's approach?

Ofgem's approach offers some useful insight into how the rail infrastructure sectors might go about forecasting input price inflation. The relevance of Ofgem's approach is limited in some respects, in part due to the different characteristics of the energy sector (particularly Ofgem's ability to adjust RPE allowances ex-post) and in part due to some of Ofgem's work now being somewhat out-of-date.

---

[138] RIIO-ED2 Final Determinations Core Methodology, paragraph 7.31.
[139] RIIO-ED2 Draft Determinations Core Methodology paragraph 7.36.

Appendix 3: Case Study on Water in England and Wales

This case study covers the approach to RPEs used in the water sector in England and Wales. Ofwat is the economic regulator for the sector, setting the maximum revenues that the monopoly water suppliers in England and Wales can raise from customers over a five-year period. One aspect of Ofwat's price controls is to estimate Real Price Effects (RPEs) for water companies that reflect expected differences between input price inflation and general inflation over a control period.

Overview of Ofwat's approach to input price inflation

The below covers Ofwat's approach to forecasting input price inflation for PR19, the most recent price review Ofwat has carried out, and the subsequent CMA appeals by four of the water companies. PR19 covers the period 2020-2025.

PR19 final determination

As part of PR19 Ofwat set a totex allowance for companies for the period 2020-25 which included an allowance for RPEs. This RPEs allowance was based on Ofwat's expectations of how water companies' input costs would change relative to CPIH, which was Ofwat's chosen price index for the price control as a whole. Ofwat determined that labour was the only input cost category for which an RPE allowance was justified.

Ofwat commissioned Europe Economics to assess whether there was a robust case for any RPEs for the control period. Our final assessment[140] included analysis of data and information submitted by water companies in their business plans and their responses to our earlier work on PR19 RPEs ahead of Ofwat's draft determinations. We first explain the framework we used to assess potential RPEs and then outline our assessment for each cost category.

Europe Economics' RPE framework for PR19

We developed a framework to assess the case for RPEs such that an RPE allowance would only be recommended if there was a sufficient and convincing case that an allowance was justified. The rationale for requiring a sufficient and convincing case was twofold. Firstly, the water companies have an information advantage over Ofwat and have an incentive to utilise this advantage to increase their cost allowances. Secondly, there were other mechanisms in place to protect water companies against cost increases, including a cost sharing mechanism and a 'substantial effects' clause.

Our framework for assessing the case for RPEs consisted of three criteria, listed below. Criterion 1 was broken down into two sub-criteria, only one of which needed to be passed.

1) Is there a significant likelihood that the value of the wedge between the input price and CPIH will differ substantially from zero over the period of the price control? To assess cost items against this criterion, we considered two things:

---

140 Europe Economics (2019), Real Price Effects and Frontier Shift – Final Assessment and Response to Company Representations [online]

a) **Is the expected value of the wedge between the input price and CPIH materially different from zero?**
To assess this sub-criterion, we assessed the statistical significance of the wedge between the input price and CPIH. This was based on historical values, though forecast data was also considered when available.

b) **Does the wedge between the input price and CPIH exhibit high volatility over time?**
To assess this sub-criterion, we evaluated the volatility of the wedge over five-year periods and analysed this variability as a share of totex. We considered any wedge with a five-year rolling average that frequently exceeded 1 per cent of totex as volatile.

2) **Are there compelling reasons to think that CPIH does not adequately capture the input price?**
To assess this criterion, we compared the share that a cost item had in water companies' totex with the share of the most comparable item(s) in the CPIH basket. The criterion was passed if there was conclusive evidence that CPIH does not adequately capture the input price, while a "partial pass" was possible if the input price was partially, but not fully, captured by CPIH.

3) **Is the input price and exposure to that input price outside management control for the duration of the price control?**
For this criterion, we assessed whether company management could make changes to mitigate the risks of an RPE for a cost item. We developed the following typology of hypothetical ways in which companies might limit their exposure to input price increases:

A. Controlling the level of the price they pay for the input, because they have buyer power in the market for the input or because they were initially paying above the competitive market price (due to inefficient management) and thus can reduce the price they pay.

B. Protecting against volatility in the price of an input though long-term contracts which fix input prices. Suppliers build their future price expectations into bids for long-term contracts, so this protects against input price volatility but not input price pressure on an expected value basis, and hence we considered this a "partial pass" of the criterion.

C. Reducing the volume of the input that they use, through greater efficiency in the use of that input or by substitution to other inputs as companies re-optimise their input mix. Cases where companies could avoid input price pressures by reducing the volume of the input they use were considered a "partial pass" against the criterion.

If a cost item passed both criteria 2 and 3 and at least one of sub-criteria 1A or 1B, it advanced to the next stage of the assessment. If any of the criteria were failed, then we considered that CPIH indexation would be sufficient to compensate companies for outturn movements in the price of that input. Where a cost item received a "partial pass" for criteria 2 or 3, we recommended that Ofwat investigates the cost item in more detail to reach a judgement on the case for an RPE allowance.

Stage 2 of the assessment considered how an RPE identified by the previous stage should be taken into account in setting price controls. This included considering whether a robust mechanism existed for taking account of the RPE, and whether an ex post or ex ante allowance was appropriate. The criteria we used for Stage 2 were:

- Is there a robust basis for forecasting the input price?
- Is there a robust and relevant index for the input price?
- Would an RPE mechanism create any perverse incentives for companies?
- Should the risk be borne by customers rather than investors?

These criteria interacted as shown in the flow diagram reproduced in Figure 0.1. Broadly, they meant that an ex ante allowance would be recommended if there was a robust basis for forecasting the price and no perverse incentives would be created. The case for an ex post adjustment was decided based on whether a

robust price index existed, whether an ex post adjustment would create perverse incentives, and which party (customers or investors) should bear the risk of input price changes.

Figure 0.1: RPE Stage 2 assessment map
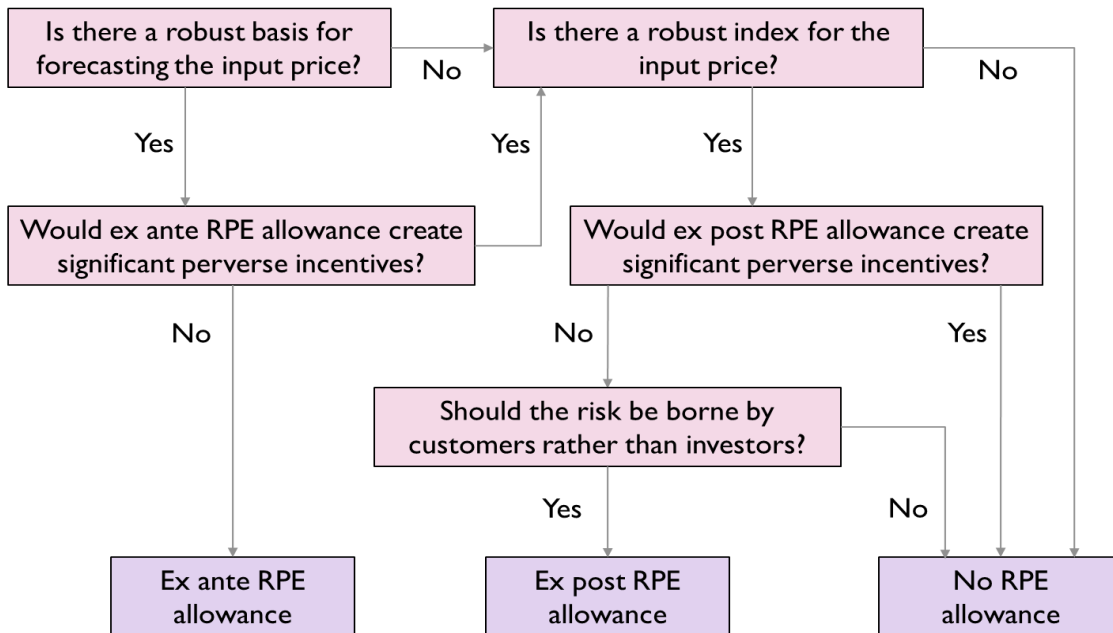
Source: Europe Economics' PR19 RPE framework

Assessment of RPEs for each cost category

The case for RPEs was assessed using the above framework for the major wholesale cost areas in the PR19 Business Plan data tables. The cost categories were:

- labour
- energy
- chemicals
- materials, plants and equipment (MPE)
- other costs

The principal data used in the assessment of RPEs were various published input price indices, government projections of wage growth and industrial electricity prices, the breakdown of costs submitted in company business plans, and the weights attached to various products in CPIH. Below we summarise the RPE assessment for each category.

Labour

Our assessment for labour concluded that the strength of the case for a labour RPE depended on how much reliance was placed on OBR's forecasts for nominal average earnings growth for the period 2019-2023. Table 0.4 presents our assessment against the criteria in our framework. Ofwat decided to use an RPE for labour.

Table 0.4: Summary of EE assessment of RPE allowance for labour

Assessment criteria	Decision
1. Is there a significant likelihood that the value of the wedge between the input price and CPIH will differ substantially from zero over the period of the price control?	
A. Is the expected value of the wedge between the input price and CPIH materially different from zero?	Depends on whether reliance is placed on OBR forecasts
B. Does the wedge between the input price and CPIH exhibit high volatility over time?	Fail
2. Are there sufficient and convincing reasons to think that CPIH does not adequately capture the input price?	Pass
3. Is the input price and exposure to that input price outside management control for the duration of the price control?	Partial Pass
Overall	Depends on whether reliance is placed on OBR forecasts

Source: Europe Economics.

To assess criterion 1, we first looked at historical data for sector specific wage indices. We analysed two ONS indices: the Index of Labour Cost per Hour (ILCH) and Average Weekly Earnings (AWE). Both were available for the electricity, gas and water supply sector. We also analysed the ONS Annual Survey of Hours and Earnings (ASHE) dataset, which separately reports water supply and sewerage wages. We estimated the wedge between these indices and CPIH, testing if the average wedge over a given period was statistically different from zero (at the 5 per cent significance level).

The historical data did not suggest that there was a statistically significant wedge between water sector wage inflation and CPIH. We found an average wedge of zero between changes in CPIH and changes in the electricity, gas and water supply sector wage indices (from 2006 to 2018 for the ILCH index, and from 2006 to 2019 for the AWE index). We also found an average wedge of zero between changes in the ASHE index for the water supply and sewerage sector and CPIH from 2006 to 2018 (both for mean weekly pay and mean hourly pay).

Forecasts were not available for sector specific wage indices, but the OBR does publish forecasts of nominal average earnings growth as well as CPI forecasts.[141] OBR's forecasts implied an average wedge between earnings growth and CPI of 1.1 percent over the period 2019-2023, suggesting that an RPE exists for labour.

However, our assessment also noted that a comparison of OBR's previous average earnings forecasts and actual outturn data indicated that OBR had systematically overestimated average earnings growth in its forecasts, and therefore reliance on OBR forecasts could upwardly bias an estimated RPE. Our report noted that there was also uncertainty around Brexit and its macroeconomic effects that added to the uncertainty about the reliability of OBR's forecasts.

None of the wedges we estimated with historical data exhibited high volatility over time, based on analysis of the five-year rolling average of the wedge. Therefore, labour failed sub-criterion 1B. Our assessment for 1A was dependent on whether reliance was placed on OBR's forecasts.

Labour passed criterion 2. There is no discrete item for labour in the CPIH basket, and therefore we concluded CPIH does not capture changes in labour costs.

---

[141] As OBR does not forecast CPIH directly, we took OBR's CPI forecasts.

For criterion 3, we concluded that labour partially passed. In our view there was no evidence that water companies had market power in labour markets. However, we argued there were some mechanisms water companies could use to protect against wage volatility, such as securing external staff under long-term framework contracts with fixed prices. We also argued there were some ways in which water companies could reduce the volume of labour used by substituting capital for labour. For example, the installation of telemetry and use of remote and automated operation could reduce the need for water company staff to be physically present on site, which could decrease the number of workers required and reduce the need for shifts at unsociable hours, both of which could reduce exposure to changes in labour prices.

The overall labour RPE assessment therefore depended on the view Ofwat took for criterion 1, which in turn depended on its view on the reliability of OBR forecasts. We progressed labour to the second stage of our assessment to assess what should be done about a labour RPE, if Ofwat decided to apply one (as was subsequently the case). Working through our criteria for stage 2, we concluded the following:

1. Is there a robust basis for forecasting the input price? No – OBR forecasts had repeatedly failed to provide accurate forecasts of labour costs in the past.
2. Is there a robust index for the input price? Yes – either the ONS wage index for private sector wages or for manufacturing wages represented a robust index to use for indexation purposes.
3. Would an ex-post RPE allowance create significant perverse incentives? No – the ONS wage indices for private sector wages and for manufacturing wages are based on data from the wider economy and could not be influenced by the actions of water companies.
4. Should the risk be borne by customers rather than investors? Yes – the risk should be borne by customers as labour costs were a material cost item (representing 39 per cent of water company totex).

As a result, we recommended an ex post indexation mechanism for labour costs, using either the ONS "Private sector" wage index or the ONS "Manufacturing" wage index.

At final determination, Ofwat decided to make a real price effect adjustment for labour costs. It set an ex-ante RPE allowance based on OBR hourly wage forecasts from March 2019 (converted to a real wage forecast using CPI), with a true-up mechanism based on the ASHE hourly manufacturing wages index that would be applied at the end of the control period to account for any over- or under-estimation by the OBR.[142]

Energy

Our assessment for energy concluded that the strength of the case for an energy RPE depended on the reliance given to BEIS forecasts and the weight placed on historical data from before 2011. Table 0.5 presents a summary of our assessment against the criteria. Ofwat decided not to include an RPE allowance for energy.

---

[142] PR19-final-determinations-Securing-cost-efficiency-technical-appendix.pdf (ofwat.gov.uk) p.196

Table 0.5: Summary of EE assessment of RPE allowance for energy

Assessment criteria	Decision
1. Is there a significant likelihood that the value of the wedge between the input price and CPIH will differ substantially from zero over the period of the price control?	
A. Is the expected value of the wedge between the input price and CPIH materially different from zero?	Depends on whether reliance is placed on BEIS forecasts and on weight placed on pre-2010 data
B. Does the wedge between the input price and CPIH exhibit high volatility over time?	Depends on weight placed on pre-2011 data
2. Are there sufficient and convincing reasons to think that CPIH does not adequately capture the input price?	Partial Pass
3. Is the input price and exposure to that input price outside management control for the duration of the price control?	Partial Pass
Overall	Depends on whether reliance is placed on BEIS forecasts and on weight placed on pre-2010 data

Source: Europe Economics.

For criterion 1, the evidence on the value and the volatility of the wedge between energy price inflation and CPIH was mixed. Our historical analysis used the electricity price index for industrial customers published by the Department for Business, Energy and Industrial Strategy (BEIS), reflecting the fact that electricity was the most important energy cost for water companies. Our forecast analysis used BEIS's Updated Energy and Emissions Projections bulletin, which included forecasts of industrial retail electricity prices out to 2035.

The historical wedge between the BEIS index and CPIH was sensitive to the choice of period over which the wedge was estimated. Historical data for the period 2006-2019 showed evidence of a significant positive wedge, 5.2 per cent, between the growth of the electricity price index and CPIH. However, this was largely driven by very high positive wedges prior to 2010. Restricting the analysis to data from 2010 onwards found a wedge of zero. Using data from 2011 or 2012 onwards found positive wedges of 2.7 and 2.8 per cent, respectively.

BEIS's forecasts implied an expected wedge of 0.7 per cent on average per year between 2020 and 2024, indicating there was evidence for an energy RPE. However, our report noted that previous BEIS electricity price forecasts were significantly different from outturn electricity prices, calling into question the reliability of such forecasts. Uncertainty around Brexit and its macroeconomic effects further increased the uncertainty around the reliability of BEIS forecasts.

Ultimately, it was clear from the evidence that the future price of energy was uncertain. The historical wedge analysis found a wedge over certain time periods, and the BEIS forecast projected a positive wedge. We concluded that the assessment of energy against sub-criterion 1A depended on whether weight is placed on BEIS forecasts, and on the weight placed on pre-2010 data.

For criterion 1B, the volatility of the wedge, a similar picture emerged. Analysis of the five-year rolling average wedge as a share of totex showed that prior to 2011 there was a material impact on totex from the wedge between industrial electricity prices and CPIH, but after 2011 the wedge (as a proportion of totex) fluctuated within the bounds set by our materiality threshold of 1 per cent. We concluded that the assessment against sub-criterion 1B depended on the weight placed on pre-2011 data.

For criterion 2, we found that CPIH partially captured energy costs and thus the criterion was partially passed. The share of electricity in the 2018 CPIH basket was 1.3 per cent, while energy had a share of 5.2 per cent.

Energy costs accounted for 9 per cent of water companies' costs, and therefore CPIH only partially captured changes in energy input prices.

For criterion 3, energy was scored a partial pass as we found that management had some ability to protect against the impact of energy price increases but that a material element was outside management control. Water companies could make use of fixed energy tariffs to partially reduce exposure to fluctuations in energy prices, though not for the full duration of a price control. Increasing energy efficiency and increasing energy generation were other mechanisms identified for reducing exposure to energy price movements, but they involve long-term capital investments that are likely to require more than a single price control to fully implement.

Overall, the assessment of an energy RPE depended on the weight given to BEIS forecasts and pre-2011 data. As with labour, we progressed energy to stage 2 of our framework to assess how an energy RPE might be accounted for, although ultimately Ofwat decided not to use an RPE for energy.

Chemicals

Our assessment for chemicals concluded that an RPE for chemicals should not be adopted, as it failed both sub-criteria 1A and 1B. Table 0.6 presents a summary of our assessment against the criteria.

Table 0.6: Summary of EE assessment for RPE allowance for chemicals

Assessment criteria	Decision
1. Is there a significant likelihood that the value of the wedge between the input price and CPIH will differ substantially from zero over the period of the price control?	
A. Is the expected value of the wedge between the input price and CPIH materially different from zero?	Fail
B. Does the wedge between the input price and CPIH exhibit high volatility over time?	Fail
2. Are there sufficient and convincing reasons to think that CPIH does not adequately capture the input price?	Pass
3. Is the input price and exposure to that input price outside management control for the duration of the price control?	Pass
Overall	Fail

Source: Europe Economics.

For criterion 1, there was no evidence of a statistically significant wedge between chemicals inflation and CPI, nor evidence that the wedge was volatile. For our analysis we used the output PPI for "chemicals and chemical products" published by the ONS. This index was strongly correlated with CPIH from 2006-2019, and we found that the wedge between the PPI and CPIH was not statistically significantly different from zero. Therefore, the historical evidence indicated there was not a material RPE for chemicals.

There was a lack of independent forecasts for chemicals. Global estimates from the World Bank[143] were investigated, which implied a wide range of negative wedges. However, the estimates were global and only available for a few specific chemical types, so little weight was given to these estimates relative to the historical analysis.

Based on the historical wedge analysis, we concluded that chemicals failed sub-criterion 1A. Analysis of the historical data showed that the wedge, as a share of totex, exhibited minimal volatility, in part because

---

[143] World Bank Commodities Price Forecast

chemicals only accounted for around 2 per cent of companies' totex. Therefore, chemicals also failed sub-criterion 1B.

Chemicals passed criterion 2 as there was no explicit category for chemicals in the CPIH basket. The closest categories in the CPIH basket were cleaning equipment and cleaning and maintenance products, both unlikely to be close matches for the chemicals that water companies purchase.

Chemicals also passed criterion 3. There was no evidence that water companies have market power in chemicals markets. Contracts with chemical suppliers were found to be typically shorter than a price control, exposing water companies to changes in chemicals prices at least once during the price control. Finally, substitution away from chemicals was difficult for water companies as they form a key part of the water treatment process. Therefore, it was concluded that movements in chemicals prices are largely outside management control.

Since chemicals failed criterion 1, indicating there was little evidence that the value of a chemicals RPE would differ substantially from zero over the control period, we did not recommend an RPE allowance for chemicals.

Materials, plant and equipment (MPE)

Our assessment for chemicals concluded that an RPE for MPE should not be adopted, as it failed both sub-criteria 1A and 1B. Table 0.7 presents a summary of our assessment against the criteria.

Table 0.7: Summary of EE assessment for RPE allowance for MPE

Assessment criteria	Decision
1. Is there a significant likelihood that the value of the wedge between the input price and CPIH will differ substantially from zero over the period of the price control?	
A. Is the expected value of the wedge between the input price and CPIH materially different from zero?	Fail
B. Does the wedge between the input price and CPIH exhibit high volatility over time?	Fail
2. Are there sufficient and convincing reasons to think that CPIH does not adequately capture the input price?	Partial Pass
3. Is the input price and exposure to that input price outside management control for the duration of the price control?	Partial Pass
Overall	Fail

Source: Europe Economics.

For criterion 1, we noted that, in contrast to the other cost categories, there was no single index that captures well the changes in prices of MPE. As a result, our approach was to consider a range of indices which may reflect the price of individual components of MPE to try and determine if there was a case for an RPE. The indices we analysed included:

- BCIS "Resource Cost Index of Building Non-housing (NOCOS)"
- BCIS "Resource Cost Index of Maintenance of Building Non-Housing (NOMACOS)"
- ONS "Construction Output Price Inflation (COPI)"
- ONS "Machinery and equipment n.e.c." PPI
- ONS "Other Pumps and Compressors" PPI
- ONS "Computer, electronic and optical products" PPI
- ONS "Electrical equipment" PPI
- ONS "Motor vehicles, trailers and semi-trailers" PPI

- ONS "Other manufactured goods" PPI
- Construction Material Price Index, published by the Government

Historical wedge analysis of the above indices resulted in a mixed picture. Some indices showed a positive RPE, while others gave no evidence of a statistically significant wedge. Moreover, some of the water companies proposed a zero or negative wedge for MPE. We concluded there was no robust evidence of a positive wedge for MPE, and thus it failed sub-criterion 1A.

Analysis of the volatility of the wedge was restricted to the 'Construction Material Price Index' and the 'Machinery and equipment n.e.c.' PPI, as these were the indices with a sufficiently long timeframe for analysis of five-year rolling averages. For both, the five-year rolling average wedge as a share of totex did not exceed the 1 per cent threshold at any point, and therefore sub-criterion 1B was failed.

MPE partially passed criterion 2. The CPIH basket included categories such as housing and DIY equipment, purchase of vehicles, relevant spare parts and the maintenance and repair of those vehicles, together accounting for 16 per cent of the CPIH basket. However, we acknowledged that a lot of the goods in these categories are unlikely to be close matches to the inputs bought by water companies. Therefore, we concluded CPIH may capture MPE costs on a partial basis.

MPE also partially passed criterion 3. We argued that through the typical practice of signing long-term contracts that can cover multiple price controls, water companies can insulate themselves from volatility in the prices for MPE within a given price control period. However, the expected value of increases in these input prices was likely to be built into the prices that suppliers offer when bidding for such contracts, so the criterion was only partially passed.

Since MPE failed criterion 1, indicating there was little evidence that the value of a MPE RPE would differ substantially from zero over the control period, we did not recommend an RPE allowance for MPE.

Other costs

Other costs covered 31 per cent of the water companies' totex, though this varied substantially between companies. This may have reflected differences between companies in the degree of outsourcing and/or differences in how costs were categorised. By their nature, other costs are difficult to assess for RPEs as it is difficult to know which input prices might be relevant.

We analysed two cost items which fell within this cost category: business rates and abstraction charges. These items represented 6.2 per cent and 1.7 per cent of totex, respectively. Business rates were judged to not require an RPE as they are indexed to CPI, which moves closely in line with CPIH. The data from company business plans indicated that most companies were not expecting any real terms increase in the abstraction charges they pay. This suggested that an RPE was not needed for this cost item.

Summary

A summary of the results of our RPE assessment at PR19 is presented in Table 0.8. Ofwat decided to apply an ex ante RPE allowance for labour, using OBR real hourly wage forecasts with a true-up mechanism to be applied at the end of the price control period based on the outturn level of the ASHE hourly manufacturing wages index. No RPEs were applied to the remaining cost categories.

Table 0.8: Summary of RPE assessment

Cost Item	Labour	Energy	Chemicals	MPE
Share in totex (%)	38.6	9.0	1.9	19.8
RPE recommendation	Depends on reliance on OBR forecasts	Depends on reliance on BEIS forecasts and on weight placed on pre-2010 data	No	No

CMA appeal

Four water companies appealed Ofwat's PR19 price control determinations to the CMA, which conducted a redetermination of the price controls for the disputing companies, published in 2021. This section summarises the CMA's redeterminations in relation to input price inflation.[144]

CMA's analysis focused on answering two questions:

- What are the correct criteria to determine whether an RPE adjustment should be made?
- For which cost items should it make an RPE adjustment?

What are the correct criteria to determine whether an RPE adjustment should be made?

The CMA reviewed the RPE assessment framework we developed for Ofwat and the companies' criticisms of the framework. In its view, there were "clear reasons and merits" behind our approach of using criteria to assess eligibility for RPEs, namely:[145]

- The companies have an information advantage and they are more likely to highlight examples that show that costs will go up rather than down.
- This approach helps to keep the RPEs simpler as line-by-line adjustments would involve potentially several RPE adjustments based on forecasts and related true-ups.
- It helps to preserve management incentives to control costs.

The CMA decided that our approach provided a balance between using RPEs when the evidence clearly demonstrated it is necessary and not over-complicating the assessment. It therefore used the same approach in its redetermination. The CMA considered adding an additional materiality criterion as an improvement to the framework, to simplify the assessment of RPEs, referencing the materiality assessment applied by Ofgem for RIIO-2. The CMA applied a 10% of totex threshold first and then a 0.5% of totex threshold when assessing the volatility of the wedge. The 0.5% threshold was the lower of the thresholds used by CEPA (0.5%) and EE (1% in criterion 1B).[146] The CMA decided not to use materiality as an additional criterion because it would not change its RPE decisions. However, it did not rule out the possibility that a materiality criterion could improve the Europe Economics framework.

For which cost items should an RPE adjustment be made?

For each cost category, the CMA applied our framework to determine if an RPE adjustment was justified. Its assessment was based on its own analysis of the data we used in our assessment, as well as more up-to-date datasets that became available after our assessment, and submissions from the water companies and Ofwat. For each cost category, its decisions on RPE adjustments were the same as those made by Ofwat at its final determination. Below we summarise the CMA's decision for each cost category, including a summary of the arguments made by water companies.

---

[144] CMA (2021) "Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations – final report" [online]

[145] CMA (2021) "Final report" paragraph 4.672

[146] CMA (2021) "Final report" paragraphs 4.675-4.679

Labour

The CMA decided to use a labour RPE adjustment based on the March 2019 OBR forecasts for annual wage growth.[147] The CMA also decided to use an ex post mechanism for labour costs, using the ASHE manufacturing index. This decision mirrored the decision that Ofwat made in its final determinations.

Whilst all parties (Ofwat, the CMA and water companies) agreed that a labour RPE was necessary, there was some debate around which set of OBR forecasts should be used as its basis. At the time of redetermination, more recent OBR forecasts were available (March 2020 and November 2020) than had been used for Ofwat's final determination (March 2019). Ofwat argued that the March 2019 forecasts remained the most appropriate to use for an RPE adjustment.[148] It argued against the March 2020 forecasts on the basis that they were higher than the March 2019 forecasts while real wage growth had fallen since March 2020 (largely due to COVID-19 impacts). Therefore, Ofwat argued, the use of the March 2020 forecasts would increase revenue allowances unnecessarily, requiring a greater adjustment under the true-up mechanism at PR24. It also argued against using the even more up-to-date forecasts from November 2020 as these did not produce plausible results for the water sector for financial years 2020/21 and 2021/22 due to the treatment of furloughed workers. The CMA agreed with Ofwat's position, and decided to use the March 2019 OBR forecasts to minimise the scale of the true-up adjustment and to avoid the risk of making potentially implausible assumptions.

There was also debate around which index should be used for the ex post mechanism. Ofwat had decided to use the ASHE manufacturing index in its final determinations, reasoning that it would not weaken management incentives because manufacturing sector wages are outside water company management control. Water companies argued that the ASHE manufacturing index was a poor proxy for water sector wages in the context of Brexit and the COVID-19 economic crisis because the manufacturing sector had suffered a larger drop in output and a higher furlough rate than the water sector. Instead, water companies argued for using the AWE electricity, gas and water supply index for the ex post mechanism on the grounds that it was a better proxy for water sector wages. Ofwat and Europe Economics both opposed use of the AWE index. We pointed out that, unlike the ASHE index, the AWE index was affected by changes in hours worked and thus more exposed to Brexit and COVID-19 impacts. The CMA decided that the ASHE index was the most appropriate index to use for the ex post mechanism, echoing our rationale that the AWE index is less robust to changes in working hours.

Energy

The CMA decided not to implement an ex ante RPE adjustment or ex post mechanism for energy. This mirrored Ofwat's decision in its final determinations.

Water companies argued strongly for an energy RPE. They argued that BEIS forecasts showed a positive, statistically significant wedge between energy and CPIH, and that there were historical wedges between energy and CPIH. They argued that CPIH failed to account for energy prices because electricity accounted for 1.3 per cent of the basket, compared to 9.4 per cent of companies' totex. They also argued that, while management had possibilities to protect against short-term volatility in energy prices, companies were not protected against the long-term trend of rising energy prices. Northumbrian Water commissioned Cornwall Insight to forecast energy prices for a customer with Northumbrian Water's energy consumption profile. Cornwall Insight projected that the energy prices faced by Northumbrian Water would rise by an average of 4 per cent per year in real terms (on a CPIH-real basis) over the price control.[149]

---

[147] CMA (2021) "Final report" paragraph 4.700 [online]
[148] CMA (2021) "Final report" paragraph 4.690 [online]
[149] Northumbrian's response to the provisional findings [online], paragraphs 84–85 and Northumbrian's final submission [online], paragraph 25

The CMA's decision to not apply an energy RPE was based on assessing all of the criteria in the assessment framework in the round.[150] The partial passes for criteria 2 and 3 showed that energy costs are partially under management control and partially captured by CPIH, and in the CMA's view this provided enough protection for companies against changes in the price of energy.

Chemicals

The CMA decided not to implement an ex ante RPE adjustment or ex post RPE mechanism for chemicals. This mirrored Ofwat's decision in its final determinations.

There was some initial opposition to Ofwat's decision to not apply a chemicals RPE. Water companies argued that the ONS chemicals price index used in our assessment did not capture relevant changes in water company chemical costs. Northumbrian Water's consultants, Economic Insight, carried out analysis covering 63 per cent of Northumbrian's chemical expenditure and this analysis showed historical price increases. We responded that a key drawback of forecasting prices from historical data could be the significant rise in crude oil prices in 2017/18. After CMA's provisional determination to not apply a chemicals RPE, no further opposition on this issue was submitted by water companies.

The CMA's decision to not apply an RPE for chemicals was reached because the expected value of the wedge between chemicals prices and CPIH was not materially different from zero. The CMA did not place much weight on the analysis of Northumbrian Water's historical procurement data as it felt this was likely to be distorted by the substantial rise in crude oil prices in 2017/18.

MPE

The CMA decided not to implement an ex ante RPE adjustment or ex post RPE mechanism for chemicals as there was no evidence of a statistically significant wedge between MPE prices and CPIH. This mirrored Ofwat's decision in its final determinations. There was very little opposition from water companies on this issue.

Other costs

Only Anglian Water made a submission relating to an RPE for other costs. It said that there was a need for an RPE, and referred to analysis in its 2018 business plan that forecast that other costs would increase at a nominal rate of 2 per cent per year. The CMA noted that a 2 per cent annual increase is the same as the Bank of England inflation target. The CMA decided not to include an RPE adjustment for other costs.

Assessment of Ofwat's approach

In this section, we assess Ofwat's approach to input price inflation for PR19.

Is Ofwat's approach applicable to the rail context?

We consider Ofwat's approach to be partly applicable to the rail context. The framework for assessing RPEs, particularly the first stage that identifies which cost categories might justify an RPE, could be adapted and then applied to Network Rail. Given that the options for how an RPE adjustment could be applied are more limited for rail than for water (in particular, ex post indexation may not be possible), the second stage of the framework is probably less applicable.

Some of the cost categories that were assessed for water companies are likely to be different to the main cost categories for Network Rail. In particular, it is unlikely that chemicals will require its own input price inflation assessment for the rail context. However, the approach to labour and energy are be applicable, as these are both large elements of Network Rail's cost bases. The combining of materials, plant and equipment

---

[150] CMA (2021) "Final report" paragraph 4.720 [online]

into one category for PR19 was based on the business plan template water companies were required to use, and it appears the broad nature of the category made it difficult to identify appropriate indices for wedge analysis. There is no intrinsic reason for having an MPE category in the rail sector if there are more useful possible breakdowns. We would hope that any costs categorised as "other" by Network Rail would account for less than 30 per cent of total costs, unlike in the water sector, thus allowing a greater proportion of total costs to be subjected to robust input price inflation analysis.

Is Ofwat's approach sufficiently up-to-date?

The initial PR19 RPE analysis is somewhat out-of-date, given it predates COVID-19 and the current environment of high energy prices and high general inflation. The subsequent CMA redetermination occurred in 2021, and therefore takes account of the impacts of the COVID-19 crisis, but was still well before the current macroeconomic turmoil. However, an interesting point to take from the CMA appeals is that the latest input cost forecast is not necessarily the correct one to use. The OBR wage cost forecast used in the initial RPE analysis had been superseded by two subsequent OBR forecasts by the time the CMA appeals were underway, but these later forecasts were not used because of a consensus that they overestimated real wage growth and incorporated unusual developments that would produce implausible results when applied to the control period (i.e. furlough). This highlights the important point that the date of a forecast must be understood in conjunction with the macroeconomic context at the time.

The assessment of energy price inflation is potentially the most out-of-date, given the impact that the Russia-Ukraine conflict has had on energy markets since the CMA's redetermination. The case for an energy RPE could be much stronger now than it was in 2021, although an energy RPE might currently be negative to reflect the potential for energy prices to fall from their current peak. An updated historical analysis of the wedge value and volatility would need to consider whether data from 2022 was appropriate to use for assessing an energy RPE, and the reliability of energy forecasts such as those published by BEIS may be even lower than at the time of PR19.

Do we consider Ofwat's approach to be valid?

We consider that the framework used by Ofwat to assess the case for RPEs is valid. Further, it is considered valid by the CMA, based on its decision to use the same framework for its own redetermination of the price controls for the four appealing companies. The fact that the CMA reached the same conclusions on RPEs for each cost category as Ofwat demonstrates that the framework can provide consistent results when applied by different parties. A regulator choosing to adapt this framework in its own sector (as done by the CAA in its regulation of Heathrow Airport, as discussed in Appendix 4) can be reasonably confident that it provides a valid approach to assessing RPEs.

The CMA's final report noted that the framework might be improved by the addition of a materiality criterion. In the case of the water companies' redetermination, the CMA chose not to add this criterion because it would not have changed any of its decisions on RPEs. Nonetheless, it is possible that an assessment of materiality, as Ofgem used for RIIO-2, would improve Ofwat's approach. Ruling out potential RPEs that do not have a material impact on companies' total expenditure can simplify the assessment process by avoiding unnecessary analysis and hence making regulation more proportionate.

What is the geographical coverage of the sector?

Ofwat regulates the water and wastewater companies covering England and Wales. It makes no distinction between RPEs for England and Wales in its assessment.

What is the overall relevance of Ofwat's approach?

We consider Ofwat's approach to offer relevant insight on how the ORR might assess Network Rail's methodology for forecasting input price inflation. Whilst the analysis is not particularly up-to-date, it is possible that similar factors will be at play when considering whether to use the most recent forecasts available in the rail context. Some parts of Ofwat's approach may be less relevant, such as the selection of indices and forecasts, the costs faced by the water sector, and the use of an ex post true-up mechanism. However, Ofwat's approach provides a useful framework that, with suitable adjustments, could aid in the assessment of the approach taken by Network Rail.

Appendix 4: Case Study on Aviation (Heathrow airport)

This case study focuses on the approach taken to RPEs by the UK's aviation regulator, the Civil Aviation Authority (CAA), in its economic regulation of the airport operator for London Heathrow Airport, Heathrow Airport Limited (HAL). We cover the CAA's approach to input price inflation for two price controls: the Q6 price control (originally covering the period 2014-2018 and since extended to 2023) and the ongoing H7 price control determination, due to cover the five-year period January 2022 to December 2026.

Q6 price control

The current control period for Heathrow Airport (known as Q6) began on 1 April 2014 and was initially scheduled to run until 31 December 2018. In 2016 the price control was extended by a year, to December 2019, and in 2019 it was further extended to December 2021. In December 2021, a one year "holding price cap" was set for 2022.

In its 2014 notice granting HAL's license (equivalent to a final determination), the CAA only presented limited analysis of input price inflation. The focus of this analysis was on construction price inflation and how this might exceed RPI, which was the measure used for the indexation of HAL's capex allowance. In past price controls, the CAA had included additional allowances to provide for the tendency of construction prices to rise faster than RPI.[151] Based on forecasts of construction price inflation made by the CAA's consultants (Davis Langdon) compared to the OBR's RPI forecasts for the five-year Q6 period, which showed construction prices increasing at a slower rate than RPI, the CAA did not consider that an additional allowance for construction inflation was appropriate.[152]

HAL opposed the CAA's proposal, arguing that the forecasts underestimated construction price inflation and that the CAA should use tender prices indices (TPIs) such as the BCIS index as well as the construction price index. In response, the CAA noted that it had used the same measure of construction price inflation for the previous control period, Q5, with the resulting forecasts being significantly in excess of the outturn.

The CAA rejected the idea of using TPIs to forecast construction inflation. It considered TPIs not to be "equally important" as outturn indices because TPIs only measure the prices that construction firms bid, not the price paid by clients (such as HAL).[153] This view was consistent with the view taken at Q5 by the CAA and the Competition Commission (CC, now the CMA). The CAA also referred to an academic study[154] noted by the CC that found "the TPI forecast produced by the BCIS is "generally overoptimistic [i.e. an overestimation of inflationary trends], leading to systematic forecast error" (CAA's edits). The CC stated that it had no reason to believe the approach to TPI forecasting had changed since this study was carried out.

---

[151] CAP 1151: Economic regulation at Heathrow from April 2014: Notice granting the licence (caa.co.uk) Paragraph C53

[152] CAP 1151: Economic regulation at Heathrow from April 2014: Notice granting the licence (caa.co.uk) Paragraph C55

[153] CAP 1151: Economic regulation at Heathrow from April 2014: Notice granting the licence (caa.co.uk) Paragraph C57

[154] Fitzgerald & Akintoye (1995) The accuracy and optimal linear correction of UK construction tender price index forecasts: Construction Management and Economics: Vol 13, No 6 (tandfonline.com).

The CAA maintained its initial position and did not grant a specific allowance for construction price inflation in its projections for HAL's Q6 capex.[155]

H7 price control

H7 refers to the next regulatory price control period for Heathrow Airport starting in January 2022 and ending in December 2026. The H7 arrangements are to replace the holding price cap that came into effect on 1 January 2022 and that lasts until 31 December 2022. A further one-year holding price cap was announced in December 2022 which will last from 1 January 2023 to 31 December 2023.[156]

For H7, the CAA has conducted more detailed analysis of input price inflation than at previous price controls, commissioning joint work from CEPA and Taylor Airey (CTA). Similarly, HAL has provided detailed analysis of its input price inflation expectations for H7. The analysis focuses on opex rather than capex (in contrast to what was the case at Q6).

CAA's initial proposals

The CAA's initial proposals for the treatment of input price inflation were published in October 2021 in the form of a report by CTA.[157] The proposals included a review of HAL's revised business plan[158] as well as CTA's own proposals for input price inflation.

HAL's proposals for input price inflation

In its business plan, HAL used a number of different price indices to inflate or deflate its historical costs to its 2018 price base and then project nominal growth in each cost category. HAL created three core price indices for wages, materials and power. Then, nominal inflation for each cost category in its business plan was projected using a blend of these indices and RPI (taken as the measure of general inflation) based on HAL's view of the drivers of costs in each category. The core indices were as follows:

- Wages – OBR forecasts for economy-wide wage growth.
- Materials – advice from HAL's consultants.
- Power – BEIS forecasts.

The overall methodology taken by HAL for input price inflation forecasting was based on a set of four principles developed by its consultants:[159]

- Input price inflation forecasts should be anchored against the most likely path for GDP growth.
- Input price forecasts should be prepared on a nominal basis alongside a separate forecast of RPI-measured inflation.
- Third-party forecasts should be used wherever possible.
- Extrapolation from historical data is possible where no published price forecasts exist.

CTA's review of HAL's approach and its own proposals

CTA identified a number of key issues with HAL's proposed approach to forecasting input price inflation. The first was that RPI was an inappropriate measure of general price inflation, given that it has been discredited by the ONS. Another issue was that HAL focused on cost areas where input prices will rise more than general inflation, and failed to consider categories where the opposite might be true. CTA reviewed

---

[155] CAP 1151: Economic regulation at Heathrow from April 2014: Notice granting the licence (caa.co.uk) Paragraph C61

[156] CAP 2488: Economic Regulation of Heathrow Airport Limited: setting a holding price cap for 2023.

[157] H7 Review of Opex and Commercial Revenues: Initial Proposals (caa.co.uk) Section 3

[158] HAL – RBP detailed plan, page 255 h7 update | Heathrow

[159] H7 Review of Opex and Commercial Revenues: Initial Proposals (caa.co.uk) page 115

which cost categories required an adjustment and the forecasts used to estimate adjustments. A third issue was that, in CTA's view, HAL had failed to provide material evidence of a real price effect for materials.

In determining its own input price inflation forecasts, CTA followed the assessment framework Europe Economics developed for Ofwat during PR19, with a materiality criterion added.[160] The framework was applied to five cost categories, namely:

- people;
- operational costs;
- facilities and maintenance;
- utilities; and
- general expenses.

Table 0.9 presents CTA's assessment of each cost category against the assessment criteria. Cost categories that passed the assessment were deemed to require a "bespoke price series" to project nominal inflation for that category, rather than CPI indexation.

Table 0.9: CTA assessment of HAL input price inflation allowances, using adapted version of Ofwat's PR19 framework

Ofwat's decision criteria	People	Operational costs	Facilities and maintenance	Utilities	General expenses
Is the cost category a material proportion of total company costs?	Yes	Yes	Yes	Partly (approx. 6% of 2019 opex)	Yes
Are there compelling reasons to think that CPI does not adequately capture the input price?	Yes	Unclear	Yes	Yes	Unlikely – no HAL analysis provided, and no clear rationale
Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?	Yes – can expect direct labour costs to differ from CPI	Potentially. Unclear from the data provided by HAL so far	Yes – includes large labour component	Greater price volatility	Unlikely – no evidence to suggest it would
Is the input price and exposure to that input price outside management control for the duration of the price control?	Partly	No – mostly contracts where price increases can be managed	Partly	Partly	Yes
Use different price series?	**Yes**	**No**	**Yes**	**Yes**	**No**

Source: CTA report

As shown in the table, people, utilities, and facilities and maintenance passed the assessment framework and therefore CTA developed bespoke price series for these cost categories. The bespoke price series were constructed using CTA's own forecasts of the same three core indices HAL developed (wages, material and power) and CPI. CTA's projections for wages, power and materials differed from HAL's, despite both reportedly using the same data sources.[161] The bespoke series developed by CTA were as follows:

---

[160] CTA did not apply a precise materiality threshold, but generally considered costs that made up more than 10 per cent of opex to be material, and costs of between 5 per cent and 10 per cent of opex to be partly so.

[161] H7 Review of Opex and Commercial Revenues: Initial Proposals (caa.co.uk) page 117

- People costs – CTA used the same OBR source to forecast economy-wide growth in wages that HAL used, but assumed that wages would stay constant in nominal terms in 2020 and 2021 based on a pay constraint implemented by HAL.
- Utilities – CTA used the same BEIS forecasts as HAL (BEIS Energy and Emissions Projection 2019). As these forecasts were in real terms, CTA inflated them using projected CPI (rather than projected RPI as HAL did) to obtain a nominal series.
- Facilities and maintenance – CTA used a blended input price inflation rate based on giving equal weight to CPI and the OBR's wage forecasts.

Insurance

There were also proposals from HAL and CTA for the forecasting of insurance costs.[162] HAL's proposals for insurance were based on recent quarterly outturn data on changes in insurance costs in various categories from Marsh Global Analytics and HAL's own analysis of insurance market performance, aviation sector performance, COVID-19 impacts on insurance markets, and future insurance market performance. CTA felt the approach was "overly conservative" and applied an assumption that insurance premiums would grow by 5 per cent per annum in nominal terms.[163]

CAA's final proposals

The CAA's final proposals for H7 were published in June 2022. Alongside the final proposals, an updated CTA report was published that presented revised input price inflation forecasts.[164] There were significant revisions to CTA's initial conclusions, based on new evidence submitted in response to the initial proposals. The new evidence led CTA to change which cost categories it applied a bespoke series to, and to change how it constructed the bespoke series. The base year for the analysis was 2019.

Revised application of assessment framework

CTA decided not to strictly apply its materiality criterion when assessing the case for a bespoke price series.[165] Instead, it allowed bespoke price series where other criteria were met and it judged there to be a significant wedge between CPI and input price inflation for that cost category.

CTA revised its assessment of operational costs and decided to apply a bespoke price series. This was based on evidence submitted by HAL that demonstrated that 35 per cent of its total opex is linked to RPI and labour due to existing contracts, and a further 13 per cent is tied to activities that are "labour-based". CTA decided this demonstrated that CPI does not adequately capture input price changes for the operational costs incurred by HAL.[166] CTA also decided to update its assessment for the management control criterion, because HAL's contract with National Air Traffic Services (NATS) is indexed to RPI and does not end until 2030. As NATS is the only air navigation service provider in the UK with experience of Heathrow's operational complexity, CTA judged that HAL had less bargaining power than in other parts of its supply chain.

CTA decided to apply a bespoke price series to insurance, despite it failing the materiality criterion. It argued that HAL provided compelling evidence of a significant wedge between insurance premium inflation and CPI. HAL was also judged to have little bargaining power in insurance markets.

---

[162] H7 Review of Opex and Commercial Revenues: Initial Proposals (caa.co.uk) page 90 (most figures are redacted)
[163] H7 Review of Opex and Commercial Revenues: Initial Proposals (caa.co.uk) page 91 (most figures are redacted)
[164] CAP2366I: Review of opex, CEPA, Tailor Airey, June 2022 (caa.co.uk)
[165] CAP2366I: Review of opex, CEPA, Tailor Airey, June 2022 (caa.co.uk) page 65
[166] CAP2366I: Review of opex, CEPA, Tailor Airey, June 2022 (caa.co.uk) page 66

A new cost category was added for HAL's electricity distribution contract,[167] and in line with direction provided by the CAA, CTA directly applied HAL's forecasts from its latest revised business plan (RBP Update 2). HAL's distribution contract, like its NATS contract, is linked to RPI and is a long-standing contract.

Revised and new bespoke price series

HAL provided new evidence to CTA which led to CTA updating the bespoke price series used in its initial recommendations. There were also new bespoke series developed for the additional cost categories passing the assessment framework: operational costs and insurance.

For people costs, CTA's initial forecast had assumed flat nominal wages in 2020 and 2021 before reverting to OBR forecasts. This approach was intended to reflect the "weak aviation labour market and a period of pay restraint within the sector". HAL opposed this approach, arguing that the OBR forecasts should be used for the entire period. HAL argued its salaries were re-baselined to market rates in 2020 and that it faced the same labour market pressures as other companies.

CTA accepted HAL's argument on the labour market pressures it faced, and decided to alter its wages index used to construct the bespoke series for people costs. The revised wages index converged with the OBR forecasts for the H7 period. However, CTA did not think its wage index, used to project HAL's people's cost from a 2019 base, should start at the same level in 2022 as the OBR's, given the widespread pay freezes and pay cuts in the aviation sector during the COVID-19 period. CTA proposed a new wage forecast that assumed zero growth in 2020 and 2021 and above-average wage growth in 2022 and 2023, so that by 2024 cumulative wage growth from 2019 is in line with the levels implied by the OBR's most recent forecast.[168]

Another issue was the choice of OBR's wage index. The OBR forecasts two series – "Wages and Salaries", which estimates the economy-wide wage bill, and "Average Earnings" which divides the former by the number of employees. CTA used Wages and Salaries for its initial proposal based on its interpretation that the series represents hourly earnings and thus would be less affected by working pattern distortions during COVID-19 years. CTA changed this interpretation for its final recommendations.[169] It considered that the Wages and Salaries index is driven in part by changes in the number of jobs over time, and so is not a 'pure price index' and hence is not suitable to use for the purpose of forecasting opex. Therefore, CTA switched to using the Average Earnings series for people costs – to which its bespoke series converges by 2024.

For utilities, CTA accepted new evidence from HAL in the form of a forecast inflation series for electricity and gas commissioned by HAL from the Energy Intelligence Centre (EIC).[170] HAL proposed a bespoke price series based on a weighted average of these forecasts and CPI (weighted according to utility costs in 2019). CTA accepted this bespoke price series, and adjusted it to account for more recent OBR CPI inflation forecasts. The EIC study was from November 2021, meaning that it predates the significant wholesale energy price increases of 2022. At the time of Final Proposals, HAL had made no representations to the CAA to adjust the bespoke price series for energy. CTA noted that the extent to which recent movements will affect HAL will depend on its hedging strategy and on whether prices revert to the forecast produced by EIC.

For facilities and maintenance, CTA accepted new evidence from HAL that cleaning costs are linked to staff costs and so should be indexed to wage inflation, but rejected the proposed use of RPI for HAL's existing baggage contract. CTA decided to use a bespoke price series with a 14/86 split between labour inflation and CPI, given that 14 per cent of HAL's facilities and maintenance costs are labour costs for cleaning.

For operational costs, CTA accepted HAL's evidence and used a bespoke price index with a 25/52/23 split between labour, CPI and RPI inflation, based on a bottom-up analysis of HAL's contracts.

---

[167] A contract with UK Power Networks relating to the leasing of the electricity distribution network at Heathrow airport.

[168] CAP2366I: Review of opex, CEPA, Tailor Airey, June 2022 (caa.co.uk) page 67

[169] CAP2366I: Review of opex, CEPA, Tailor Airey, June 2022 (caa.co.uk) page 68

[170] EIC (2021) Delivered Electricity Price Forecast.

For insurance, CTA rejected HAL's proposed 10 per cent annual increase in insurance costs. Instead, it used evidence from the Swiss Re Institute[171] which forecast real increases in insurance costs to develop a bespoke index with a significantly lower rate of increase than HAL proposed.

A summary of the input price inflation recommendations from CTA, which were adopted by CAA for its final proposals, is given in Table 0.10.

Table 0.10: Revised price series assumptions from CAA final proposals

Cost item	Price series
People	Bespoke wage series: zero growth in 2020 and 2021; with above-average wage growth in 2023 and 2024; OBR-implied wage growth thereafter.
Operational	52/23/25 blend of CPI/RPI/labour
Insurance	CTA bespoke series
Facilities and Maintenance	86/14 blend of CPI/labour
Rates	CPI
Utility	HAL bespoke series
Distribution contract	RPI
General expenses	CPI
Other	CPI

Source: CTA report Table 9.2

Responses from HAL and airlines (British Airways) to final proposals

This section summaries two responses to CAA's final proposals for input price inflation from HAL and British Airways (BA), both of which opposed parts of CAA's proposed approach.

British Airways

BA opposed the increased allowances for energy price inflation that the CAA approved based on the forecasts from EIC.[172] BA considered that HAL was somewhat insulated from energy price changes due to hedging arrangements, which it requested the CAA to investigate. BA's understanding of the hedging arrangements was that it would mean that there was little need for a rise in opex to account for energy cost inflation. It also raised concerns that future energy price declines would not be returned to consumers and suggested that the CAA might consider how consumers could benefit from eventual energy price falls and how it could avoid creating windfall gains for Heathrow when such declines occur.

BA also opposed the allowances for insurance costs, which it viewed as not being aligned with a statement in CAA's final proposals that "while insurance premiums have increased markedly since mid-2019, the current trend appears to be downwards".[173]

HAL

HAL welcomed the updated methodology for the final proposals, which it considered a significant improvement on the initial proposals. However, HAL considered the final proposals from CAA to underestimate the impact of increasing input price inflation, particularly for energy, insurance and wages.[174] It stated that the underestimation amounted to £137m. HAL stated that it was critical the H7 operating cost allowances recognised the efficient incremental costs of input price pressures in the current inflationary environment.

---

[171] Swiss Re Institute (2021) Sigma No. 5/2021 - Turbulence after lift-off: global economic and insurance market outlook 2022/23.

[172] British Airways Response to CAP2365 Economic regulation of Heathrow Airport Ltd H7 Final Proposals, page 89

[173] CAA CAP2365C, "Economic regulation of Heathrow Airport Limited: H7 Final Proposals Section 2: Financial issues", para 4.52

[174] Heathrow's Response to CAP2365 Economic regulation of Heathrow Airport Ltd H7 Final Proposals, page 6

HAL acknowledged that the CAA had accepted its approach to energy inflation forecasting, but it stated that the final proposal needed to be updated with the latest available forecast (the EIC forecasts underlying the indexation predated the significant energy price increases over 2022). HAL provided an updated EIC report, from April 2022, which it proposed that CAA use to update its energy price indexation.

HAL commissioned Frontier Economics to review the CTA analysis of wage inflation. Frontier Economics' summarised findings were:[175]

- **The OBR Average Earnings index is the most appropriate index for people costs**: when comparing the OBR Average Earnings and Wages and Salaries price forecasts, the Average Earnings series is likely to be a more representative view of the average trend in the UK.
- **CTA's bespoke wages index does not reflect real-world events**: CTA assumes zero wage growth in 2020 and 2021, with a phased catch-up to the OBR Average Earnings index by 2024. HAL stated that this catch-up is a judgment with no reasoning provided, and a construct that appears to ignore the significant resourcing challenges faced by the aviation sector.
- **Aviation wage pressure is greater than that of the general labour market**: Recent evidence from web-scraping suggests an aviation wage trend higher than the OBR forecast.
- **Regulatory precedent supports a bespoke approach**: For RIIO-ED2, CEPA recommended applying a weighted average approach for labour costs, using both the OBR's Average Earnings series and sector-specific forecasts relevant to the labour cost base in the energy sector. HAL argued that a more bespoke approach would also seem reasonable for Heathrow.

HAL stated that CTA should adjust the wage forecasts used in its construction of the bespoke series for people costs, though the proposed adjustment is redacted in the published response document.

On insurance, HAL argued that the CAA underestimated increasing pressure on insurance premiums. It stated that the growth rates from Swiss Re that CTA used in its analysis to derive insurance inflation forecasts implied insurance inflation forecasts for 2022 that were 4 per cent below outturn. It argued the Swiss Re forecast fails to consider "real life issues" such as increasing property values. Further, HAL disagreed with CAA's view that the current trend in insurance premiums is downwards. HAL also argued that CTA was wrong to cite the example of airline insurance costs, given the different risk profiles that airlines and airports have. HAL provided insurance market data from Marsh, which HAL considered as confirmation that a significantly higher per annum forecast for increases in insurance costs should be adopted by the CAA.

Assessing the CAA's approach to forecasting input price inflation

In this section, we assess CAA's approach to input price inflation, focusing particularly on its approach for H7 given that this represents the CAA's most recent thinking on this issue.

Is the CAA's approach applicable to the rail sector?

The CAA's approach is partly applicable to rail. The application of the assessment framework and the approach to forecasting prices for specific cost categories provides useful insight, particularly as the CAA is grappling with issues around macroeconomic uncertainty and energy price volatility which are not specific to the aviation sector. During COVID-19 lockdowns, the aviation sector faced significant demand reductions that are familiar to the rail sector, although arguably they were more acute in aviation. The recovery of demand for both forms of transport, coupled with the wider macroeconomic context, presents similar difficulties for the respective regulators when it comes to projecting input price inflation.

---

[175] Heathrow's Response to CAP2365 Economic regulation of Heathrow Airport Ltd H7 Final Proposals, page 92

The residual impacts of COVID-19 are clear when reviewing the discussion between HAL and the CAA on wage inflation forecasts. The aviation sector is emerging from a period of severe weakness during which staff were subject to pay freezes and cuts. This has presented challenges when applying OBR wage indices for the economy as a whole to estimate labour cost inflation for HAL. To our knowledge, this difficulty does not apply to rail, although other labour cost inflation forecasting difficulties are present for Network Rail, given the unresolved industrial action focused on disputes around staff compensation.

The debate over the preferred OBR wage cost series is relevant to rail. We agree that the Wages and Salaries series is partially reflective of the number of jobs, which means that it is not suitable for use in wage growth forecasts.

The long-term RPI-linked contracts HAL is tied into with NATS and distribution providers may or may not be applicable to Network Rail, though we would expect that generally it has greater bargaining power when negotiating supply chain contracts than HAL does when negotiating with NATS. The issue of a lack of bargaining power may be more relevant in the context of Network Rail's labour cost inflation.

The criticism levelled at the use of tender price indices (TPIs) by the CAA during Q6, and previously by the CC, is potentially applicable to rail, given that TPIs are often used by both Network Rail. However, we would need to review the critique of TPIs to determine if it is still applicable, given that the CAA refers to a study from before 2000 in its criticism.

As Heathrow is a private company, it is not reliant on government funding, unlike Network Rail. This means that ex post adjustments to allowances are possible for the CAA in a way that is not the case in the rail sector. For example, the CAA is currently considering a significant COVID-19-related RAB adjustment request from HAL (the request is for a £1.2bn adjustment, whereas the CAA has proposed a £300m adjustment).[176]

Is the CAA's approach sufficiently up-to-date?

The CAA's final proposals were published in June 2022, and so are relatively up-to-date, although most of the inflation forecasting relied on data from 2021 or early 2022, which is already quite outdated given the current speed of macroeconomic change. HAL appears to have provided some updated forecasts to ensure that the CAA can base its decisions on the most recent forecasts (e.g. the April 2022 energy inflation forecast).

Do we consider CAA's approach to be valid?

The assessment framework applied by the CAA's consultants, CTA, is one we consider to be valid, and one we have covered in depth in the water sector case study.

The proposals for bespoke price indices are more questionable. The CAA and its consultants have made significant revisions to their initial proposals based on evidence provided by HAL. Much of this evidence is not available to be reviewed, such as the bottom-up analysis of HAL contracts used to establish the bespoke price series for operational costs. However, we would suggest that analysis of HAL's existing contracts may not be the best approach to determining the efficient level of input price inflation, given that often contractual terms are subject to management control. In general, the bespoke price series have been developed through a lot of analysis of HAL's own expenditure data, rather than analysis of external indices or independent forecasts which might be more reflective of efficient costs. It is important that the CAA recognises specific

---

[176] https://publicapps.caa.co.uk/docs/33/HAL%20Economic%20Regulation%20Covid-19%20related%20RAB%20adjustment%20(CAP2140%20v2).pdf

costs and pressures that HAL faces, but this needs to be balanced against analysis of the input price inflation efficiencies achieved in competitive markets.

What is the geographical coverage of the sector?

This case study focuses on one specific airport, Heathrow, and therefore certain costs are likely to be affected by local developments. In particular, the London Living Wage is considered to limit HAL's ability to mitigate wage increases. The London Living Wage is also considered to justify an upward adjustment to facilities and maintenance costs to reflect the additional costs associated with requiring suppliers to pay it.

What is the overall relevance of the CAA's approach?

Overall, the CAA's approach is relevant for the purposes of this review. It is up-to-date, and its ongoing H7 price review is dealing with similar challenges to PR23. There are enough similarities between aviation and the rail sector that much of the input price inflation analysis may be applicable to our review, although some characteristics of aviation and specifically Heathrow mean that there is not a perfect read-across. However, we do not necessarily agree with the approach that the CAA has taken. The reliance on HAL's existing contracts and internal expenditure data as inputs for a number of the bespoke price series is a particular area where the approach could be improved, for example by analysing external indices and forecasts. We do not consider this approach to be optimal for establishing efficient costs.

Appendix 5: Case Study on Telecommunications (BT)

This case study covers Ofcom's approach to input price inflation in its regulation of the telecoms infrastructure owner British Telecoms (BT). It focuses on the approach to input price inflation in recent charge control decisions and consultations that Ofcom has published. Ofcom have maintained a consistent approach to input price inflation in three recent market reviews, and as a result in this case study we summarise the methodology for one recent market review, which was subsequently reapplied on two more occasions.

Ofcom's approach to input price inflation for the 2018 Wholesale Local Access Market Review

In 2018 Ofcom undertook a review of the regulation of the wholesale local access (WLA) market for the fixed connection used by broadband and fixed telephone services.[177] It was determined that BT had significant market power in the WLA market in the UK (excluding the Hull Area) and therefore it was appropriate for Ofcom to continue to set charge controls on various fixed connection services provided by BT for the period 2017/28 to 2020/21.

After WLA 2018, Ofcom subsequently took the approach described below to forecast input price inflation for its 2019 Business Connectivity Market Review consultation[178] and its 2021 Wholesale Fixed Telecoms Market Review.[179] The most recent data available was used from each data source, and certain pay agreements with trade unions were no longer relevant inputs for calculating pay inflation, but otherwise Ofcom's methodology was identical.

Ofcom set cost-based charge controls for WLA 2018 using a "CPI-X" control, with X set to align charges to forecast efficient costs for the control period. To forecast costs over the control period, Ofcom made assumptions about the inflation of operating costs and asset prices.[180] Ofcom forecasted inflation for pay opex, non-pay opex and assets separately. The rest of this section covers the approach taken to each type.

Pay operating cost inflation

To forecast pay cost inflation, Ofcom considered a range of evidence. These sources are described under the headings below.

Historical and forecast pay cost data from BT's management accounts

The source came directly from BT, which provided forecasts of total labour cost (TLC) and 'PVEO' analysis, a management accounting tool which breaks down annual movements in costs into changes due to Price (inflation), Volume effects, Efficiency (or cost transformation) and Other. This focused on two BT divisions – Technology and Service Operations (TSO) and Openreach, as these divisions together accounted for the majority of pay costs. It is not clear how TLC and PVEO forecasts were produced or the assumptions underpinning them.

---

[177] Wholesale local access market review - Ofcom
[178] Ofcom (2019) BCMR consultation Annexes 1-22, paragraph 18.71 [online].
[179] Ofcom (2021) WFTMR Annexes 1-26, paragraph A14.129 [online].
[180] 2018 WLA statement, Annexes 17-27, paragraph A17.4

The TSO division stopped producing historical and forecast PVEOs after 2015/16. This meant that it was not possible to estimate historical pay inflation for TSO in 2016/17. It also meant that forecast pay inflation estimates were based on forecast TLC rather than forecast PVEO (which are only produced by Openreach). The forecast pay inflation in these data were BT-specific and based on BT management's knowledge of the labour markets and the relevant grade-mix within each division.

Historical pay cost data from BT's Annual Reports

This data was ultimately not used by Ofcom as it could not differentiate pay cost inflation between different BT divisions.

Public reports of BT's discussions on future pay awards with its Trade Unions

In 2017, BT reached new pay agreements with two key trade unions (one for non-managerial staff and one for managers). The agreements extended until 2019. Ofcom recognised that these agreements are directly relevant to the wages and salaries elements of pay costs.

Economy-wide studies of historical and forecast changes in pay costs

Ofcom acknowledged that it is important to use the most up-to-date forecasts in its analysis.[181] Ofcom used data on annual historical growth in median full-time gross weekly earnings from the ONS's Annual Survey of Hours and Earnings (ASHE), ONS data on annual changes in average weekly earnings (total pay i.e. including bonuses), and the Bank of England's forecasts of average weekly earnings (the most up-to-date available). Ofcom also considered historical and forecast data on average earnings growth from the OBR. Both ONS and OBR made a downward revision to their forecasts in the time between Ofcom's March 2017 consultation and its 2018 WLA statement.

Consolidation of sources and judgement

The four sources above were each considered and Ofcom's proposed pay cost inflation rate for the control period was based on its judgement of the evidence as a whole.[182] Ofcom's final decision was a geometric mean pay cost inflation assumption of 2.8 per cent per annum between 2017/18 and 2020/21. For 2017/18, 2018/19 and 2019/20 pay inflation, Ofcom gave most weight to BT's forecasts of its pay costs, whilst also stating that it considered the trade union agreements and external forecasts for the economy as a whole. For 2020/21, Ofcom used BT's forecasts TLC data and the OBR's forecasts of average earnings growth. It is not clear exactly how Ofcom synthesised these various sources to derive its pay forecast.

Following the publication of Ofcom's proposed approach, TalkTalk opposed the use of BT's agreements with the trade unions and the use of BT's internal forecasts, noting this would impact on BT's incentives to secure a low wage settlement.[183] Ofcom acknowledged TalkTalk's concerns but noted that:[184]

- the relevant divisions' TLC forecasts were submitted to BT Group as part of its planning process;
- pay agreements are just one of the several sources of evidence that Ofcom considered in reaching a decision; and
- in practice, BT has strong commercial incentives to engage in meaningful discussions with the trade unions regarding pay and conditions, due to its incentives to achieve the efficiency target that Ofcom set and to outperform the charge control.

Non-pay operating cost inflation

Ofcom considered separately cost inflation estimates for energy, accommodation and all other non-pay operating costs. It then weighted the forecasts using information from BT's regulatory accounts to reflect the

---

[181] 2018 WLA statement, Annexes 17-27, paragraph A17.24
[182] 2018 WLA statement, Annexes 17-27, paragraph A17.6
[183] 2018 WLA statement, Annexes 17-27, paragraph A17.7
[184] 2018 WLA statement, Annexes 17-27, paragraph A17.29

different cost mix of different BT service groups. The approaches for energy and accommodation costs are covered below.

Energy costs

Ofcom used the latest available electricity price forecasts produced by BEIS as part of its annual updated energy projections (UEPs) of future energy consumption and emissions. Specifically, Ofcom used the forecasts for prices per kilowatt hour for the "services" sector, an approach Ofcom took at three earlier market reviews.[185]

One confidential respondent to Ofcom's consultation noted that BT could hedge in the energy futures market to reduce its energy costs, and Ofcom's energy inflation assumption should reflect that. Ofcom acknowledged this point and performed a cross-check analysis of BT's actual historical electricity unit costs against historical BEIS estimates. The results of the cross-check are not published but Ofcom concluded that the BEIS forecasts for the services sector remained an appropriate input for calculating energy price inflation for BT.[186] Given this and the absence of suitable alternative forecasts, Ofcom continued to use the BEIS UEPs.

Accommodation costs

Ofcom took the same approach that it had for previous charge controls and assumed that all of BT's accommodation costs (except for its business rates costs, which were excluded from the estimate of non-pay inflation) would increase at 3 per cent per year over the control period. This is the rate agreed between BT and Telereal Trillium, covering the majority of BT's properties.[187]

Other costs

Ofcom used CPI to forecast costs where no specific rate could be identified.[188]

Asset price inflation

Ofcom adopted asset price change assumptions that ensured duct and copper assets were valued consistently with how they were revalued for current costs accounting purposes in BT's Regulatory Financial Statements, which assume the prices for duct and copper assets will increase by RPI. Therefore, Ofcom used OBR's RPI forecasts up to 2020/21 to set forecast asset price inflation over the control period. One stakeholder opposed the use of RPI, given it is recognised to be a flawed measure of general inflation. However, Ofcom maintained its position, arguing it was appropriate to use RPI to re-value copper and duct to ensure consistency with BT's approach to copper and duct valuation and Ofcom's past decisions.[189]

All other asset prices were assumed to stay flat in nominal terms. This was based on analyses of historical asset price changes and of holding gains and losses using BT regulatory accounting data.[190]

Assessment of Ofcom's approach

In this section we assess Ofcom's approach to input price inflation for WLA 2018 (and subsequent market reviews).

---

[185] 2016 BCMR, 2014 FAMR and 2014 WBA
[186] 2018 WLA statement, Annexes 17-27, paragraph A17.44
[187] 2018 WLA statement, Annexes 17-27, paragraph A17.48
[188] 2018 WLA statement, Annexes 17-27, paragraph A17.49
[189] 2018 WLA statement, Annexes 17-27, paragraph A17.65
[190] 2018 WLA statement, Annexes 17-27, paragraph A17.64

Is Ofcom's approach applicable to the rail context?

Ofcom's approach is mostly applicable to the rail context, although there are some elements of the methodology that are not applicable due to differences between the telecoms sector and the rail sector.

Ofcom's approach to pay cost inflation could be applied to rail. This would involve taking internal data and forecasts from Network Rail in combination with external forecasts of pay inflation to take a rounded view on the likely path of pay costs in the next control period. However, the impact of using internal pay data on future incentives to negotiate pay settlements might be different for BT, a private company, than it is for the publicly-owned Network Rail.

As is the case with Network Rail, BT staff are unionised and use their bargaining power to negotiate pay settlements with BT, a factor that Ofcom considered when assessing BT's pay cost inflation for WLA 2018. This raises the question as to whether Network Rail's input price inflation methodology should take account of the strength of the rail workers' union and the impact this could have on labour cost inflation.

It is clear that, firstly, Ofcom recognised the value of using the most-up-to-date external inflation forecasts. Secondly, it considered that the absence of a suitable alternative to established input price series meant that there was little reason to deviate from an approach used before. And thirdly, for those cost inputs where no suitable series is available at all, it used CPI as its default forecast. These three characteristics of its approach are transparent and defensible, offering a sensible framework that could be deployed in the rail context.

Ofcom's approach to accommodation costs is probably less applicable. Ofcom's approach is based on an ongoing agreement between BT and Telereal Trillium (a private property company) on the rate at which BT's rent costs would increase, covering most BT properties, which Ofcom then applies to all BT accommodation costs). In theory, this approach could be applied in the rail context if a similar agreement existed between Network Rail and a property company.

Ofcom's approach to asset price inflation is not relevant to the regulation of Network Rail, as we understand that the calculation of revenues for Network Rail is not based on valuation of an asset base.

Is Ofcom's approach sufficiently up-to-date?

While Ofcom's most recent charge control for BT was 2021, the approach to input price inflation for that charge control was essentially unchanged from its 2018 approach. Consequently, the approach pre-dates the more unpredictable inflationary context of today. Ofcom's publications give little indication that it was concerned at the time about future macroeconomic volatility causing its forecasts to be significantly wrong. Caution may therefore be needed in applying Ofcom's approach in the current macroeconomic environment.

Do we consider Ofcom's approach to be valid?

Ofcom's approach to pay cost inflation has some validity, given that it considered a wide range of evidence to come to a view on how it expects pay cost inflation to change over time. Ofcom provides reasoning for why it gives more weight to certain data sources than others. In general, however, placing a lot of weight on BT's internal data and forecasts as an approach to estimating BT's efficient costs is questionable, especially when little information about these forecasts is made available.

The approach to non-pay cost inflation is one we consider less valid. For example, we would question the validity of assuming that an existing agreement between BT and a property company necessarily represents efficient accommodation cost inflation across all of BT's property, particularly if the agreement is long-standing. Even if one makes assumptions on BT management's skill as negotiators and their bargaining power, the fact that 3 per cent was an efficient rate at the time of the original agreement does not mean that it

remained so at the time of Ofcom's determination. Moreover, it is unclear exactly how much of BT's property is covered by the aforementioned agreement, other than being 'the majority' of BT's properties.[191]

What is the geographical coverage of the sector?

Ofcom's market reviews cover virtually the whole of the UK including Northern Ireland. The Hull area is treated separately due to KCOM being the infrastructure owner in that area. BT's UK network includes assets in England, Scotland, Wales and Northern Ireland.[192] Ofcom's approach to input price inflation does not appear to have differentiated between regions.

What is the overall relevance of Ofcom's approach?

We consider that there are two key disadvantages to applying Ofcom's approach to rail. Firstly, it is not sufficiently up-to-date and therefore caution would be required in applying it to the current high-inflation environment. It is possible that the relatively simplistic approach (e.g. few cost categories, defaulting to CPI) is suited to a low-inflation environment. Secondly, we consider that certain aspects of Ofcom's approach to forecasting input price inflation may not necessarily lead to efficient cost allowances. Ofcom makes some use of external, independent data sources, but its reliance on internal data and forecasts provided by the company it regulates – without describing whether and how it challenged this analysis – could potentially be improved.

---

[191] 2018 WLA statement, Annexes 17-27, paragraph 17.48.
[192] 2018 WLA statement, Annexes 17-27, footnote 30.

Appendix 6 – Case Study on Water in Northern Ireland

This case study covers the approach to RPEs in the water and wastewater sector in Northern Ireland. The Utility Regulator sets price controls for Northern Ireland Water (NI Water), the most recent of which was PC21, which covers the six-year period 2021-2027. We describe the Utility Regulator's approach to input price inflation for PC21 below and provide an assessment of its relevance to the rail context.

NI Water PC21

The Utility Regulator published its final determination for PC21 in May 2021, setting out the price limits NI Water can charge its non-domestic customers and the outputs to be delivered for the six-year price control period.

For PC21, the Utility Regulator's input price inflation analysis was a component of its frontier shift methodology. The Utility Regulator combines nominal input price forecasts with productivity expectations and a general inflation forecast (measured using RPI forecasts from the OBR) to determine the "frontier shift in real terms" to be applied to the PC21 opex and capex targets for NI Water, which can be an addition to or a subtraction from the targets.[193] The formula below summarises the Utility Regulator's approach:

Frontier shift in real terms ≈ input price inflation − productivity improvement − forecast RPI-measured inflation.

In this regard, the Utility Regulator's approach to input price inflation has remained largely unchanged since PC13,[194] in which the Utility Regulator based its approach on the Competition Commission's approach for its 2010 Bristol Water inquiry.

Analysis of the macroeconomic outlook

The Utility Regulator noted that input prices are heavily dependent on the performance of the economy and therefore analysed forecasts from the OBR, the International Monetary Fund (IMF) and the Ulster University Economic Policy Centre (UUEPC) for GDP and GVA. All three sources gave similar projections – following a large contraction in 2020/21 (reflecting the impacts of the COVID-19 pandemic on the economy), strong economic growth was projected for 2021 and 2022, with the growth rate levelling off subsequently. The Utility Regulator also analysed projections for the world GDP growth rate from OBR and the IMF, which showed a similar story, though the 2020 downturn was less pronounced.

Opex

The Utility Regulator based its input price inflation analysis on the opex cost structure of a hypothetical water company. For PC21, the Utility Regulator initially established a cost structure based on representative water companies in England and Wales, which it then adjusted to recognise specific cost factors in Northern Ireland in order to establish the opex costs of a hypothetical efficient Northern Irish water company. Historically, Northern Ireland has experienced higher electricity costs then Great Britain and therefore the share of power costs has been revised upwards to recognise this at previous price controls. The difference has diminished over time, and at PC21 there was only a moderate adjustment – from 12.5 per cent of opex for

---

[193] PC21 Final Determination - Annex K Opex and Capex frontier shift paragraph 1.9
[194] ANNEX D - Rate of Frontier Shift - PC13 FD.pdf (uregni.gov.uk)

the hypothetical GB water company to 13 per cent for the hypothetical NI company. The opex input mix for PC21 also accounted for the lower cost of wages in Northern Ireland, meaning that the proportion of spend relating to labour is lower than assumed for an Ofwat company (47 per cent as opposed to 50 per cent).[195] Other categories are adjusted to ensure the proportions still sum to 100 per cent. The final column in Table 0.11 presents the input mix used by the Utility Regulator for its opex input price analysis.

Table 0.11: Hypothetical opex input mix for efficient water companies

Input	Share of opex for Ofwat-regulated company (%)	Share of opex for hypothetical NI water company (%)
Labour – general	50	47
Materials and Equipment	10	11
Chemicals	2.5	3
Power	12.5	13
Rates	10	11
Environment Agency Charges	5	5
Bad Debt	5	5
Other	5	5

Source: PC21 Final Determination - Annex K Opex and Capex frontier shift

We now summarise the Utility Regulator's approach to forecasting nominal price inflation for each input.

Labour cost inflation (opex)

To forecast labour cost inflation, the Utility Regulator first analysed historical data from three indices related to whole economy wage costs, namely:

- ONS AWE: Private Sector Level: Seasonally Adjusted Total Pay Excluding Arrears
- ONS AWE: Private Sector Level: Seasonally Adjusted Regular Pay Excluding Arrears
- ONS Index of Labour Costs per Hour (ILCH) – Wage costs per hour (whole economy)

The Utility Regulator noted that the outturn data for 2019/20 was impacted by the furlough support scheme, particularly in the case of the ILCH data, which measures hourly pay. Lockdowns significantly reduced hours worked, but furloughed workers were receiving 80 per cent of their wages.

The Utility Regulator also analysed projections of average hourly earnings published by the OBR, which at the time of PC21 were significantly influenced by the impacts of the pandemic. OBR's projected hourly earnings growth rate swung significantly from double digit growth in 2020/21 to a contraction of 8 percent in 2021/22, with earnings growth not returning to its pre-pandemic 3 per cent until 2023/24. The Utility Regulator viewed the projections as a result of "the peculiarity of the circumstances and data that these numbers are produced from" or "what may be referred to as an artefact of the data."[196]

Given the above, the Utility Regulator decided not to use the average hourly earnings projections. Whilst the Utility Regulator felt that typically a measure of hourly earnings growth is preferable to other earnings projections when estimating real price effects, so as to remove the effects of (smaller) changes in hours worked, it decided for PC21 it would change to using OBR's Average Earnings Growth dataset as the forecast for labour cost inflation.

Materials and equipment

For materials and equipment costs, the Utility Regulator considered the ONS machinery and equipment price index to be a good indicator of price movements. The Utility Regulator also analysed historical general input price inflation for all manufacturers, based on the ONS PPI for manufacturing (excluding food, drink, tobacco and fuel). Both series showed average growth of 1.7 per cent per annum in the six years prior to the PC21

---

[195] PC21 Final Determination - Annex K Opex and Capex frontier shift paragraph 2.8
[196] PC21 Final Determination - Annex K Opex and Capex frontier shift paragraph 2.35

determination, and therefore the Utility Regulator adopted this figure as its estimate of the annual input price increase for materials and equipment.

Chemicals

For chemicals, the Utility Regulator analysed the ONS PPI for chemicals, looking at historical data since 1997. The most recent data at the time indicated negative price growth in chemicals. The Utility Regulator viewed this as reflective of sluggish growth in the world economy, and it expected chemicals prices would continue to be impacted by reduced global demand while economies continued to be affected by the pandemic.[197] It therefore took the same approach that it had for the previous price control, PC15, which was to take the view that future chemical prices may be more closely linked to global growth than to the long-term trend growth rate of the ONS PPI (which was 1.7 per cent per annum). The Utility Regulator therefore forecast an annual cost increase of 2.7 per cent for chemicals, based on an average of the growth rates implied by historical ONS data and the forecast of global GDP growth, with greater weight given to global GDP.

Power

For power, the Utility Regulator focused on electricity as this is the main component of power costs for water and sewerage companies. The Utility Regulator looked at two sets of forecasts for electricity prices: BEIS Updated Energy and Emissions Projections and the Department for Energy and Climate Change (DECC) estimates for electricity price growth up to 2035. The Utility Regulator considered these departmental forecasts to be the best available independent data, and while its final figure for power costs was redacted, it was constructed by averaging both departments' forecasts over the price control period.

Rates, bad debt and other costs

The Utility Regulator assumed that rates, Environment Agency charges and other costs would move in line with RPI inflation, consistent with its previous approaches.[198]

The Utility Regulator used the OBR's annual RPI forecast and assumed that RPI would be 3 per cent in the final year of PC21 that the OBR had not forecasted as at the time of its determination.[199]

Capex

As with opex, the Utility Regulator based its input price inflation analysis on the capex cost structure of a hypothetical water company. This was based on representative Ofwat-regulated companies, with no adjustment. The input mix is shown in Table 0.12.

Table 0.12: Capex input mix for a representative water company

Input	Share of capex (%)
Labour – general	30
Labour – specialist	15
Materials – machinery	10
Materials – civils	15
Plant and equipment	25
Other	5

Source: PC21 Final Determination - Annex K Opex and Capex frontier shift

Costs categorised as 'other' were assumed to grow in line with RPI. General labour inflation was assumed to be the same for opex and capex. "Materials – machinery" was assigned the same nominal input price inflation

---

[197] PC21 Final Determination - Annex K Opex and Capex frontier shift paragraph 2.55
[198] PC21 Final Determination - Annex K Opex and Capex frontier shift paragraph 2.66
[199] PC21 Final Determination - Annex K Opex and Capex frontier shift paragraph 4.7

rate as the materials and equipment cost category within opex. We summarise the approach for the remaining cost categories below.

Specialist labour

At PC15, the Utility Regulator applied an uplift of 1.25 per cent per annum to allow for faster wage inflation for specialist labour than general labour wage inflation.

At PC21, the Utility Regulator decided not to apply an uplift for specialist labour wage inflation. This was based on a comparison of historical data from the BCIS index "Civil engineering – labour and supervision" with ONS data on private sector average weekly earnings and average hourly earnings. The Utility Regulator found that the historical growth rate of the BCIS index for the period 2009-2020 closely matched that of the general economy indices from ONS. In the light of this, it adopted the same nominal wage inflation rates for specialist labour as it did for general labour.

Materials – civils

This cost category refers to construction materials such as bricks, concrete, metal and plastics used by water companies in construction work.[200] The Utility Regulator used the new work output prices in the ONS's Construction Output Price Indices (OPIs) for its analysis, comparing the OPIs for infrastructure, public (non-housing), private industrial and private commercial. The datasets only went back to 2016/17, and showed that infrastructure had risen from being initially below the other OPIs to overtaking them in 2019/20. The Utility Regulator decided to take the average of the full dataset across all the categories as its figure for annual nominal input price inflation for civils cost growth.

Plant and equipment

The Utility Regulator used the BCIS index "Plant and Road Vehicles" as an indicator of cost pressures for the plant and equipment used by water companies. The long-term average for the index (1997-2020) was 2.6 per cent, and the Utility Regulator adopted this as its nominal input price inflation assumption for plant and equipment.

Assessment of the Utility Regulator's approach

Below we assess the approach to input price inflation taken by the Utility Regulator.

Is the Utility Regulator's approach applicable to the rail context?

We consider the Utility Regulator's approach to be partly applicable to the rail context. The Utility Regulator's approach is relatively straightforward, and the approaches for certain cost categories such as labour and materials could be applied/adapted to rail. Some elements of the approach are not applicable to rail, however.

The Utility Regulator's approach of basing its input price analysis on a hypothetical cost structure based on representative water companies from Great Britain (with some Northern Ireland-specific adjustments) would be difficult to apply to rail due to the lack of suitable comparators on which to base a notional cost structure. Analysis of input price inflation for Network Rail is likely to need to be based on the company's specific cost structure, as presented in their business plan submissions.

As with the Ofwat case study, some of the cost categories that were assessed for water companies are likely to be different to the main cost categories for Network Rail. In particular, it is unlikely that chemicals will require its own input price inflation assessment for the rail context.

---

[200] PC21 Final Determination - Annex K Opex and Capex frontier shift paragraph 2.50

The Utility Regulator's analysis of the wider macroeconomic outlook, including an assessment of UK GDP and global GDP forecasts, could be applied in the rail context. The difficulty at present revolves around the uncertainty of economic forecasts, and therefore the usefulness of drawing conclusions from such forecasts may be more limited now than when the Utility Regulator conducted its analysis. Nonetheless, it is possible that it might offer some insight into trends for the prices of specific inputs that are affected by global demand (e.g. steel).

Is the Utility Regulator's approach sufficiently up-to-date?

The Utility Regulator's approach analysed in this case study is not particularly up-to-date. The Utility Regulator has published more recent price controls is other sectors (GT22 was determined this year), but on reviewing the materials we determined that this is the most recent price control that included a reasonably detailed analysis of input price inflation.

This approach was published in 2021, pre-dating the current inflationary spike. However, the Utility Regulator was forced to deal with uncertainty related to the recovery from COVID-19 and the impact it had on certain forecasts, such as OBR's average hourly earnings projections. This could provide some, limited, insight into dealing with uncertainty when forecasting input prices, although the nature of the uncertainty is different.

Overall, the Utility Regulator's approach is not sufficiently up-to-date to place significant weight on its findings or the decisions it made regarding the selection of data sources.

Do we consider the Utility Regulator's approach to be valid?

The use of RPI as the default measure of general inflation is not an approach we consider to be valid, given that the ONS no longer recognises RPI as a valid measure of inflation. Whilst this does not impact the Utility Regulator's approach to nominal input price inflation for categories with a bespoke analysis, we consider that not enough evidence was provided to justify the assumption that the remaining categories will rise in line with RPI.

For the cost categories not linked to RPI, the Utility Regulator's approach has more validity. It relies primarily on external independent forecasts and historical data rather than internal data from NI Water. Forecasts are analysed where available, but the Utility Regulator also assessed the context around forecasts/historical indices to determine how useful it would be to apply them to future water sector costs (e.g. the decision to not use average hourly earnings forecasts, or to combine the PPI for chemicals with evidence from global GDP forecasts).

The use of global GDP forecasts to partially guide its chemical input price inflation assumption is a novel approach in the context of the case studies presented here. The Utility Regulator noted that this was an approach it introduced at PC15, in which it stated that future prices may be more closely linked to global growth rather than the long-term price trend,[201] although it did not provide supporting analysis. While future GDP growth may be linked to demand for certain inputs and hence to their price, we consider that this is a factor best taken into account qualitatively. We consider that it is far from straightforward to determine quantitatively what GPD growth will mean for the prices of specific inputs.

Generally, whilst the Utility Regulator's choice of indices for various cost categories seems reasonable, the process it used to determine the index to use for each cost element is unclear. There is no evidence that the Utility Regulator systematically selected indices based on defined criteria. Generally, the Utility Regulator appears to have used the same indices it has relied on for previous price controls, where that was possible.

---

[201] [PC15 Final Determination - Annex S Opex Frontier Shift Report](#) paragraph 2.5.4.

What is the geographical coverage of the sector?

NI Water covers the entirety of Northern Ireland. The Utility Regulator recognised differences between NI and the rest of the UK when determining the cost structure of a notional efficient water company in Northern Ireland. In particular, it allowed for cost factor adjustments to reflect different labour and power costs.[202] Historically, electricity costs have been higher in Northern Ireland relative to Great Britain, so previous control periods adjusted power costs upwards to account for this. More recent analysis suggests the gap has closed over time, so the Utility Regulator decided to reverse this adjustment. Northern Ireland's wage costs remain below those in England and Wales, so labour costs as a share of opex is adjusted downwards.

However, the indices and forecasts the Utility Regulator used to forecast input prices all provide UK-level information, indicating that they could be used for the rail context.

What is the overall relevance of the Utility Regulator's approach?

Overall, the Utility Regulator's approach is of limited relevance, due to it not being sufficiently up-to-date and because the level of detail provided in the Utility Regulator's published documents is lower than that for the other sectors we have analysed. Certain elements are applicable to the rail context, but we consider other industries have more insight to offer on the current challenges faced by rail in relation to input price inflation.

---

[202] PC21 Final Determination - Annex K Opex and Capex frontier shift paragraph 2.4.

Appendix 7: Biases in the Delphi Approach to Surveying Views

Since 2019, the BCIS has used the Delphi method for estimating its All-in Tender Price (TPI) Index.[203] Given that the Delphi method involves the opinions of individuals on a panel, there is a risk that the resulting consensus view is biased in some way. This note sets out the potential biases we have identified from the literature. Amongst the key literature is Hallowell (2009), which lists a set of biases present in construction-related studies involving the use of questionnaires such as Delphi.[204] Other reviews are provided by Skinner et al. (2015), who also provides a list of measures to correct for some biases,[205] and Hung et al. (2008).[206]

Biases introduced by questionnaire/research design

- **Questionnaire design.** Hung et al. (2008) suggest that surveys are open to manipulation by researchers.
- **Panel selection bias.** Avella (2016) suggested that there may be "temptation" for a researcher to select panel members with known positions on the problem, particularly where field of experts is limited.[207]
- **Bias in arbitration** (Avella, 2016). Researchers can exert bias in panel member selection by appointing themselves as arbiters of participant qualifications.
- **Contrast effect bias** (Hallowell, 2009; Bjarnason and Jonsson, 2005).[208] Panellists' perceptions of specific views may be enhanced or diminished by the value of the immediately preceding subject in the questionnaire. This can have a significant bias effect, especially if experts are asked to rate multiple factors back-to-back.
- **Primacy effect** (Hallowell, 2009): The unconscious assignment of importance to initial questions or observations.

Biases in the formulation of consensus

- **Reflects the 'lowest common denominator' view.** Rennie (1981), cited by Hohmann et al. (2018), suggested that the views of the discussion are likely to become oversimplified in order for the panellists to reach an agreement.[209] More controversial views may go unheard, resulting in a bias against these views.
- **Collective unconscious bias / bandwagon effect** (Hallowell, 2009; Durkheim, 1982).[210] Panellists may unconsciously feel pressure to converge their views in the process of discussion. As a result, the outcome of the panel may lead to a result that is different from the 'true' consensus.
- **Dominance bias** (Hallowell, 2009; Linstone and Turoff, 2002).[211] Vocal dominance expressed by a panellist can result in the views and opinions of other members going unheard. This source of bias is especially common when groups come together to discuss views, such as in the Delphi method.
- **Eloquence bias.** Hung et al. (2008) note that the Delphi method requires panellists to have written communication skills. We suggest that this could introduce a bias such that views that are communicated more eloquently may be given more weight, unconsciously, by panellists in reaching a consensus.

---

[203] BCIS (2022). 'BCIS Tender Price Index' – [online]
[204] Hallowell (2009), Table 1 [online]
[205] Skinner et al. (2015), see Table 2. [online]
[206] Hung et al. (2008) [online]
[207] Avella (2016) [online]
[208] Bjarnason and Jonsson (2005) [online]
[209] Hohmann et al. (2018) [online]
[210] Durkheim (1982) [online]
[211] Linstone and Turoff (2002) [online].

Relevant biases in the individuals that compose the expert panel

- Neglect of probability (Hallowell, 2009): People generally disregard the likelihood of an event when making a decision under uncertainty.
- Von Restorff effect and Recency effect (Hallowell, 2009): In theory, individuals are more likely to remember events associated with severe outcomes, or those that occurred most recently. This could distort the perception of probability and artificially inflate judgements.
- Myside bias (could be interpreted as a form of confirmation bias) (Hallowell, 2009; Skinner et al.,2015): This occurs when an individual generates arguments only on one side of an issue or is unwilling to address objective viewpoints that counter a subjective position.