Water & Sewerage Services Price Control 2021-27

Final determination - Annex K

Opex and Capex Frontier Shift

May 2021

About the Utility Regulator

The Utility Regulator is the independent non-ministerial government department responsible for regulating Northern Ireland's electricity, gas, water and sewerage industries, to promote the short and long-term interests of consumers.

We are not a policy-making department of government, but we make sure that the energy and water utility industries in Northern Ireland are regulated and developed within ministerial policy as set out in our statutory duties.

We are governed by a Board of Directors and are accountable to the Northern Ireland Assembly through financial and annual reporting obligations.

We are based at Queens House in the centre of Belfast. The Chief Executive leads a management team of directors representing each of the key functional areas in the organisation: Corporate Affairs, Markets and Networks. The staff team includes economists, engineers, accountants, utility specialists, legal advisors and administration professionals.

Our mission

To protect the short- and long-term interests of consumers of electricity, gas and water.

Our vision

To ensure value and sustainability in energy and water.

Our values

- Be a best practice regulator: transparent, consistent, proportionate, accountable and targeted.
- Be professional – listening, explaining and acting with integrity.
- Be a collaborative, co-operative and learning team.
- Be motivated and empowered to make a difference.

Contents

Executive Summary

1.1 The purpose of this report is to decide whether we (the Utility Regulator or **UR**) should make an addition to or subtraction from our catch-up efficiency target for NI Water in the incoming price control period (**PC21**).

1.2 This decision is based on the projected rate of water industry costs and productivity trends compared to Retail Price Index (**RPI**) measured inflation movement. The comparison can show a positive or a negative difference.

1.3 Extra allowance is made when water industry cost inflation is forecast to outstrip RPI estimates automatically included in the regulatory decision. Conversely, an additional challenge will arise if industry costs are forecast to rise by a factor lower than RPI inflation.

1.4 The methodology used follows that used as part of the PC13 and PC15 final determinations. This paper simply updates the previous forecasts with the latest available information set. This includes both historical and/or recent actual out-turn data and our best, most up-to-date view on where prices are likely to go across the 6-year period represented by PC21.

1.5 For PC21 we have combined separate reports for operational expenditure (**opex**) and capital expenditure (**capex**) into a single report.

1.6 This paper focuses on providing an update to the forecast given at draft determination stage[1], where updated data is available[2]. And as at draft determination, it explains any changes since our examination of frontier shift at PC15.

1.7 The original frontier shift methodology paper (for PC13) can be found at the link below:

www.uregni.gov.uk/uploads/publications/ANNEX_D_-_Rate_of_Frontier_Shift_-_PC13_FD.pdf

1.8 Frontier shift is a key element in setting the opex efficiency targets for NI Water in PC21. Alongside the assessment of catch-up efficiency, frontier shift represents another element of cost challenge on the company.

[1] https://www.uregni.gov.uk/sites/uregni/files/media-files/UR%20PC21%20DD%20Annex%20K%20-%20Opex%20and%20Capex%20Frontier%20Shift%2001.00%20Published.pdf

[2] Note for example, ONS has suspended some publications to free up resources for other areas of work. See the 'Notice' placed 10 March 2021 at the top of this ONS webpage for labour index data: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/indexoflabourcostsperhourilch/julytoseptember2020

1.9 The concept of frontier shift is wider than simple productivity assumptions. Within this report, we have adopted the methodology used in PC15, which in turn aligned closely with the Competition Commission (CC) determination for Northern Ireland Electricity at RP5[3]. This process combines nominal input price forecasts with productivity expectations and general (RPI) inflation.

Frontier shift in real terms ≈ Input prices *minus*

Productivity *minus*

Forecast (RPI) inflation

1.10 The forecast for each of the components and the frontier shift to be applied to PC21 opex and capex targets are given in the tables below.

	PC15		PC21					
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
Weighted Input Prices	3.0%	1.5%	2.7%	2.6%	2.5%	3.1%	3.3%	3.3%
RPI	(2.6%)	(1.3%)	(2.6%)	(2.1%)	(2.5%)	(2.8%)	(3.0%)	(3.0%)
Productivity	(0.8%)	(0.8%)	(0.8%)	(0.8%)	(0.8%)	(0.8%)	(0.8%)	(0.8%)
Frontier Shift	**RPI - 0.4%**	**RPI - 0.6%**	**RPI - 0.6%**	**RPI - 0.3%**	**RPI - 0.7%**	**RPI - 0.6%**	**RPI - 0.4%**	**RPI - 0.4%**

Figures may not sum due to rounding

Table 1.1 – Opex frontier shift calculations (%)

	PC15		PC21					
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
Weighted Input Prices	2.8%	1.6%	2.5%	2.5%	2.4%	2.8%	3.0%	3.0%
RPI	(2.6%)	(1.3%)	(2.6%)	(2.1%)	(2.5%)	(2.8%)	(3.0%)	(3.0%)
Productivity	(0.6%)	(0.6%)	(0.6%)	(0.6%)	(0.6%)	(0.6%)	(0.6%)	(0.6%)
Frontier Shift	**RPI-0.5%**	**RPI-0.3%**	**RPI-0.7%**	**RPI-0.2%**	**RPI-0.7%**	**RPI-0.7%**	**RPI-0.6%**	**RPI-0.6%**

Figures may not sum due to rounding

Table 1.2 – Capex frontier shift calculations (%)

1.11 The tables highlight the findings of the analysis. Whilst it is difficult to predict with accuracy so far in advance, the frontier shift given above is our best estimate with the available information. Further detail on the make-up of the frontier shift is contained in the following sections.

[3] https://www.gov.uk/cma-cases/northern-ireland-electricity-price-determination

1.12 As indicated at our draft determination, for final determination we have updated economic outlook views, forecast data and key indicators used with the latest available.

2. Input Price Inflation

Input mix

Operational Expenditure (**opex**)

2.1 Starting with the opex element of costs, in order to estimate input price inflation, we first examine key cost drivers and their relative contributions to total opex.

2.2 We use an input mix based on representative Ofwat regulated companies, whose opex can be categorised into labour, power, materials & equipment, rates, chemicals, bad debt, Environment Agency charges and other costs.

Input	% of Opex
Labour	50
Materials and Equipment	10
Chemicals	2.5
Power	12.5
Rates	10
Environment Agency Charges	5
Bad Debt	5
Other	5
Total	**100**

Weights may not sum due to rounding

Table 2.1 – opex input mix for a representative water company

2.3 NI Water like any other company, is unlikely to experience the exact same make-up of costs as the rest of the industry. This is particularly true given the continued absence of domestic charging. However, it is important that the frontier shift is estimated against a cost input mix as closely aligned to a typical company, and the expected change in industry costs at the frontier of efficiency.

2.4 As in PC13 and PC15, we make an amendment to these cost proportions in order to allow for opex special cost factor adjustments in Northern Ireland, specifically those related to labour and power.

2.5 This revised input mix, is more representative of the opex costs of a hypothetically efficient Northern Ireland company than a typical England and Wales company. Once adjusted for PC21 special cost factors, the mix of weights change from those used in PC15.

2.6 Power costs in the revised input mix are no longer a higher proportion of costs, now at 13%[4] as opposed to 17% at PC15.

2.7 The background to the weight change is that, historically, Northern Ireland has experienced higher costs of electricity relative to Great Britain. This situation has changed over time, with the gap closing in all usage categories. Indeed, across most usage categories the position has now been reversed. This can be seen from the data in the Quarterly Transparency Reports published by our Retail colleagues[5].

2.8 Our revised opex input mix also took into account 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% as opposed to 50%).

2.9 In order for all proportions to sum to 100%, other categories are adjusted to scale back the sum of the individual elements, once our special cost factors treatment is factored in. The revised input mix used in our draft determination frontier shift calculations are shown in the table below.

Input	% of Expenditure
Labour	47
Materials and Equipment	11
Chemicals	3
Power	13
Rates	11
Environment Agency Charges	5
Bad Debt	5
Other	5
Total	**100**

Weights may not sum due to rounding

Table 2.2 – Hypothetical opex input mix for an efficient water company

[4] [4] Please note that the weight of 13% is presented at zero decimal places. This may imply power cost input is still a slightly higher proportion of the revised input cost mix compared to the Ofwat representative water company of 12.5%. However, at 1 decimal place, our reweighting calculations provide a figure of 12.6% for power costs for the revised input mix. Our alignment to relative power prices (see Annex L - PC21 Efficiency Modelling (CEPA)), whilst incorporated into revised weighting is itself overlaid by the materially larger adjustment to the weight for relative wage costs.

[5] https://www.uregni.gov.uk/market-information

Capital Expenditure (**capex**)

2.10 For the capex element of costs, in order to estimate input price inflation, we first examine key cost drivers and their relative contributions to total capex.

2.11 We use a capex input mix based on representative Ofwat regulated companies, whose capex can be categorised into labour, materials, plant and equipment and other costs.

Input	% of Capex
Labour	30
Labour – specialist	15
Materials – machinery	10
Materials – civils	15
Plant and equipment	25
Other	5
Total	**100**

Weights may not sum due to rounding

Table 2.3 – Capex input mix for a representative water company

2.12 As in PC15, we base our capex input price analysis on this weight mix.

Macroeconomic Outlook

2.13 Input prices will be heavily dependent upon the performance of the economy. Many bodies focus on GDP growth forecasts. These groups will analyse the effects of global trends, policy changes, spending budgets, tax changes and other metrics in order to form a view on economic growth.

2.14 In this section, reliance is placed on the forecasts of the Office for Budget Responsibility (OBR), the International Monetary Fund (IMF) and the Ulster University Economic Policy Centre (UUEPC)[6].

2.15 The latest GDP/GVA[7] projections of each are provided below. As indicated at our draft determination, for final determination we have updated the forecast data and key indicators used with the latest available.

[6] The UUEPC was formerly the Northern Ireland Centre for Economic Policy (NICEP).
[7] GVA = Gross Value Added; a measure of output similar to GDP.

Forecaster	2018	2019	2020	2021	2022	2023	2024	2025
OBR[8] - GDP	1.3%	1.3%	-11.3%	5.5%	6.6%	2.3%	1.7%	1.8%
IMF[9] - GDP	1.3%	1.4%	-9.9%	5.3%	5.1%	2.0%	1.8%	1.5%

Table 2.4 – United Kingdom GDP growth forecasts (%)

Forecaster	2018	2019	2020	2021	2022	2023	2024
UUEPC[10] - UK GVA	1.4%	1.7%	-	-	-	-	-
UUEPC[11] – NI GVA	1.2%	1.3%	-11.6%	4.4% - 5.6%[12]	3.0% - 3.2%	~2% or less	~2% or less

Table 2.5 – United Kingdom and Northern Ireland GVA forecasts (%)

2.16 The latest UUEPC figures for NI GVA aren't presented as decisive forecasts. They are instead intended to present an indicative range of possible scenarios for recovery. Uncertainty highlighted with the ranges of growth rates and the point at which growth levels out is noted.

2.17 The caveats around recovery pace and extent aside, the various projections appear to convey a similar message. A large contraction in growth during 2020, followed by an expected strong pick up of growth rates during 2021 into 2022. Growth rates then are expected to level off towards an uncertain point in the future when losses from negative growth may have been regained.

2.18 The economic growth and employment impacts of the COVID-19 pandemic feature strongly in the 2020/2021 period. National 'lockdowns' to control infection rates severely restricted large swathes of economic activity in the UK, Northern Ireland and the world, throughout 2020 and into 2021. More long term, the effects of illness and loss will impact personally and economically, beyond the initial period of pandemic and recovery.

2.19 The assistance from vaccine programs and fiscal support measures play no small part in weathering the economic impact of the pandemic. However, pre COVID-19 factors that bring risk to global growth remain in place. These factors, cited at draft determination, plus factors that may yet emerge, remain

[8] OBR Economic and Fiscal Outlook – March 2021. Year 2018 and 2019 is out turn data.
[9] IMF World Economic Outlook Database – April 2021. Year 2018 and 2019 is out turn data.
[10] UUEPC Outlook: Summer 2019
[11] UUEPC, Discussion Paper 3: Pathways to economic recovery after COVID-19 in Northern Ireland. The figures given for 2021 and 2022 are for 'Lower' and 'Upper' scenarios i.e. speed of, and extent to which, recovery takes place, back to around previous peak growth. Figures for 2023/2024 are indicative of being at pre-COVID growth rates or possibly still recovering towards this.

to be considered. That is, even after some semblance of normality starts to return, albeit while society still adjusts to life with the risk of COVID-19. They include:

- Trade wars, protectionist and geopolitical risks;
- Tighter financial conditions (resulting from financial market issues that cause pricing revaluation of financial assets. Perhaps due to debt levels, bankruptcy, monetary shocks and other drivers); and
- slowing world economic growth pre COVID

2.20 There are of course positive factors that may lend support to improve world growth rates, but the level of uncertainty is high around any stated scenario.

2.21 In global terms, the GDP outlook is similar to national and regional expectations. That is, a sharp period of contraction, followed by a reasonably strong period of growth. The latter is said to be due to fiscal support within a limited number of large economies and the effects of vaccination efforts allowing economic activity to resume. This initial hike in growth rates then levels off over the next 3 to 4 years to around the growth rates forecast for these later years prior to COVID-19. The IMF and OBR have predicted GDP growth rates for the world at the rates in Table 2.6 below.

Forecaster	2018	2019	2020	2021	2022	2023	2024	2025
OBR	3.6%	2.8%	-4.4%	5.2%	4.2%	3.8%	3.6%	3.5%
IMF	3.6%	2.8%	-3.3%	6.0%	4.4%	3.5%	3.4%	3.3%

Table 2.6 – Estimates of the world GDP growth rate[13] (%)

2.22 The IMF assess the economic scars of the COVID-19 pandemic to be less severe than experienced after the 2008 financial crisis[14]. This is illustrated by, for example, a build-up of household savings in advanced economies during lockdown. This may indicate there is the promise of pent up consumer demand to aid the recovery. Note for instance the unusual double-digit figures from OBR for UK household sector savings ratio in 2020 and 2021[15]. To what extent this translates into spending is subject to varying views and will be linked to personal and household financial circumstances. As with all other outlooks and forecasts at present, there is substantial uncertainty around views of recovery and growth.

[13] Year 2018 and 2019 is out turn data
[14] IMF, World Economic Outlook, April 2021
[15] OBR, Economic and Fiscal Outlook, March 2021

2.23 There is considerable concern around unequal impacts of the pandemic, both globally and within nations and sectors. Growth was slowing globally pre-pandemic, with advanced economies at the time expected to continue with growth slow down toward long term potential growth rates. Conversely, emerging market and developing economies were expected to see a pickup in growth into 2020.

2.24 More generally, it seems growth was expected to slow as globalisation slows (hence the term sometimes used - 'slowbalisation')[16].

2.25 Manufacturing and global trade were highlighted as key contributors to "sluggish" growth during 2019. Factors driving this included higher tariffs and trade policy uncertainty, in turn damaging investment, particularly in capital goods. These factors remain live, indeed likely compounded by pandemic effects.

2.26 At draft determination, we noted the IMF estimated the cost to world GDP of the ongoing US-China trade issues at around 0.8% in 2020. While the pandemic has removed focus from issues such as this, they remain ongoing.

2.27 Economic performance is considered to largely depend on the path of the pandemic health crisis; policy interventions from governments; financial conditions and commodity prices. The IMF sums this up with "*The ebb and flow of these drivers and their interaction with country-specific characteristics will determine the pace of the recovery and the extent of medium-term scarring*"

2.28 None of the global factors referenced can be confidently said to be changing direction, or indeed when this may be seen. At present it would seem COVID-19 impacts may reinforce the gloomy economic outlook.

Wages and Salaries

2.29 As highlighted above, the single largest component of operational cost is labour. As a result, the forecast movement in labour cost will be a key element of frontier shift.

2.30 In broad terms, since 2001, the rate of private sector labour inflation has averaged around 3% (both including and excluding bonuses). Variation over this time can be observed in the data. In the period after the recession of 2008, wage growth remained sluggish. Though the last 5 years has seen earnings rise from the post-recession lower growth period, climbing to

[16] See for example various PwC publications for example: https://www.pwc.com/gx/en/news-room/press-releases/2020/gew-january-2020.html and The Economist, 26th Jan 2019 edition, leader, global business: "Slowbalisation".

around the long term average of approximately 3% per annum. Historic changes in wages and salaries are detailed in the figure below.

2.31 In an update to the data available at draft determination, the 2019/20 whole economy wage costs per hour appear to have taken a step upwards from the previous year. ONS notes the context for this uptick in hourly wages in their commentary for the data. That is, lockdowns severely reduced hours worked, but wages were still being paid up to 80% via the government furlough support scheme (Coronavirus Jobs Retention Scheme, or CJRS).

2.32 Some employers topped up wages beyond the CJRS. These factors resulted in pay remaining high compared to the number of hours worked, thus giving a high cost per hour calculation, at least on paper. Future data publications will shed more light on the extent workers are seeing increases in rates. As to what extent labour costs increased for employers, given funding of wages by government, is also unclear at this point.

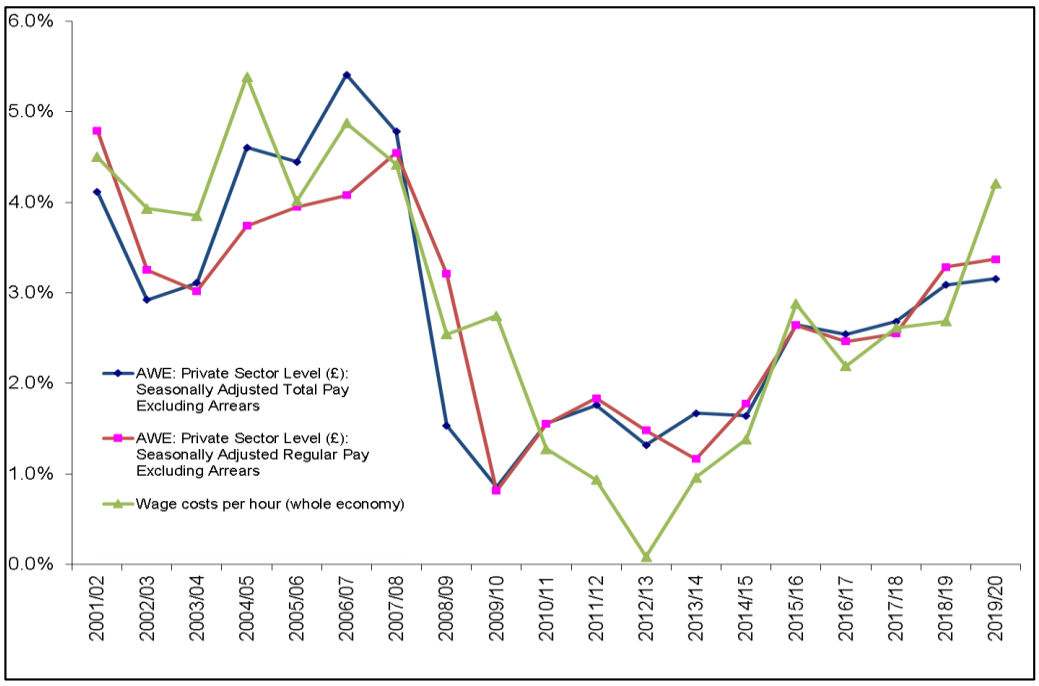


Figure 2.1 – Private sector earnings inflation and whole economy hourly wage costs (% change)[17]

[17] Sources: Office for National Statistics (ONS): Average Weekly Earnings (AWE) data and Monthly Digest of Statistics and the Index of Labour Costs per Hour (ILCH).

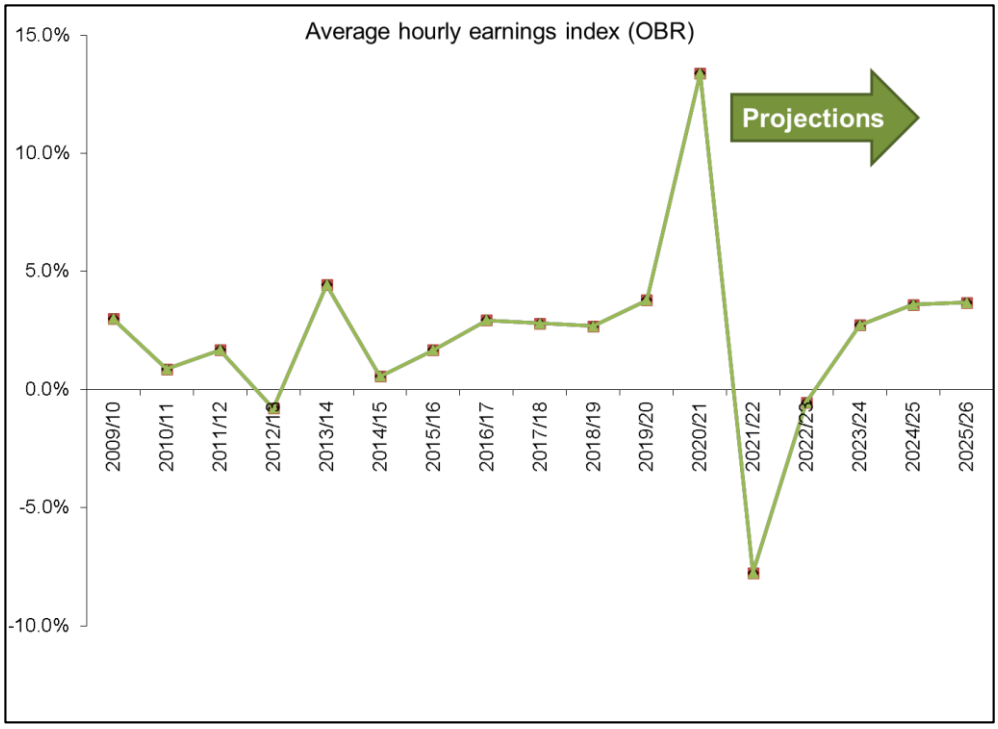


Figure 2.2 – Forecast average hourly earnings for the private sector (including bonuses)

2.33 OBR offers a view of what may lie further ahead for labour costs. However, the data used by OBR also picks up the effects of reduced hours being worked, while up to 80%+ of wages continue being paid. This is evident particularly in the hourly earnings growth rates for the years 2020/21 through 2022/23 which show large swings between positive and negative.

2.34 Taking a closer look at the variability, OBR forecast average hourly earnings to grow by a little over 13% in 2020/21, while furlough was ongoing and economic activity was severely curtailed. This is followed by a contraction of just under 8% in 2021/22, as the economy gets going again. Finally, just under 0% growth is forecast in 2022/23, before growth rates begin to settle back around the pre-pandemic 3% mark.

2.35 Double digit growth in hourly earnings, followed by high single digit contraction is likely 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. This is discussed in the context of ONS data at §2.31 and §2.32 above.

2.36 If we were to use the OBR hourly earnings data for our real prices effects calculation, the large swings will be carried through into our calculations. The company would then be rewarded and subsequently penalised when, as ONS point out, it is not necessarily the case that the changes translate in to employer costs:

"Note that changes in labour costs do not necessarily translate to a change in cost to the employer as it is based on what was paid to the employee

regardless of whether it was funded by the employer or by the Coronavirus Job Retention Scheme (CJRS)[18]".

Year	Average Hourly Earnings Growth (%)
2019-20	3.8%
2020-21	13.4%
2021-22	-7.8%
2022-23	-0.5%
2023-24	2.7%
2024-25	3.6%
2025-26	3.7%

Source: OBR Economic and Fiscal Outlook – March 2021

Table 2.7 – Average Hourly Earnings Growth (OBR)

2.37 For the reasons above, we substitute another dataset from OBR – Average Earnings Growth, in place of Average Hourly Earnings[19]. We acknowledge that under normal circumstances, a measure of hourly earnings growth is preferable, so as to remove the effects of (smaller) changes in hours worked. Unfortunately, in the current circumstances this seems to break down. The data we use in place of hourly earnings is shown in Table 2.8 below.

2.38 These projections are used as the forecast for wage inflation for the water industry.

Year	Average Earnings Growth (%)
2019-20	3.0%
2020-21	0.7%
2021-22	2.4%
2022-23	2.5%
2023-24	2.1%
2024-25	3.1%
2025-26	3.5%
2026-27	3.5%

Source: OBR Economic and Fiscal Outlook – March 2021, with UR assumption used for 2026-27

Table 2.8 – Wage inflation projections

2.39 In PC15 we also made a specific allowance for specialist labour, above general labour, in the mix of inputs for capex. The chart below shows

[18] Index of Labour Costs per Hour, UK: July to September 2020
[19] Average earnings growth, used by OBR, is an implied measure of earnings growth using National Accounts measure of wages and salaries divided by the number of employees.

average weekly earnings, average hourly earnings and for specialist labour, civil engineering labour and supervision costs growth.

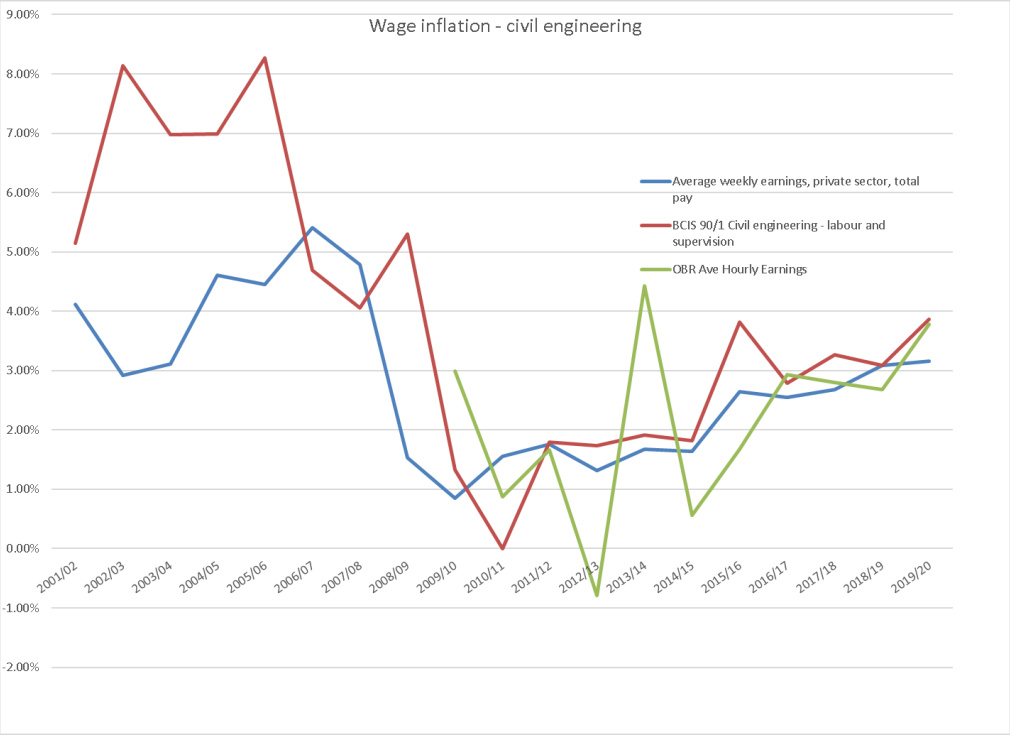


Figure 2.3 – Private sector earnings inflation and whole economy hourly earnings inflation (%)[20]

2.40 OBR average hourly earnings out turn data goes back to 2009/10, over which it averages 2.1% annual growth. ONS average earnings over the same period averages 2.2% annual growth. While the BCIS data, taken as an indicator for relevant specialist labour costs, averages 2.3% annually over the same period.

2.41 We have used OBR average earnings data for labour growth rates, as is set out previously. When compared to the BCIS provided (specialist labour) index, as used at PC15, the data does not appear to support the +1.25% uplift applied for specialist labour over general at PC15.

2.42 We do not propose to apply such an uplift for specialist labour in PC21. Rather we adopt the labour growth rates set out in Table 2.8 above for the specialist labour category.

Materials/Equipment/Plant; Parts/Machinery; Civils

2.43 Materials and Equipment and machinery is a key cost area for water companies. It will include items such as tools, machinery, clothing and equipment necessary to operate and maintain the network. A good indicator

[20] Source: ONS Average Weekly Earnings, OBR Average Hourly Earnings, BCIS 90/1 civil engineering.

of price movements in this area is given by the machinery and equipment price index produced by the ONS.

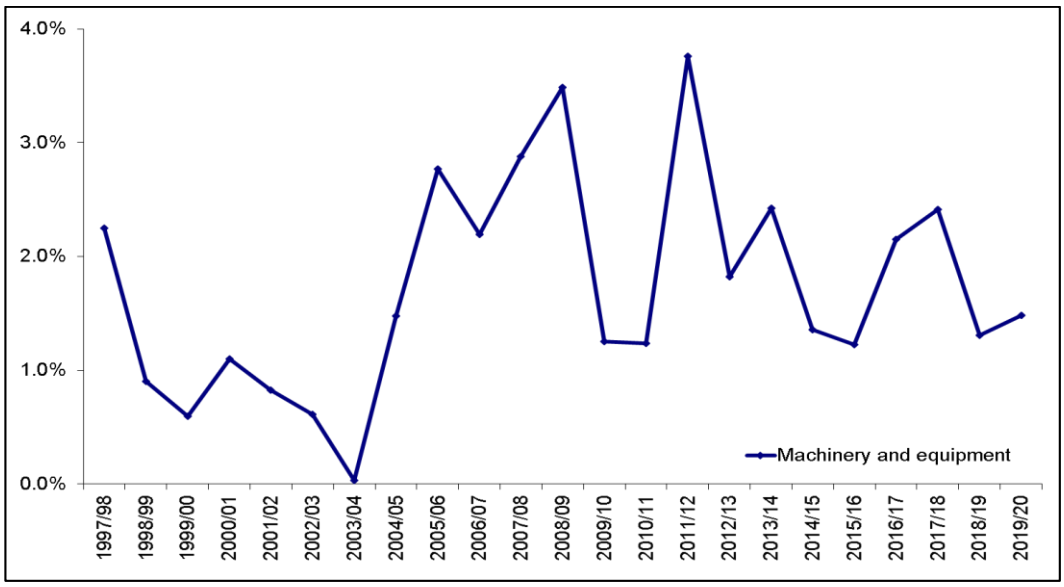


Figure 2.4 – Annual price changes for machinery and equipment (%)[21]

2.44 For this ONS dataset, machinery and equipment prices have maintained a positive, if slightly volatile growth rate, even in the immediate post 2008 recession years. More recent data show that in the last 6 years' growth has been a 1.7% annual average. This compares to the long term average of the series, which sits at 1.7%.

2.45 We also considered general input price inflation for all manufacturers.

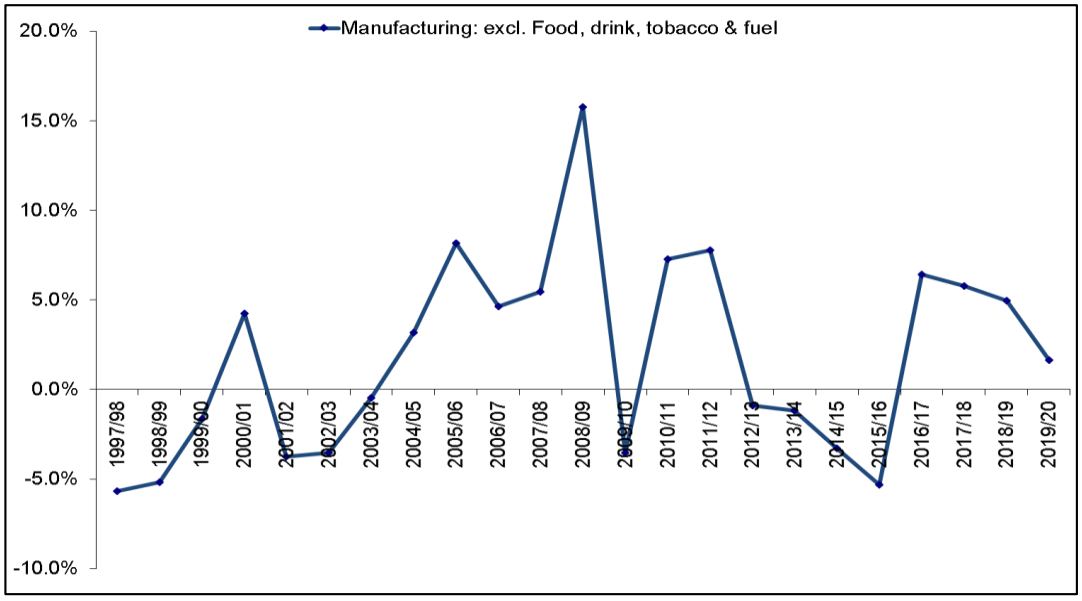


Figure 2.5 – Manufacturing input prices percentage change (excluding food, drink, tobacco and fuel) [22]

[21] Source: ONS Producer Price Index – (K389)
[22] Source: ONS Producer Price Index – (K658)

2.46 While noting a tendency for growth rate fluctuation between negative and positive growth, the last 6 years' growth averaged 1.7% annually. This is viewed against an overall trend since 1997 of 1.8% per annum price rises. This is comparable to the findings for the machinery and equipment index.

2.47 The analysis suggests that the input price for machinery is around its long term average. As such, we have adopted an average figure of 1.7% per annum price rises for materials – equipment/machinery in line with the ONS data long-run average. This follows the PC15 approach.

Input cost category	Annual cost increase
Materials and Equipment (opex)	1.7%
Materials – machinery (capex)	

Table 2.9 – Materials: equipment/machinery cost inflation (nominal)

2.48 As in PC15, we look to the BCIS plant and road vehicles index as the indicator of cost pressures on plant and equipment used by water companies. The chart below shows the detail of the annual data available.

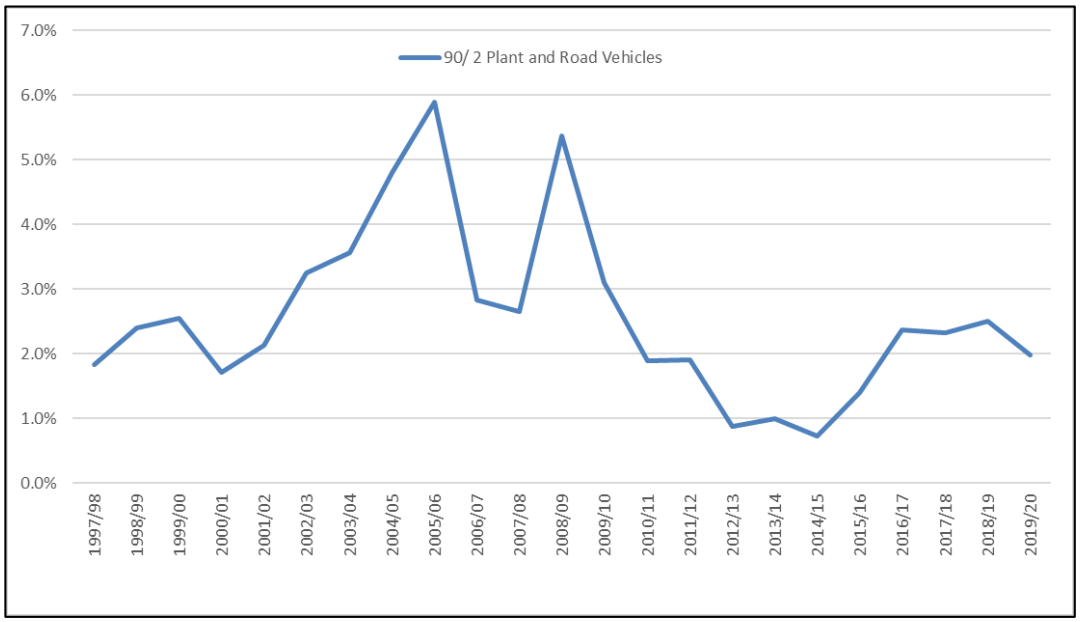


Figure 2.6 – Annual price changes for plant and road vehicles (%)[23]

2.49 The chart shows the slowing down of growth from 2010 to around 2015. After which the growth rate recovered some ground before seemingly levelling off to around 2% – 2.5% from 2017 to date. This compares to the long term average of the dataset of 2.6%. Allowing for variation in growth rate experienced pre and post 2008 decline and recovery, we adopt the long term average of plant and equipment input price growth rate of 2.6% for our final determination.

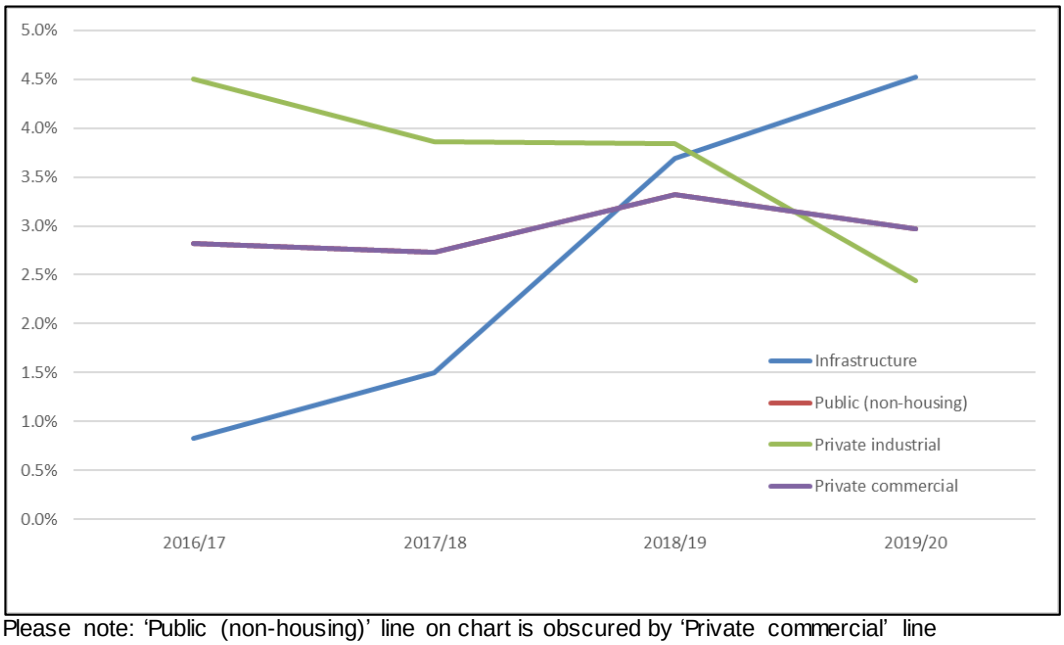
[23] Source: BCIS Plant and Road Vehicles index (90/2)

Input cost category	Annual cost increase
Plant and Equipment (capex)	2.6%

Table 2.10 – Materials: equipment/machinery cost inflation (nominal)

2.50 The other capex materials category is general/civils costs. This is taken to refer to construction materials such as bricks, concrete, metal and plastics used by water and sewerage companies in construction work.

2.51 The Department for Business, Innovation and Skills (BIS) cost data used in PC15 analysis is no longer produced. However, a new data series is produced in its place by ONS called the Construction Output Price Indices (**OPIs**). The OPIs hold National Statistic status and index data from the series is shown below in the chart.



Please note: 'Public (non-housing)' line on chart is obscured by 'Private commercial' line

Figure 2.7 – ONS Construction output prices annual change (%) [24]

2.52 The new data series doesn't have as long a series as the dataset it replaced. But from the chart we can see that infrastructure costs growth has come from below the other categories and overtaken them in the last year or so. While the other categories seem to have settled around the 3% mark, taking an average of the full dataset across the categories above gives a figure of 2.9% per annum for civils cost growth.

Input cost category	Annual cost increase
Materials - civils (capex)	2.9%

Table 2.11 – Materials: equipment/machinery cost inflation (nominal)

[24] Source: ONS Construction Output Price Indices (OPIs), Table 2: new work output prices.

Chemicals

2.53 The ONS Producer Price Index details the movements in chemical costs from year to year. The chart below shows price changes for chemicals.

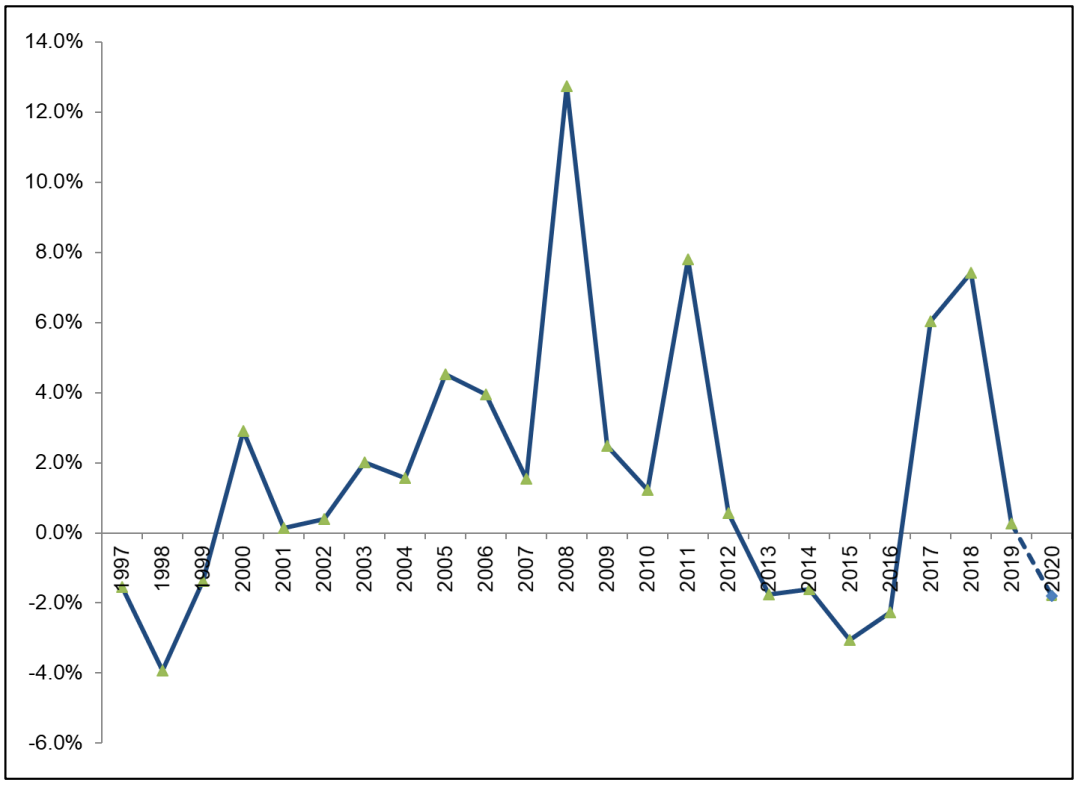


Figure 2.8 – Chemical prices annual change (%) [25]

2.54 The chart indicates that the price change has generally been positive over the last 20 years, with a period of negative growth 2013 – 2016. While 2020 data suggests negative price growth, this data is at present, preliminary and incomplete.

2.55 While growth appeared to recover its positive position the most recent complete annual data indicate a slowing of growth again. The context is of the generally more uncertain and perhaps sluggish growth outlook discussed for the world economy above. Chemicals can be expected to feel the influence of throttled back global demand while economies continue to struggle with pandemic effects.

2.56 Using the latest data, since 1997, the price growth rate of the chemical indices is roughly 1.7% per annum. At PC15, we suggested that it is reasonable to believe that future chemical prices may be more closely linked to global growth rather than the long-term trend.

2.57 Continuing the transposition of our PC15 approach for PC21, we proposed an annual chemical price inflation forecast of 3.0% at draft determination. Updating for the latest firm annual data (for 2019), a slightly revised figure of 2.7% is arrived at. As for PC15 and our draft determination, this represents

[25] Source: ONS Producer Price Index – (K37Z)

an average of historic chemical prices and global GDP growth, with a greater weight given to global growth.

Input cost category	Annual cost increase
Chemicals (opex)	2.7%

Table 2.12 – Chemicals cost inflation (nominal)

Power

2.58 Electricity cost is a key component of expense for water and sewage companies.

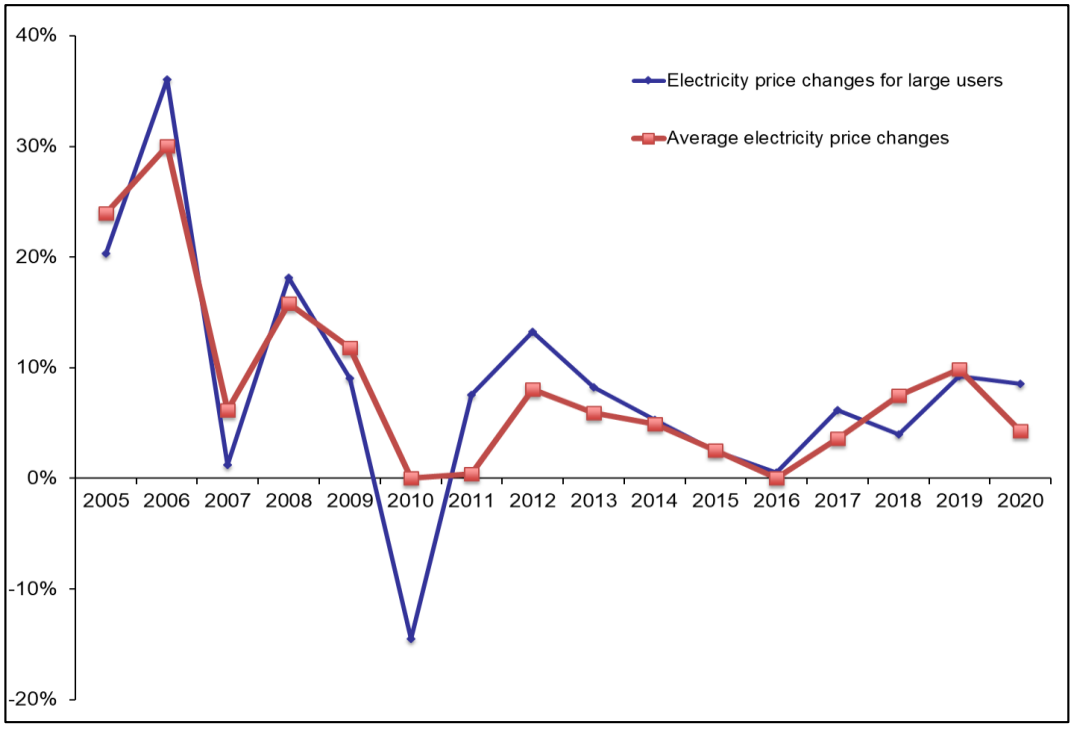


Figure 2.9 – Electricity price changes (%)[26]

2.59 The chart shows the volatility that can be experienced in electricity prices at certain periods, leading to an element of unpredictability over a number of price control periods. Since 1997, the overall trend for industrial electricity prices has generally supported annual increases of between 4% and 5%[27].

2.60 The future of electricity prices for industrial customers is expected to entail year on year increases, with some variability year on year. The Department

[26] Source: Large and average user data is from Department for Business, Energy and Industrial Strategy (BEIS), Gas and electricity prices in the non-domestic sector – March 2021, Table 3.4.2.
[27] BEIS Industrial energy price indices, Table 3.3.2,

for Energy and Climate Change (DECC) has produced estimates of electricity price growth up to 2035.

2.61 Whilst there remains uncertainty around these estimates, DECC's central 'reference' scenario projections are still showing year-on-year increases.

2.62 Estimations of UK electricity prices for industrial users are detailed below.

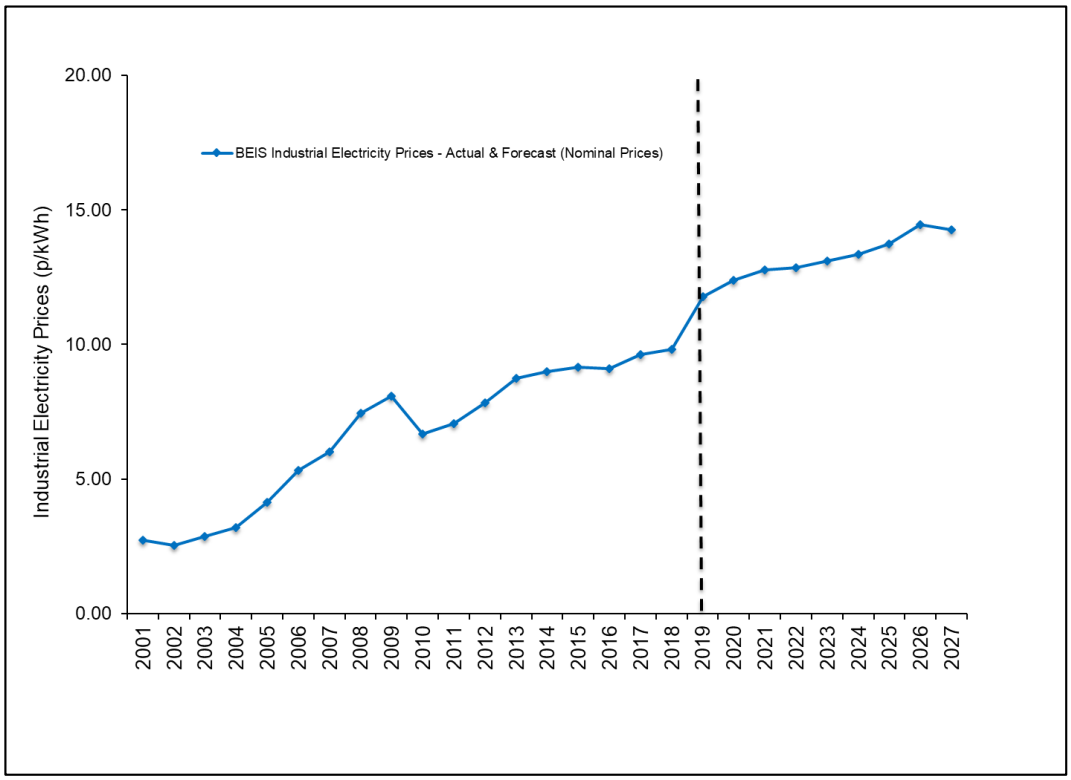


Figure 2.10 – UK industrial electricity price forecasts (nominal prices)[28]

2.63 The chart shows the expected rise in prices for non-domestic customers. The forecast increases have softened slightly from those presented at the draft determination. That said, BEIS are still forecasting increases in the industrial electricity price during 2021-26, the majority of the PC21 period.

[28] Source: BEIS 2019 Updated Energy and Emissions Projections

2.64 The year-on-year percentage increases are in the table below.

Year	Price inflation forecast (%)
2020	5.3%
2021	3.0%
2022	0.8%
2023	1.9%
2024	2.0%
2025	2.8%
2026	5.2%
2027	-1.3%

Source: BEIS 2019 Updated Energy and Emissions Projections

Table 2.13 – Industrial electricity price inflation forecast (nominal)

2.65 We consider these departmental forecasts to be the best available independent data. Whilst these figures are more stable than those estimated at PC15 over the then eight years in question, we have still smoothed the input figures into a ✂% annual increase. This ✂% figure is an increase from the draft determination figure, but remains comparable with the historic average of the data and will have the effect of avoiding unnecessarily large positive and negative swings in the final frontier shift numbers (and therefore, opex allowances) for PC21.

Input cost category	Annual cost increase
Power (opex)	✂%

Table 2.14 – Power cost inflation (nominal)

Rates, bad debt and other costs

2.66 For the purposes of simplicity, it is assumed that rates, environment agency charges and other costs simply move in line with RPI inflation. This mirrors the previous approach at PC13/15.

2.67 For PC21 we also include bad debts moving with inflation. Analysis of historic bad debt costs indicate the level of cost growth allowed for in PC15 is no longer supported by the cost information.

3. Productivity

Total factor productivity

3.1 Total factor productivity, or TFP, is defined as the ratio of total outputs to inputs. This measure will be impacted by changes to labour productivity and capital investment. In this report, our interest is focused on changes to output which are not affected by the normal inputs.

3.2 If output increases yet inputs remain the same, this is considered a productivity improvement. This may be due to improvement in working practices, technological progress, a combination of these or other means of using less inputs to obtain the same output.

3.3 Within the UK water industry there has been a long history of increasing efficiency. Frontier companies reducing staff and costs while at the same time improving water and effluent quality illustrate this.

3.4 Previous price controls have noted that this is not all due to labour productivity progress or better technology. Rather, the industry has benefited from a privatisation effect and investing in a large quality programme (increasing inputs).

Water industry productivity

3.5 In order to avoid the impacts of these other water industry variables, we have used comparable TFP information from the EU KLEMS[29] data set. In its latest release this data is produced the period 1995 – 2016. It includes EU member states and contains growth, productivity and technology.

3.6 In terms of analysing opex trends this report is interested in:

- Manufacturing sectors where a product is being made;
- Sectors that are involved in maintaining an asset and transporting goods; and
- Sectors covering financial, scientific, admin and technical services

3.7 And for analysing capex trends, we are interested in:

- Competitive sectors with activities that are in some way comparable to water and sewerage company capex
- Hence we use, as previous price controls have done, sector data from construction, manufacturing and machinery production

[29] EU KLEMS refers to European Union countries productivity levels. The inputs included in the measurement are capital (K), labour (L), energy (E), materials (M) and services (S).

3.8 For both opex and capex, the respective sectors are used as a proxy for the water industry as they cover similar activities. The productivity trends in these industries should help reveal the potential for growth for water and sewage companies.

Draft determination

3.9 In response to our draft determination, NI Water raised some concerns they have with the productivity assumption we proposed. These concerns centred around:

- The level of our productivity assumption compared to NI Water's proposal in their business plan, and connected to this;
- The time period (especially around: the 1997 'peak' for Financial and insurance activities in the data; and number of years selected from either side of the 2008 financial crisis period);
- Weights applied to the various comparator sectors;
- Productivity generally in Northern Ireland.

3.10 We acknowledge the difference between productivity assumptions that we calculated compared to NI Water's calculations. These are shown in the table below.

	Opex	Capex
UR final determination	0.8%	0.6%
NI Water PC21 Business Plan	0.4%	0.08%

Table 3.1 – Comparison of productivity assumptions

3.11 The time period of data used has an impact on the number calculated, as will the weightings (further discussed below in the capex section). This is why, as we have done with our other network price control decisions recently, we used the full dataset available. This helps smooth any volatility in the data over the full period.

3.12 On the face of it, this may leave the calculation susceptible to undue influence from 'outlier' years of particularly sharp rises or falls in growth. However, our calculation method is driven by the start and end years of the period in question. Not being a simple average of data points within a time series, the influence of outlier data points is limited.

3.13 The CMA also looked at issues around data time period selection. They opted to assess productivity over a full business cycles, as productivity

growth is typically 'procyclical'. In this case CMA used data for 1990-2007 (an older published version of the same data we use). This incidentally is entirely pre-2008 financial crisis period. The more recent dataset doesn't allow selection of a the most recent business cycle, as the CMA chose, being 1995-2016.

3.14 The question of NI being considered a low productivity economy was also raised by NI Water in their response. Productivity data reviewed for Northern Ireland, generally focuses on labour productivity. Within EU KLEMS, there is a dataset for a broader Total Factor Productivity metric, as we discuss at the start of the productivity section. That said, no regional data breakdown is available from the UK dataset, to look specifically at Northern Ireland for instance.

3.15 However, it's worth noting that NI companies are also able to benefit from technological and procedural improvements that may be realised by GB companies and contribute to the aggregate UK data. For these reasons we continue to consider the EU KLEMS data suitable for productivity growth estimates, subject to selection of appropriate comparator sectors (as applied in successive calculations since PC13).

Opex productivity

3.16 The division of opex activities for water and sewage companies (**WaSC**) and the industries chosen for comparison is detailed in the table below.

WaSC Activity	% of Opex	Comparable Industry
Water resource and treatment Sewage treatment Sludge treatment and disposal	20%	Total Manufacturing
Water distribution Sewerage network	20%	Electricity, gas & water supply Transportation and storage
General and support Customer services Scientific services Other business activities	45%	Finance and insurance Professional, scientific, technical, admin and support services
EA charges Bad debts Other	15%	-

Table 3.2 – WaSC opex activity and comparable industries

3.17 The comparable industries are the same as those chosen at PC15. The productivity trends of the industry sectors in question are given below.

Industry	Per annum productivity growth (%)	Average (%)
Total manufacturing	1.28%	1.28%
Electricity, gas & water supply Transportation and storage	-1.53% 0.43%	-0.55%
Finance and insurance Professional, scientific, technical, admin and support services	1.57% 1.30%	1.44%

Table 3.3 – Annual opex comparator sectors productivity growth 1995-2016 (%)

3.18 The growth trends will vary depending on what years are selected for analysis. We have looked at the trend from 1995 to 2016, the full series in the latest dataset available.

3.19 The latest (2019) EU KLEMS data does not include information on 1970s and 1980s productivity that previous datasets contained. We do however follow the approach used in previous price controls, across electricity, water and gas, using as long a dataset as is available and appropriate. Usefully, the data period available provides a view before and after the 2008 recession, which wasn't available for PC15.

3.20 This helps to smooth volatility within the data over time and supports our aim of taking a more balanced, longer term view of productivity in the comparator sectors.

3.21 Applying the data to the water industry gives an expected level of opex related productivity growth shown in the table below.

WaSC Activity	% of Opex	Annual Productivity (%)	Weighted Average (%)
Water resource and treatment Sewage treatment Sludge treatment and disposal	20%	1.28%	0.26%
Water distribution Sewerage network	20%	-0.55%	-0.11%
General and support Customer services	45%	1.44%	0.65%

Scientific services Other business activities			
EA charges Bad debts Other	15%	-	-
Weighted Average (%)			**0.8%**[30]

Table 3.4 – Weighted industry average for opex productivity

3.22 The growth trends of the proxy industries have changed some since PC15. However, the changes largely balance out, with the overall findings similar, if a little lower than PC15's 0.9%.

3.23 The conclusion from the analysis is that the expected level of productivity growth in the water industry opex activity is 0.8% per annum. Whilst sitting below the results of our analysis at PC15, this still represents a substantial challenge to NI Water.

Capex productivity

3.24 The division of capex activities for water and sewage companies (**WaSC**) and the industries chosen for comparison is detailed in the table below.

WaSC Activity	Comparable Industry	Annual Productivity (%)
Water resource and treatment Sewage treatment Sludge treatment and disposal	Total Manufacturing	1.28%
Water distribution Sewerage network	Construction	0.48%
General and support Customer services Scientific services Other business activities	Machinery production	0.7%

Table 3.5 – WaSC capex activity, comparable industries and their annual productivity growth 1995 – 2016 (%)

[30] Calculation is: (A) (% of Opex * Annual Productivity), then sum of all (A) calculations to give weighted average of 0.8%.

3.25 For capex, as with opex, the comparable industries are the same as those chosen at PC15. The productivity trends of the industry sectors in question are given in the table above.

3.26 In keeping with the opex productivity analysis, we use the 1995 – 2016 dataset for capex. Productivity growth data for Total Manufacturing and Machinery Production are relevant to capex, though, as in our PC15 methodology, we place most weight on the data for the construction sector.

3.27 However, the weights applicable to the capex comparator sectors were not explicit in the capex report provided at PC15 (Annex O). To address this for PC21, we have calculated capex productivity using a range of weights, all of which give most weight to the construction sector, as stated at PC15 and PC21 draft determination. By that we mean calculations whereby construction is weighted 60%, 70%, 80% and 90%, with the remainder divided between the other comparator sectors.

3.28 We then take an average of the results from the range calculated. This gives a figure of 0.6% per annum for capex productivity growth.

Productivity growth	Annual change (%)
Capex	0.6%

Table 3.6 – PC21 WaSC capex productivity (%)

Adjustments

3.29 No adjustments have been made to these findings to account for capital substitution and/or catch-up efficiency effects. For PC21, we propose to adopt the position taken in previous price controls that these impacts will largely cancel each other out.

3.30 As a result, the 0.8% opex and 0.6% capex figures are taken as the long-run targets for opex and capex productivity in PC21.

Regulatory precedent

3.31 Historical precedent may not always be the best tool to use to predict future real price effects. These tend to be subject to future changes that have not been reflected in past data. However, at times we are constrained by what data is available.

3.32 Precedent is however useful when considering levels of productivity. Indeed, historical averages provide the main evidence as to what can be expected going forward.

3.33 Across many of the regulated industries, companies and regulatory authorities will make an assessment as to what level of productivity might be expected. Recent regulatory decisions are shown in the table below.

Decision	Opex (%)	Capex (%)
Ofgem RIIO-T1/GD1	1.0%	0.7%
Ofgem RIIO-ED1	1.0%	1.0%
CMA Bristol Water PR14	1.0%	
Competition Commission – NIE RP5	1.0%	1.0%
UR Gas Distribution Networks GD14	1.0%	1.0%
UR NI Water PC15	0.9%	0.6%
UR Gas Distribution Networks GD17	1.0%	1.0%
UR NIE Networks RP6	1.0%	1.0%
CMA PR19	1.0%	

Table 3.7 – Recent regulatory decisions on annual productivity growth

3.34 Across different sectors and networks, productivity assumptions range from 0.6% to 1.0% per annum. Our findings for the water industry in PC21 (0.8% opex, 0.6% capex) are within the bounds of this range.

3.35 The most recent regulatory decision on water industry productivity is the England and Wales water and sewerage company price control review for "PR19". In their most recent price control, Ofwat decided on a 1.1% (totex) annual productivity growth assumption in their final determinations[31]. There was subsequently a referral made to the Competition and Markets Authority (CMA). The CMA decided on a 1.0% (totex) annual productivity growth assumption in their final determination[32] albeit within the PR19 price control context of a number of financial incentives.

3.36 Ofwat's determination is the more recent of the sector regulator decisions in this topic area[33]. At draft determination we said we didn't propose going as high as the then 1.1% Ofwat determined for PR19. We arrive at the same decision for the subsequent CMA determination of 1.0%, maintaining the methodology we applied at previous price control periods.

3.37 As we indicated at draft determination, having conducted our analysis, there are some differences in the respective approaches.

3.38 In PR19's case, 1.0% number is applicable to totex. We base our final determination on the opex/capex categories used throughout PC15 and in to PC21. NI Water is not subject to a totex incentive regime. And so any productivity benefits Ofwat, and by extension, the CMA are seeking to capture for customers going into PR19, are not in the scope of our analysis.

3.39 We continue to seek substantial cost efficiency challenge for NI Water, as we have done in previous price controls. We are not proposing to attempt to set

[31] Note that Europe Economics, in their report for Ofwat, use 'frontier shift' – to mean the productivity growth estimate they calculate from EU KLEMS data – what we term 'productivity'. See Europe
[32] https://www.gov.uk/cma-cases/ofwat-price-determinations
[33] Economics "Real Price Effects and Frontier Shift" papers for Ofwat, January 2018/December 2019.

what was termed the “stretching targets” Ofwat sought, in conjunction with the capture of totex and outcomes framework efficiencies.

3.40 Our analysis of the EU KLEMS data and how our calculated 0.8% for opex and 0.6% for capex compare to the relevant comparator sector EU KLEMS data is illustrated in the charts below. We use a 10 year rolling average of productivity growth to demonstrate the various sectors growth trends.

3.41 Note the position of our opex and capex productivity calculations in comparison to the current comparator sector positions and apparent growth trends. When viewed in context, our productivity assumptions are not lacking in challenge to the company.

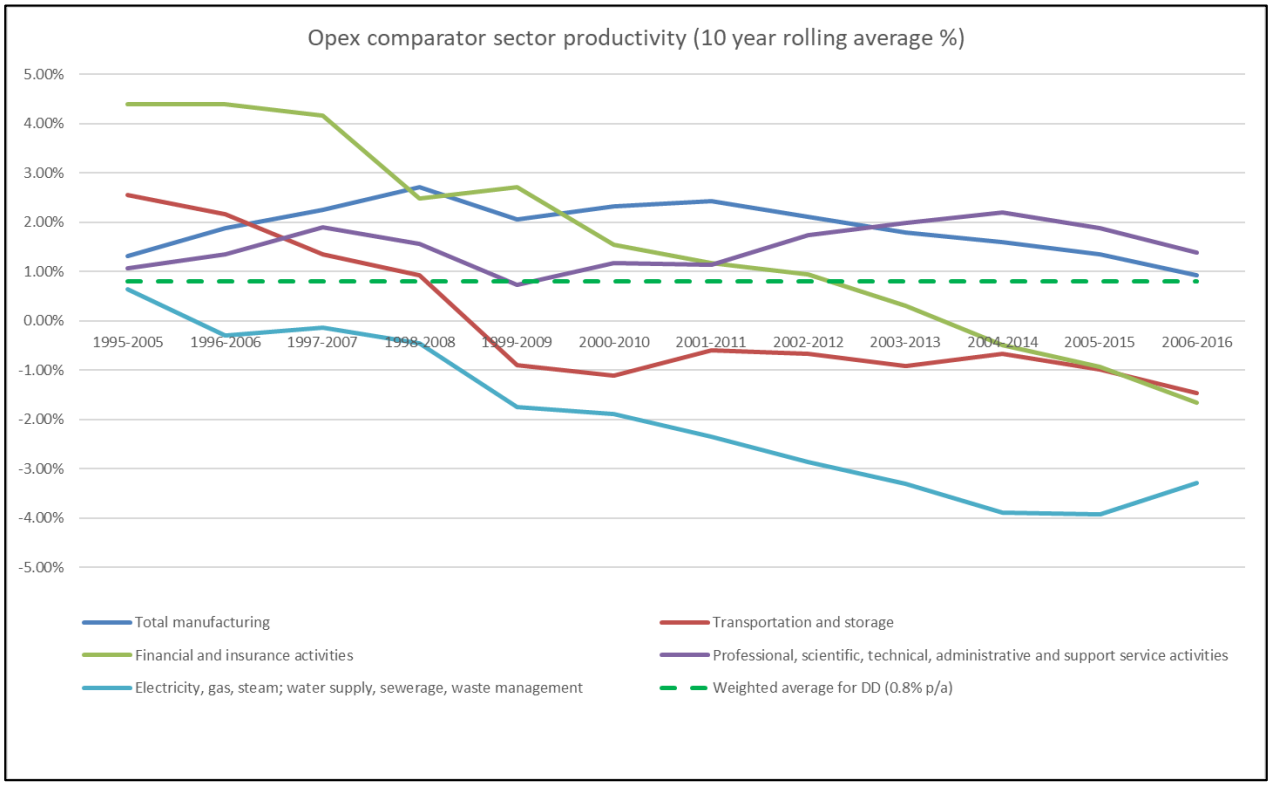


Figure 3.1 – Opex comparator sector productivity growth (% 10yr rolling average)[34]

[34] Source: EU KLEMS, 2019 release

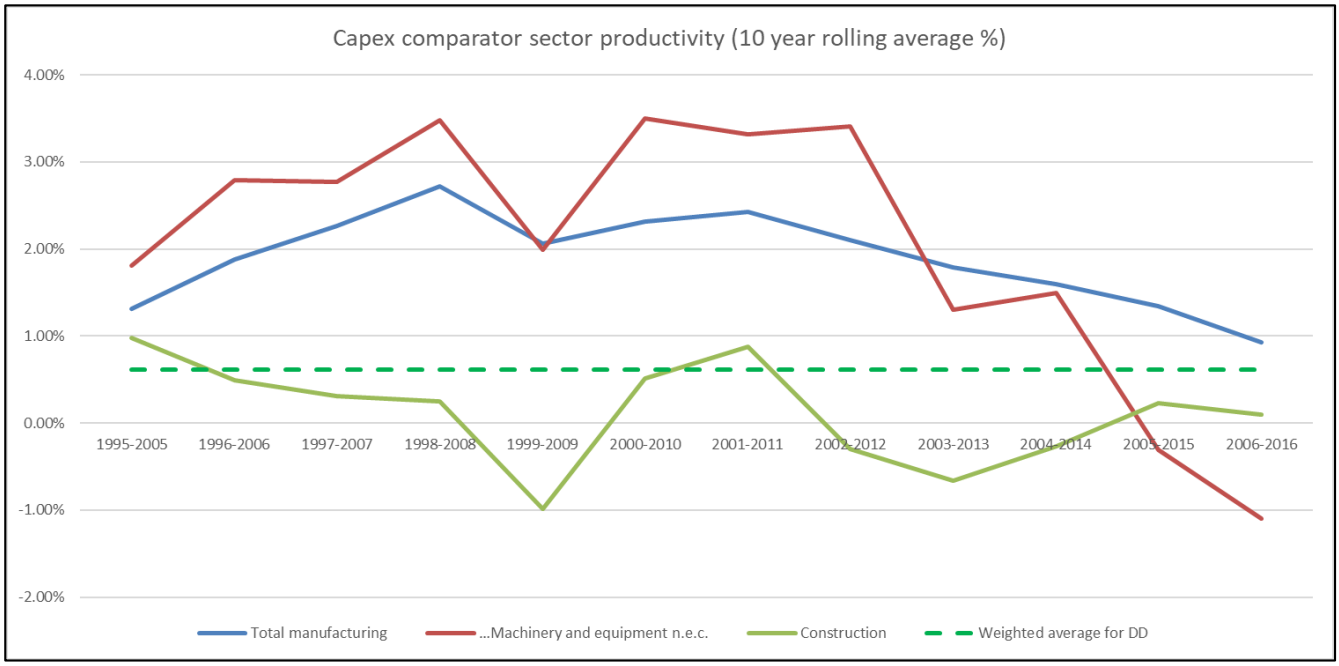


Figure 3.2 – Capex comparator sector productivity growth (% 10yr rolling average)[35]

[35] Source: EU KLEMS, 2019 release

4. Retail Price Index Projections

Historic data

4.1 The final element of the frontier shift calculation relates to inflation. This is measured by RPI. Historic changes in RPI are given in the figure below.

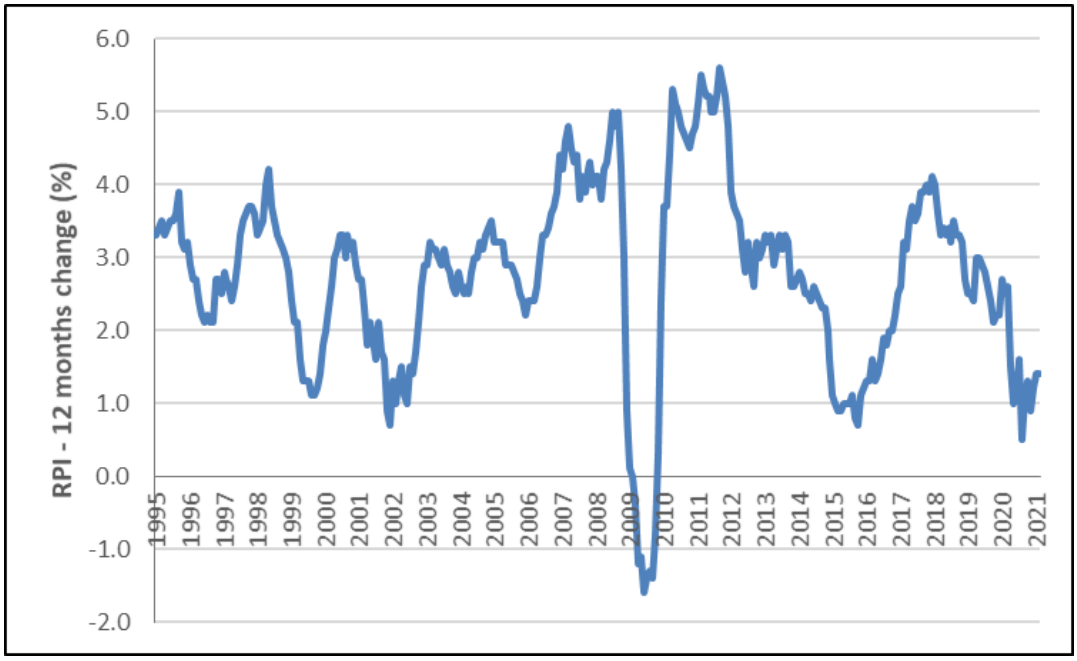


Figure 4.1 – RPI annual percentage change (monthly data)[36]

4.2 Over the period analysed, RPI has averaged around 3%. In recent years, the index has been falling. This is of course in the context of relatively low central bank base interest rates, sitting sub 1% since March 2009.

4.3 OBR forecasts in March 2020 indicated that future growth is expected to be largely in keeping with the historic average. Revised forecasts from March 2021 expect that to be the case. But this is expected later in the PC21 period, taking to around 2024/25 to settle to the similar levels forecast in March 2020. This is seen in the earlier years' forecasts, which are lower than those used for our draft determination. Some volatility is expected as sections of the economy restart after pandemic related restrictions and as economic support mechanisms taper off.

RPI forecasts

4.4 OBR forecasts of inflation run up to 2025-26. Within their forecasts, OBR considered various policy measure impacts such as previously mentioned government expenditure in pandemic support packages. OBR also considered more medium term influences such as house price, oil price and interest rate movements.

[36] Source: Office for National Statistics (ONS).

4.5 The latest OBR forecasts (for March 2021) are included in the table below.

Year	RPI Projections (%)
2019-20	2.6%
2020-21	1.3%
2021-22	2.6%
2022-23	2.1%
2023-24	2.1%
2024-25	2.8%
2025-26	3.0%
2026-27	3.0%[37]

Table 4.1 – OBR forecasts of RPI percentage changes

4.6 In the short-term, the projections are slightly below the historic average mentioned above. As PC21 progresses the forecast is for inflation more closely aligned with the historic average.

4.7 We adopt the RPI figures above for our draft determination frontier shift calculations, using an assumption of 3.0% for the last year of PC21 that OBR do not provide a forecast for.

[37] UR assumption for draft determination

5. Frontier Shift Conclusions

Frontier shift calculations

5.1 Combining the results of input prices, inflation and productivity gives the updated targets for PC21 frontier shift.

Nominal Price Change (%)	PC15		PC21					
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
Labour	3.0	0.7	2.4	2.5	2.1	3.1	3.5	3.5
Equipment	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Chemical	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Power	✂	✂	✂	✂	✂	✂	✂	✂
Rates	2.6	1.3	2.6	2.1	2.5	2.8	3.0	3.0
Bad Debt	2.6	1.3	2.6	2.1	2.5	2.8	3.0	3.0
EA Charges	2.6	1.3	2.6	2.1	2.5	2.8	3.0	3.0
Other	2.6	1.3	2.6	2.1	2.5	2.8	3.0	3.0
Weighted Input Prices (%)	**3.0**	**1.5**	**2.7**	**2.6**	**2.5**	**3.1**	**3.3**	**3.3**
RPI	(2.6%)	(1.3%)	(2.6%)	(2.1%)	(2.5%)	(2.8%)	(3.0%)	(3.0%)
Productivity	(0.8%)	(0.8%)	(0.8%)	(0.8%)	(0.8%)	(0.8%)	(0.8%)	(0.8%)
Frontier Shift (%)	**RPI-0.4%**	**RPI-0.6%**	**RPI-0.6%**	**RPI-0.3%**	**RPI-0.7%**	**RPI-0.6%**	**RPI-0.4%**	**RPI-0.4%**

Figures may not sum due to rounding

Table 5.1 – Opex frontier shift calculations (%)

Nominal Price Change (%)	PC15		PC21					
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
Labour	3.0	0.7	2.4	2.5	2.1	3.1	3.5	3.5
Labour – specialist	3.0	0.7	2.4	2.5	2.1	3.1	3.5	3.5
Materials – machinery	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Materials – civils	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Plant and equipment	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Other	2.6	1.3	2.6	2.1	2.5	2.8	3.0	3.0
Weighted Input Prices (%)	**2.8**	**1.6**	**2.5**	**2.5**	**2.4**	**2.8**	**3.0**	**3.0**
RPI	2.6	1.3	2.6	2.1	2.5	2.8	3.0	3.0
Productivity	(0.6%)	(0.6%)	(0.6%)	(0.6%)	(0.6%)	(0.6%)	(0.6%)	(0.6%)
Frontier Shift (%)	**RPI-0.5%**	**RPI-0.3%**	**RPI-0.7%**	**RPI-0.2%**	**RPI-0.7%**	**RPI-0.7%**	**RPI-0.6%**	**RPI-0.6%**

Figures may not sum due to rounding

Table 5.2 – Capex frontier shift calculations (%)

5.2 The analysis indicates an additional real terms challenge in all of the years assessed in opex and capex. Some variation is present over the years included, with forecast inflation this is expected.

5.3 Whilst it is likely that input prices will rise, as shown in the nominal changes estimated in the tables; it is expected that companies will be well enough compensated by RPI. For most years in PC21 we estimate weighted input prices growth running at or around that of RPI.

5.4 When combined with anticipated productivity growth this results in a moderate real reduction in allowed opex and capex each year, varying between RPI -0.2% to RPI -0.7%. Over the eight years, our analysis of the frontier shift shows an average of around RPI -0.5% for opex and RPI -0.5% for capex.