# Water & Sewerage Services Price Control 2021-27

Draft determination - Annex K
Opex and Capex Frontier Shift
September 2020

# 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 updated forecast and explains any changes since our previous 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.

1.9 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[1]. 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 | 2.9% | 3.0% | 3.0% | 3.2% | 2.9% | 3.0% | 3.0% | 3.0% |
| RPI | (2.9%) | (2.8%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) |
| Productivity | (0.8%) | (0.8%) | (0.8%) | (0.8%) | (0.8%) | (0.8%) | (0.8%) | (0.8%) |
| **Frontier Shift** | **RPI-0.9%** | **RPI-0.6%** | **RPI-0.8%** | **RPI-0.6%** | **RPI-0.8%** | **RPI-0.8%** | **RPI-0.8%** | **RPI-0.8%** |

*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% | 3.0% | 2.9% | 3.0% | 2.8% | 2.9% | 2.9% | 2.9% |
| RPI | (2.9%) | (2.8%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) |
| Productivity | (0.6%) | (0.6%) | (0.6%) | (0.6%) | (0.6%) | (0.6%) | (0.6%) | (0.6%) |
| **Frontier Shift** | **RPI-0.8%** | **RPI-0.4%** | **RPI-0.8%** | **RPI-0.6%** | **RPI-0.8%** | **RPI-0.7%** | **RPI-0.7%** | **RPI-0.7%** |

*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 very 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.

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

1.12 Please note, for our draft determination, economic outlook views, forecast data and key indicators used are pre-COVID-19 impact. We will seek to update this position for the final determination. This will be done as more data and updated forecasts become available and a clearer picture emerges of the COVID-19 impact on the regulated sectors.

# 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, EA 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%[2] 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[3].

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**

[2] [2] 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.

[3] https://www.uregni.gov.uk/publications/transparency-reports-2020

## 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 etc 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). The UUEPC was formerly the Northern Ireland Centre for Economic Policy (NICEP).

2.15 The latest GDP/GVA[4] projections of each are provided below. For our draft determination, data used is pre-COVID-19 impact. We will seek to update this position for the final determination as more data becomes available and a clearer picture emerges of the COVID-19 impact on the regulated sectors.

[4] GVA = Gross Value Added; a measure of output similar to GDP.

| Forecaster | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|
| OBR[5] - GDP | 1.3% | 1.4% | 1.1% | 1.8% | 1.5% | 1.3% | 1.4% |
| IMF[6] - GDP | 1.4% | 1.2% | 1.47% | 1.5% | 1.5% | 1.5% | 1.5% |

**Table 2.4 – United Kingdom GDP growth forecasts (%)**

| Forecaster | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|
| UUEPC[7] - UK GVA | 1.4% | 1.7% | 1.6% | 1.6% | 1.2% | - |
| UUEPC – NI GVA | 1.2% | 1.3% | 1.2% | 1.2% | 0.9% | - |

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

2.16 The projections all appear to convey a similar message. Reasonably steady but much lower future growth than had been expected at the last price control review. The UUEPC forecast lower NI GVA growth by 2022, dipping below 1.0% as the impacts of further budgetary restraint and interest rate rises take hold.

2.17 Factors cited for the gloomy growth outlook include:

- trade war and geo-political risks
- sustained low UK Household savings ratio indicating lower potential for future consumer spending growth; and
- slowing world economic growth

2.18 As mentioned, in global terms, the GDP outlook is for slowing growth from previous expectations. The IMF and OBR have predicted GDP growth rates for the world at the rates in Table 2.5 below.

| Forecaster | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|
| OBR | 3.6% | 2.9% | 3.0% | 3.6% | 3.5% | 3.6% | 3.6% |
| IMF | 3.6% | 3.0% | 3.4% | 3.6% | 3.6% | 3.6% | 3.6% |

**Table 2.6 – Estimates of the world GDP growth rate[8] (%)**

[5] OBR Economic and Fiscal Outlook – March 2020. Year 2018 is out turn data.
[6] IMF World Economic Outlook – October 2019. Year 2018 is out turn data.
[7] UUEPC Outlook: Summer 2019
[8] Year 2018 is out turn data

2.19 The IMF describe the global economy as being in a synchronised slowdown, contrasting sharply with a global upswing only 2 years prior.[9] Advanced economies are expected to continue with growth slow down toward long term potential growth rates. While emerging market and developing economies are expected to see a pickup in growth into 2020.

2.20 More generally, it seems growth is being expected to slow as globalisation slows (hence the term sometimes used - 'slowbalisation')[10].

2.21 Continuing this theme, manufacturing and global trade are highlighted as key contributors to "sluggish" growth during 2019. Factors driving this include higher tariffs and trade policy uncertainty, in turn damaging investment, particularly in capital goods.

2.22 US-China trade relations are referenced specifically. The IMF estimates the cost to world GDP of the ongoing US-China trade issues at around 0.8% in 2020.

2.23 Overall, in light of the aforementioned synchronised slowdown and uncertainty around growth recovery, the IMF describe the global outlook as precarious.

2.24 None of the global factors referenced appear either to be changing direction, or seem likely to do so at the point of PC21 draft determination. At present it would seem likely COVID-19 impacts may reinforce the gloomy economic outlook.

2.25 We will, as previously mentioned, seek to refresh the global and national economic outlooks and data forecasts with more up-to-date information for our final determination.

## Wages and Salaries

2.26 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.

2.27 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, with the period after the recession of 2008, wage growth remained sluggish. The last 5 years has seen earnings rise from the post-recession lower growth period to approximately 3% per

[9] World Economic Outlook, October 2019
[10] 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".

annum. Historic changes in wages and salaries are detailed in the figure below.

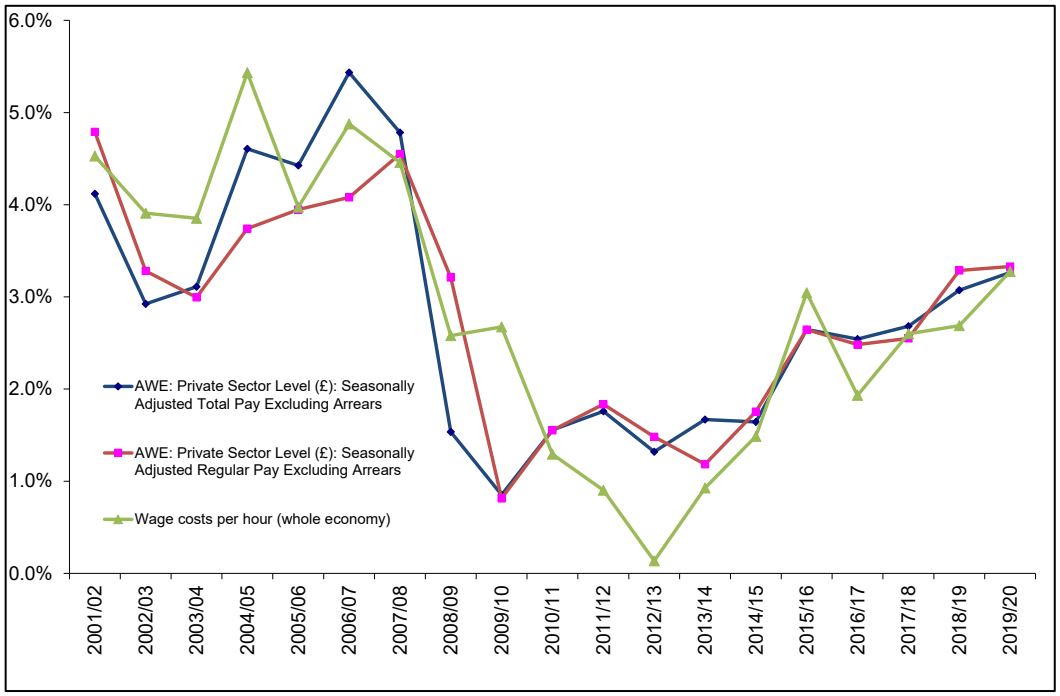



**Figure 2.1 – Private sector earnings inflation and whole economy hourly wage costs (% change)**[11]

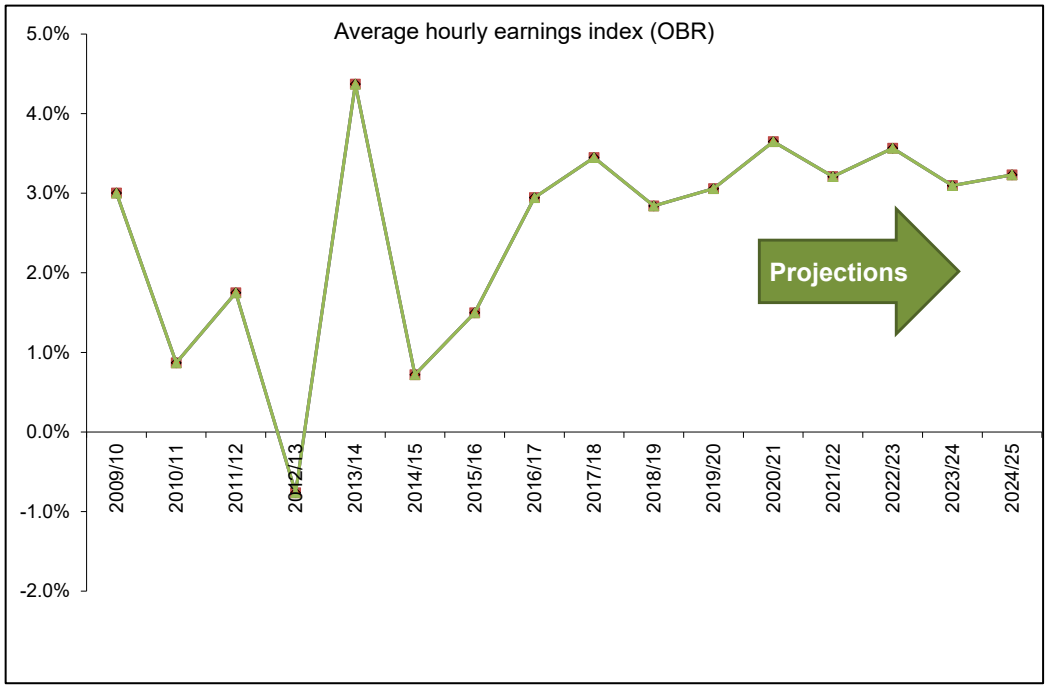



**Figure 2.2 – Forecast average hourly earnings for the private sector (including bonuses)**

[11] 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).

2.28 OBR anticipates earnings to pick up slightly with productivity gains but overall settle to around its current performance of around 3% per annum. The expected productivity gains are partially due to some business investment that was postponed over EU Exit uncertainty being made as clarity is provided over future trading relationships.

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

| Year | Average Hourly Earnings Growth (%) |
|---|---|
| 2019-20 | 3.1% |
| 2020-21 | 3.6% |
| 2021-22 | 3.2% |
| 2022-23 | 3.6% |
| 2023-24 | 3.1% |
| 2024-25 | 3.2% |
| 2025-26 | 3.2% |
| 2026-27 | 3.2% |

*Source: OBR Economic and Fiscal Outlook – March 2020 figures used up to 2024-25, with UR assumptions used for 2025-26 and 2026-27 years.*

**Table 2.7 – Wage inflation projections**

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

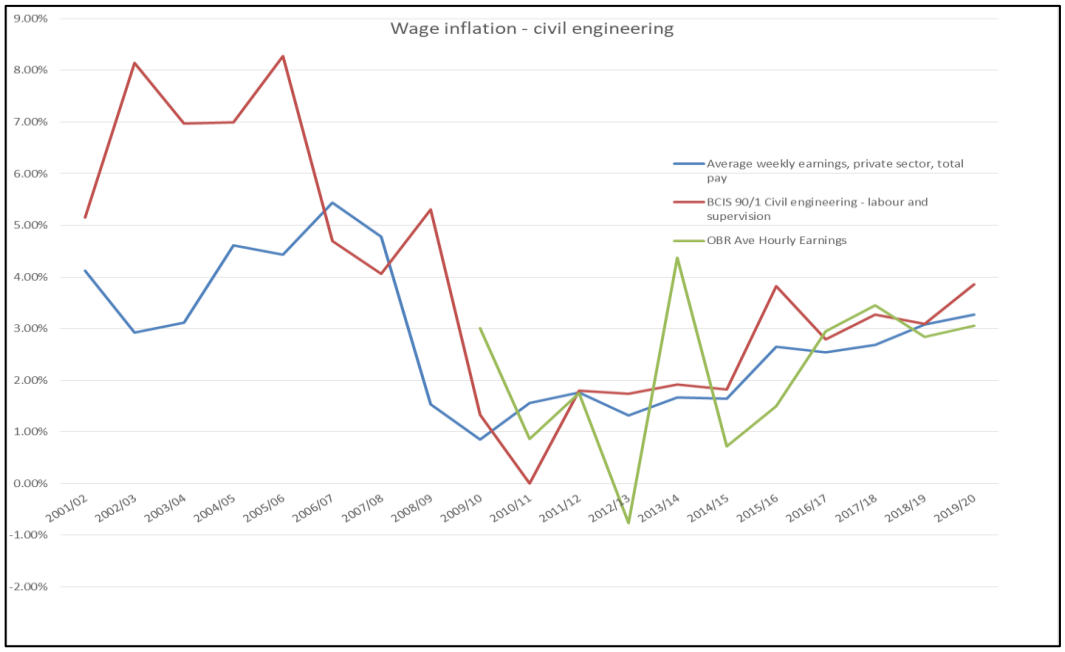



**Figure 2.3 – Private sector earnings inflation and whole economy hourly earnings inflation (%)[12]**

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

2.32 We have used OBR hourly 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.

2.33 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 2.6 above for the specialist labour category.

## Materials/Equipment/Plant; Parts/Machinery; Civils

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

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

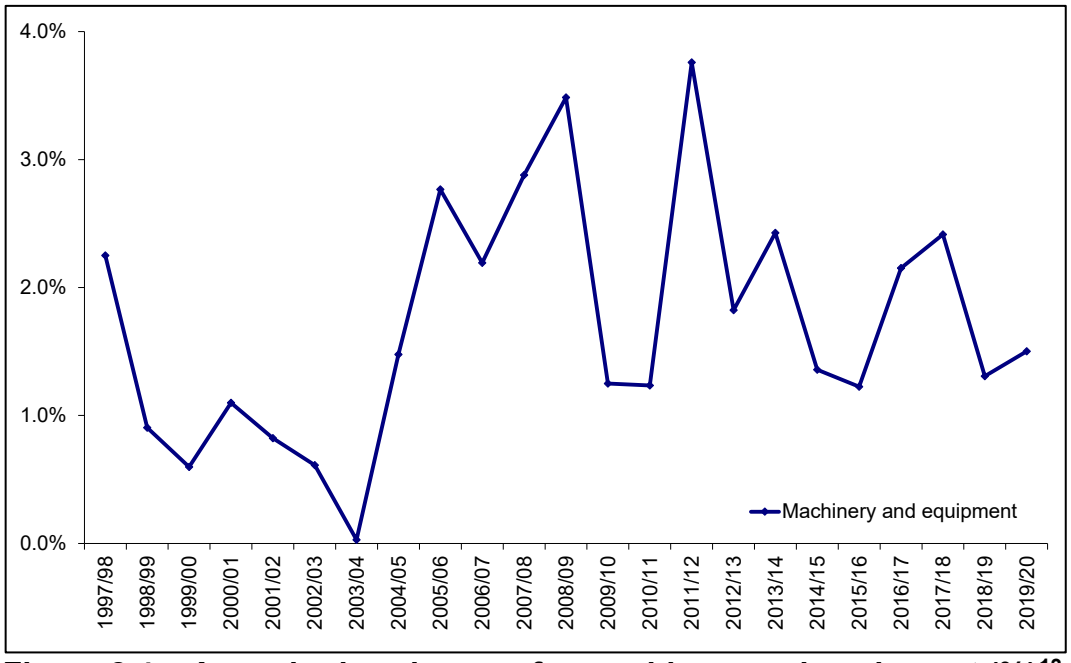



**Figure 2.4 – Annual price changes for machinery and equipment (%)[13]**

2.35 For almost the all the 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 also at 1.7%.

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


**Figure 2.5 – Manufacturing input prices percentage change (excluding food, drink, tobacco and fuel)** [14]

[13] Source: ONS Producer Price Index – (K389)
[14] Source: ONS Producer Price Index – (K658)

2.37 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 similar to the findings for the machinery and equipment index.

2.38 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 2.8 – Materials: equipment/machinery cost inflation (nominal)**

2.39 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.

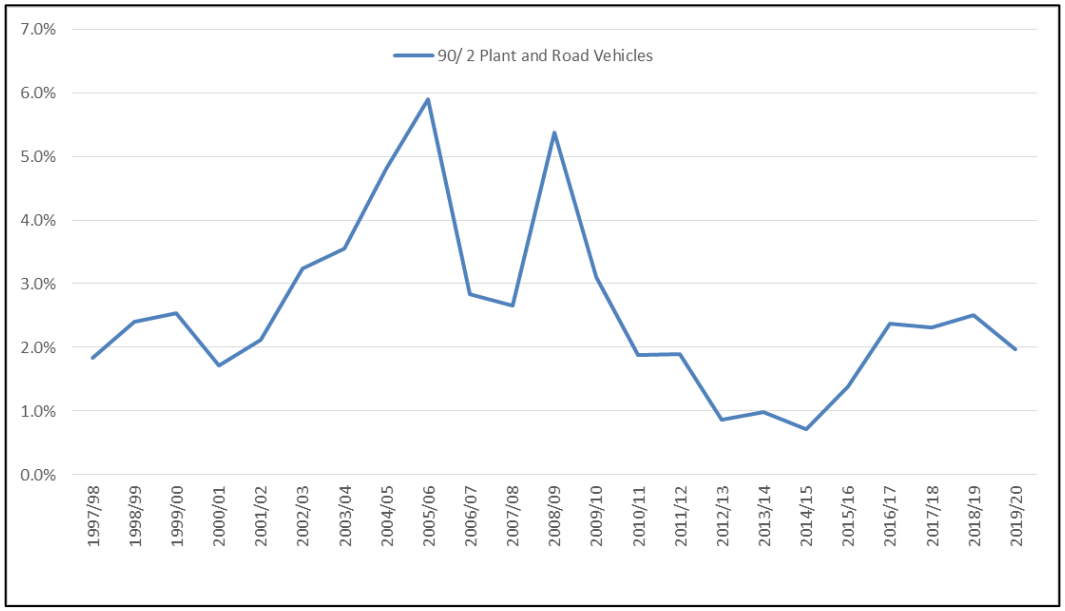



**Figure 2.6 – Annual price changes for plant and road vehicles (%)[15]**

2.40 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 for our draft determination plant and equipment input price growth rate of 2.6%.

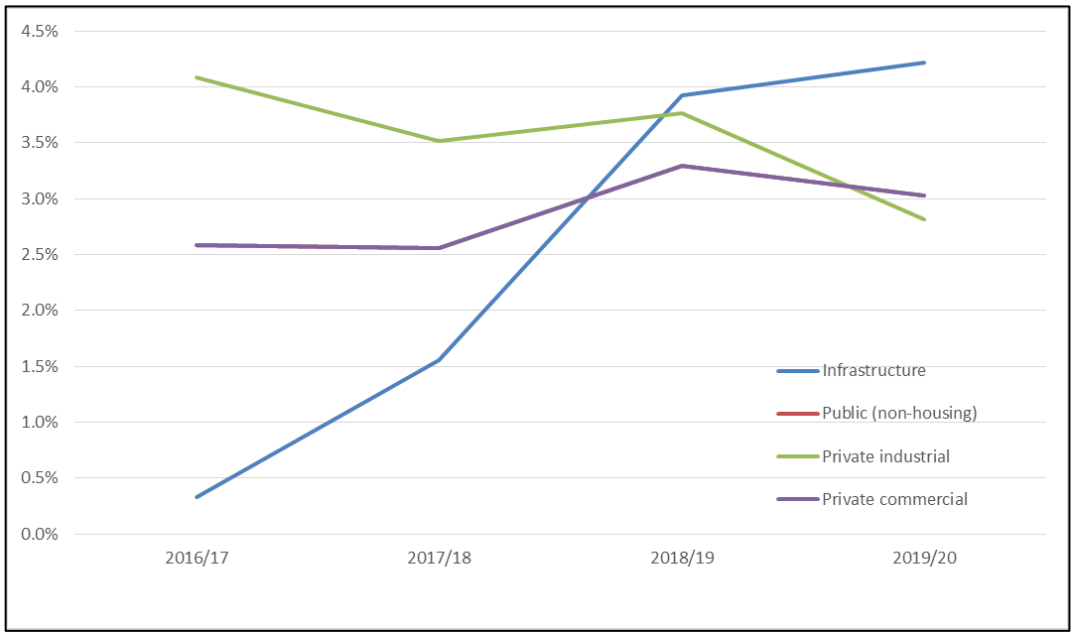
[15] Source: BCIS Plant and Road Vehicles index (90/2)

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

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

2.41 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.

2.42 The Department for Business, Innovation and Skills (BIS) cost data used in PC15 analysis is no longer produced. There is however a new data series 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 (%)** [16]

2.43 The new data series doesn't have as long a series as the series 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 the 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 2.10 – Materials: equipment/machinery cost inflation (nominal)**

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

## Chemicals

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

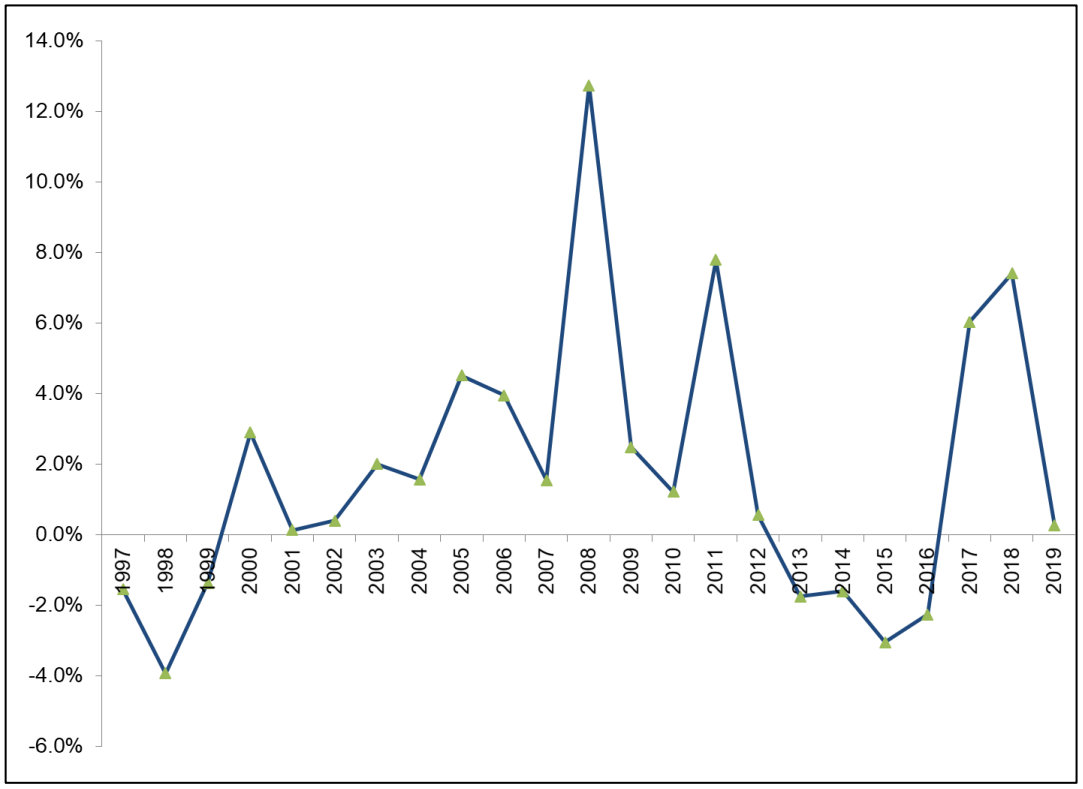



**Figure 2.8 – Chemical prices annual change (%)** [17]

2.45 The graphic indicates that the price change has generally been positive over the last 20 years, with a period of negative growth 2013 – 2016.

2.46 Growth appeared to recover its positive position but the most recent annual data indicate a slowing of growth again. In the context of the generally more sluggish than previously expected growth outlook discussed for the world economy above, chemicals can be expected to feel the influence of slowing global demand.

2.47 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.

2.48 Transposing our PC15 approach for PC21, an annual chemical price inflation forecast of 3.0% is arrived at. This represents an average of historic chemical prices and global GDP growth, with a greater weighting given to global growth.

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

| Input cost category | Annual cost increase |
|---|---|
| Chemicals (opex) | 3.0% |

**Table 2.11 – Chemicals cost inflation (nominal)**

## Power

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

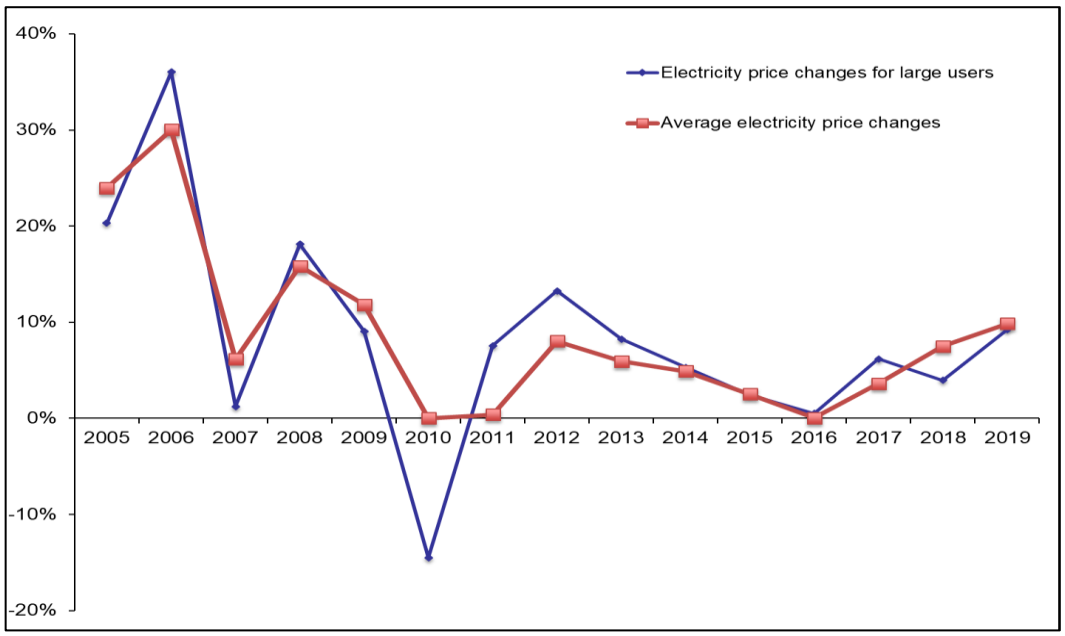



**Figure 2.9 – Electricity price changes (%)**[18]

2.50 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 supported annual increases of between 4% and 5%[19].

2.51 The future of electricity prices for industrial customers is expected to entail year on year increases, with some years possibly above the historical trend. The Department for Energy and Climate Change (DECC) have produced estimates of electricity price growth up to 2035.

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

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

[18] 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 2020, Table 3.4.2.
[19] BEIS Industrial energy price indices, Table 3.3.2

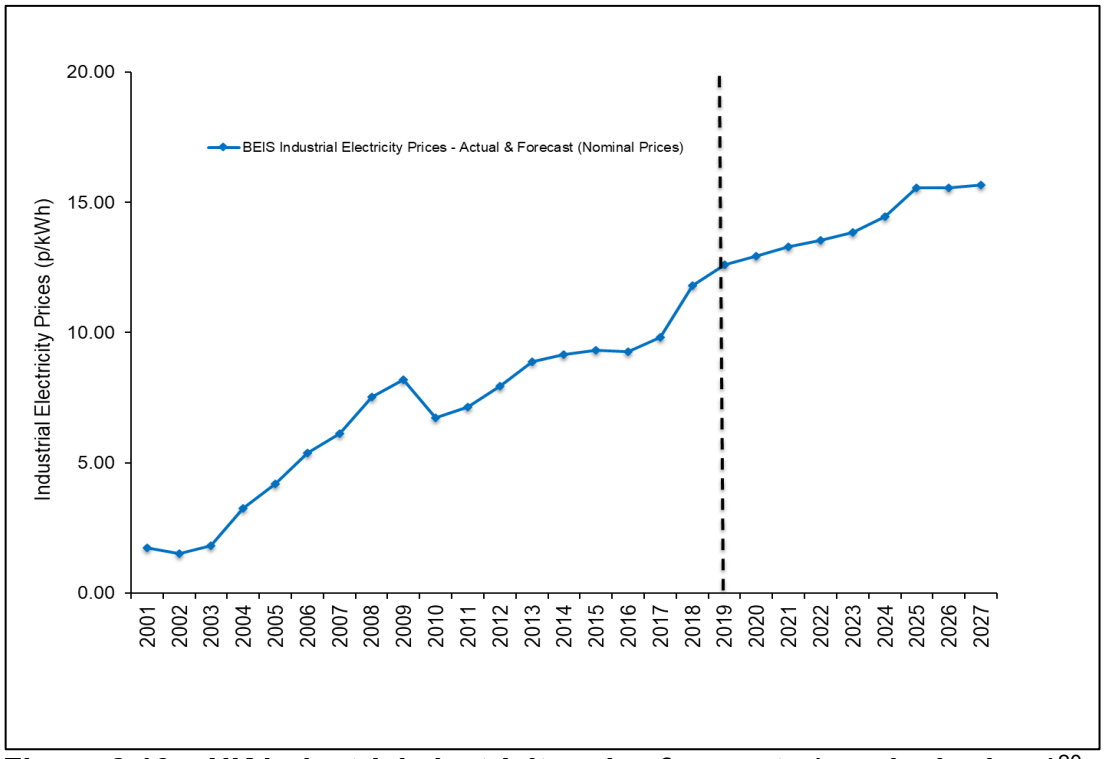



**Figure 2.10 – UK industrial electricity price forecasts (nominal prices)**[20]

2.54 The chart shows the expected rise in prices for non-domestic customers and that BEIS are forecasting increases in the industrial electricity price during 2020-25, the majority of the PC21 period.

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

| Year | Price inflation forecast (%) |
|---|---|
| 2019 | 6.7% |
| 2020 | 2.6% |
| 2021 | 2.8% |
| 2022 | 1.9% |
| 2023 | 2.2% |
| 2024 | 4.5% |
| 2025 | 7.5% |
| 2026 | 0.1% |

*Source: BEIS 2018 Updated Energy and Emissions Projections*

**Table 2.12 – Industrial electricity price inflation forecast (nominal)**

[20] Source: BEIS 2018 Updated Energy and Emissions Projections

2.56 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 eight years in question, we have smoothed the input figures into a ✂[21]% annual increase. This ✂% figure is comparable with the historic average and will have the effect of avoiding unnecessarily large positive and negative swings in the final frontier shift numbers (and opex allowances) for PC21.

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

**Table 2.13 – Power cost inflation (nominal)**

## Rates, bad debt and other costs

2.57 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.

2.58 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.

[21] ✂ This symbol denotes redacted material which is likely to be classified 'Commercial in Confidence' such that publication may adversely affect NI Water's subsequent ability to secure best VFM in the marketplace.

# 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, the 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[22] 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

[22] 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.

## Opex productivity

3.9 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<br>Sewage treatment<br>Sludge treatment and disposal | 20% | Total Manufacturing |
| Water distribution<br>Sewerage network | 20% | Electricity, gas & water supply<br>Transportation and storage |
| General and support<br>Customer services<br>Scientific services<br>Other business activities | 45% | Finance and insurance<br>Professional, scientific, technical, admin and support services |
| EA charges<br>Bad debts<br>Other | 15% | - |

**Table 3.1 – WaSC opex activity and comparable industries**

3.10 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<br>Transportation and storage | -1.53%<br>0.43% | -0.55% |
| Finance and insurance<br><br>Professional, scientific, technical, admin and support services | 1.57%<br><br>1.30% | 1.44% |

**Table 3.2 – Annual opex comparator sectors productivity growth 1995-2016 (%)**

3.11 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.

3.12 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.

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

3.14 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<br>Sewage treatment<br>Sludge treatment and disposal | 20% | 1.28% | 0.26% |
| Water distribution<br>Sewerage network | 20% | -0.55% | -0.11% |
| General and support<br>Customer services<br>Scientific services<br>Other business activities | 45% | 1.44% | 0.65% |
| EA charges<br>Bad debts<br>Other | 15% | - | - |
| **Weighted Average (%)** | | | **0.8%** |

**Table 3.3 – Weighted industry average for opex productivity**

3.15 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%.

3.16 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 somewhat below the results of our analysis at PC15, this still represents a substantial challenge to NI Water.

## Capex productivity

3.17 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<br>Sewage treatment<br>Sludge treatment and disposal | Total Manufacturing | 1.28% |
| Water distribution<br>Sewerage network | Construction | 0.48% |
| General and support<br>Customer services<br>Scientific services<br>Other business activities | Machinery production | 0.7% |

**Table 3.4 – WaSC capex activity, comparable industries and their annual productivity growth 1995 – 2016 (%)**

3.18 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.

3.19 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.

3.20 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.

3.21 We then select the average of the results. This gives a figure of 0.6% per annum for capex productivity growth.

| Productivity growth | Annual change (%) |
|---|---|
| Capex | 0.6% |

**Table 3.5 – PC21 WaSC capex productivity (%)**

## Adjustments

3.22 No adjustment has been made to these findings to account for capital substitution 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.

3.23 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

3.24 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.

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

3.26 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% |
| Ofwat PR19 | 1.1% | |

**Table 3.6 – Recent regulatory decisions on annual productivity growth**

3.27 Across different sectors and networks, productivity assumptions range from 0.6% to 1.1% per annum. Our findings for the water industry in PC21 (0.8% opex, 0.6%) are within the bounds of this range.

3.28 The most recent regulatory decision on water industry productivity is the PR19 decision. In this price control, Ofwat have decided on a 1.1% (totex) annual productivity growth assumption in their final determinations[23].

[23] 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

3.29 Ofwat's is the more recent of the regulatory decision in this topic area. At draft determination we don't propose going as high as the 1.1% Ofwat determined for PR19.

3.30 Having conducted our analysis, there are some differences in the respective approaches.

3.31 In PR19's case, 1.1% number is applicable to totex. We base our draft determination on the opex/capex categories used throughout PC21. NI Water is not subject to a totex regime. And so any productivity benefits Ofwat are seeking to capture for customers going into PR19, are not in the scope of our analysis.

3.32 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 the "stretching targets" Ofwat seek, in conjunction with the capture of totex and outcomes framework efficiencies.

3.33 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. Note the position of our opex and capex productivity calculations in comparison to the current comparator sector positions and apparent growth trends.

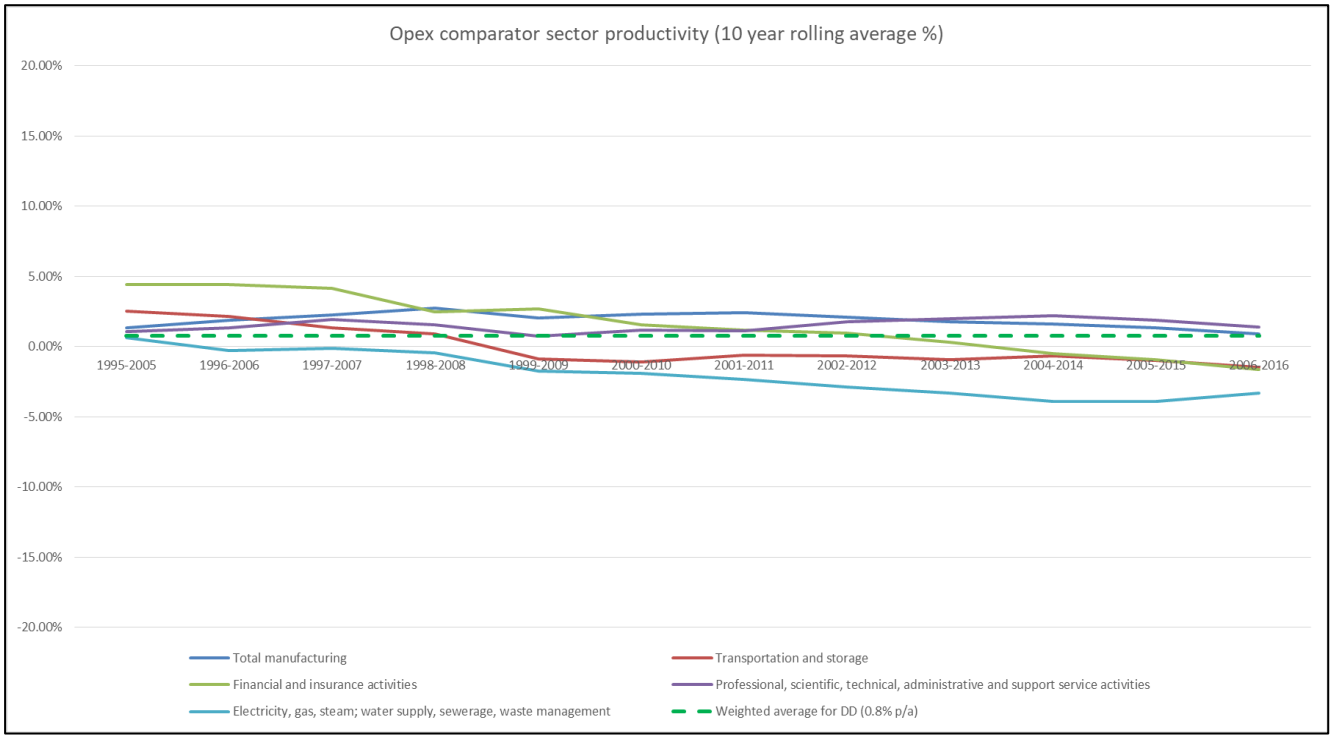



**Figure 3.1 – Opex comparator sector productivity growth (% 10yr rolling average)**[24]

Economics "Real Price Effects and Frontier Shift" papers for Ofwat, January 2018/December 2019.
[24] Source: EU KLEMS, 2019 release

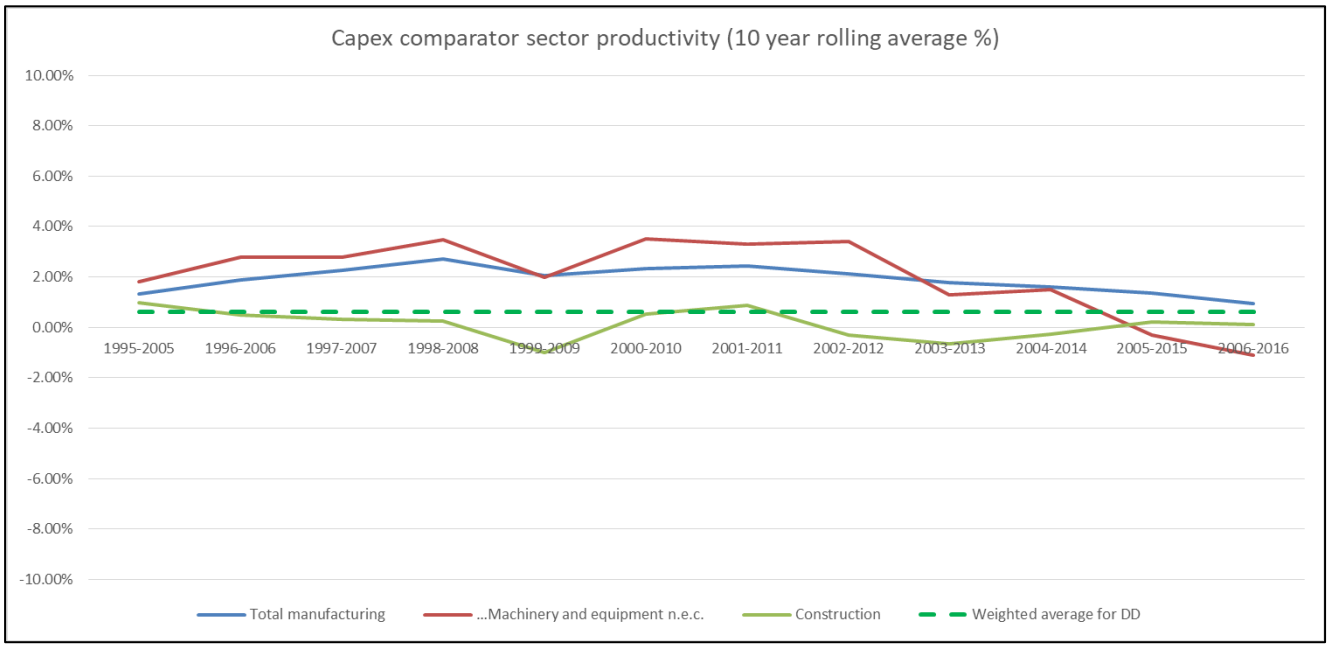



**Figure 3.2 – Capex comparator sector productivity growth (% 10yr rolling average)**[25]

[25] 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.

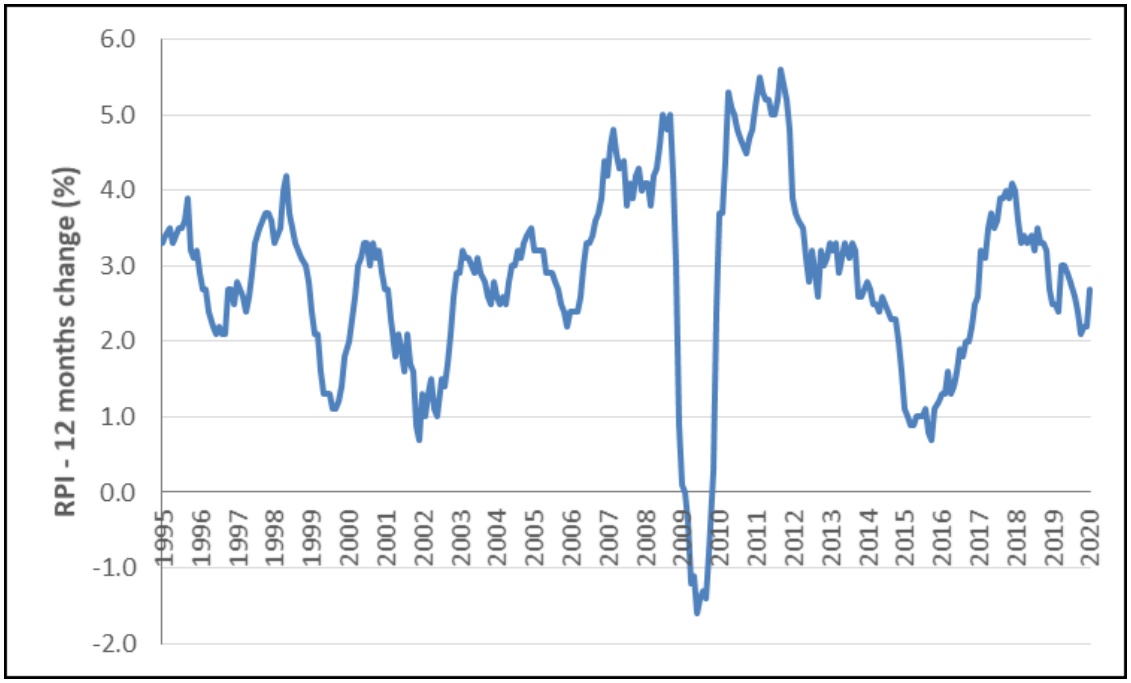



**Figure 4.1 – RPI annual percentage change (monthly data)**[26]

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 will be in keeping with the historic average. This was based on anticipated increases in government spending subsequently impacting government consumption and investment price growth.

## RPI forecasts

4.4 OBR forecasts of inflation run up to 2024-25. Within their forecasts, OBR considered various policy measure impacts such as previously mentioned government expenditure plans. OBR also considered more medium term influences such as house price and interest rate movements.

4.5 The latest OBR forecasts (for March 2020) are included in the table below.

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

| Year | RPI Projections (%) |
|---|---|
| 2019-20 | 2.6% |
| 2020-21 | 2.1% |
| 2021-22 | 2.9% |
| 2022-23 | 3.0% |
| 2023-24 | 2.9% |
| 2024-25 | 2.8% |
| 2025-26 | 2.8% [27] |
| 2026-27 | 2.8% [28] |

**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 2.8% for the last years of PC21 that OBR do not provide a forecast for.

[27] UR assumption for draft determination.
[28] 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 | 3.1 | 3.6 | 3.2 | 3.6 | 3.1 | 3.2 | 3.2 | 3.2 |
| Equipment | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| Chemical | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Power | ✂ | ✂ | ✂ | ✂ | ✂ | ✂ | ✂ | ✂ |
| Rates | 2.6 | 2.1 | 2.9 | 3.0 | 2.9 | 2.8 | 2.8 | 2.8 |
| Bad Debt | 2.6 | 2.1 | 2.9 | 3.0 | 2.9 | 2.8 | 2.8 | 2.8 |
| EA Charges | 2.6 | 2.1 | 2.9 | 3.0 | 2.9 | 2.8 | 2.8 | 2.8 |
| Other | 2.6 | 2.1 | 2.9 | 3.0 | 2.9 | 2.8 | 2.8 | 2.8 |
| **Weighted Input Prices (%)** | **2.8%** | **3.0%** | **3.0%** | **3.2%** | **2.9%** | **3.0%** | **3.0%** | **3.0%** |
| RPI | (2.9%) | (2.8%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) |
| Productivity | (0.8%) | (0.8%) | (0.8%) | (0.8%) | (0.8%) | (0.8%) | (0.8%) | (0.8%) |
| **Frontier Shift (%)** | **RPI-0.9%** | **RPI-0.6%** | **RPI-0.8%** | **RPI-0.6%** | **RPI-0.8%** | **RPI-0.8%** | **RPI-0.8%** | **RPI-0.8%** |

*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 | 3.1 | 3.6 | 3.2 | 3.6 | 3.1 | 3.2 | 3.2 | 3.2 |
| Labour – specialist | 3.1 | 3.6 | 3.2 | 3.6 | 3.1 | 3.2 | 3.2 | 3.2 |
| Materials – machinery | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| Materials – civils | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 |
| Plant and equipment | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 |
| Other | 2.6 | 2.1 | 2.9 | 3.0 | 2.9 | 2.8 | 2.8 | 2.8 |
| **Weighted Input Prices (%)** | **2.8%** | **3.0%** | **2.9%** | **3.0%** | **2.8%** | **2.9%** | **2.9%** | **2.9%** |
| RPI | (2.9%) | (2.8%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) | (3.0%) |
| Productivity | (0.6%) | (0.6%) | (0.6%) | (0.6%) | (0.6%) | (0.6%) | (0.6%) | (0.6%) |
| **Frontier Shift (%)** | **RPI-0.8%** | **RPI-0.4%** | **RPI-0.8%** | **RPI-0.6%** | **RPI-0.8%** | **RPI-0.7%** | **RPI-0.7%** | **RPI-0.7%** |

*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 slightly below 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 -0.4% to RPI-0.9%. Over the eight years, our analysis of the frontier shift averages around RPI -0.8% for opex and RPI -0.7% for capex.