Water & Sewerage Services Price Control 2015-21

Draft Determination - Annex S

Opex Frontier Shift Report

July 2014

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Water and Sewerage Services Price Control 2015-21
Annex S – Opex Frontier Shift Report

1.0 Introduction

1.1. Purpose

1.1.1   The purpose of this report is to decide whether the Utility Regulator (UR) should be making an addition to or subtraction from its catch-up target for NI Water.

1.1.2   This decision is based on the projected rate of water industry costs compared to Retail Price Index (RPI) measured inflation. The comparison can work both ways.

1.1.3   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 rise by a factor lower than RPI inflation.

1.1.4   The methodology used follows that detailed as part of the PC13 final determination. This paper simply updates the previous forecasts with more up-to-date information. This includes both historical or recent actual out-turns and our best, most up–to-date view on where prices are likely to go across the 6-year period represented by PC15.

1.1.5   The difference in this report is that the forecasts are over a longer period. The UR has also investigated different measures of productivity growth. This simply reflects adopting a wider ranging view than just using the EU KLEMS[1] data.

1.1.6   This paper focuses on providing updated forecasts and explaining any changes since our previous examination of frontier shift at PC13.

1.1.7   The original frontier shift paper for PC13 can be found at the link below.

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

1.2. Summary of findings

1.2.1   Frontier shift is a key element in setting the opex efficiency targets for NI Water in PC15. Alongside the assessment of catch-up, frontier shift represents another element of challenge on the company.

1.2.2   The concept of frontier shift is wider than simple productivity assumptions. Within this report, the UR has adopted the methodology used in PC13, which aligns closely with the Competition Commission determination for Northern

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[1] EU KLEMS is a database aimed at the production of relevant stats for EU member states. Within this is detail on growth, employment, hours worked and productivity.

Ireland Electricity. This process combines input price forecasts with productivity expectations and RPI inflation.

Frontier shift in real terms = Input prices *minus*

Productivity *minus*

Forecast RPI inflation

1.2.3 The forecast for each of the components and the frontier shift to be applied to PC15 opex targets is given in the table below.

Table 1.1 – Frontier shift calculations (%)

	PC13		PC15					
	2013-14	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**
Weighted Input Prices	2.5%	4.1%	4.6%	4.6%	3.6%	4.4%	4.9%	3.8%
RPI	(2.9%)	(2.6%)	(3.3%)	(3.6%)	(3.8%)	(3.9%)	(3.4%)	(3.4%)
Productivity	(0.9%)	(0.9%)	(0.9%)	(0.9%)	(0.9%)	(0.9%)	(0.9%)	(0.9%)
Frontier Shift	**RPI-1.2%**	**RPI+0.5%**	**RPI+0.3%**	**RPI+0%**	**RPI-1.1%**	**RPI-0.4%**	**RPI+0.5%**	**RPI-0.6%**

Figures may not sum due to rounding

1.2.4 The table highlights the findings of the analysis. Whilst it is very difficult to predict with accuracy so far in advance, the frontier shift given above is the UR's best estimate with the available information.

2.0 Input Price Inflation

2.1. Input mix

2.1.1   In order to estimate input price inflation, we first examine key cost drivers and their relative contributions to total opex. This report has simply adopted the input mix as used in PC13.

2.1.2   This mix is based on representative Ofwat regulated companies.   An amendment is allowed for special factors in Northern Ireland, specifically those related to labour and power. Other categories are adjusted to scale back the sum of the individual elements, once special factors are factored in.

Table 2.1 – Hypothetical input mix for an efficient water company

Input	% of Expenditure
Labour	47
Materials and Equipment	10
Chemicals	2
Power	17
Rates	10
Environment Agency Charges	5
Bad Debt	5
Other	5
Total	**100**

Weights may not sum due to rounding

2.1.3   Obviously, NI Water will not have 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.

2.1.4   By way of a sense check, comparison was made of actual NI Water costs against the input mix above. In our analysis, all PPP costs (e.g. unitary charge, power, rates etc) were excluded to avoid distorting the findings.

2.1.5   For the key cost areas, we find that the percentage splits are similar as those mentioned in Figure 2.1. Labour accounts for 37.4% of spend for NI Water in 2012-13. This figure would rise if hired and contracted wages were included.

2.1.6   In the other main areas, power accounts for 18.6% and rates for 8.0% in 2012-13. The findings demonstrate that the assumed input mix is unlikely to differ that greatly from NI Water spending.

2.2. Macroeconomic outlook

2.2.1   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.

2.2.2   In this section, reliance is placed on the forecasts of the Office for Budget Responsibility (OBR) and the International Monetary Fund (IMF).

2.2.3   The latest GDP projections of each are provided below.

Table 2.2 – United Kingdom GDP growth forecasts (%)

Forecaster	2013	2014	2015	2016	2017	2018	2019
OBR[2]	1.8%	2.7%	2.3%	2.6%	2.6%	2.5%	-
IMF[3]	1.8%	2.9%	2.5%	2.4%	2.3%	2.4%	2.4%

2.2.4   The projections all appear to convey a similar message. Low growth initially but in the medium-term, the UK is expected to recover growth levels. These rates are predicted to be steady throughout the first half of PC15.

2.2.5   The implications of these projections are quite similar to the findings at PC13. Weak domestic growth is unlikely to have much effect on price rises. As PC15 continues and the economy recovers, inflationary pressures will gradually intensify.

2.2.6   In global terms, the GDP outlook is slightly more positive. The IMF and OBR have predicted GDP growth rates for the world at the following rates:

Table 2.3 – Estimates of the world GDP growth rate (%)

Forecaster	2013	2014	2015	2016	2017	2018	2019
OBR	2.9%	3.8%	3.9%	4.1%	4.2%	4.2%	-
IMF	3.0%	3.6%	3.9%	4.0%	3.9%	3.9%	3.9%

2.2.7   The IMF has indicated that the world outlook is generally positive as countries exit the recession. Advanced economy forecasts have improved since last year with the US predicted to stage a strong recovery.

2.2.8   Emerging markets are still doing well, though major threats remain. The dangers of deflation and high levels of debt exist in the Euro area, whilst new geopolitical risks have emerged in Eastern Europe.

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[2] OBR Economic and Fiscal Outlook – March 2014
[3] IMF World Economic Outlook – April 2014

2.3. Wages and salaries

2.3.1   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.

2.3.2   Since 2001, the rate of private sector labour inflation has averaged about 3% (both including and excluding bonuses).

2.3.3   After the recession of 2008, wage growth has been much less buoyant. The last five years has seen earnings rise by approximately 1.5% per annum. Historic changes in wages and salaries are detailed in the figure below.
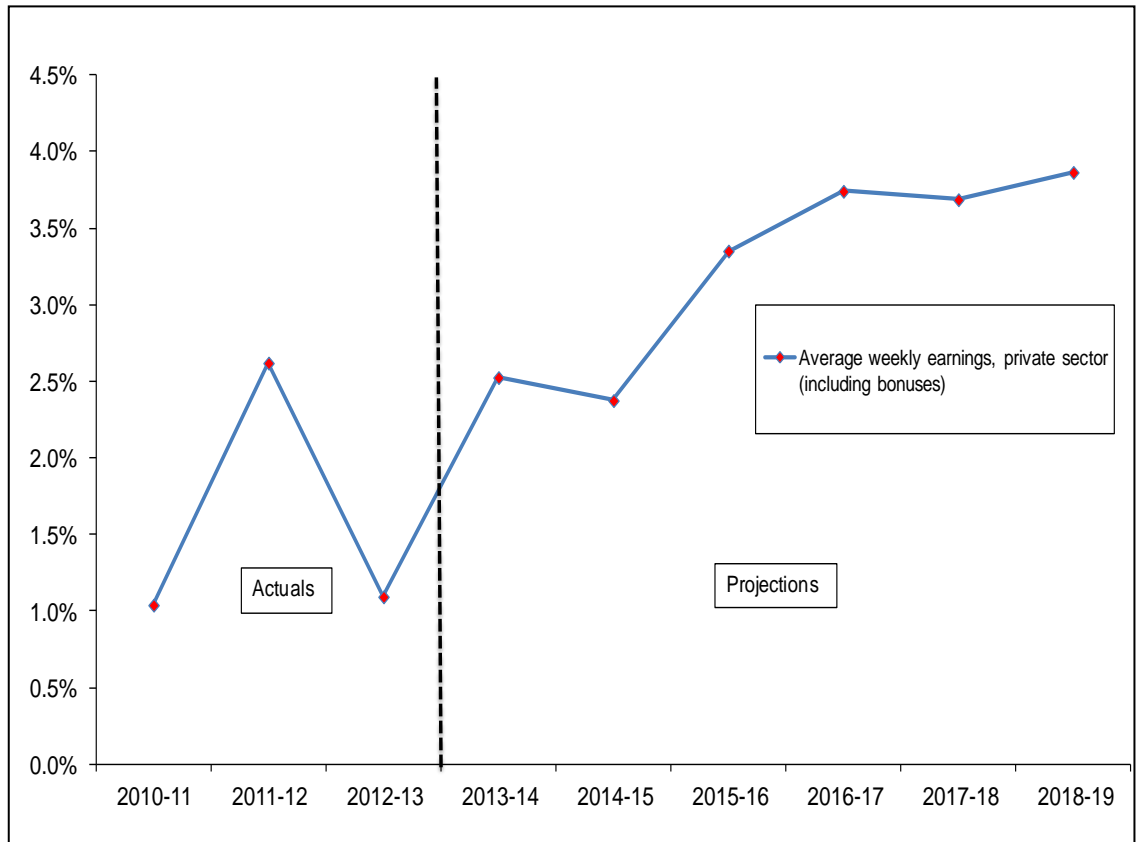
Figure 2.1 – Private sector earnings inflation and whole economy hourly wage costs (% change)[4]
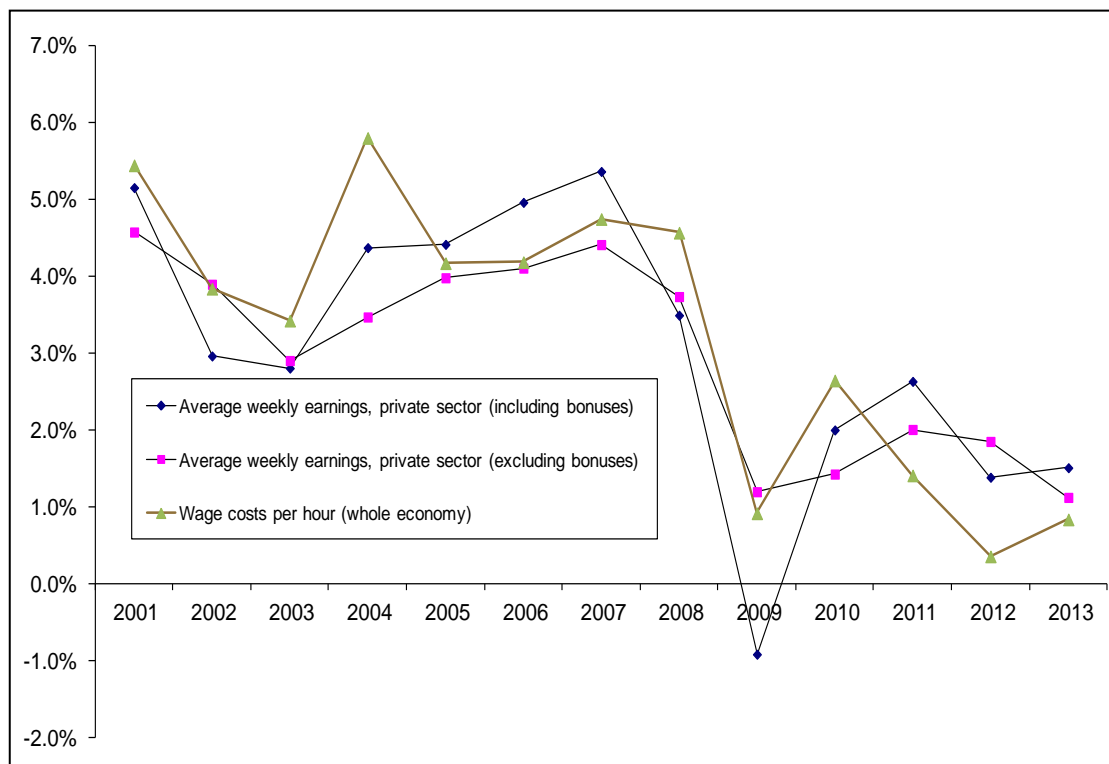
2.3.4   The OBR expects earnings to follow a similar trajectory to GDP.

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[4] Source: Office of National Statistics (ONS) – Monthly Digest of Statistics and the Index of Labour Costs per Hour (ILCH).

Figure 2.2 – Forecast average weekly earnings for the private sector

2.3.5   Whilst earnings growth is anticipated to be modest in the short-term, the OBR anticipates a return to >3.5% p.a. increases by 2016-17. This inflationary pressure coincides with expected reductions in the unemployment rate and a fall in the amount of spare capacity in the economy.

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

Table 2.4 – Wage Inflation projections

Year	Average Earning Growth (%)
2013-14	2.5%
2014-15	2.4%
2015-16	3.4%
2016-17	3.7%
2017-18	3.7%
2018-19	3.9%

*Source: OBR Economic and Fiscal Outlook – March 2014*

2.4. Materials and equipment

2.4.1   Materials and equipment 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.

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

Figure 2.3 – Annual price changes for machinery and equipment (%)
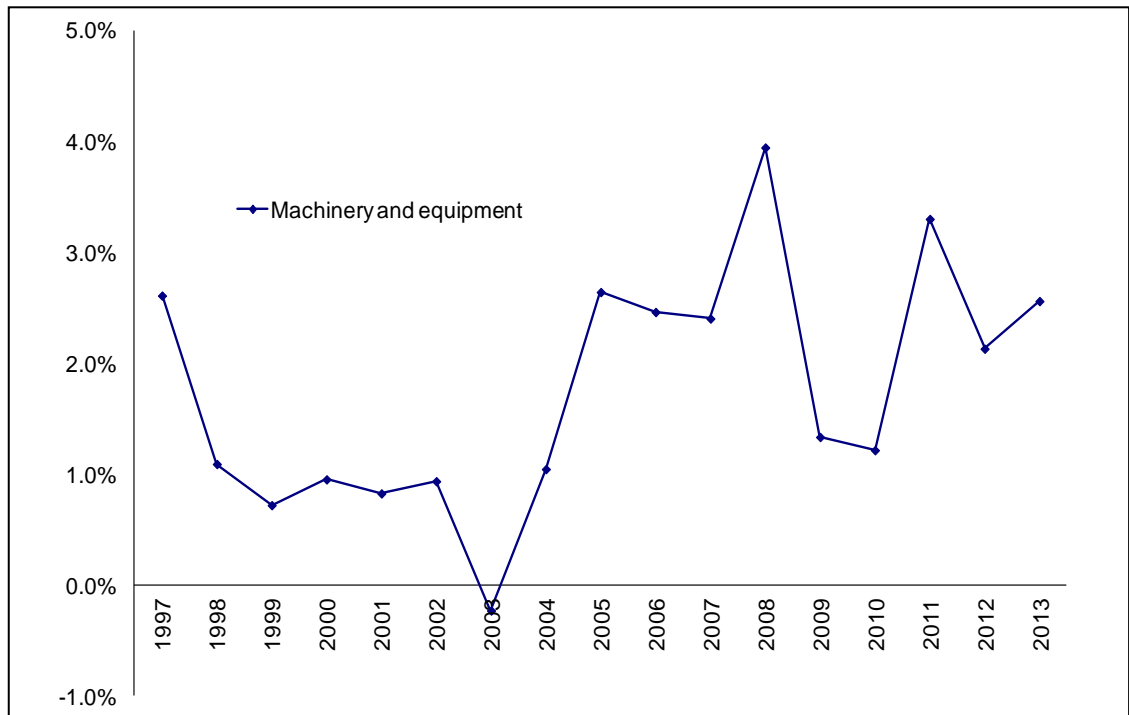
2.4.3   Despite the recession, equipment prices have consistently risen in the last few years. First Economics attributed this to both the depreciation of sterling and global demand. Since 2010, the increases have followed a 2% p.a. trend. The index has an overall average of a 1.8% price increase each year from 1997.

2.4.4   By way of a check, our report also looked at the general input price inflation experienced by all manufacturers.

Figure 2.4 – Manufacturing input prices percentage change (excluding food, drink, tobacco and fuel)[5]
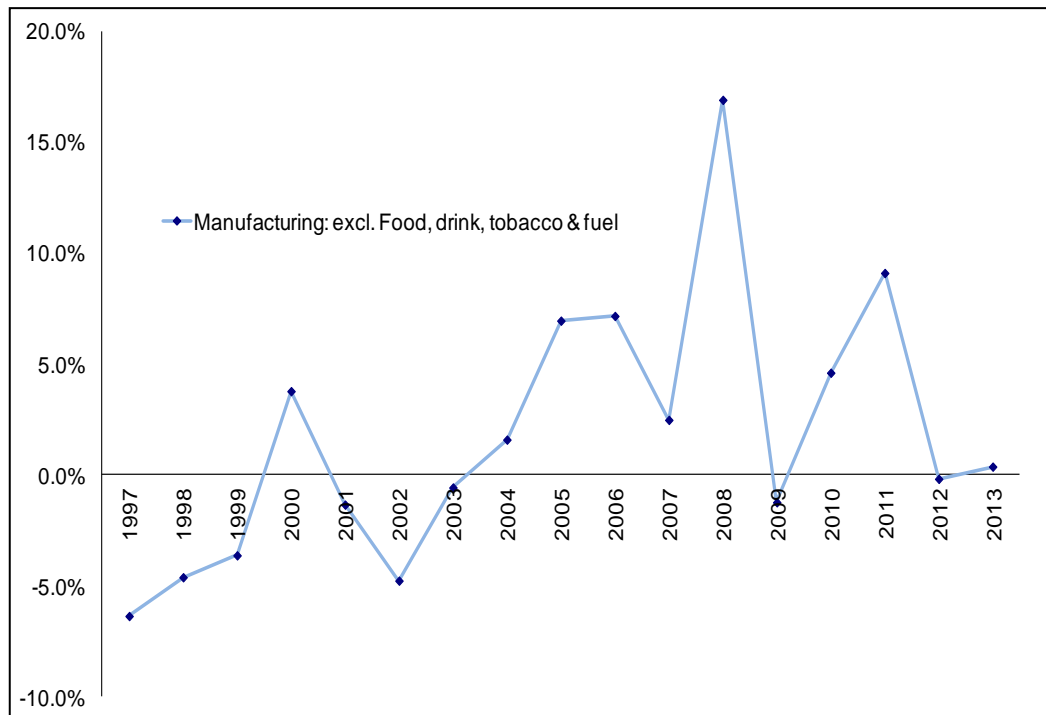
2.4.5   Whilst prices can tend to fluctuate, the overall trend since 1997 has been 1.6% per annum price rises. This is similar to the findings for the machinery and equipment index.

2.4.6   The analysis suggests that the input price for machinery is going to remain reasonably low. In the absence of further market intelligence, the Regulator has adopted an average figure of 2.0% per annum price rises for materials and equipment.

2.5.   Chemicals

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

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[5] Source: ONS Producer Price Index – (K658)

**Figure 2.5 – Chemical prices annual change (%)**[6]
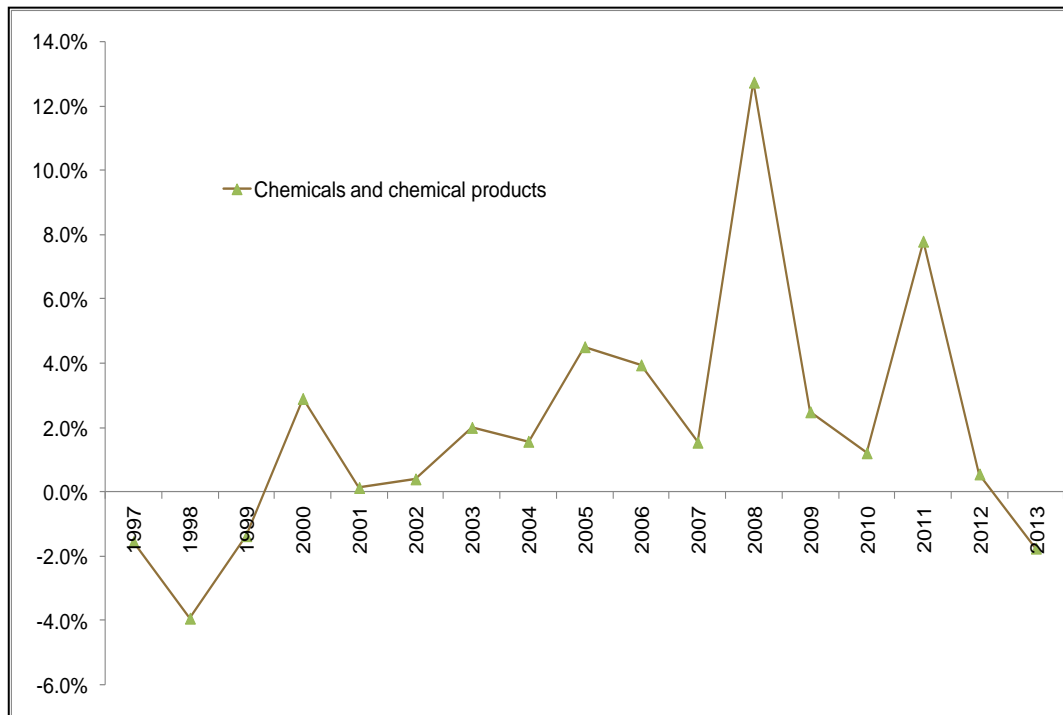
2.5.2   The graphic indicates that the price change is generally positive. It is also notable that price increases have mostly continued, in spite of a recession.

2.5.3   This can be attributed this to two factors. The first is the depreciation of sterling. The second, and more relevant, is the impact of global demand causing raw commodity inflation.

2.5.4   Since 1997, the price growth rate of the chemical indices is roughly 1.9% per annum. It is reasonable however to believe that future prices may be more closely linked to global growth rather than the long-term trend.

2.5.5   Chemical price inflation of 3.5% p.a. has therefore been forecast. This represents an average of historic chemical prices and global GDP growth, with a greater weighting given to global growth.

2.6.   Power

2.6.1   Electricity cost is a key component of expense for water and sewage companies. Of late, prices have been quite volatile.

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

Figure 2.6 – Electricity price changes (%)[7]
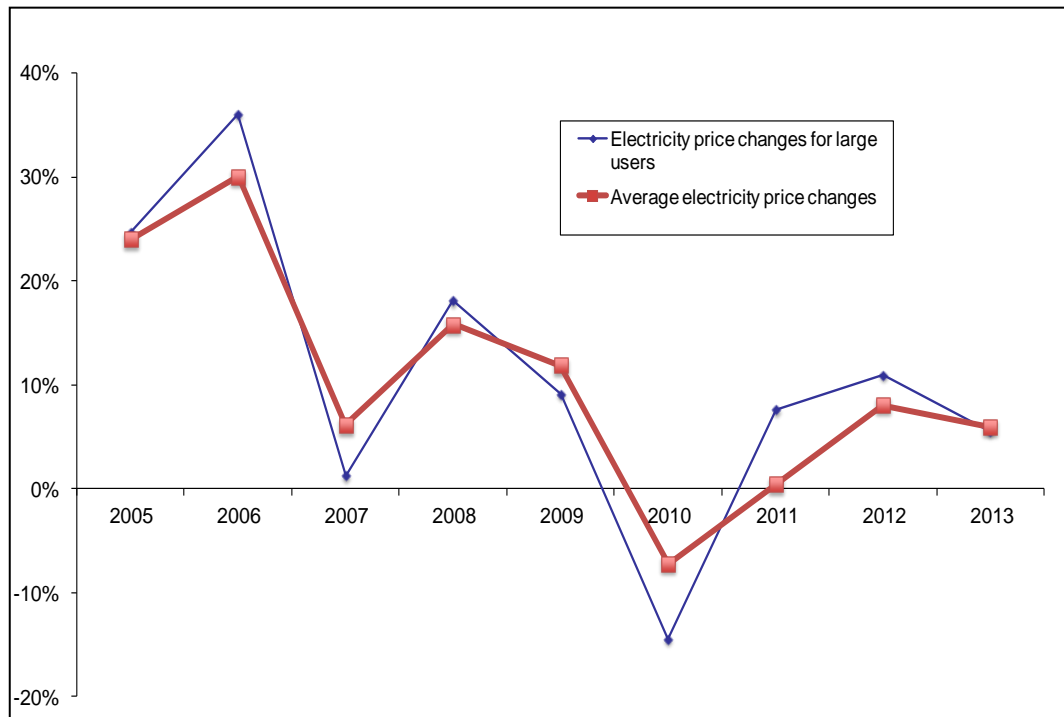
2.6.2   The graph shows large spikes in price in certain years and some sizeable drops. This demonstrates the somewhat unpredictable nature of energy costs. Since 1997, the overall trend for industrial electricity prices has supported increases of between 4% and 5%.

2.6.3   The future of electricity prices for industrial customers is expected to entail large increases above the historical trend. The Department for Energy and Climate Change (DECC) have produced estimates of electricity price growth up to 2030.

2.6.4   Whilst there remains uncertainty around these estimates, the central scenario projections are still showing year-on-year increases of a significant magnitude.

2.6.5   Estimations of UK electricity prices for non-domestics are detailed below.

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[7] Source: Large and average user data is from the Department of Energy and Climate Change (DECC), Quarterly Energy Prices – Mach 2014, Table 3.4.2.

Figure 2.7 – UK industrial electricity price forecasts (2013 prices)[8]
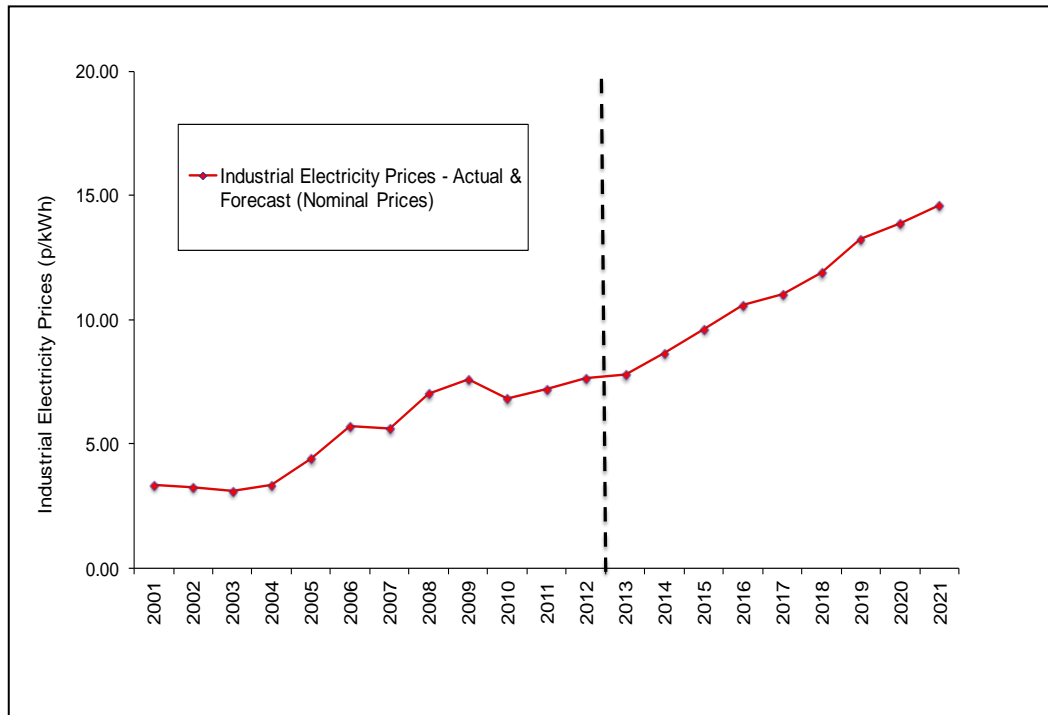
2.6.6   The chart shows the expected rise in prices for non-domestic customers. The year-on-year percentage increases indicate the following:

Table 2.5 – Industrial electricity price inflation

Year	Electricity Inflation (%)
2013	1.9%
2014	11.6%
2015	11.2%
2016	9.8%
2017	4.1%
2018	8.0%
2019	11.2%
2020	4.6%

Source: DECC Updated Energy and Emissions Projections 2013

2.6.7   The UR considers departmental forecasts to be the best available, independent data. As such, the percentages in the table above are used in the RPE analysis.

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[8] Source: DECC Updated Energy and Emissions Projection 2013

2.7.   Rates, bad debt and other costs

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

2.7.2   This is a pragmatic decision given that it is unclear how any rates revaluations in England and Wales will affect costs going forward or whether proposed penny rate freezes become reality or not.

2.7.3   By way of a check, the UR analysed historic rates spend for water companies since 1996-97. Findings suggest average increases slightly above RPI but similar to current RPI percentages for the best companies.

2.7.4   For bad debts, an above RPI allowance of 4% per annum is made. Analysis of historic costs shows sizeable changes to doubtful debts, particularly in the recent years of recession.

2.7.5   Whilst this situation should ease as the economy recovers, financial strain remains within the business community. This risk has been somewhat accounted for by the additional allowance.

3.0 Productivity

3.1. Total factor productivity

3.1.1 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.

3.1.2 If output increases yet inputs remain the same, this is considered a productivity improvement. This is referred to as technological progress.

3.1.3 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.

3.1.4 The previous report in PC13 noted that this is not all due to labour productivity progress or better technology. Rather, the industry has profited from a privatization effect and investing in a large quality programme (increasing inputs).

3.1.5 This raises the question as to what level of productivity has there been in the industry once these other effects are removed.

3.2. Water industry productivity

3.2.1 In order to avoid the impacts of these other water industry variables, First Economics used comparable TFP information from the EU KLEMS[9] data set. This is data produced since 1970 for EU member states on growth, productivity and technology. The most recent data extends to 2009.

3.2.2 In terms of analyzing 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.

3.2.3 These 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.

3.2.4 The division of labour for WaSC's (Water and Sewage Companies) and the industries chosen for comparison is detailed in the table below.

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[9] 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).

Table 3.1 – WaSC activity and comparable industries

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%	-

3.2.5   The comparable industries are similar to those chosen at PC13.   The exception is the professional and technical sector, which was not used last time. The productivity trends of the industries in question are given below.

Table 3.2 – Annual productivity growth from 1990-2009 (%)

Industry	Per annum productivity growth (%)	Average (%)
Total manufacturing	1.65%	1.65%
Electricity, gas & water supply Transportation and storage	0.23% 0.24%	0.24%
Finance and insurance Professional, scientific, technical, admin and support services	1.82% 0.49%	1.16%

3.2.6   The growth trends will vary depending on what years are selected to be analysed. The Regulator has looked at the trend since 1990. This follows on from the First Economics approach at PC13.

3.2.7   It seems a logical method in that it covers a full business cycle from either peak-to-peak or trough to trough. In this instance, we use data from the 1990's recession to the first year of the recent recession. The true growth trend could be understated if more recent data is used, since there was a notable fall in general productivity in 2009.

3.2.8   Applying the data to the water industry gives an expected level of productivity growth as follows.

Table 3.3 – Weighted industry average for productivity

WaSC Activity	% of Opex	Annual Productivity (%)	Weighted Average (%)
Water resource and treatment Sewage treatment Sludge treatment and disposal	20%	1.65%	0.33%
Water distribution Sewerage network	20%	0.24%	0.05%
General and support Customer services Scientific services Other business activities	45%	1.16%	0.52%
EA charges Bad debts Other	15%	-	-
Weighted Average (%)			**0.90%**

3.2.9   The findings are similar to those of PC13. This is despite the fact that the growth trend in some of the proxy industries has changed quite a lot. For instance, it is noteworthy that the finance and professional services sectors have shown much higher levels of growth than was the case in the previous analysis.

3.2.10   The conclusion from the analysis is that the expected level of productivity growth in the water industry is 0.9% per annum. This represents a substantial challenge to NI Water.

3.3.   Adjustments

3.3.1   No adjustment has been made to these findings to account for capital substitution or catch-up efficiency effects. In the absence of any better data, the UR has adopted the position that the two impacts will largely cancel each other out.

3.3.2   As a result, the 0.9% is taken as the long-run target for productivity in PC15.

3.4.   Regulatory precedent

3.4.1   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.

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

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

Table 3.4 – Recent regulatory decisions on productivity

Decision	RPE	Productivity (%)	Frontier Shift (%)
Utility Regulator – Water and sewerage (PC13)	RPI + 0.7%	-0.9%	RPI – 0.2%
PPP Arbiter – underground infracos, central costs	RPI +1.5%	-0.7%	RPI + 0.8%
PPP Arbiter – underground infracos, opex	RPI + 1.2%	-0.9%	RPI + 0.3%
Ofgem – Gas distribution initial proposals (RIIO – T1/GD1)	RPI + 0.0%	-0.6%	RPI – 0.6%
ORR - Network Rail, operational costs	RPI + 1.4%	-0.2%	RPI + 1.2%
ORR - Network Rail, maintenance costs	RPI + 1.3%	-0.7%	RPI + 0.6%
Competition Commission – Bristol Water referral	RPI + 0.4%	-0.9%	RPI – 0.5%[10]
Competition Commission – NIE referral	RPI – 0.2%	-1.0%	RPI – 1.1%[11]

3.4.4   Across different sectors and networks, productivity assumptions range from 0.2% to 1% per annum. The findings for the water industry in PC15 (0.9%) are towards the high end of this range. However, they do align with the most recent Competition Commission findings for NIE.

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[10] Whilst the findings in the table reflect the CC analysis, they settled on a target of RPI – 0.25% for the frontier shift challenge.
[11] Figures are different for each individual year, but this represents the average position.

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4.0 Retail Price Index Projections

4.1. Historic data

4.1.1 The final element of the equation relates to inflation. This is measured by RPI, which has long been used in many regulated industries. Historic changes in RPI are given in the figure below.

Figure 4.1 – RPI annual percentage change[12]
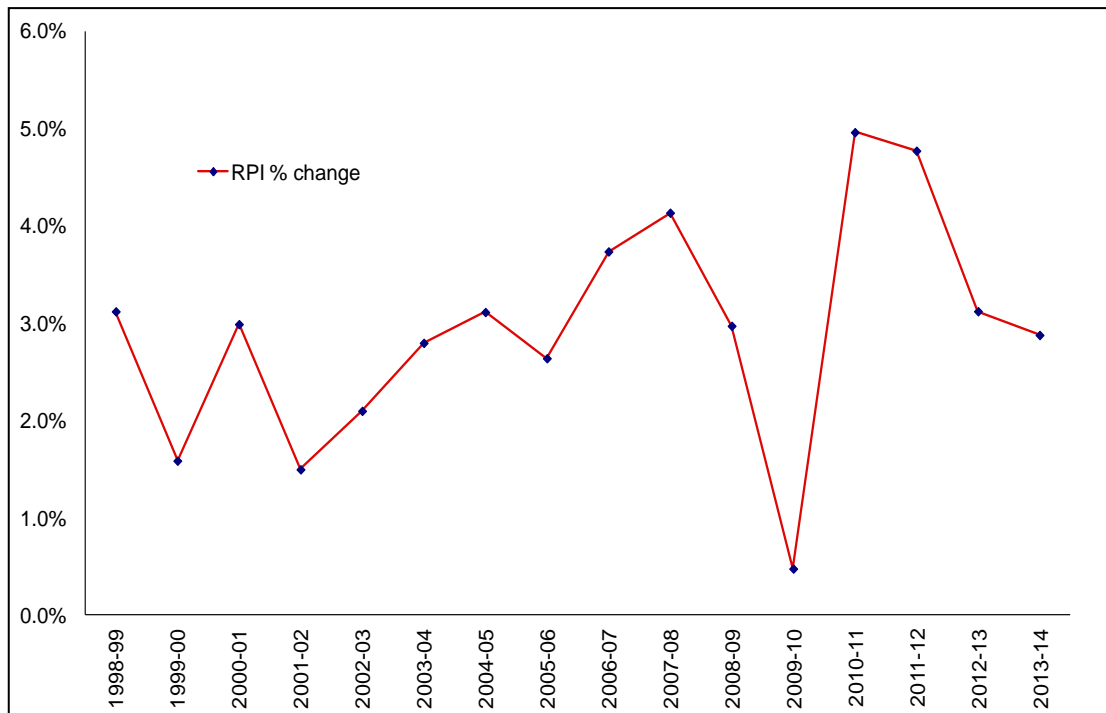
4.1.2 Over the period analysed, the average growth rate is 2.9%. In recent years, the trend has been higher because of global demand for raw materials and food among other things.

4.1.3 OBR forecasts indicate that future growth will be higher than the historic average. This is due to the anticipated increase in interest rates and the knock-on effect to mortgage payments, which are included in RPI.

4.2. RPI forecasts

4.2.1 The OBR has produced estimates of inflation up to 2018-19. Within their forecasts, they have looked at short-term policy measure impacts such as freezing fuel duty. They have also considered more medium term influences such as house price movements.

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[12] Source: ONS statistics.

4.2.2   The latest OBR forecasts for March 2014 are included in the table below.

Table 4.1 – OBR forecasts of RPI percentage changes

Year	RPI Projections (%)
2013-14	2.9%
2014-15	2.6%
2015-16	3.3%
2016-17	3.6%
2017-18	3.8%
2018-19	3.9%
2019-20	3.4%[13]
2020-21	3.4%[14]

4.2.3   In the short-term, the projections are quite close to the historic average mentioned above. As PC15 progresses the forecast is for higher inflation. OBR attributes this to the following:

- House prices moving in line with average earnings; and

- Mortgage payments increasing due to expected rise in interest rates.

4.2.4   For the purposes of this analysis, the Regulator sees no reason to deviate from the independently produced figures of the OBR. For the remaining years of PC15, the figure of 3.4% is used.

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[13] Utility Regulator assumption.
[14] Utility Regulator assumption.

5.0 Frontier Shift Conclusions

5.1. Frontier shift calculation

5.1.1 Combining the results of input prices, inflation and productivity gives the updated targets for PC15 frontier shift.

Table 5.1 – Frontier shift calculations (%)

Nominal Price Change (%)	PC13		PC15					
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Labour	2.5	2.4	3.4	3.7	3.7	3.9	4.0	4.0
Equipment	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Chemical	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Power	1.9	11.6	11.2	9.8	4.1	8.0	11.2	4.6
Rates	2.9	2.6	3.3	3.6	3.8	3.9	3.7	3.7
Bad Debt	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
EA Charges	2.9	2.6	3.3	3.6	3.8	3.9	3.7	3.7
Other	2.9	2.6	3.3	3.6	3.8	3.9	3.7	3.7
Weighted Input Prices (%)	**2.5%**	**4.1%**	**4.6%**	**4.6%**	**3.6%**	**4.4%**	**4.9%**	**3.8%**
RPI	(2.9%)	(2.6%)	(3.3%)	(3.6%)	(3.8%)	(3.9%)	(3.4%)	(3.4%)
Productivity	(0.9%)	(0.9%)	(0.9%)	(0.9%)	(0.9%)	(0.9%)	(0.9%)	(0.9%)
Frontier Shift (%)	**RPI-1.2%**	**RPI+0.5%**	**RPI+0.3%**	**RPI+0.0%**	**RPI-1.1%**	**RPI-0.4%**	**RPI+0.5%**	**RPI-0.6%**

Figures may not sum due to rounding

5.1.2 The analysis indicates an additional challenge in some years with extra funds above the forecast rate of inflation being provided in others.

5.1.3 Whilst it is likely that input prices will rise, it is expected that companies will be well enough compensated for this by higher levels of RPI. However, large material increases in expected electricity costs will contribute to the requirement for the provision of extra funds in the early years of PC15.

5.1.4 Combined with the anticipated productivity levels, the result is both extra costs provided in some years and extra challenge in others.