SRN 16 Real Price Effects
Technical annex

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from Southern Water

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1. Introduction

1.1. Why RPEs matter at PR24

The purpose of this document is to provide evidence for the RPE values that we have calculated as part of our business plan and contributing to the totex we claim. These are in conjunction with the numbers submitted in table SUP11.

The wider economic environment at PR24 is both more volatile and more uncertain than at PR19. The industry has been affected by shocks to the macroeconomy from the war in Ukraine and lingering effects of Covid 19. Inflation has risen both rapidly and to levels much beyond historic trend levels. Although this is true of inflation in the wider economy, the effects are even sharper for inputs critical to the water industry, as we describe below. This is particularly true for energy. In AMP7, companies have had to absorb these costs as no real price effect (RPE) mechanism was put in place at PR19 for any relevant inputs, besides labour. We believe that the evidence shows that high inflation and a volatile wider economic context will persist in AMP8. Therefore, we argue that Ofwat should consider a broader application of RPEs at PR24 beyond the labour RPE applied at PR19.

This technical annex explains how we have derived our RPEs adjustment for energy, labour, chemicals, materials and equipment, and 'other' inputs that we expect Ofwat to apply at PR24. It provides supporting information to the following data tables, technical annexes and chapters of our business plan:

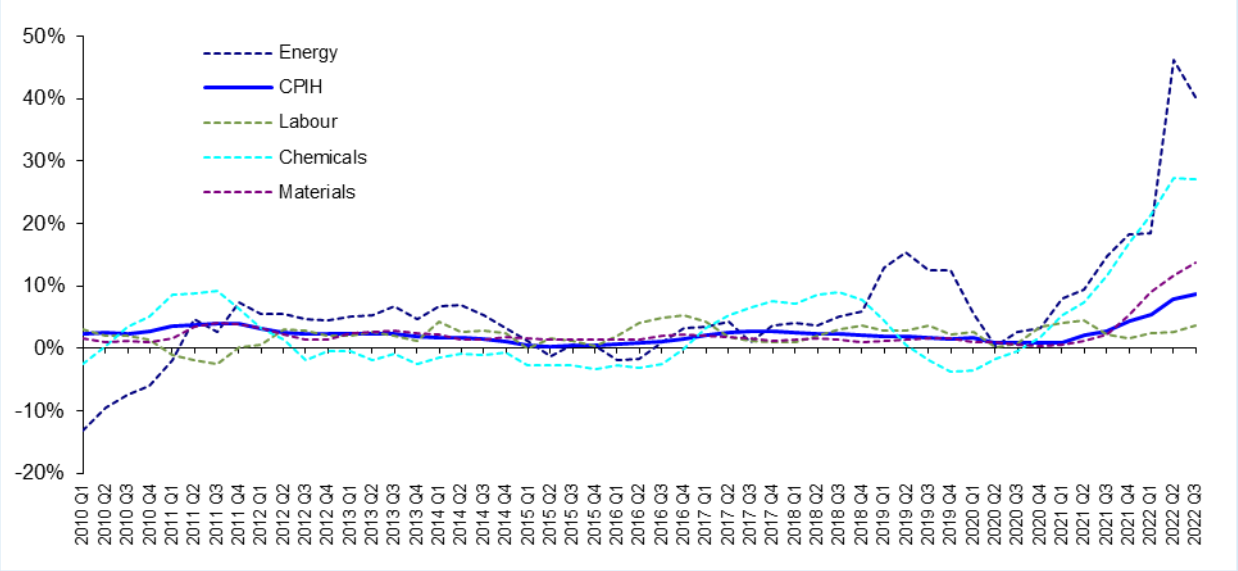
Data tables	SUP11	Real price effects and frontier shift
	PD12	PR19 reconciliation adjustments summary
Chapters	SRN04 Costs and outcomes approach	
Technical annex	SRN19 Botex Technical Annex	

1.2. Context for estimation of RPEs at PR24

Ofwat allows us to adjust the allowance we recover from customers in line with the Consumer Price Index including owner occupiers' Housing costs (CPIH) published by the Office for National Statistics (ONS).

However, input prices faced by water companies can materially deviate from movements in CPIH over the period of a price control. The figure below shows that prices for labour, energy, chemicals, and materials, the key inputs that water companies face, have evolved differently than general inflation in the past and the gap has become significantly wider recently.

Figure 1: Year-on-year changes in CPIH and input prices



Source: ONS datasets: Producer Price Index, ASHE, and CPIH.

RPEs are a standard tool in Ofwat's regulatory toolbox to capture input price deviations from CPIH. The aim of the RPE mechanism is to ensure that input price risks that are outside of management control are appropriately allocated, and companies are allowed efficient costs.

There is increased uncertainty over the path of general inflation (as measured by CPIH) at PR24, driven by the recent political and economic developments. In a volatile environment, as PR24 is foreseen to be, RPEs will play an even greater role in Ofwat's assessment of our cost allowances.

If Ofwat does not provide RPE adjustments where appropriate, we might not be able to recover efficiently incurred costs. This could hinder our ability to finance our statutory functions.

1.3. Issues with the current RPE framework

At PR19, Ofwat applied an RPE for labour costs based on real wage growth forecasts produced by the Office for Budgetary Responsibility (OBR), with a true-up to actual manufacturing wages growth. Ofwat chose the hourly manufacturing wage index from the ONS's Annual Survey of Hours and Earnings (ASHE) as the true up index. Ofwat considered but did not allow RPEs for any other of the key inputs to the water industry (energy, chemicals and materials). This was despite the mixed evidence found by its own consultant, Europe Economics, on whether these were justifiable.

The PR19 experience shows that not allowing RPEs for other key inputs at PR19 has resulted in us facing significant input price pressures during the price control period, which, in the absence of an ex-post true up, are left uncompensated.

The reason why this is so important is that the basket of goods measured by CPIH is not representative of the basket of inputs that water and wastewater companies face and customers should be paying for. We have provided evidence in Figure 1 above that CPIH has not represented the water industry basket of inputs (energy, chemicals, materials and labour) well since at least AMP7. Therefore, we not only need to be compensated for volatile prices but we need to be compensated according to the right measure. We face the

key problem of volatile, non-controllable risk. We accept that we should bear some level of risk but high volatility to this degree necessitates some RPEs and true ups. In AMP7, we have faced a large-scale funding problem from this unforeseen risk and we are keen that the same does not occur in AMP8.

Ofwat has not yet published its proposed approach to RPEs for PR24 but it has stated that it will consider cases for the application of RPEs to other costs areas, other than labour. We welcome Ofwat's openness to consider RPEs for other cost areas and believe that RPEs should be applied to all non-controllable cost areas given the volatility of prices in the current period, as Figure 1 shows, and the uncertainty from the current global political and economic climate. However, Ofwat must ensure that the appropriate RPEs are applied to adjust our allowances, since, as Figure 1 shows, CPIH is not capturing the right basket of inputs, which means that we would under-recover efficient costs incurred.

Given that Ofwat has not yet disclosed its approach to RPEs, we are concerned that the current RPE framework (the PR19 approach) will not adequately compensate us for efficiently incurred costs over the PR24 period. The spike in input prices in AMP7 (see Figure 1) will not be fully reflected in Ofwat's cost assessment models as the econometric models do not include any input price-related cost drivers. Therefore, cost allowances based on historic benchmarking will understate the actual efficient costs required. This means that even if RPEs are allowed for all cost categories at PR24, there will still be a mismatch with the actual price pressures that we face in the current AMP7.

We believe that Ofwat should reconsider the RPE framework at PR24. To estimate RPEs for the next price control period (PR24), it is important not to dismiss the input price inflation observed in the current price control period, which is not captured by the econometric models.

The issue described above, applies, in principle, to all cost areas. However, due to the significant wedge between CPIH and energy prices in current period, the impact is most notable on the estimation of the energy RPE for PR24. We further explain the issues with the current approach to energy RPE in the following section and provide potential remedies. We also address the issue with RPEs for other key inputs later in this document.

This technical annex is structured as follows:

- **Section 2** sets out the context and potential issues which might arise if Ofwat's framework does not appropriately account for increased energy prices. The section estimates energy RPEs and the potential gap that exists with Ofwat's base cost allowances.
- **Section 3** explains the approach to RPEs for other cost areas, e.g., labour, chemicals, materials and estimates the appropriate RPE adjustment required at PR24.
- **Section 4** summarises our argument.

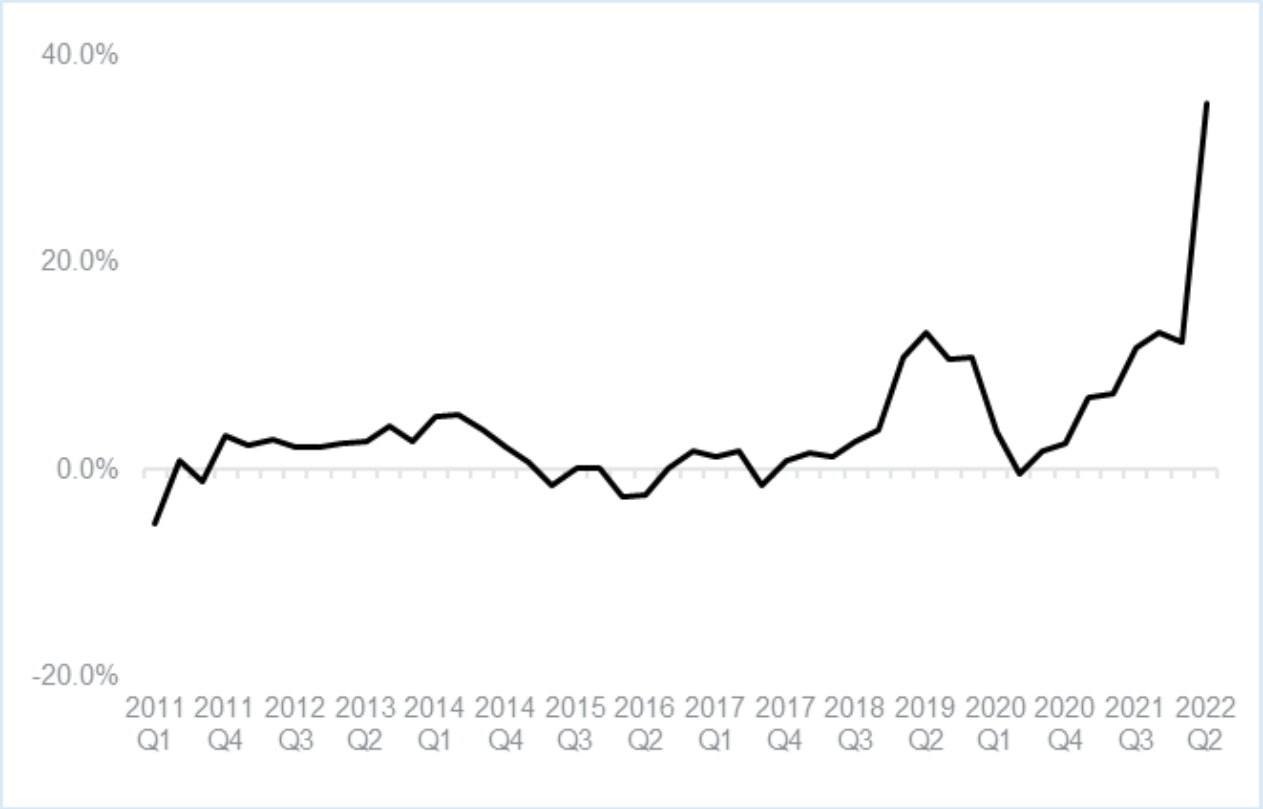
2. The Energy RPE

2.1. Funding gap

The conflict in Ukraine has led to levels of energy price inflation in the UK close to 45%, which is 35 percentage points above CPIH inflation in Q3 2022 (see Figure 1 above). This is the highest increase in energy prices in real terms across the whole sample period Ofwat considered for its base econometric models.

This has had a significant impact on the energy costs water companies have faced in the last two years. In 2021-22, the sector faced a 12% increase in power costs, which is the largest year-on-year growth rate for the last 10 years. The figure below demonstrates the increase in energy prices in real terms since 2020.

Figure 2: Year-on-year increase in the industry electricity price index discounting for CPIH (i.e., in real terms)



Source: BEIS and ONS data

PR19 proved that energy prices are highly sensitive to macroeconomic and political changes. The current RPE methodology might not accurately capture energy price inflation at PR24 in the following two ways:

1. **Ofwat's current econometric models will not provide sufficient allowances for efficient energy costs.** High inflation in energy has lifted the future energy cost requirements significantly higher compared to the historic average. This means that historic trends may no longer be sufficient to determine future energy costs. So, PR24 cost assessment models should be designed to reflect the step change in energy prices.

   Energy costs are a material component of our costs, accounting for circa 14% of our base costs in water and 10% in wastewater network plus (see Table SUP11). Ofwat's current base cost models put significantly more weight on a period of low energy costs as more than 80% of the sample reflects a period of low energy prices. As a result, the cost models generate allowances that are insufficient to meet the efficient energy costs we actually face.

2. **The lack of clarity on the time period on which RPEs will be applied.** There is a significant positive wedge between forecasts of energy prices and CPIH in the period between the last year of Ofwat's modelling sample and the first year of PR24 (i.e., from 2021-22 to 2023-24), see Appendix 1.

Ofwat has not yet published its approach to RPEs at PR24. It is unclear from which year RPEs are going to be estimated. If the high energy price inflation expected in the last years of PR19 are omitted from the econometric models, then the energy RPE will certainly not adequately capture the true inflation which water companies may face during PR24.

There are two different but closely linked mechanisms to account for power cost increases; through econometric models and the application of an RPE. They do not serve as substitutes but should be applied together. The econometric models should ensure that allowed efficient costs already reflect the higher energy prices which the water sector currently faces. Only then can the RPE mechanism provide an adequate protection from future changes in prices.

2.2. Potential remedies

We suggest two options for capturing energy price inflation in cost allowances at PR24. We consider that both methods could sufficiently compensate us without harming customers by ensuring RPE adjustments do not exceed actual input inflation. However, it is vital in any case that Ofwat ensures we do not face a negative outturn for an energy RPE over AMP8, otherwise we will not be able to recover efficient levels of the costs we incur. Below, we describe each of the two options that we suggest. We do not claim that either option perfectly captures the funding requirement but we believe both to be reliable. Option 1 still requires the standard RPE adjustments for AMP8 to provide the same protection as Option 2.

Option 1: Application of RPEs from 2021-22
The gap between Ofwat's modelled cost allowance and the required efficient costs for operating in PR24 can be compensated by applying RPEs from 2021-22 instead of 2023-24, as the data table SUP11 requests. Estimating RPEs from two years earlier will allow the RPE allowance to reflect the observed energy price spike which is not reflected by Ofwat's cost models.

Option 2: Uplifting the cost allowances to reflect the recent spike in energy prices
A group of companies, including Southern Water, commissioned KPMG to explore approaches to capture a step change in energy costs within Ofwat's base cost modelling.[2] The study recommends including a price index as a cost driver in the Ofwat econometric models as one possible way to capture cost variations due to input price movements. We believe that the inclusion of a price index as a cost driver in the econometric models is a plausible method because it meets Ofwat's properties of being exogenous (i.e., outside management control) and avoiding perverse incentives. The inclusion of an input price driver in cost models is also in line with economic theory and has been used in regulatory cost benchmarking, including in Ofwat's PR14 cost models.

Our business plan submission assumes the selection of Option 2. Under the Option 1, Ofwat's data tables (SUP11) would need to be adjusted to capture two additional years of the energy RPE. This could be achieved by replacing the annual energy RPE reported in 2023-24 by the cumulative energy RPE measuring the energy price increase from 2021-22 to 2023-24. We are submitting the SUP11 tables as per Ofwat's guidance, but only expect it to be used if Ofwat selects Option 2.

The table below summarises the features of each option.

Table 1: Key features of our options for energy RPE adjustments at PR24

Option 1 Cumulative RPEs starting in 2021-22	Option 2 Model Uplift + RPEs starting in 2023-24
Step 1: Applying RPEs from 2021-22 Because Ofwat data table SUP11 starts only in 2023-24, it does not capture the energy price spike seen in 2021-22 to 2022-23. So, under this option we propose to report the cumulative energy price from 2021-22 to 2023-24 against the 2023-24 column in table SUP11.	**Step 1**: Uplifting modelled costs based on an estimated adjustment by including an energy index as a cost driver in the econometric models.
	Step 2: Applying RPEs from 2023-24 as set out in Ofwat's RPE data tables (SUP11)

2.3. Estimated impact on cost allowance

Below we estimate the adjustment according to each option proposed in the previous section. The key risk that we aim to avoid is facing a negative outturn energy RPE over AMP8.

Option 1: Applying RPEs from 2021-22 year

One way of accounting for the energy price spike, which is not appropriately captured by Ofwat's modelled allowances, is to apply an energy RPE adjustment from 2021-22, which is when we start to see a a large wedge between the energy price and CPIH (as seen in Figure 1). Estimating the RPE allowance cumulatively, that is from 2021-22 to 2029-30 results in a PR24 energy RPE allowance of £59m for Southern Water, depending on the modelling specification used by Ofwat at PR24. We present the estimate as the midpoint of a range because they are based on forecasted allowances at PR24, and any allowance forecast has a significant degree of uncertainty attached to it. We make assumptions about which modelling specifications to use. Please see the SRN19 Botex Technical Annex (Part A - efficiency section) on how we develop a range of model estimates. This RPE adjustment is calculated using the percentage change, year-on-year, of the forecasted energy prices from Cornwall Energy.

Option 2: Modelling uplift and RPEs starting in 2023-24

- **Step 1: Uplifting cost allowances to reflect the recent spike in energy prices.** The KPMG study estimated the impact of the inclusion of an electricity price index in the cost models, which resulted in an upward adjustment of the sector's total 2022-23 modelled costs by 10.4% in water and by 7.2% in wastewater network plus. KPMG's analysis[2] included only the first two quarters of both, the BEIS outturn electricity price index and the CPIH index for 2022-23. The sector average upward adjustment required after including the last two quarters of 2022-23 is 14.3% in water and 9.3% in wastewater network plus. The Southern Water equivalent adjustment of the modelled costs is 13.7% in water and 7.9% in wastewater network plus. This means that an uplift of £269m (mid-point estimate of various modelling specifications) to our allowed costs would be necessary to account for energy price inflation faced up to 2022-23, which is currently being disregarded by Ofwat's base cost models.

- **Step 2: Application of RPEs from 2023-24.** After uplifting the forecasted allowances to account for the energy price spike up to 2022-23, we need to account for the potential price movements from 2022-23 onwards. Therefore, we apply an RPE from 2023-24 to 2029-30. As energy prices are forecasted to move downwards in AMP8 (see Appendix 1), we remove £223m (the negative RPE by the forecasted allowance) from the AMP8 forecasted allowance leading to a net adjustment of £46m, depending on the model specification used by Ofwat.

The table below summarises and compares our estimated net allowances after application of an energy RPE under the two proposed approaches for water and wastewater combined. Our Appendix 3 shows the same information for water and for wastewater, separately. The estimated net allowances are similar under both proposed options and notably higher than net allowance based on Ofwat's default approach. Ofwat should carefully consider the treatment of energy prices in its cost assessment at PR24. This can be achieved by either uplifting modelled costs to reflect recent high energy prices with further RPE adjustment from 2023-24 onwards or by applying RPEs to an extended period starting from 2021-22, which is when we start to see a wedge between the energy price and CPIH.

We recognise that there might be other approaches that Ofwat prefers to implement. We are open to alternatives, as long as the estimated funding gap is covered. The table below compares the impact of each approach on the modelled allowance.

Table 2: Energy RPE adjustment for AMP8 and resulting new modelled costs – comparison of proposed options

Prices of 2022-23	Ofwat's approach RPEs from 2023-24	Proposed Option 1 RPEs from 2021-22	Proposed Option 2 Model uplift + RPEs from 2023-24
Modelled costs before frontier shift (a)	£3,077m	£3,077m	£3,077m
Estimated model uplift (b)	N/A	N/A	£269m
Frontier shift (c)	-£14m	-£14m	-£15m
Modelled costs after frontier shift (d) = (a) + (b) +(c)	£3,063m	£3,063m	£3,331m
Estimated RPE adjustment (e)	-£202m	£59m	-£223m
New modelled costs (f) = (d) + (e)	**£2,861m**	**£3,122m**	**£3,108m**
Net RPE adjustment (g) = (b) + (e)	**-£202m**	**£59m**	**£46m**

3. Approach to RPEs for Labour, Chemicals, and Materials

The greater macroeconomic uncertainty that we are experiencing in the current period reinforces the case for RPEs at PR24 not just in energy, but in all cost areas, including labour, chemical and materials costs.

At PR19 Ofwat allowed a labour RPE with a true-up mechanism, which has provided protection against wage volatility. Ofwat did not provide RPEs for chemicals and materials costs at PR19. However, due to economic and political developments in the first years of AMP7, we have experienced supply chain issues, resulting in input price pressures in both areas and there is no reason to believe that such input price volatility will ease in AMP8. These costs are not featured in the CPIH basket of costs but are very volatile and have recently increased persistently above CPIH (see Figure 1). As with energy prices, the spike in other input prices during PR19 above CPIH is not reflected in Ofwat's cost models. Therefore, we are exposed to any further changes in prices while the starting point of any RPE allowances is understated.

We expect Ofwat to revise and improve its approach to RPEs at PR24. Failing to allow RPEs for cost areas other than labour at PR19 has resulted in us facing cost pressures which we are concerned will not be resolved by the current RPE approach. We quantify the scale of the cost pressures for each individual input below.

Good regulatory practice involves establishing a clear, realistic, flexible, and consistently applied set of tests to determine the need for RPEs. Some of the tests developed by Europe Economics and used by Ofwat in its PR19 assessment are too mechanistic, for example, the volatility test which considers volatility as the five-year rolling average wedge between input price and CPIH as a share of totex with a 1% threshold. Other tests developed by Europe Economics at PR19, such as the management controllability test, involve a large degree of regulatory judgment, for example, regarding whether management has any degree of control over external macroeconomic factors impacting costs.

We recognise that companies have some ability to manage risks related to input prices. However, it is not reasonable to expect companies to manage all risks, especially from unforeseen macroeconomic shocks, and to not share any price pressures with customers. Management decisions cannot influence external factors and the water sector, as any other industry, is exposed to developments in the overall economy. We already face a number of challenges at PR24, such as to improve performance (stretching targets) at lower costs (efficiency challenge). As such, the PR24 regulatory framework should ensure that external risks are appropriately allocated.

3.1. Labour

Labour costs are a very material component of our base costs with a share of 26% of our water costs and 36% of our wastewater network plus costs. At PR19, Ofwat provided an ex-ante RPE allowance based on OBR real wage growth forecasts with a true-up based on the ASHE hourly manufacturing wage index at the end of the price control period.

We estimate a labour RPE based on the extrapolation of the ASHE index for specialist labour in wholesale controls and the ASHE retail index for labour in the retail control (see Appendix 1 for a step-by-step methodology). OBR forecasts of average earnings cover all types of labour across the economy. Within the utilities sector, specialist labour is employed, chiefly in the category of civil engineering, which we expect to have faster growing pay than general labour. We consider that the ASHE index for specialist and retail

labour is therefore a better proxy for labour price changes in water sector than the OBR forecast of average earnings.

Separately, it is important to use hourly wages over weekly ones to account for distortions resulting from overtime pay and part-time working. Ofwat itself has questioned the OBR forecasts at PR19 FD on this basis. Therefore, the ASHE manufacturing index is a better measure as it "provides wages on an hourly basis which allows for the real price effect to be isolated".

The scale of capital programmes in our plans to deliver in PR24 is significantly larger than historically. The PR24 price control is an important period for water companies where the sector is planning to undertake a massive capital investment to deliver environmental targets. Delivering these programmes requires experienced and specialised labour. We are concerned that due to the expected shortages in the sector, labour costs faced by water companies will increase significantly more than average wage growth in the economy. We expect Ofwat to consider these factors in the approach to labour RPEs at PR24.

3.2. Chemicals

Chemicals account for about 2% of our base costs in water and wastewater (see table SUP11). Recent economic and political developments have had a significant impact on the costs of chemicals, as Figure 1 shows. This is due to persistent logistics issues that started with the Covid-19 pandemic and have been prolonged by the war in Ukraine. We are concerned that these problems will remain unsolved during PR24 and expect Ofwat to provide an RPE for chemical costs to ensure external risks are adequately captured, given that there is no explicit category for chemicals in the CPIH basket.

KPMG[5] analysed the historical wedge between prices of chemical costs and CPIH movements based on the Chemicals & Chemical Products' PPI index and found that there is evidence of a significant positive wedge in the recent historical period (last five years). There is lack of independent forecasts for input prices for chemicals. Therefore, to estimate an RPE for chemical costs, recent historic information is the best available source.

We calculate a chemicals RPE based on the historical wedge (10-year average) between general inflation and the Inputs of Chemicals dataset in the PPI series published by ONS, which is the best available proxy for input prices for chemicals. We apply an estimated historical wedge to inflation forecasts (see Appendix 1 for a step-by-step methodology).

3.3. Materials, plant, and equipment

Materials, Plant and Equipment costs represent a material component of our base costs, at 16% in water and 27% in wastewater network plus (see table SUP11). At PR19 Ofwat did not provide an RPE allowance for these costs. Given the current and likely future macroeconomic volatility, as a result of the economic reverberations following the advent of the Covid 19 pandemic, we consider it important for Ofwat to provide RPE allowances for costs that relate to materials, plant and equipment at PR24.

We have estimated RPEs for materials plant and equipment costs over PR24 based on the Producer Price Inflation series on Purchases of fuels and materials (including the Climate Change Levy) and Inputs into production of machinery and equipment indexes published by ONS. There is a lack of third-party forecasts available for input price movements for this cost category. Therefore, historic information is the most relevant evidence to consider when estimating the RPE allowance. We have used the historic wedge between CPIH and the two indexes above (equally weighted) over the last 10 years to estimate the expected gap between forecasted inflation and input prices over AMP8 (see section 5 for a step-by-step methodology), which is a standard technique where there is a lack of forecasts.

4. Conclusion

Energy prices have risen in an unprecedented way during AMP7, which has had a strong impact on the industry. There is both increased uncertainty and volatility surrounding the energy market, largely due to exogenous factors such as the war in Ukraine and economic reverberations following the advent of the Covid 19 pandemic. These are factors that management has little control over as even long hedging and futures contracts will soon expire across the industry.

We have provided data and calculations in this document that show energy inflation above CPIH has a material impact on our AMP8 allowances. We have also shown that Ofwat's current, default option for RPEs will not only fail to compensate the industry sufficiently for the present energy price spike but will actually exacerbate the underfunding problem as energy prices fall in AMP8, leading to wholesale allowances set to decrease by £202m (see Table 2). Instead, our recommended alternative, Option 2, suggests that there should be a positive energy RPE adjustment of £46m. As a company, we will face very serious funding and performance consequences for a level of underfunding of that magnitude.

In addition, we have estimated that the RPE impacts for labour, materials, plant, and equipment are also significant. As Appendix 2 details and the table below summarises, for labour the underfunding is £28m in AMP8. For chemicals, Ofwat's default method to treat RPEs would remove £5m of funding in AMP8, whereas we estimate that the impact should be about -£1m. For materials, plant, and equipment, Ofwat's default option for treating RPEs would remove £44m of funding but we estimate that we should actually receive £0m as an RPE adjustment, which leaves us with a total gap of £44m in AMP8. These estimates reflect that it is not only energy where there are significant input price pressures above CPIH.

As the summary table below shows, adding the RPE impacts on energy, labour, chemicals and 'materials, plant, and equipment' means that we would expect an overall RPE adjustment of £73m, whereas Ofwat's approach would result in removing £223m from our allowances. This means that the Ofwat approach would leave us with an overall RPE funding gap of £296m. This is about 10% of our expected base cost regulatory allowance, which is very material. That is a very significant sum and it will have serious funding implications if not addressed.

Table 3: Summary of proposed RPE adjustments for AMP8 – Overall

Prices 2022-23	Ofwat's approach RPEs from 2023-24	Proposed Option 2 Model uplift + RPEs from 2023-24
Energy RPE adjustment	-£202m	£46m
Labour RPE adjustment	£28m	£28m
Chemicals RPE adjustment	-£5m	-£1m
Materials, plant and equipment RPE adjustment	-£44m	£0m
Total RPEs adjustment - total	**-£223m**	**£73m**
Overall RPE funding gap – total	**£296m**	

Table 4: Summary of RPE proposed adjustments for AMP8 – Water

Prices 2022-23	Ofwat's approach RPEs from 2023-24	Proposed Option 2 Model uplift + RPEs from 2023-24
Energy RPE adjustment	-£83m	£30m
Labour RPE adjustment	£5m	£5m
Chemicals RPE adjustment	-£2m	£0m
Materials, plant and equipment RPE adjustment	-£10m	£0m
Total RPEs adjustment - water	**-£90m**	**£35m**
Overall RPE funding gap – water	**£125m**	

Table 5: Summary of RPE proposed adjustments for AMP8 – Wastewater

Prices 2022-23	Ofwat's approach RPEs from 2023-24	Proposed Option 2 Model uplift + RPEs from 2023-24
Energy RPE adjustment	-£119m	£16m
Labour RPE adjustment	£23m	£23m
Chemicals RPE adjustment	-£3m	-£1m
Materials, plant and equipment RPE adjustment	-£34m	£0m
Total RPEs adjustment – wastewater	**£-133m**	**£38m**
Overall RPE funding gap - wastewater	**£171m**	

We have proposed two possible methods in this annex to adequately compensate for the impacts of energy inflation above CPIH. We expect Ofwat to change its approach to energy RPEs from PR19 by either incorporating one of these methods or by using an alternative method that solves the underfunding problem according to the gap we have estimated. In addition, it is vital that the risk of a negative energy RPE in AMP8 is avoided and the remedy chosen must also satisfy this requirement. Instead, the data suggests that we require an uplift to compensate for the energy price spike in starting in 2021-22. We believe that the PR19 approach will also underfund us in the areas of chemicals and materials, plant and equipment. Ofwat must apply an RPE adjustment in all these areas at PR24 and ensure the adjustment is sufficient.

We have submitted RPE data in table SUP11 of the business plan in line with Ofwat's guidance and under the assumption that Ofwat will apply our Option 2. It requires an uplift to the Botex models to account for inputs price inflation above CPIH from 2021-22 to 2022-23 with RPEs applied from 2023-24 onwards, i.e. to account for the RPE funding gap of £296m, as summarised in the table above. We have reflected this funding gap in our business plan as a revenue adjustment line in table PD12. We are assuming all the RPE funding gap will impact revenues and not RCV due to it being predominantly an energy adjustment.

We expect Ofwat to implement a method that closes the funding gap. We propose Option 2 described above. However, we are open to further options that close this funding gap. Note that Option 1 would require an adjustment to the RPE tables. We do not expect both methods to be used concurrently as that could lead to overcompensation of the underfunding gap and would be detrimental to customers.

Glossary

Term	Description
AMP	Asset Management Period
APR	Annual Performance Reports
ASHE	Annual Survey of Hours and Earnings
BEIS	Department for Business, Energy and Industrial Strategy
CCL	Climate Change Levy
CPI	Consumer Price Index
CPIH	Consumer Price Index including owner occupiers' housing costs
EA	Environment Agency
FD	Final Determination
OBR	Office for Budgetary Responsibility
ONS	Office for National Statistics
PR14	Price Review 2014
PR19	Price Review 2019
PR24	Price Review 2024
RPEs	Real Price Effects
STW	Sewage Treatment Works
Totex	Total expenditure: enhancement expenditure plus based expenditure

List of References

1 Ofwat (December 2019), “PR19 Final Determinations, Securing cost efficiency technical appendix”, , PR19-final-determinations-Securing-cost-efficiency-technical-appendix.pdf (ofwat.gov.uk)
2 KPMG (May 2023), “Treatment of energy costs in base models”
3 Office for Budget Responsibility (March 2023), “Economic and fiscal outlook”
4 First Economics (2014), “PC15 Annex O – The Rate of Frontier Shift Affecting Water Industry Capital Costs”, produced for the Northern Ireland Utility Regulator, p5, Table 3.1.
5 KPMG (June 2023). “Real price effects at PR24”
6 Chemicals & Chemical Products’ PPI index and Purchases of fuels and materials (including Climate Change Levy)
7 Economic Insight (April 2023), “Productivity and frontier shift at PR24”. Link
8 Ofwat (December 2022), PR24 Final Methodology – Appendix 9 – Setting expenditure allowances link

Appendix 1: Data tables methodology

In this appendix we set out how we calculate the values in the RPE table SUP11 that we are submitting with our plan.

Inflation

Given that Ofwat allows companies to recover the cost of general price inflation (CPIH) on the wholesale controls, input price pressure is estimated 'net' of CPIH. This is accounted for at the top of table SUP11 and applied to the raw input price pressures. We use financial year average indices year on year percentage change, which can also be found in table PD1 of the data tables.

Table 6: Proposed annual inflation rate

CPIH	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Annual	3.67%	8.77%	5.57%	2.39%	1.97%	2.10%	2.09%	2.10%	2.10%
Cumulative	-	12.45%	18.02%	20.41%	22.39%	24.49%	26.58%	28.69%	30.79%

Source: Table PD1.35, Financial year average indices year on year percentage change.

Labour

Within the utilities sector, specialist labour is employed, namely in the category of civil engineering. To estimate specialist labour and retail labour costs, we extracted data from the ASHE dataset produced by the ONS, covering the period up to 2021-22. We extrapolate the index to 2029-30 using a simple linear trend. These are hourly, median, full-time earnings for SIC codes 42 and 82 respectively, and can be found in ASHE table 5.5a for each year.

Table 7: Proposed Labour RPEs

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Market price index (Source: "Economic and fiscal outlook", Table C2.17, Office for Budgetary Responsibility, Link.)									
Labour price index - Wholesale	18.51	19.17	19.97	20.77	21.57	22.37	23.17	23.97	24.77
Labour price index - Retail	15.61	15.58	16.06	16.54	17.02	17.50	17.98	18.46	18.94
Our view									
Our wholesale labour price index	18.51	19.27	20.53	20.92	21.57	22.37	23.17	23.97	24.77
Our wholesale RPE index	100.00	95.73	96.59	96.13	97.19	98.72	100.15	101.48	102.70
Wholesale RPE change		**-4.27%**	**0.90%**	**-0.47%**	**1.10%**	**1.57%**	**1.45%**	**1.32%**	**1.21%**
Our retail labour price index	15.61	16.25	17.31	17.64	17.02	17.50	17.98	18.46	18.94
Our Retail RPE index	100.00	95.73	96.59	96.13	90.92	91.57	92.16	92.67	93.13
Retail RPE change		**-4.27%**	**0.90%**	**-0.47%**	**-5.42%**	**0.71%**	**0.64%**	**0.56%**	**0.49%**

Our labour price index, for both wholesale and retail, match the market labour price index in AMP8. In AMP7, we use our own labour price index based on our own budget forecasts.

Chemicals, materials and equipment and 'other' inputs

The business prices division at the Office for National Statistics produces index price data for numerous business inputs.[6] From these we have extracted indexes for chemicals, materials, and equipment. ONS only produces historic price information for these categories. We therefore forecast price inflation for these categories by finding the "inflation wedge" for each (we calculate inflation in each case for the past ten years and subtract average annual CPI). This gives the market real price effect for each in the last 10 years. We add this to forecasted CPI to find the input price pressure for each of the categories. However, there is a spike in prices in AMP7, and the RPE tables miss this in its entirety. For the materials and equipment input, we weight the individual inflation rate by 50% on the assumption that materials and equipment account for similar share of the overall category 'materials and equipment'. We adjusted the market RPEs down by taking into account our hedging position for chemicals, materials, and equipment.

Table 8: Proposed RPEs for chemicals, materials and equipment, and 'other' inputs

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Market price index (Source: ONS)									
Chemicals price index	100	105.7	106.2	105.9	106.0	107.3	108.8	110.4	112.0
Materials and equipment price index	100	106.5	107.8	108.3	109.2	111.4	113.8	116.3	118.9
Other inputs price index	100	108.8	115.0	117.6	119.9	122.4	125.0	127.6	130.3
Our view									
Our chemicals price index	100	162.7	170.7	174.0	106.0	107.3	108.8	110.4	112.0
Our chemicals RPE index	**100**	**149.6**	**148.7**	**148.1**	**88.5**	**87.7**	**87.2**	**86.6**	**86.1**
Chemicals RPE change		**49.59%**	-0.63%	-0.37%	-40.23%	-0.88%	-0.64%	-0.65%	-0.65%
Our materials and equipment price index	100	108.8	114.1	116.3	109.2	111.4	113.8	116.3	118.9
Our materials and equipment RPE index	**100.0**	**100.0**	**99.4**	**98.9**	**91.1**	**91.0**	**91.1**	**91.1**	**91.2**
Materials and equipment RPE change		**0.00%**	-0.63%	-0.48%	-7.90%	-0.14%	0.10%	0.09%	0.09%

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Our 'Other' inputs price index	100	108.8	114.1	116.3	119.9	122.4	125.0	127.6	130.3
Our 'Other' inputs RPE index	**100.0**	**100.0**	**99.4**	**98.9**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
'Other' inputs RPE change		**0.00%**	-0.63%	-0.48%	1.11%	0.00%	0.00%	0.00%	0.00%

In AMP8, for each of the inputs in the table above, our input price indexes match the market input indexes. In AMP7, we use our own price index based on our own budget forecasts.

Energy

For power, we take price forecasts from Cornwall Energy adjusted by our hedging position, as detailed in the table below.

Table 9: Proposed energy prices

	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Market price index (Source: Cornwall Energy)									
Price Index	100.0	291.2	346.5	233.2	183.9	154.9	142.1	134.9	137.7
Our view									
Our price index	100.0	107	140.96	203.87	183.9	154.9	142.1	134.9	137.7
Our RPE index	100.0	98.4	122.6	173.4	153.4	126.6	113.7	105.7	105.7
RPE change (%)		**-1.63%**	**24.65%**	**41.40%**	**-11.53%**	**-17.49%**	**-10.13%**	**-7.03%**	**-0.03%**

Our energy price index takes into account our existing hedging position from 2021-22 to 2024-25 (AMP8). From 2025-26 onwards, our price index matches the market price index as we are assuming no hedging for that period.

Our forecasts predict a fall in energy prices, overall, across AMP8. However, there is an extremely large increase in prices prior to that, for which Ofwat's default RPE tables do not account at all.

Input mix

We take the capex-opex split for each company from the Final Determination at PR19. We use this to calculate the industry average split, assuming that the annual pattern in AMP8 is the same as in AMP7. The industry split allows us to weight the capex and opex expenditure proportions to calculate the input proportions required in table SUP11. We use the industry value as our own capex-opex split is quite different from that of the average company.

Table 10: Capex-opex split from PR19 FD

	Water resources		Water network +		Wastewater network +		Bioresources	
	Opex	Capex	Opex	Capex	Opex	Capex	Opex	Capex
2020-21	16.3%	4.7%	12.5%	7.9%	10.4%	9.5%	12.2%	7.4%
2021-22	16.3%	4.5%	12.4%	8.3%	10.4%	10.3%	12.3%	8.2%
2022-23	15.8%	4.6%	12.3%	8.4%	10.2%	10.0%	12.3%	8.8%
2023-24	15.4%	3.7%	12.1%	7.2%	10.2%	10.3%	12.2%	7.6%
2024-25	15.4%	3.3%	12.1%	6.9%	10.1%	8.5%	12.2%	6.6%

Source: Southern Water analysis.

Using data provided internally within Southern Water, we get a split showing our budgeted opex split by price control and by inputs in 2022-23.

Table 11: Composition of budgeted wholesale opex for 2022-23

	Water resources	Water network +	Wastewater network +	Bioresources
Labour	11%	23%	27%	15%
Materials	1%	3%	5%	3%
Chemicals	0%	4%	3%	14%
Power	26%	15%	19%	-8%
Rates	8%	10%	8%	6%
EA	35%	0%	2%	0%
Other	19%	45%	36%	71%

Source: Southern Water, internal data.. EA = Environment Agency

Environment Agency-related costs form the largest single contribution to Southern Water's budgeted opex. Labour is consistently a high contributor across all price controls. Power has a negative value in the bioresources price control because of the energy revenue that is generated in the value chain.

We used internal data on the split of expenditure into the same categories for enhancement across the same price controls. In wastewater, no expenditure is attributed to enhancement, it is recorded in capex and opex. In water, 96% is attributed to "other", as many costs are contracted outside the business and the remaining 4% is labour.

Therefore, we calculate the input mix for capex based on regulatory precedent, which derives from a study by First Economics as shown in the table below. Although we have detailed information on a project-by-project basis, this is not categorised according to Ofwat's required inputs, hence using the mix for a representative company produced by First Economics.

Table 12: Capex input mix of a representative water company

Input	Capex
Labour - general	30%
Labour - specialist	15%

Input	Capex
Materials - parts/equipment	10%
Materials - civils	15%
Plant and equipment	25%
Other	5%

Source: First Economics (2014), "PC15 Annex O – The Rate of Frontier Shift Affecting Water Industry Capital Costs", produced for the Northern Ireland Utility Regulator, p5, Table 3.1.

The input mix is not split by price control or service, so this analysis assumes that the capex input mix is constant across the value chain.

The resulting input proportions

For base, we take the capex and opex input mix for each input, multiply it by the capex-opex split for the relevant price control, and sum the result to give a weighted average. For enhancement we use the capex mix where there is a value (labour, materials, plant, and equipment, and other) and just the enhancement where there is not, with each receiving a 50% weight.

Regarding the "Additional control" section, we do not consider any further price controls beyond those explicitly stated. So, we have treated the Additional control as a nil return.

Appendix 2: Estimated funding gap for water and wastewater

This appendix gives the breakdown of the overall RPE adjustment into water and wastewater.

Table 13: Summary of RPE proposed adjustments for AMP8 – Water

Prices 2022-23	Ofwat's approach RPEs from 2023-24	Proposed Option 2 Model uplift + RPEs from 2023-24
Energy RPE adjustment	-£83m	£30m
Labour RPE adjustment	£5m	£5m
Chemicals RPE adjustment	-£2m	£0m
Materials, plant and equipment RPE adjustment	-£10m	£0m
Total RPEs adjustment - water	**-£90m**	**£35m**
Overall RPE funding gap – water	**£125m**	

Table 14: Summary of RPE proposed adjustments for AMP8 – Wastewater

Prices 2022-23	Ofwat's approach RPEs from 2023-24	Proposed Option 2 Model uplift + RPEs from 2023-24
Energy RPE adjustment	-£119m	£16m
Labour RPE adjustment	£23m	£23m
Chemicals RPE adjustment	-£3m	-£1m
Materials, plant and equipment RPE adjustment	-£34m	£0m
Total RPEs adjustment – wastewater	**£-133m**	**£38m**
Overall RPE funding gap - wastewater	**£171m**	

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Appendix 3: RPEs adjustments split – water and wastewater

Table 16: Energy RPE adjustment from Ofwat's default methodology, Option 1 and Option 2 - Water

Prices of 2022-23	Ofwat's approach RPEs from 2023-24	Proposed Option 1 RPEs from 2021-22	Proposed Option 2 Model uplift + RPEs from 2023-24
Modelled costs before frontier shift (a)	£914m	£914m	£914m
Estimated model uplift (b)	N/A	N/A	£125m
Frontier shift (c)	-£5m	-£5m	-£5m
Modelled costs after frontier shift (d) = (a) + (b) + (c)	£909m	£909m	£1,034m
Estimated RPE adjustment (e)	-£83m	£15m	-£94m
New modelled costs (f) = (d) + (e)	**£826m**	**£924m**	**£940m**
Net RPE adjustment (g) = (b) + (e)	**-£83m**	**£15m**	**£30m**

Table 17: Energy RPE adjustment from Ofwat's default methodology, Option 1 and Option 2 - Wastewater

Prices of 2022-23	Ofwat's approach RPEs from 2023-24	Proposed Option 1 RPEs from 2021-22	Proposed Option 2 Model uplift + RPEs from 2023-24
Modelled costs before frontier shift (a)	£2,163m	£2,163m	£2,163m
Estimated model uplift (b)	N/A	N/A	£144m
Frontier shift (c)	-£9m	-£9m	-£10m
Modelled costs after frontier shift (d) = (a) + (b) + (c)	£2,154m	£2,154m	£2,297m
Estimated RPE adjustment (e)	-£119m	£44m	-£128m
New modelled costs (f) = (d) + (e)	**£2,035m**	**£2,198m**	**£2,169m**
Net RPE adjustment (g) = (b) + (e)	**-£119m**	**£44m**	**£16m**

Table 18: Labour RPE adjustment - Water

Prices 2022-23	Ofwat's approach RPEs from 2023-24
Modelled costs before frontier shift	£914m
Frontier shift	-£5m
Modelled costs before frontier shift	£909m
Estimated RPE adjustment	£5m
New modelled costs	£914m

Table 19: Labour RPE adjustment from - Wastewater

Prices 2022-23	Ofwat's approach RPEs from 2023-24
Modelled costs before frontier shift	£2,163m
Frontier shift	-£9m
Modelled costs before frontier shift	£2,154m
Estimated RPE adjustment	£23m
New modelled costs	£2,177m

Table 20: Chemicals RPE adjustment from Ofwat's default methodology and Option 2 - Water

Prices 2022-23	Ofwat's approach RPEs from 2023-24	Our proposed adjustment
Modelled costs before frontier shift	£914m	£914m
Frontier shift	-£5m	-£5m
Modelled costs after frontier shift	£909m	£909m
Estimated RPE adjustment	-£2m	£0m
New modelled costs	£907m	£909m

Table 21: Chemicals RPE adjustment from Ofwat's default methodology and Option 2 - Wastewater

Prices 2022-23	Ofwat's approach RPEs from 2023-24	Our proposed adjustment
Modelled costs before frontier shift	£2,163m	£2,163m
Frontier shift	-£9m	-£9m
Modelled costs after frontier shift	£2,154m	£2,154m
Estimated RPE adjustment	-£3m	-£1m
New modelled costs	£2,151m	£2,153m

Table 22: Materials RPE adjustment from Ofwat's default methodology and Option 2 - Water

Prices 2022-23	Ofwat's approach RPEs from 2023-24	Our proposed adjustment
Modelled costs before frontier shift	£914m	£914m
Frontier shift	-£5m	-£5m
Modelled costs before frontier shift	£909m	£909m
Estimated RPE adjustment	-£10m	£0m
New modelled costs	£899m	£909m

Table 23: Materials RPE adjustment from Ofwat's default methodology and Option 2 - Wastewater

Prices 2022-23	Ofwat's approach RPEs from 2023-24	Our proposed adjustment
Modelled costs before frontier shift	£2,163m	£2,163m
Frontier shift	-£9m	-£9m
Modelled costs before frontier shift	£2,154m	£2,154m
Estimated RPE adjustment	-£34m	£0m
New modelled costs	£2,120m	£2,154m