

Review of the treatment of enhancement opex in Ofwat's PR19 initial assessment of business plans

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1. Introduction and summary

Introduction

Ofwat is currently carrying out its periodic review of the price controls for English and Welsh water companies to apply in the period 1 April 2020 to 31 March 2025 (the PR19 review). As part of this review, Ofwat published its initial assessment of water companies' business plans (IAP) on 31 January 2019. One of the major elements of Ofwat's work for the IAP has been its cost assessment, which has drawn on a range of analysis and approaches to produce provisional allowances for each water company's efficient expenditure requirements over the period 2020-25.

Ofwat's approach to cost assessment ultimately produces an annual totex allowance for each company, for each separate wholesale control; totex comprises the sum of operating expenditure (opex) and capital expenditure on a cash basis. However, the cost assessment approach used for the IAP follows is not a pure totex approach: it is not indifferent to the balance of opex and capex in companies' business plans. The way that Ofwat has approached the cost assessment for the IAP entails significant differences in the treatment of opex and capex. The approach involves marking a boundary between (a) the assessment of the capex proposed by companies to accommodate increases in customer demand, increases in service quality and improvements to environmental outcomes, and (b) the assessment for the remainder of companies' costs.

Ofwat's IAP is generally dismissive of the forecasts put forward by water companies for the opex associated with plans to accommodate increases in customer demand, increases in service quality or improvements to environmental outcomes. The size of that expenditure is not insignificant. Across the sector, the opex put forward in companies' business plans to cover such enhancements in 2020-25 is around £975 million for wholesale water services, and £625 million for wholesale wastewater services (2017/18 prices).

Three water companies, Anglian Water, Northumbrian Water and Wessex Water, asked Reckon LLP to carry out a review of the treatment of enhancement opex in Ofwat's IAP.

The findings from our review of enhancement opex

Ofwat's regulatory framework is intended to reward and encourage efficiency and innovation.

This policy intention is undermined by the way in which the IAP cost assessment has responded to companies' proposals for the operating expenditure associated with accommodating increases in customer demand, delivering increases in service quality or achieving improvements to environmental outcomes.

While Ofwat has carried out analysis and review of companies' forecasts of the capex associated with enhancements, it has generally swept aside companies' claims for the opex associated with enhancements. Yet Ofwat has repeatedly emphasised in its publications that the efficient approach to delivery may often involve solutions that replace capital investment with more innovative approaches that would fall under operating expenditure.

The rationale given in the IAP is that the allowances for base costs, which it derives from econometric models applied to historical data on "base costs" (opex plus capital maintenance expenditure), covers all operating costs, including those for enhancements. This argument does not stand up to scrutiny.

It is true that, in some cases, the allowances for base costs may include some "implicit allowance" for the opex associated with enhancements. This is the case, for example, for enhancements related to growth in the number of customers supplied. However, an identification of implicit allowances would not explain the wide-ranging dismissal of companies' claims for enhancement opex. Instead, it would provide a basis for making a deduction from companies' enhancement opex (or totex) forecasts in specific cases where an implicit allowance is identified.

In other parts of its IAP, Ofwat suggests a different type of rationale, which seems relevant to its treatment of enhancement opex. Ofwat presents a view that companies *ought* to be able to achieve enhanced environmental performance and improved service levels in the 2020-25 period without exposing customers to additional base costs. This view is not about implicit allowances within the econometric models. It might instead be explained as a regulatory policy assumption about the opportunities for efficiency improvement by water companies over time and about what costs customer should be expected to pay for. But if that is the case, it represents an efficiency challenge that applies in addition to those applied much more explicitly in the IAP (e.g. the use of an upper quartile cost efficiency benchmark and an assumption of 1.5 per cent annual efficiency improvements per year), and there are questions as to whether these efficiency assumptions are reasonable in aggregate. When it comes to enhancements, the IAP approach seems to involve an additional type of efficiency challenge that is applied to companies' proposed opex but not their proposed capex.

Overall, we have found deficiencies with the treatment of enhancement opex within the IAP cost assessment. There are several implications of these deficiencies:

- Taking Ofwat back to a regulatory framework in which it is financially more attractive for water companies to favour relatively capex-intensive solutions, even where such solutions lead to higher costs overall on a whole-life cost basis. This is in stark contrast to Ofwat's policy objective to reward and encourage efficiency and innovation.
- Exacerbating inaccuracy in the cost assessment that is used to set price controls, which raises issues of fairness for customers and for companies.
- Exacerbating inaccuracy in Ofwat's reported findings on companies' relative efficiency, which has reputational implications for companies.
- Reducing trust and confidence in the regulatory framework, with inconsistency between the stated policy intention and the practical implementation.

A possible way forward

We have some sympathy for Ofwat's situation. It has quite rightly moved away from the totex econometric modelling used for PR14. Limiting its high-level econometric modelling to base costs is sensible. This, in turn, entails a role for a separate strand of cost assessment concerning enhancement. The separation between base costs and enhancements creates complications and risks. The difficulty is not so much that Ofwat's cost assessment is in two broad parts (base costs and enhancements), but that it is in two parts that are not additive. The two parts are difficult to combine or reconcile.

Ofwat might reasonably be concerned that if it combines estimates from its econometric models of base costs with estimates from a review of business plan submissions on enhancements, these parts of its cost assessment could give rise to some double-counting when taken together. But the approach taken in the IAP – dismissing companies' enhancement opex claims completely for most enhancement categories – is unreasonable.

Ofwat has worked with water companies to make improvements to its econometric modelling of base costs since PR14, drawing on issues raised by the CMA in its *Bristol Water* determination. We feel that work on the cost assessment approach for enhancements, and especially on the interactions between enhancement costs and base costs, is relatively under-developed as it stands. There is a strong case that this should be an area of focus as

Ofwat moves from its IAP to its draft determinations. Ofwat has indicated in a recent webinar that it will consider enhancement opex further for its draft determinations.

In the main body of this paper we set out how Ofwat could further develop and adapt its IAP approach and significantly reduce the problems experienced with the treatment of enhancement opex. To summarise, this would build on the following points:

- It is important to develop a much better understanding of the relationship between the allowances derived from the econometric models of historical base costs and the costs that an efficient company faces to accommodate increases in customer demand, deliver increases in service quality and achieve improvements to environmental outcomes. What element of enhancement costs is it reasonable to think is covered by the “implicit allowances” from the base cost models?
- In doing so, it will be helpful to draw a distinction between those categories of enhancements for which the drivers relate to explanatory variables in the econometric models of base costs (e.g. enhancements relating to growth in customer numbers) and those enhancements that relate to aspects of service quality or environmental outcomes that are not captured by the explanatory variables in these models.
- It is important not to cloud the assessment of implicit allowances by confusing these with the regulatory assumptions on efficiency improvements that are used in the calculation of allowances.
- The transparency and quality of the cost assessment for enhancements would be improved by providing clarity on the intended ways in which price control allowances for enhancements could differ from companies’ forecasts of enhancement costs.
- Given Ofwat’s policy aims on innovation and efficiency, it seems mistaken to apply regulatory efficiency challenges such that companies are expected to absorb the opex, but not the capex, associated with achieving improvements in service quality and environmental outcomes.

Finally, there seems to be real value in a sense-check of considering whether the cost assessment models and methodologies used are capable of accommodating a hypothetical case where a company proposes to achieve improvements in service quality or environmental outcome through an innovative delivery approach that is 100 per cent opex. The application of this sense-check may point to the need for revisions to benchmarking

models used for enhancements, consideration of potential adjustments to the results of existing models, or perhaps an approach that places less weight on the results of the benchmarking models for enhancements and more on a qualitative review of business plan submissions.

Adapting the IAP approach in light of the points above seems entirely practical for PR19 and would help reduce the concerns identified.

Structure of this paper

The remainder of this paper is structured as follows:

- Section 2 recaps on some of the policy context for Ofwat's totex and outcomes approach to the price control framework for wholesale water and wastewater services and provides a series of practical examples that support Ofwat's policy intentions. It then highlights a conflict between the policy intentions and the approach taken to enhancement opex in the cost assessment for the IAP.
- Section 3 provides a more detailed explanation of the deficiencies of the treatment of enhancement opex in the IAP.
- Section 4 outlines a way to try to mitigate some of the problems with the treatment of enhancement opex, focusing on measures that seem practical and realistic for PR19 and involving adaption of the approach used for the IAP.

2. Policy issues for IAP treatment of enhancement opex

Ofwat's policies on totex and innovation

In its final methodology for the PR19 review, Ofwat highlighted the role of the totex and outcomes framework introduced at PR14:²

“Our price control framework is designed to reward and encourage efficiency and innovation. At PR14, we introduced a totex and outcomes framework. The framework has given companies the flexibility to decide how best to deliver their services, and to come up with the most cost-efficient and innovative solutions.”

The totex approach was introduced in the context of concerns about the capex bias that Ofwat had identified under previous regulatory approaches: the concern that companies may focus unduly on capital-intensive solutions, at the expense of potentially more innovative and more efficient opex-based solutions.

Ofwat's approach to PR19 has been developed with a recognition of the potential for water companies to adopt innovative solutions that replace a capex-intensive solution with more opex-based solutions. Ofwat has cited examples such as:

- Procuring bulk water supplies from neighbouring water companies or third parties, rather than investing in increases in the capacity of the company's own water resources and water treatment assets.
- Catchment management measures (e.g. agreements with farmers to help limit water pollution caused by fertilisers) as a means to address deterioration in raw water quality, rather than investment in water treatment assets.
- Using neighbouring water companies or third parties to provide sludge treatment services rather than using in-house capacity.

There are further examples which help to show the wide-ranging potential for innovation and efficient delivery to involve solutions that are opex-intensive rather than capex-intensive:

² Ofwat (2017) Delivering Water 2020: Our final methodology for the 2019 price review, December 2017, p138.

- Wessex Water told us that, as an alternative to capital interventions at sewage treatment works, it has been working with community partners to reduce the nutrient load in the rivers, an evolution in its catchment management approach. It has been using Farmscoper a decision support tool developed on behalf of Defra, to help assess where working with the agricultural community allows for a lower whole-life cost mitigation to nutrient pollution than intervention on its capital assets. For example, it may make payments to farmers for cover crops to absorb nutrients.
- Wessex Water told us that, in relation to drinking water quality, the majority of failures against mean zonal compliance come from customer-side pipes (e.g. lead pipes) and issues with the plumbing at customers' premises. Wessex Water is proposing to work with customers, offering to replace their pipes at no charge and to inspect their home and offer advice to reduce the number of failures arising. These initiatives present a way to improve water quality outcomes, and largely involve opex (e.g. replacement of a customer's pipe does not create a water company asset and is not reported as capex).
- Anglian Water told us that, as a means to protect its assets and customers from pluvial, fluvial or coastal flooding, an approach of working in partnership with third parties can be more efficient than carrying out the investment itself. It has included partnership funding expenditure in its plan to enable it to contribute to third party projects (usually those of a flood risk management authority such as the Environment Agency (EA), Lead Local Flood Authority (LLFA), District Council or Internal Drainage Board so that these can achieve the benefits it is seeking. The costs of these partnership solutions will be classified as opex since Anglian Water will not own the assets created.
- Anglian Water gave an example of river augmentation. If the Environment Agency has identified that abstraction from a raw water source should be reduced to avoid adverse environmental impacts, Anglian Water will consider a range of options to enable the reduction. In some cases, it has found that the most efficient approach is to pay third parties (typically a contractor working for the river owner) to retain flow in the river by altering the watercourse rather than digging a river support borehole or piping water to the watercourse from another source. Where augmentation is achieved by watercourse

alteration the expenditure on river augmentation is not capitalised and so forms part of opex, even though it brings lasting environmental benefits.

- Wessex Water told us that it had worked with the Environment Agency in developing the WINEP by looking at alternative approaches to meeting the required standards. This has led to the introduction of a different operational regime at some sewage treatment sites, with increases in staff time to optimise and control the processes, using more chemicals to dose the effluent and operating assets more intensively. These changes involve greater opex but can allow a lower whole-life cost born by the customers compared to capital-intensive solutions.

More generally, Ofwat's policy on totex recognises that there may be legitimate differences between companies in the way that companies deliver outcomes for customers and the environment, which lead to differences in the mix of opex and capex between companies.

Ofwat has also recognised that there may be significant differences between companies in the mix of reported opex and reported capex due to differences in accounting practices (the figures for opex and capex reported by companies for regulatory purposes reflect each company's own capitalisation policy for statutory accounts and there is no attempt to standardise data across companies for regulatory reporting).

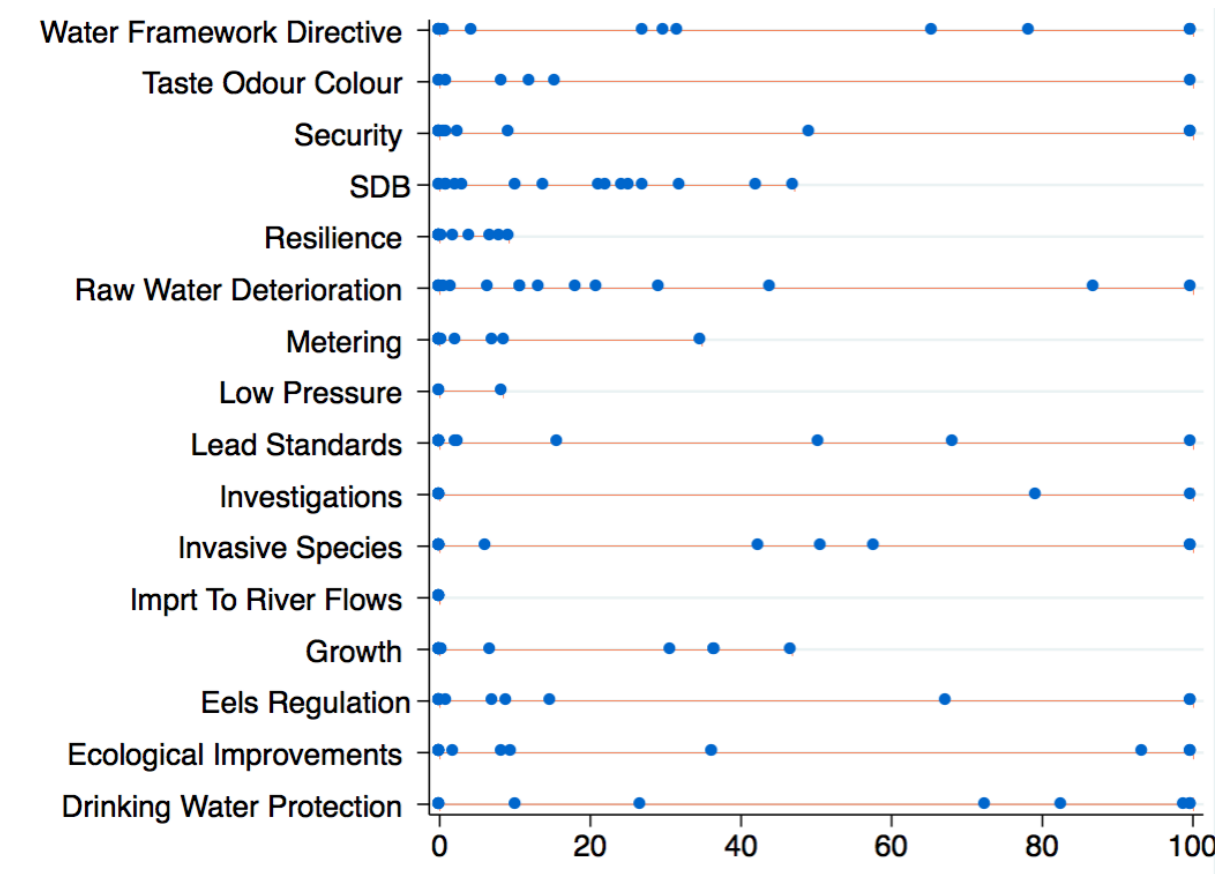
An example of differences in accounting treatment or cost allocation is that for Ofwat's enhancement category of "WINEP/NEP Investigations". Northumbrian Water has treated the costs of these investigations into enhancements that may be required for environmental purposes in 2025-2030 as opex but some other companies have treated these costs as capex.

Companies' business plan proposals on enhancements give an idea of the scale and importance of the differences in the mix of opex and capex. Figure 1 and Figure 2 show the ratio of operating expenditure to total expenditure for different categories of enhancements, as defined by Ofwat, across the set of companies. For each enhancement category, each company's observation is marked by a blue dot, and the orange line marks the range of values. The figures are based on the capital and operating expenditure reported in Tables

WS2 and WWS2 of companies' Business Plans and on the set of reallocations of expenditure across enhancement categories carried out by Ofwat.³

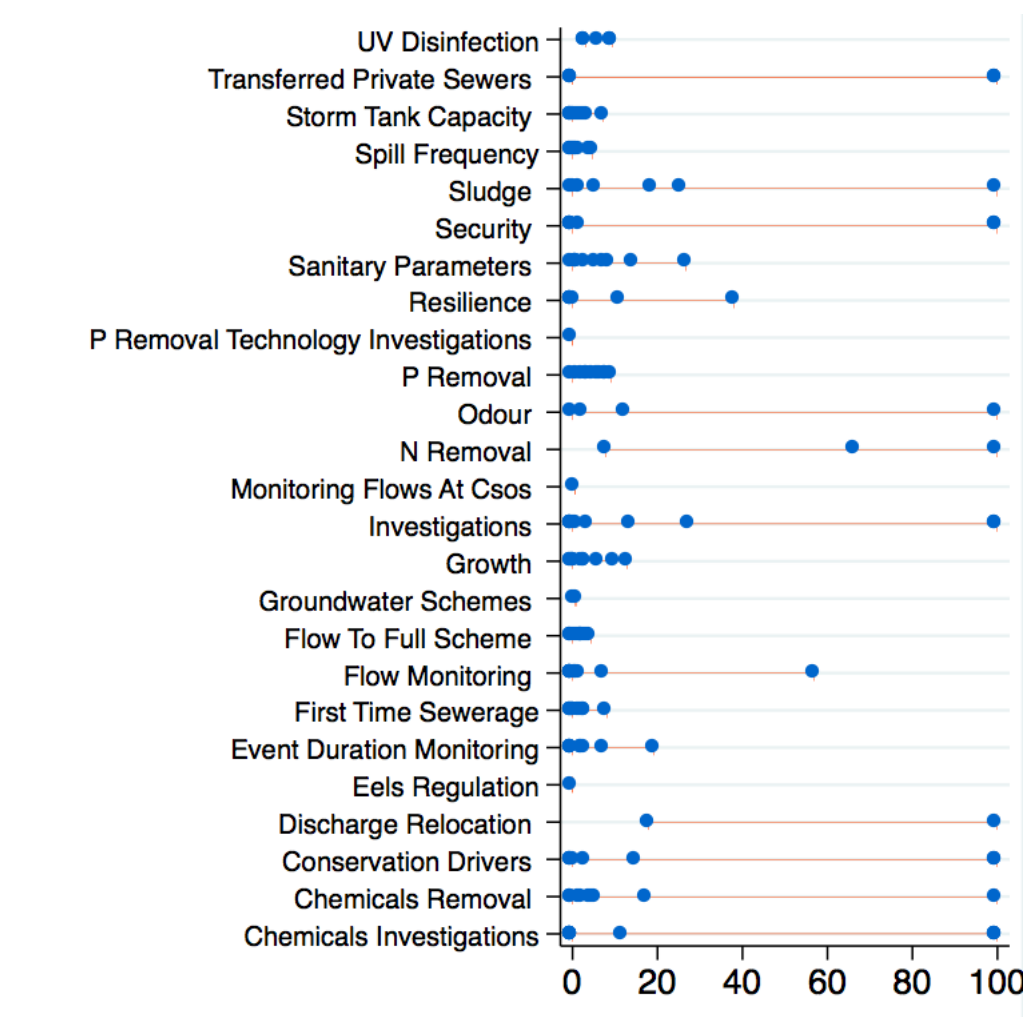
We can see that there are large differences between companies in the mix of enhancement opex and enhancement capex. In a number of cases companies have proposed solutions for specific enhancement categories that are 100 per cent opex even when most companies in the industry have proposed capex-intensive solutions. Observing this contrast reinforces the conceptual point discussed earlier: that there is merit in a price control framework that seeks to avoid or limit differences in the regulatory treatment of opex and capex.

Figure 1 Enhancement opex as a proportion of total proposed expenditure on enhancements: company business plans for wholesale water



³ Based on Business Plans downloaded from companies' websites on 14 January 2019.

Figure 2 Enhancement opex as a proportion of total proposed expenditure on enhancements: company business plans for wholesale wastewater



Conflicts between the IAP approach and policies on totex and innovation

Ofwat's implementation of its totex approach is evolving. For its cost assessment at PR14, Ofwat experimented with a rather extreme form of totex cost assessment, which gave significant weight to the results from highly-aggregated econometric models of totex. These models involved comparisons across companies in terms of a measure of totex expenditure which included opex, capital maintenance expenditure and capital enhancement expenditure.

Ofwat's totex models for PR14 were criticised by the CMA in its *Bristol Water* determination (2015). The CMA's approach for Bristol Water focused on econometric models of base expenditure (rather than using econometric models of totex).⁴

Ofwat has moved on from its PR14 approach. In describing its approach for PR19 in the IAP, Ofwat stated the following:⁵

"Unlike at PR14, where we had totex models in wholesale water, the models we use at PR19 include base costs only. Our totex models at PR14 did not perform as well as models of base costs. This is expected, given that enhancement costs tend to be non-routine and company specific. The use of base costs in econometric modelling is consistent with the models developed by the Competition and Markets Authority (CMA) in its determination of Bristol Water and with company feedback."

Ofwat's move away from the type of totex econometric models used for PR14 is understandable. However, the separation between (a) the determination of allowances based on econometric models of historical base expenditure, and (b) a series of separate cost assessments for individual categories enhancements, provides brings with it some risks of inconsistent treatment of opex and capex.⁶ Whether these risks materialise in practice depends on exactly where cost assessment boundaries are drawn, and on the details of the approach taken to assess the set of costs on either side of the boundaries.

We found that the approach that Ofwat has used for the IAP does not deal at all well with these risks.

Ofwat's IAP gives much less attention to companies' requirements for enhancement opex than to their requirements for enhancement capex. The IAP dismisses large parts of companies' proposals for enhancement opex without good reason. For a large proportion of enhancement categories, Ofwat provides no allowance for enhancement opex even where it has accepted the case for an allowance for enhancement capex (e.g. enhancements relating

⁴ CMA (2015) *Bristol Water plc: a reference under section 12(3)(a) of the Water Industry Act 1991*

⁵ Ofwat (2019) "Technical appendix 2 – Securing cost efficiency", page 10.

⁶ Under a building blocks approach to price controls it is probably unrealistic to think that the regulatory framework can be designed in a way that does not have some distortionary effects on companies incentives (e.g. compared to a hypothetical competitive market).

to environmental outcomes). The reasoning given in the IAP for not making additional allowances for enhancement opex is that these are already covered through the allowances derived from econometric models of base costs; this argument does not stand up to scrutiny.

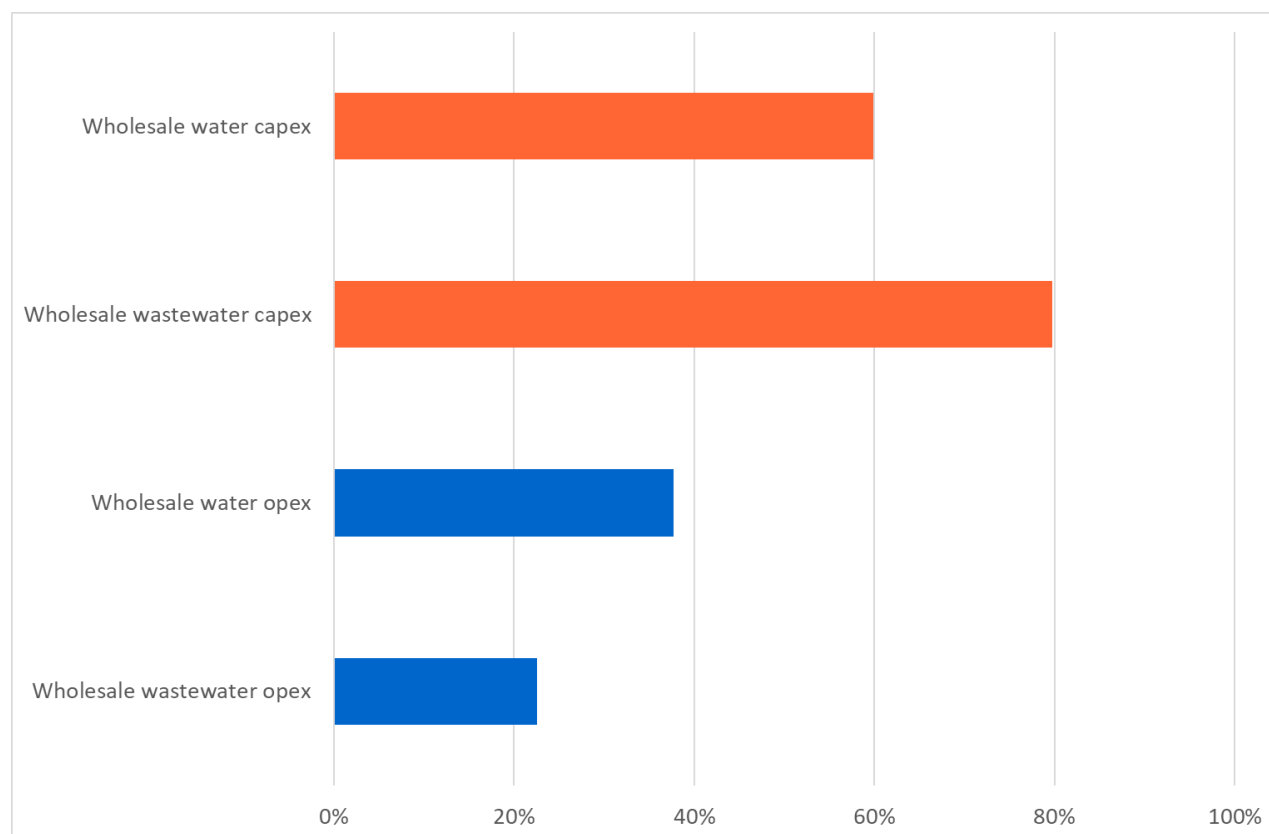
Figure 3 illustrates the contrast in this treatment. Taking wholesale water and wholesale wastewater separately, the figure shows an estimate of the proportion of the enhancement costs put forward in companies' business that is identifiable as covered in IAP allowances, breaking down allowances between opex and capex elements of enhancement costs. Our analysis takes account of the implicit allowances for growth (e.g. customer numbers) within the allowances derived from the econometric models of base costs.⁷ We developed these estimates taking account of expenditure and allowances across all enhancement categories, other than the "freeform" enhancements and cost adjustment claims related to enhancements. With respect to wholesale water, we find the IAP made identifiable allowances for 60 per cent of capex put forward by companies (£3,917 million out of £6,545 million) and for 38 per cent of opex (£350 million out of £929 million). For wastewater, the contrast in the share of expenditure allowed for by Ofwat is starker: 80 per cent for capex (covering £6,143 million out of £7,699), and 23 per cent for opex (£125 million out of £557 million).

Our analysis here cannot show what allowances Ofwat ought to apply – that would depend on detailed cost assessment that tackles the deficiencies in the IAP – but it does highlight the stark contrast between the treatment of opex and capex for enhancements, in terms of how much of companies' business plan proposals are allowed for in the IAP.

⁷ We derived estimates for opex enhancements as the sum of our estimated implicit allowance for opex enhancements related to; (i) growth, for water and wastewater; (ii) supply-demand balance; and (iii) metering. The example provided in Figure 4 below outlines the approach we took to estimate (i). Our estimate of (ii) and (iii) – which relate to cases where Ofwat carried out a totex assessment of enhancements – is based on allocating the allowance made by Ofwat for the particular enhancement category between opex and capex, drawing on the capex and opex figures submitted by companies in their business plans and on the subsequent set of reallocation of expenditure across categories made by Ofwat, and on Ofwat's analysis of those enhancement categories. We did not seek to estimate implicit allowances associated with enhancements relating to the proportion of load treated at works with tight ammonia consent – a variable included in some of the wastewater models. There may be implicit allowances for opex relating to other enhancement categories, but, based on information published by Ofwat for its IAP, we are not able to strip these out from the overall allowance figures.

The contrast shown in Figure 3 above is indicative of an issue that requires further attention.

Figure 3 Estimated proportion of company business plan proposals for enhancement costs that is identifiable as covered in IAP allowances



In section 3, we identify a series of specific problems with the IAP treatment of enhancement opex. These problems have the effect of under-estimating the efficient totex for water companies whose approach to delivery (or accounting policy) is relatively opex-intensive and, potentially, over-estimating the efficient totex for water companies whose approach to delivery is relatively capex-intensive.

This feature of the IAP approach to cost assessment conflicts starkly with Ofwat's regulatory policy objectives on totex and innovation for PR19.

There are several implications of the problems we have identified:

- Returning to a regulatory framework in which it is financially more attractive for water companies to favour relatively capex-intensive solutions, even where such solutions lead to higher costs overall on a whole-life cost basis, reduced innovation and higher bills to customers in the long term.
- Exacerbating inaccuracy in the cost assessment that is used to set price controls, which raises issues of fairness for customers and for companies.
- Exacerbating inaccuracy in Ofwat's reported findings on companies' relative efficiency, which has reputational implications for companies.
- Reducing trust and confidence in the regulatory framework, with inconsistency between the stated policy intention and the practical implementation.

No price control cost assessment can be perfectly accurate, and there can be trade-offs between accuracy and other considerations such as the desired incentive properties of the controls and the practicalities in terms of the time and resources available. However, the nature and scale of the deficiency in the IAP assessment of enhancement opex means that it is not something that it would be reasonable to ignore and tolerate for the next phase of Ofwat's cost assessment process.

There is a serious concern that, if left unresolved, this approach would create incentives for water companies to favour capex-intensive approaches at the expense of more opex-intensive solutions when it comes to accommodating increases in the number of customers supplied, achieving better environmental outcomes and delivering improved service levels.

This situation is at odds with the policy reforms that led to the introduction of Ofwat's totex and outcomes approach at PR14 and with its focus at PR19 on innovation.

3. Deficiencies in Ofwat's treatment of enhancement opex

The IAP approach is deficient in its treatment of the opex associated with enhancement projects, both with opex associated with enhancements commissioned in the past and with the opex associated with enhancements proposed for the 2020-25 period. The IAP draws a boundary between base costs and enhancement capex for the purposes of cost assessment. But the approach overlooks the way that opex may be affected by enhancement programmes and does not take sufficient account of the *interactions* between enhancement capex and base costs.

This deficiency contributes to inaccuracy in the cost assessment (and determination of price limits) and poses risks of giving water companies financial incentives to favour capex solutions over opex solutions. We focus in this section on the nature of this deficiency, and then turn in section 4 to discuss potential remedies and mitigations.

This section is organised as follows. We first summarise Ofwat' approach and then take the following topics in turn below:

- A. The influence of historical capital enhancements on historical opex.
- B. Opex associated with future enhancements versus historical enhancements.
- C. Implicit regulatory assumptions on efficiency improvements to fund enhancement opex.
- D. The IAP forecasts for cost drivers relating to enhancements for growth.
- E. Exceptions to IAP approach to enhancement opex that are not exceptional.

Ofwat's IAP approach to base costs and enhancements

Ofwat provided the following explanation for the differences between the assessment of enhancement costs and of base costs in the IAP:⁸

"The efficient level of enhancement costs is more difficult to estimate than for base costs. Due to their irregular nature, there is less opportunity to compare the cost of required enhancement solutions between companies, and in some

⁸ Ofwat (2019) "Technical appendix 2 – Securing cost efficiency", page 15.

areas the exact requirements may be subject to uncertainty. This difference between base and enhancement costs means that the focus of our assessment framework is different between the two.

- *For base cost our focus is on an incentive-based framework. We develop our fully independent cost baselines to incentivise companies to submit efficient business plans (along with other incentives such as the IAP incentive to submit high quality plans and the new cost sharing incentive) and to strive to find further efficiencies throughout the control period.*
- *For enhancement costs, given the uncertainty, our focus is less on incentives and more on protecting customers from paying for inefficient, unrequired or undelivered investment in the control period”*

The IAP describes base costs as “routine, year on year costs, which companies incur in the normal running of their business”.⁹

The terminology used here of “base costs” and “enhancement costs” is somewhat loose and could be misleading. Although the IAP presents the approach as involving a distinction between base costs and enhancement costs, the approach applied in practice draws a boundary between *enhancement capex* and all other costs.

Enhancements to service levels and capacity to meet customer demand might be achieved, in full or in part, through solutions involving opex rather than capex. With a couple of exceptions, the opex associated with enhancements is not covered under the IAP approach to assessing enhancement costs.¹⁰ As quoted in the previous section, the IAP reports that in most cases, the enhancement allowances only include the capex associated with

⁹ Ofwat (2019) “Ofwat (2019) “Technical appendix 2 – Securing cost efficiency”, page 9.

¹⁰ The exceptions we detected relate to the assessment of enhancements for supply-demand balance and to metering. These are not the same areas that Ofwat itself has highlighted. Specifically, on page 19 of its January 2019 “Technical appendix 2 – Securing cost efficiency”, Ofwat lists the example of some management catchment proposals as one where it had taken a totex approach. In our review, we found no trace, within the set of IAP working files published by Ofwat, of how it had taken a totex approach with respect to catchment management proposals. Separately, on its webinar of 7 February 2019, Ofwat referred to P-removal as a further example of where the allowances made covered capex and opex; again, we found this did not fit with the analysis presented in the set of working files.

enhancements and that allowances for opex associated with enhancements is covered under the allowances for base costs.

Leaving aside the exceptions, the overall approach to cost assessment used for the IAP draws a boundary not between enhancement costs and base costs but between:

- capital expenditure for enhancement programmes/projects; and
- the aggregate of capital maintenance expenditure (which includes asset replacement) and operating expenditure.¹¹

For ease of reference, we follow Ofwat and use the term “base costs” for the latter category, but we have some reservations about the use of this term to refer to allowances for a future period.

The allowances in the IAP for (modelled) base costs over the 2020-25 period are derived by applying the estimated coefficients from the econometric models of base costs in the period 2011-12 to 2017-18 to forecasts, for each company, of the explanatory variables (cost drivers) for these models over the 2020-25 period. The determination of these allowances also involves the application of several forms of “efficiency challenges”. In some cases, Ofwat has also allowed adjustments to the allowances, following review of “Cost adjustment claims” submitted by companies in their business plans.

For enhancement capex, Ofwat’s IAP approach takes individual categories of enhancement capex separately and applies a range of different approaches to these for the purpose of cost assessment. The IAP summarises these approaches as: benchmarking of historical data; benchmarking of business plan (forecast) data; deep dive; and shallow dive. The IAP describes the efficiency challenges applied in setting allowances as a bespoke challenge depending on the quality of the model used in the assessment or on its view of a company efficiency in the context of the wider plan.¹²

¹¹ Under the IAP approach, several items of operating expenditure are excluded from this and subject to bespoke assessments. These include business rates; abstraction charges; traffic; Management Act costs; Wastewater Industrial Emissions Directive costs (Appendix A2, page 7). For ease of reference, where we refer to opex in this paper, we mean opex excluding these items.

¹² Ofwat (2019) “Ofwat (2019) “Technical appendix 2 – Securing cost efficiency”, page 7.

A) The influence of historical capital enhancements on historical opex

The first issue that we turn to concerns the influence of historical capital enhancements on historical opex data. This is an important issue by itself and also an illustration of the way that separation between base costs and enhancement capex causes problems when different companies operate with a different mix of opex and capex. At this stage, we are not looking at how Ofwat has made forecasts or allowances for the period 2020-25, but rather we are concerned with the interpretation and understanding of its econometric models of base costs.

As a simple illustration of the issue, consider a hypothetical example of two water companies which are identical other than for the following:

- Company A has experienced 2 per cent annual growth in customer numbers over the last 20 years and has accommodated this growth through long-established engineering solutions that involve high capital costs and low ongoing operating costs.
- Company B has experienced the same growth in customer numbers over time as company A but has accommodated this growth through more innovative solutions that involve lower upfront capital costs and higher ongoing operating costs.

Ofwat's regulatory reporting arrangements mean that the data captured under base costs (operating expenditure and capital maintenance expenditure) will be significantly higher for company B than for company A. Part of the costs that enable company A to supply its customer base is enhancement capex which is excluded from base costs, whereas the full costs of company B fall under base costs. Therefore, even if both companies are equally efficient, any cost comparisons or benchmarking analysis of base costs will present company B as historically inefficient unless account is taken of the interactions between opex and enhancement capex.

More generally, and from a statistical perspective, the exclusion of enhancement capex from the econometric modelling of base costs will tend to:

- Contribute to over-estimation of the efficient level of base costs for those companies that use an asset base that reflects relatively capital-intensive enhancement programmes in the past.

- Contribute to under-estimation of the efficient level of base costs for those companies that use an asset base that reflects relatively opex-intensive approaches to achieving capacity and service enhancements in the past.

The scale of the estimation issues identified above will be greater: (a) the greater is the variation between companies in the opex-capex mix of their enhancements (whether due to engineering and operational practices or accounting policies); and (b) the greater has been the scale of capital enhancement expenditure in the industry, relative to base costs, over the data period used for the historical benchmarking analysis.

B) Opex associated with future enhancements versus historical enhancements

To the best of our knowledge, with the exception of two enhancement categories, Ofwat's IAP approach makes no allowance for the opex associated with enhancements beyond the allowances derived from the results of its econometric models of base costs over the 2020-25 period.¹³ The IAP explains this as follows:¹⁴

“In companies’ annual regulatory accounts, enhancement costs are exclusively capital expenditure. Any operating expenditure incurred as part of an enhancement activity is reported under base costs. We consider that our efficient base cost allowance, which is estimated on the basis of reported base costs, covers all operating costs, including those for enhancement. This is because the opex associated with historical enhancement programmes is included in the data used to generate our base models.”

The terminology used in the annual regulatory accounts, or Annual Performance Report (APR) is not “enhancement costs”. For the purposes of the APR, there are breakdowns of expenditure that allow for a decomposition of capex between enhancement capex and capital maintenance. There is no corresponding requirement on companies to decompose

¹³ Based on our analysis of the set of Excel files containing Ofwat's working on its cost assessment for enhancement expenditure, the two areas where it made an allowance for opex are (i) supply demand balance, and (ii) metering.

¹⁴ Ofwat (2019) “Ofwat (2019) “Technical appendix 2 – Securing cost efficiency”, page 19.

their historical operating expenditure between opex arising from enhancement programmes and other opex.¹⁵

Given the regulatory reporting arrangements and the data it has used, it is correct for Ofwat to say that its econometric models of base costs draw on historical opex data that include opex associated with historical enhancement programmes.

However, there is simply no logical or statistical basis for the claim, implied in the quote above that, because the opex associated with historical enhancement programmes is included in the historical data used to generate the base models, it follows that the base cost allowances from the IAP (which are allowances for the 2020-25 period) cover all operating costs including those for enhancements.

The underlying problem with this claim concerns the dimension of time. The inclusion of the opex associated with historical enhancement programmes in the econometric models of base costs covering the period 2011/12 to 2017/18 (2011-18) might mean that expenditure benchmarks calculated from those models provide opex allowances in respect of the customers supplied, and service levels achieved, in the past period 2011-18. But the inclusion of the historical opex associated with historical enhancement programmes in the econometric modelling of base costs provide no basis for funding the opex that will be incurred in the future (e.g. 2020-25 period) when future enhancement programmes have enabled further increases to the number of customers supplied and to service levels.

To take a simple illustrative example, suppose that the whole water industry was proposing to achieve, in the 2020-25 period, a substantial decrease in internal sewer flooding incidents associated with customer-side action, compared to historical levels, and this was to be achieved through customer engagement and awareness campaigns, the expenditure for which would fall under opex. The inclusion within the *historical* opex data feeding into the econometric modelling of opex associated with historical enhancement programmes (which enable companies to meet current service levels and demand), offers no funding for new initiatives in the 2020-25 period.

¹⁵ Some time ago, companies were required to provide a breakdown of operating expenditure between base service and enhancements in the annual reporting under the June returns. But this reporting of historical enhancement opex did not seek to disentangle opex associated with enhancements introduced in previous price control periods, so only painted a partial picture of enhancement opex.

In terms of the opex associated with a water company's enhancement programme for the 2020-25 period, we can see routes through which these *might* be allowed for in the IAP base cost allowances in certain circumstances. For instance:

- **Inclusion of relevant explanatory variable in the base cost models.** If there is an explanatory variable in the model which captures, or proxies for, the driver(s) of the future enhancement programme, then this might provide the basis for a reasonable allowance for the enhancement opex, if combined with reasonable forecasts for that explanatory variable over the 2020-25 period.¹⁶ For example, the base cost allowances in the IAP can be seen to include an implicit allowance for the increase in base costs associated with growth in customer numbers, and growth in the scale of a company more generally, as the econometric models of base cost include variables relating to forecasts of customer numbers and company scale over the 2020-25 period.
- **Enhancements in 2020-25 to achieve historical industry-average performance.** If a company's enhancement programme acts to bring it up to an industry-average level of performance (e.g. in terms of environmental outcomes or service levels for customers) and there is no explanatory variables in the models to capture or proxy for the relevant aspect of performance, then there may be a case that the base cost allowances derived from the econometric models of base costs do make a reasonable allowance for the opex associated with these enhancements.¹⁷

These two points highlight that Ofwat is right to have been concerned that some part of companies' opex enhancement forecasts for 2020-25 might be covered by the allowances derived from econometric models of historical base costs.

But, a large part of the enhancement programmes that companies have put forward would seem to fall outside of the two points above. For instance, a substantial amount of proposed enhancement expenditure for 2020-25 is intended to achieve improvements in environmental outcomes that are not captured in the econometric models of base costs and which go beyond levels of performance achieved in the industry historically. We see no basis for the stronger and wide-ranging claim put forward by Ofwat in its IAP, as quoted

¹⁶ This will depend also on whether the estimated coefficient for that explanatory variable from the econometric models provides for a reasonable relationship between base costs and the explanatory variable.

¹⁷ Leaving aside the concern discussed under point (A) above.

above, that its “efficient base cost allowance [...] covers all operating costs, including those for enhancement.”

In a webinar on its approach to securing cost efficiency, Ofwat elaborated on its approach to enhancement opex.¹⁸ Ofwat did not give any convincing further rationale for the IAP approach,¹⁹ and seemed to recognise that there were problems with it.²⁰ Although Ofwat restated its position from the IAP that in most cases enhancement opex is included in its base cost allowances, it also said that, for draft determinations, it will consider whether it is appropriate to make allowances for enhancement opex in a wider set of areas.

C) Implicit regulatory assumptions on efficiency improvements to fund enhancement opex

As set out in the sub-section above, the specific explanation provided in the IAP for the treatment of enhancement opex does not stand up to scrutiny. In other parts of its IAP, Ofwat suggests a different type of rationale for its approach, which seems relevant to its treatment of enhancement opex. Specifically, the IAP suggests the view that companies *ought* to be able to achieve enhanced environmental performance and improved service levels in the 2020-25 period without exposing customers to additional base costs. For instance, in relation to common performance commitments, the IAP says that “[t]he delivery of stretching performance is to be funded from base costs” and that the “totex allowance (at

¹⁸ Ofwat (2019) “Ofwat webinar: Securing cost efficiency 7 February 2019 12:00 – 13:30pm: Q and A”, page 2.

¹⁹ Ofwat mentioned that besides enhancement activities that are new, there are typically enhancement activities that are no longer required, or that are no longer considered enhancements. Ofwat said that, since opex associated with these activities is included in the historical data used for its econometric models, it will be reflected in allowances. This does not seem a valid basis for the IAP approach. Especially in a context of substantial ongoing improvements in service quality and outcomes in the water industry, it does not seem reasonable to simply assume that the efficient operating costs associated with improvements in the 2020-25 period are cancelled out by a corresponding amount of cost reductions being available from past enhancement projects/activities being no longer required.

²⁰ Ofwat said that with better cost information available in the future, it will look to assess capex and opex together for enhancement activities. This seems to be a recognition of the problems of an approach to enhancements that looks at capex only. While there are likely to be opportunities to improve the approach to cost assessment for enhancements in future periodic reviews, including through changes to data collation, this does not mean that the IAP approach is reasonable within the data and practical constraints of PR19.

PR19 and in previous price reviews) should allow efficient companies to reach the performance levels that we have set”.²¹

This is not something that can be justified by reference to the historical data used or to the statistical properties of the econometric models of base costs. However, it might be seen as a regulatory policy assumption about the opportunities for efficiency improvement by water companies over time and about what costs customer should be expected to pay for.

In using historical expenditure data over the period 2011-18 to determine allowances for the period 2020-25, it is important for the regulator to take an informed view on what represents an efficient level of costs and on the evolution of efficient costs over that period. This should consider both the potential for efficiency/productivity improvements over time and the potential for changes in input prices relative to the inflation measure used for the price control (CPIH).

In Ofwat’s IAP approach, two explicit “efficiency challenges” are applied:²²

- a) **Upper quartile efficiency adjustment.** This is calculated by working out how much of a reduction in base costs would be needed by a hypothetical company with industry-average efficiency for it to achieve a level of costs that would be upper quartile in terms of “efficiency” across the historical data period.²³ Ofwat estimates this figure to be 4.8 per cent for wholesale water and 3.7 per cent for wholesale wastewater.²⁴
- b) **Annual industry-wide efficiency improvement rate.** An annual “frontier shift” assumption for industry-wide efficiency improvement (before consideration of RPEs) of 1.5 per cent.

²¹ Ofwat (2019) “Ofwat (2019) “Technical appendix 2 – Securing cost efficiency”, page 18.

²² Ofwat (2019) “Ofwat (2019) “Technical appendix 2 – Securing cost efficiency”, page 7.

²³ The predicted value from the econometric models can be interpreted as a cost estimate for a company with industry-average levels of efficiency over the historical period of the data.

²⁴ The worksheets “Control” within the Excel files FM_WW4.xlsx and FM_WWW4.xlsx, published by Ofwat as part of its IAP, report, for water and wastewater respectively, reports the estimates of the “within sector historical catch-up”, reflecting the upper quartile efficiency adjustment.

A possible interpretation of the IAP approach is that, in addition to these elements, the allowances calculated by Ofwat involve a further implicit assumption for efficiency improvement. We would describe this further implicit assumption as follows:

*A regulatory assumption that an averagely-efficient water company in the industry can make additional efficiency improvements for the 2020-25 period that allow it to absorb the **operating and capital maintenance expenditure** (but not the enhancement capex) of achieving environmental outcomes and service levels that are better than the environmental outcomes and service levels achieved, at the industry-average level, over the period 2011-18.*

The extent of the implicit challenge may vary across categories of enhancements and across companies. For example, for some types of enhancements, the implied regulatory assumption may be that an averagely-efficient water company will make efficiency improvements that cover the full operating expenditure incurred in delivering its proposed environmental outcomes for the 2020-25 period (e.g. P-removal). For some other types of enhancements, the implied regulatory assumption may be that an averagely-efficient water company will make efficiency improvements that cover the operating expenditure of achieving service levels for the 2020-25 period that represent a forecast of the upper quartile level of performance in the 2020-25 period (e.g. this may be the case where Ofwat's approach in the IAP expects companies' performance commitments to fit with upper quartile performance).

This paper is not intended to address the question of whether the overall scale of efficiency improvement expected of particular water companies is reasonable. Regardless of what position is taken on that point, we see three serious problems with this type of approach:

- **Lack of transparency and ambiguous policy:** In the IAP, Ofwat has sought to provide a high degree of transparency on many aspects of its approach to cost assessment. The IAP provides an explicit description of the upper quartile efficiency challenge and the frontier shift challenge, together with supporting assessment and evidence. There is no similar transparency in relation to any (implicit) efficiency challenge concerning the operating expenditure associated with environmental outcomes and service levels that are higher than the historical industry-average performance in these dimensions. Because of the lack of transparency, it is unclear whether Ofwat's policy intention was to assume a further layer of efficiency improvement from water companies over the 2020-25 period – as we entertained above – or whether the IAP approach just involves an

implementation error from misinterpretation of what the base cost allowances represent and the extent of implicit allowances (discussed under point (B) above).

- **Application of additional efficiency challenge to opex but not capex.** If the policy intention is to apply an additional efficiency challenge to companies, to achieve efficiency improvements that can enable them to achieve environmental outcomes and services levels that are above the historical industry-average level without increases to base costs, it seems undesirable and unfair for this efficiency challenge to be applied only to opex. In some cases relating to common performance commitments, notably leakage, Ofwat seems to have applied a similar efficiency challenge to opex and capex, but these cases seem to be the exceptions. For the vast majority of the enhancement categories, the stated approach in the IAP makes no corresponding efficiency challenge to that applied to enhancement opex.²⁵ The effect of the IAP approach is to under-fund companies' enhancement opex relative to enhancement capex and to provide perverse financial incentives for companies to favour capital-intensive approaches (and accounting policies).
- **Inconsistency across enhancement categories.** As highlighted in the point above, there seem to be inconsistencies across enhancement categories, with some form of implicit efficiency assumption for enhancement capex relating to common performance commitments such as leakage but not for other enhancements such as those related to environmental outcomes. There may be a basis for treating different categories differently but this is not explained in the IAP. Furthermore, we have found no explanation by Ofwat of why it considers that there is a special case for making an opex allowance for enhancements relating to the supply-demand balance and metering; it is possible that Ofwat has recognised some of the problems we have identified in this paper, but there is no reason to think that these would be limited to the two areas of supply-demand balance and metering.²⁶

²⁵ Ofwat (2019) "Ofwat (2019) "Technical appendix 2 – Securing cost efficiency", pages 46-59. The upper quartile unit cost and other efficiency challenges applied as part of the IAP allowances for enhancement capex are more akin to the upper quartile adjustment applied to base costs and do not represent an additional efficiency challenge of the type we identify for enhancement opex.

²⁶ Ofwat's cost assessment of enhancements associated with supply-demand balance, and with metering are the two areas where, to the best of our knowledge, made an allowance based on analysis of capex and opex.

These issues are closely related. The lack of a clear and well-developed policy position creates risks of the types of inconsistencies which have materialised in practice.

D) The IAP forecasts for cost drivers relating to enhancements for growth

There is a further issue with the IAP treatment of enhancement opex which is less about the conceptual basis and assumptions for the IAP allowances and more about the evidence used as part of the calculation of these allowances.

In making allowances for base costs over the 2020-25 period, Ofwat combined the coefficients estimated from econometric models on historical data with forecasts over the 2020-25 period of the explanatory variables (cost drivers) for those models. These include forecasts for variables such as: the number of connected properties for each of wholesale water and wholesale wastewater services; measures of the length of water mains and the length of sewers; and a measure of sewage load. The forecasts of cost drivers used are based, predominantly, on Ofwat rather simplistic analyses (e.g. using simple historical averages or time-trend extrapolations), and are independent of each company's own forecasts and evidence. For instance, both for water and wastewater models, and for each company separately, Ofwat forecasts the number of connected households in each year in the period 2020-25 by fitting a simple time-trend to data covering the period 2011-2018 and controlling for no other explanatory factor besides time.

In principle, the use of econometric models with customer numbers (or some function of this) as an explanatory variable, along with forecasts of growth in customer numbers for each company over the 2020-25 period, can provide a basis to remunerate the efficient opex associated with growth in customer numbers. However, in practice we see two main problems with the IAP approach:²⁷

As referred to earlier, these two areas do not match those that Ofwat has given as examples of where it has followed a totex approach.

²⁷ In addition to these main problems, there is the further issue relating to the opex-capex mix arising from historical enhancement programmes (point (A) in this section), and a potential risk that the relationships between base costs and drivers such customer numbers that are implied by the estimated coefficients from the econometric models are not reasonable (this depends on specific modelling results and is beyond the scope of this paper).

- The limitations in Ofwat’s independent forecasts in relation to growth in number of properties and other dimensions of demand.
- The inconsistency between the forecasts used for Ofwat’s calculation of allowances for base costs and the forecasts underpinning Ofwat’s allowances for enhancement capex.

In relation to the first point, Ofwat states that “[u]sing an independent view of cost drivers is key for the development of an independent view of efficient costs, which is an instrumental part of our incentive based regulation approach”.²⁸ Our view is that benchmarking analysis is indeed a crucial part of an incentive-based regulatory approach for English and Welsh water companies. However, we see no reason why Ofwat’s forecast cost drivers need to be so “independent” that they are set in a way that pays no regard whatsoever to each water company’s own forecasts or to the evidence that companies have provided on this. This is particularly so for cost drivers such as the number of connected properties for which changes over time, and the variation between companies, is largely due to factors outside of companies’ control. Elsewhere, in the development of the specifications for its econometric models of base costs, Ofwat did not seek to develop models there were independent of the views and evidence of companies, and it has benefitted from engagement with water companies on this.

There is a need for proportionality and prioritisation in a regulatory cost assessment process. However, we estimate that, across water and wastewater wholesale services, approximately £242 million (in 2017/18 prices) has been included (implicitly) for enhancement opex relating to growth in water company business plans. This strikes us as far too high a figure for Ofwat to deal with simply through the type of approach used for the forecast cost drivers in the IAP.

It is possible that Ofwat’s approach to forecast cost drivers is reasonable in the context of an initial assessment of business plans, but for draft determinations we suggest that Ofwat carries out further analysis, drawing on company forecasts and other evidence that is available. Other public bodies in the UK have to make evidence-based forecasts of the growth in population in certain geographic areas, over a variety of time periods (and companies have drawn on these for their business plan submissions). For the next phase of its cost assessment work, it does not seem reasonable for Ofwat to ignore this evidence

²⁸ Ofwat (2019) “Ofwat (2019) “Technical appendix 2 – Securing cost efficiency”, page 10.

when producing forecasts for cost drivers relating to customers numbers, or for cost drivers that may be quite strongly correlated with this (e.g. sewage treatment load).

Turning to the second point above, Ofwat's independent forecast of cost drivers seem to be used for its costs assessment for base costs but not for enhancement capex. For example, in its modelling for wholesale water new developments and new connections (the water growth model) Ofwat reports that it has used each company's own forecast of the number of new connections in the year as the cost driver.²⁹

More generally, the structure of Ofwat's cost assessment provides greater opportunity for each company's own forecasts and evidence to contribute to the determination of allowances for enhancement capex than for enhancement opex. This difference of approach between enhancement opex and enhancement capex does not seem to make sense and risks distorting companies' financial incentives in favour of capex solutions.

E) Exceptions to IAP approach to enhancement opex that are not exceptional

In the sub-sections above we have discussed problems with Ofwat's general approach to cost assessment for enhancements, which applies to the majority of its enhancement categories. The IAP reports that, as an exception to its general approach of only including capex within its enhancement allowances, it makes a totex allowance in the case of enhancements for the supply-demand balance, and for some catchment management proposals, where it considers there is a case for an increase in the opex allowance.³⁰

The supporting spreadsheets for the IAP assessment for supply-demand balance (SDB) enhancements includes the further explanation that "Opex has been included in the assessment of the SDB lines because the demand benefits require a significant amount of opex expenditure" and that the Ofwat allowance has been assessed as totex "due the significant opex included in demand side options".³¹

This aspect of the IAP seems to recognise that enhancement programmes may entail opex that goes beyond that allowed through the base cost allowances. It could just as well apply

²⁹ Ofwat (2019) "Ofwat (2019) "Technical appendix 2 – Securing cost efficiency", page 49.

³⁰ Ofwat (2019) "Ofwat (2019) "Technical appendix 2 – Securing cost efficiency", page 19. However, we have not managed to find within the set of working files published by Ofwat analysis supporting view that it has made a totex allowance with respect to catchment management proposals.

³¹ Ofwat (2019) *Supply demand balance enhancement feeder model*.

to other areas of enhancements. Figure 1 and Figure 2 show that companies forecast a significant element of opex for many categories of enhancements. The IAP provides no reason for the special treatment enhancements for the supply-demand balance or catchment management that would not also apply to other categories of enhancements.

Furthermore, we would be astonished if Ofwat's intended policy position was that there is only opportunity for water companies to deliver enhancements through opex-intensive rather than capex-intensive solutions in the limited cases of demand-side schemes for water resource management or catchment management solutions to water quality issues.

We see the special treatment the supply-demand balance as a symptom of the wider deficiencies of the IAP approach to cost assessment for enhancements.

4. Potential remedies and mitigation

In this section we consider how to tackle the problems described in the previous sections.

The interactions between enhancements and base costs which lie behind the problems encountered in Ofwat's IAP are complex. It may be difficult to fully remedy these issues without making some quite fundamental changes to Ofwat's cost assessment models and approaches for enhancements and base costs. This is beyond the scope of this paper and not something that is likely to be useful to Ofwat at this stage in the PR19 process.

Even so, there are several realistic and practical things that Ofwat can do to help mitigate the problems, within the broad approach to cost assessment that it is taking for PR19 and without revisiting its base cost econometric models. We outline in this section how Ofwat can adapt its cost assessment for PR19 to improve the treatment of enhancement opex.

We take the following in turn:

- Foundations of a way forward.
- Enhancements captured by explanatory variables in base cost models.
- Implicit allowances for service quality and environmental enhancements.
- Transparent limitation rules for the cost assessment of enhancements.
- Cost assessment for non-growth enhancements.
- Sense check for balanced approach to opex and capex.

Foundations of a way forward

The IAP approach has struggled to combine two separate parts of the cost assessment:

- The use of econometric models of base costs to estimate allowances for efficient base costs over the period 2020-25. These allowances are generated through cross-company comparisons, and the allowance for an individual company is heavily influenced by data relating to other companies in the industry; it does not take much account of that company's own circumstances, service levels, environmental outcomes and history

(beyond the small number of factors captured through the explanatory variables in the econometric models or allowed for as cost adjustment claims).

- A separate assessment (further broken down by individual categories of enhancement) of companies' proposals/forecasts for the costs of enhancements in the 2020-25 period. The approach taken by Ofwat to assess these varies across enhancement categories and, in general, companies' own submissions on enhancements (on proposed costs, and/or on forecast cost drivers) provide a starting point for Ofwat's analysis. Companies' proposals for enhancements are frequently presented in terms of what improvements they achieve for the company relative to its current situation, rather than in terms of what they deliver compared to the performance of other companies.

The difficulty is not so much that Ofwat's cost assessment is in two broad parts, but that is in two parts that are not additive. The two parts are difficult to combine or reconcile because the first is firmly based on a cross-industry perspective, while the second starts with a company-specific perspective.

This creates a situation where:

- **Reasonable concern of water companies** Water companies might quite reasonably be concerned that the allowances from the IAP do not provide sufficient funding for the efficient costs of carrying out their activities and delivering their business plan over the 2020-25 period, as significant areas of expenditure fall through the gaps between the two separate parts of Ofwat's cost assessment (e.g. a significant part of the opex associated with enhancements seems to have fallen through this gap).
- **Reasonable concern of Ofwat and customers** Ofwat and customers might reasonably be concerned that the allowances Ofwat determines from the two separate parts of its cost assessment could give rise to double-counting when taken together. It would be wrong to think that the allowances derived from econometric models of historical base costs cover all of the opex that an efficient company would need in the period 2020-25, including opex associated with enhancements in the 2020-25 period. But it would be right to expect that these allowances cover some of the costs that companies have included in their proposals/forecasts on enhancement costs.

The opportunity we see for improving upon the IAP approach to enhancement opex is to try to address these two concerns head-on. To keep things practical for PR19, we take Ofwat's

use of econometric models of base costs as given (the first main cost assessment part identified above) and look for ways to adapt its approach to enhancement cost assessment.

To make progress, Ofwat could further develop and adapt its IAP approach by building on the points we set out below:

- It is important to develop a much better understanding of the relationship between the allowances derived from the econometric models of historical base costs and the costs that an efficient company faces to accommodate increases in customer demand, to deliver increases in service quality and to achieve improvements to environmental outcomes: what element of these costs is it reasonable to think is covered by allowances from the base models? This work can provide the foundation for a more informed and realistic view of the “implicit allowances” for enhancements within the base cost allowances.
- The existence and extent of implicit allowances will vary considerably across different categories of enhancements. It will be helpful to draw a distinction between those categories of enhancements that relate to explanatory variables in the econometric models of base costs (e.g. enhancements relating to growth in customer numbers) and those enhancements that relate to aspects of service quality or environmental outcomes that are not captured by the explanatory variables in these models. For the first type of enhancements, implicit allowances can be estimated approximately by drawing directly on the results of the econometric models.
- For the second type of enhancements, the implicit allowances are more difficult to deduce. Given the specification of the econometric models of base costs, and the data used, a reasonable starting point is that the implicit allowances for this type of enhancements capture the opex associated with industry-average service quality or environmental outcomes, assuming an approach to delivery that involves an industry-average mix of opex and capex.
- Work on implicit allowances can provide the basis for an assessment of companies’ enhancement costs (covering enhancement capex and enhancement opex) that avoids double-counting and recognises legitimate differences across companies, and over time, in the mix of opex and capex.

- It is important not to cloud the assessment of implicit allowances by confusing these with the regulatory assumptions on efficiency improvements that are used in the calculation of allowances.
- The transparency, and in turn quality, of the cost assessment for enhancements would be improved if, for each category of enhancements, Ofwat sets out the “limitation rules” that it intends to apply as part of its cost assessment. These would specify ways in which the allowances for enhancements could differ from companies’ business plan forecasts of enhancement opex and enhancement capex (e.g. exclusion for implicit allowances, regulatory efficiency challenges applied, exclusion of costs funded through ODI rewards).
- Crucially, given Ofwat’s policy aims on innovation and efficiency, there seems to be no basis for applying, as part of the cost assessment for enhancements, different efficiency challenges between enhancement opex and enhancement capex.
- There is real value in a sense check of considering whether the cost assessment models and methodologies used are capable of accommodating a hypothetical case where a company proposes to achieve improvements in service quality or environmental outcome through an innovative delivery approach that is 100 per cent opex.

The remainder of this paper discusses, in more detail, several key aspects of this approach.

The way forward discussed in this section is focused on changes to the way that Ofwat’s cost assessment is applied to enhancements proposed for the period 2020-25. It does not deal with the risk that the allowances from models of historical base costs are inaccurate for a given company due to differences in its mix of opex and capex compared to the historical industry-average. Nor does it tackle the risk that that the opex allowances from PR24 onwards, for enhancements introduced in 2020-25, will not be properly remunerated. These issues seem a little more difficult to fix and are outside the scope of this paper. This does not detract from the case for making the changes that seem more practical below.

Enhancements captured by explanatory variables in base cost models

We focus in this sub-section on the approach to cost assessment for enhancements relating to features that are captured by explanatory variables in the econometric models of base costs. This concerns, in particular, enhancements relating to customer growth. It does not

concern the general approach for enhancement categories relating to service levels or to environmental outcomes.

Ofwat's econometric models of base costs include explanatory variables which relate to the scale of a water company's wholesale business, such as customer numbers, sewage load and length of water mains. This provides these models with some capability to make allowances for the opex and capital maintenance associated with growth in the number of customers supplied (or growth in the demand of existing customers). We discuss enhancements driven by growth below but the points may be relevant to other enhancement categories if these are linked to explanatory variables included in the base cost models.³²

A number of the enhancement categories that Ofwat uses relate to growth in the number of customers supplied by water companies (or growth in the demand of existing customers). This includes enhancements to water distribution and sewerage infrastructure to accommodate new developments and connections, but also extends to the enhancement of other aspects of the system (e.g. water treatment, sewage treatment, leakage, metering) where this is driven by customer growth.

Water companies may adopt different approaches to accommodating this growth, and such differences will have implications for the balance of opex and capex. Furthermore, even where companies use similar approaches, differences in their accounting policies may affect the proportion of expenditure reported as capex rather than opex.

We see two different ways in which to adapt the IAP approach to cost assessment to accommodate better the legitimate differences in the mix of opex and capex when it comes to enhancements for growth:

- **Cost assessment for enhancements that include opex and capex together with deduction to remove implicit allowances for opex.** This approach would involve a separate cost assessment for enhancements relating to customer growth that results in a single allowance (i.e. on a totex basis) that is intended to cover both enhancement capex and enhancement opex. The cost assessment approach should be alive to the possibility of water companies proposing ways of accommodating growth that involve

³² For example, some proposed enhancements might reflect planned schemes to address tightening of consents and some wastewater models include a variable on the proportion of load treated at works with an ammonia consent below 3 mg/l).

different mixes of capex and opex (whether for engineering and operational reasons, or due to accounting practices). The cost assessment approach should be able to handle the scenario in which a water company proposes to accommodate growth entirely through arrangements that involve opex and no capex. Under this approach, the efficient opex element of enhancements would be funded as part of the allowances for enhancements. It would be important to take steps to avoid double-counting when the enhancement allowances are considered alongside the allowances derived from historical models of base costs. To do so, an estimate can be made of the implicit allowances for increases in opex associated with the growth in customer numbers (and related variables) over the period 2020-25. This can be made using figures from the econometric modelling of base costs. Such implicit allowance can then be deducted from the cost assessment covering enhancement opex and capex.

- **Reasonable and consistent allowances for enhancement opex through base cost allowances.** This approach would involve a separate cost assessment for enhancement capex (as in the IAP), and would then seek to provide reasonable allowances for enhancement opex through the allowances derived from the econometric models of base costs. Under this approach, it would be important to ensure that the allowances for base costs are calculated using forecasts for explanatory variables (e.g. customer numbers) that are both reasonable and consistent with those used for (or reflected within) the allowances for enhancement capex. The IAP approach would need to be adapted to ensure this consistency. Given the significant amount of money at stake, these forecasts should take account of a range of evidence and not rest on the simple extrapolations used for IAP. The reasonableness of the allowances for enhancement opex would also depend on the size of the estimated coefficients for explanatory variables relating to the number of customers supplied and other aspects of company scale relating to growth.

Both of these approaches offer a practical way to reduce the problems with the treatment of enhancement opex in the IAP.

To help illustrate the first approach we have provided an example of how the implicit allowances for wholesale wastewater might be calculated in Figure 4 at the end of this subsection.

Neither approach is perfect and the choice between them will depend on the circumstances; there may also be a case for applying both approaches and comparing results. The first approach has the benefit of allowing more of a totex approach to the enhancement

assessment (at least for the 2020-25 period), without drawing a boundary between enhancement opex and enhancement capex. It seems better able to take account of differences between companies in their mix of opex and capex. However in some cases it may be difficult to adapt the existing cost assessment techniques for enhancements to include opex (either due to data constraints or the time needed to develop alternative models and assessment approaches). There will also be a degree of approximation in the method to be used to strip out the implicit opex allowance for growth from the allowances derived from econometric models of base costs.

The second approach has the benefit of fitting more closely with the existing models for both enhancements and base costs. But the implicit allowances for enhancement opex derived from the models of base costs will not take account of differences between companies in their mix of opex and capex. Furthermore, there may be inaccuracies (and arguments for further adjustments) if the estimated coefficients for scale variables in the econometric models of base costs do not imply a reasonable relationship between base costs and customer growth. Finally, since the second approach places more weight on cross-company benchmarking, it may be appropriate to consider adjustments in cases where there is evidence that the efficient costs to a company of accommodating growth are likely to be significantly higher or lower than the benchmarks implicit in base cost modes.

We expect that both approaches could benefit from a process of trial, review and refinement. The identified limitations in these approaches seem minor compared to the deficiencies in the IAP treatment of enhancement opex.

Figure 4 Example of calculation of implicit allowance for opex

Illustrative calculation of implicit allowances for opex associated with wastewater growth

For wholesale wastewater services, Ofwat set allowances for base service for 2020-25 by calculating a weighted-average of the modelled costs derived from a set of eight different econometric models. In turn, for each of those models, modelled costs are obtained by applying the set of estimated coefficients to the forecast of the cost drivers in the models for the period 2020-25.

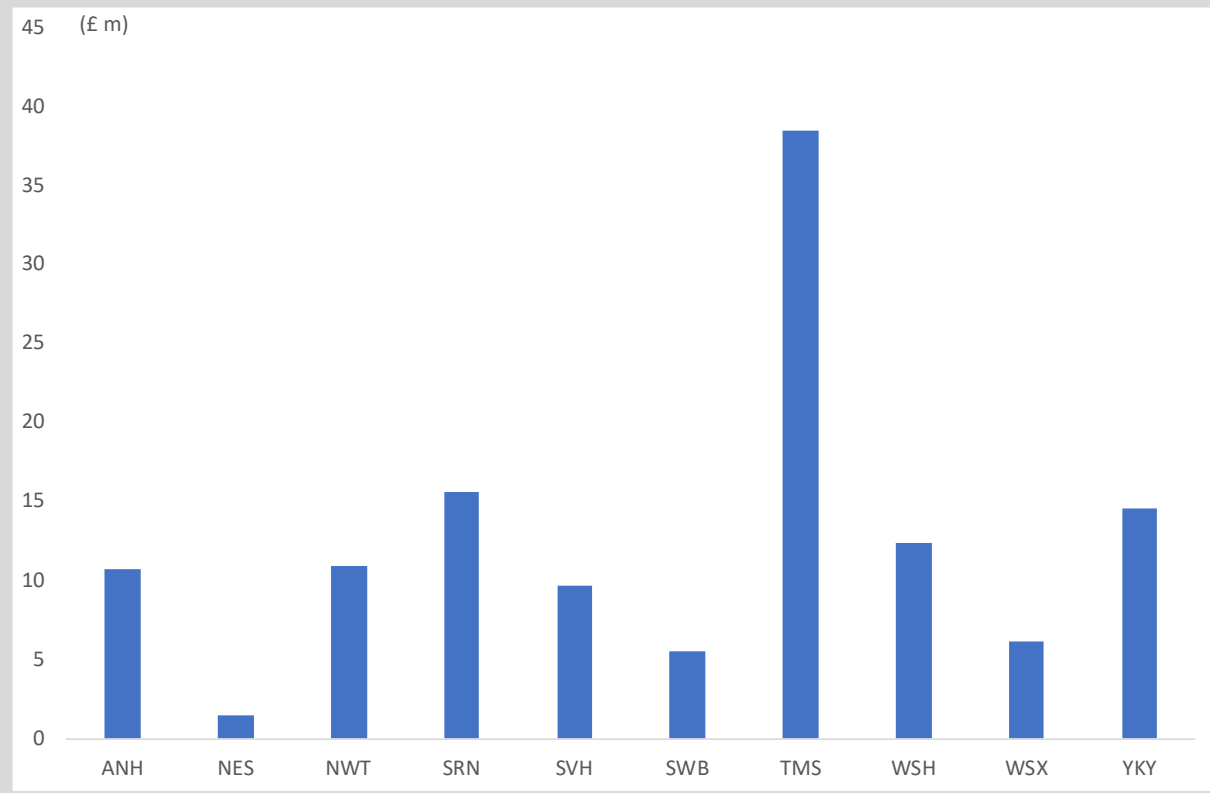
All eight models include drivers that control for, and vary with, the scale of companies. These drivers cover length of sewers, load treated and sludge produced. Our illustrative calculation of implicit allowances is based on estimating the allowances for opex relating to changes in these scale variables.

We did this as follows:

- a) For each of the eight models, we calculated the modelled base costs for 2020-25 under the assumption that, for those cost drivers relating to scale – and only for those cost drives – the values over that period were “frozen” at the levels forecast for 2019/20.
- b) We took the weighted-average of these modelled costs and subtracted the result from the allowance for base costs made by Ofwat. The difference can be interpreted as the implicit allowance for base costs attributable to growth in the scale of each company.
- c) Some of that difference will reflect allowances for capital maintenance and some to opex, as both are part of the base costs modelled through the econometric models. We allocated the difference between these two using the industry-average split of these two measures from 2011-18/.

The chart below shows our calculation of the implicit allowance for each company. Our method here is illustrative of the broader concept and not intended to be applied directly without further review.

In this exercise, we have calculated the implicit allowance for the combined company SVH and not sought to allocate this between Severn Trent England and Hafren Dyfrdwy.



Implicit allowances for service quality and environmental enhancements

We now turn to enhancements that are not captured by explanatory variables in the econometric models of base costs. These relate primarily to enhancements for service quality and environmental enhancements.

For these enhancements in particular, we consider it is important to develop a much better understanding of the relationship between the allowances derived from the econometric models of historical base costs and the costs that an efficient company faces to accommodate increases in customer demand, deliver increases in service quality or achieve improvements to environmental outcomes. This work can provide the foundation for a more informed and realistic view of the implicit allowances than was used for the IAP.

We do not see any general case for thinking that the implicit allowances from the historical models of base costs cover the costs of delivering performance levels beyond the industry-average levels of performance (assuming no explanatory variables for the relevant aspects of performance are included in the models).

In the absence of evidence and analysis that relates directly to a given aspect of service quality or environmental performance, we propose that the implicit allowances for base costs should be understood as funding a level of quality/performance that is the industry-average over the historical period covered by the data used for the modelling.³⁴ We feel that this is the natural assumption in the absence of further evidence, given the statistical properties of the models and the allowances derived from them.

We do not discount the possibility, that in some cases, there may be strong evidence to support a different interpretation of what the implicit allowances cover. For instance:

- It is possible that, for some enhancements, the implicit allowance from the models of base costs excludes the costs of achieving the levels of service quality and environmental performance seen over the historical period covered by the models. This might be the case if the levels of quality/performance achieved by companies in the industry is attributable in large part to past capital enhancement programmes. The costs of these capital enhancement programmes will not have fed into the models of historical

³⁴ Whether it is the industry-average over the data period, or the average for a given year, will depend on model specifications (e.g. use of constants or time dummy variables).

base costs as base costs excluded enhancement capex. In those cases it is difficult to see how allowances derived from models of historical base cost provide funding for even historical industry-average levels of performance.

- It is possible that there are underlying correlations between the level of service quality or environmental performance under consideration and explanatory variables in the models of base costs which are sufficiently strong as to affect the level of quality/performance that is implied within the allowances derived from these models.³⁵ This could lead to implicit allowances that fund performance that is above or below the industry average.
- It is possible that are relationships between the level of service quality or environmental performance under consideration and the underlying efficiency differences between companies such that the relatively efficient companies are also those which perform relatively well in service quality and environmental performance. If so, the implicit allowances based on upper quartile companies' costs might fund higher level of quality or environmental performance than the historical industry average.
- It is possible that limitations in the model specifications mean that those companies identified as relatively "efficient" are those companies which perform below-average on an aspect of service quality or environmental performance that is omitted from the model. If so, the implicit allowances based on upper quartile "efficient" companies' costs might fund a lower level of quality or environmental performance than the historical industry average.

There is also a need to consider the opex-capex mix within implicit allowances, given that historical capital enhancement expenditure is excluded from the measure of costs used for the econometric models of base costs. The implicit allowances should be interpreted as allowances for opex and capital maintenance, assuming an industry average mix between opex and capex in achieving the relevant levels of service and environmental outcomes. If most companies have achieved a given level of performance using capex solutions (the costs of which are excluded from base cost models), the implicit allowance would not cover the costs of a company catching-up to this level of performance using relatively/entirely opex-based solutions.

³⁵ This point links to that of econometric variable bias in the econometric literature.

A better understanding of implicit allowances is one part of what is needed. To make good use of this, it will then be important to understand how companies' business plan proposals for enhancements relate to the implicit allowances. In particular:

- How does the level of performance targeted by a company's enhancement proposals for the 2020-25 period relate to the level of performance assumed to be funded by implicit allowances (e.g. historical industry-average levels of performance)?
- How does the mix of opex and capex in a company's enhancement proposals for the 2020-25 period relate to the mix assumed within the implicit allowances (this matters because levels of performance that companies have achieved historically through enhancement capex might not be covered by implicit allowances)?

Transparent limitation rules for the cost assessment of enhancements

A key feature of the approach we envisage is that there would be a clear distinction between the identification of implicit allowances and other reasons to disallow all or part of a company's business plan proposals for enhancement opex and capex as part of its cost assessment. This applies especially for enhancements the drivers of which are not well captured through explanatory variables in the econometric models of base costs.

We propose that Ofwat determines a series of limitation rules. These would specify the intended limitations to the totex allowances that it will include in its price control determinations in the case of enhancements. These would help specify the circumstances in which, and extent to which, Ofwat's cost assessment for enhancements would make a totex allowance for the (efficient) costs of a company's proposed enhancement. This would be especially relevant in cases where the econometric models of base costs include no explanatory variables to capture the aspects of service quality or environmental outcomes targeted by the enhancements. It would help reconcile Ofwat's allowances with companies' totex forecasts.

The rules could vary across different types of enhancement, depending on the circumstances and context. Aside from the general idea that price control allowances should not cover inefficient or unnecessary costs, we see a number of possibilities in the case of enhancement cost assessment, such as:

- **Implicit allowances from base cost allowances.** As discussed in the previous subsection, it will be important to develop an informed view on what implicit allowances (if

any) are included in the allowances derived from econometric models of historical base costs. Estimates of these implicit allowances can be deducted or excluded from the cost assessment for the totex of enhancements.

- **Implicit allowances from past enhancement funding.** Where previous price control determinations (e.g. PR14) have provided allowances (e.g. enhancement capex) that enable a specific company to achieve specific service levels or environmental outcomes, this may provide reasonable grounds to exclude any proposals for enhancement opex or capex that would act to remunerate the company for what should have already been achieved. The point here is that, besides implicit allowances from the allowances from econometric models of base costs, there may also be a form of implicit allowance arising from past price control determinations. This is more relevant to past price control allowances for enhancement capex that was intended to deliver benefits over multiple price control periods, rather than for opex allowances covering a single price control period only.
- **Additional efficiency challenge on service levels or environmental outcomes.** In some cases, Ofwat may decide that it is appropriate for only the efficient costs of achieving service levels or environmental outcomes that go beyond some specified performance level to be funded through enhancement allowances. If the specified industry-wide performance level is more demanding than that reasonably assumed to be funded through implicit allowances, this type of policy might be explained as involving an additional efficiency challenge applied for the 2020-25 period, under which companies are expected to achieve efficiency improvements that enable them to meet the specified performance level without incurring any extra costs or to fully offset the costs of these improvements. This additional efficiency challenge would be a regulatory assumption for the purposes of setting the price controls.
- **Cap enhancement funding for performance up to ODI baseline.** There are interactions between cost assessments for enhancements the ODIs. There is a risk of double-counting arising: certain enhancements could be funded both through the cost assessment allowances for enhancements and through ODI financial rewards. It may not be appropriate to make enhancement allowances for the efficient costs of achieving levels of performance that go beyond the level of performance used as the baseline for a financial ODI (i.e. the point at which the company can start to earn financial rewards for improved performance under the ODI). This would need to be assessed separately for different types of enhancements and for each company where ODI arrangements differ.

The limitation rules would require further development work, but we hope the general idea is clear from the illustrative examples and distinctions drawn above. The limitations rules would be transparent policy decisions, taken separately for each category of enhancement (there would, of course, be an expectation that similar categories are treated in a similar way). There should be a logical basis for each of them.

There are traces of the approach outlined above in some parts of Ofwat's IAP, such as the "test" as to when enhancement costs for leakage may be allowed and the exclusions for interactions with ODIs. Our proposal is to take that idea further, determining rules for each category of enhancements, and thinking much more clearly about the differences between an efficiency challenge and an implicit allowance.

We have several further comments on the potential use of an additional efficiency challenge which relates to absorption of the costs of improvements to service levels or environmental outcomes:

- It does not seem sensible to apply an additional efficiency challenge of this nature to enhancement opex but not to enhancement capex. To do so would seem to introduce an unnecessary conflict with Ofwat's policy objectives on totex and innovation, and introduces unnecessary unfairness for companies with opex-intensive solutions and for customers served by companies with capex-intensive solutions.
- The more categories of enhancements that Ofwat applies an additional efficiency challenge to, the greater is the financial scale of this challenge for companies. Since the overall efficiency challenge (including the upper-quartile adjustment on base costs and the 1.5 per cent annual "frontier shift" assumption) will need to be reasonable, there may be limitations on how widely any additional efficiency challenge should be applied.
- If an additional challenge is applied to some categories of expenditure but not others, it would be important to have a sound basis for the different treatment. In a context where a company may perform well in some areas and relatively badly in others, it could be quite unfair to companies and customers to take arbitrary decisions on the areas in which performance improvements should be funded through totex allowances (and customer bills) and areas in which performance improvements should be achieved without additional totex allowances.

Given these complexities, it also seems relevant to consider an alternative of refraining from applying the additional efficiency challenges to individual categories of enhancements, and instead apply a more broad-ranging challenge at the company level.

Adapting cost assessment for service quality and environmental outcomes

Ofwat might be concerned, quite reasonably, that providing separate allowances for a company's enhancements can lead to customers paying too much if these allowances fund the delivery of a plan put forward by that company to improve performance which is not efficient. It is quite possible that the companies that are performing relatively well in a particular aspect of service quality or environmental outcomes are doing so using an efficient approach that does not entail any additional costs compared to the companies performing relatively badly. We suspect Ofwat's approach to enhancement opex reflects concerns along these lines, at least in part. But the key point is that although this is a concern to be aware of, it applies just as much to enhancement capex as it does to enhancement opex. It does not justify an approach of being far more dismissive of companies' business plan proposals for enhancement opex than enhancement capex.

We believe that the further work on implicit allowances and on the limitation rules set out above provides a better basis on which Ofwat can carry out its cost assessment for PR19 and reduces the concerns we have identified about the assessment of enhancement opex. We now turn further to the practicalities of the assessments for enhancements not captured by explanatory variables in the econometric models of base costs.

In some cases, it may be reasonably straightforward to extend the types of approach used for enhancement capex in the IAP to also cover enhancement opex. This may be the case, in particular, for the categories subject to shallow dive and where deep dive reviews give weight to companies' business plan forecasts and the evidence behind them.

In other cases, it may be less straightforward. This could be the case where the current IAP approach places emphasis on unit cost modelling that focuses on enhancement capex costs only. In these cases, there are likely to be range of potential approaches which could be considered and developed further on a case-specific basis:

- Adapt the models developed for enhancements to cover opex as well as capex elements, recognising that these elements cannot simply be added together for the purpose of a unit cost benchmark, as one is recurring annually and the other is not.³⁶
- Retain the use of unit cost models that are limited to capex aspects of enhancements, but do not apply these in cases where there is evidence that a company's enhancement proposals involve a significantly more opex-intensive approach than the approaches reflected in the historical or forecast data feeding into the unit cost models. In these cases, a more bespoke assessment would be made of the company's enhancement claim (opex and capex elements), predicated on the basis that the more opex-intensive solution should be demonstrably more efficient over the longer term than the more capex-intensive solution reflecting in capex unit cost benchmarks.
- Retain the use of unit cost models that are limited to capex aspects of enhancements, but make targeted totex adjustments to the results from these models for specific companies to try to allow for differences in the mix of opex and capex between companies. These adjustments would draw on companies' business plan proposals, and, potentially, on other evidence such as engineering knowledge and information on differences in accounting practices.

Irrespective of the approach, there would be a need to limit any allowances to those for the efficient costs of enhancements according to the applicable limitation rules. There may be a need for some further queries to companies, or approximate cost allocation methods, to disentangle the cost forecasts or cost data that is available to enable the limitation rules to be applied. Where exclusions are made for implicit allowances, it may also be relevant to consider company-specific factors which could mean that the company's efficient base costs are significantly higher or lower than reflected in the implicit allowance (e.g. due to the opex-capex mix or to some local factors).

³⁶ Ofwat's cost assessment for supply-demand balance seems to be intended to make some allowance for enhancement opex as well as enhancement capex (this is an exception to Ofwat's general approach). However, the way that it has incorporated opex and capex elements into the unit cost benchmarks is severely problematic and its use of these for the IAP is highly questionable. A review of these unit cost benchmarks is beyond the scope of this paper, but the key point here is that the IAP approach to supply-demand balance enhancements is not in any way what we have in mind here.

Sense check for balanced approach to opex and capex

Overall, and given the deficiencies in the IAP approach, we suggest a thought experiment to apply as a sense check on the approach to be taken in each of Ofwat's enhancement categories:

Does the approach to enhancement cost assessment provide for reasonable allowances over the price control period in the hypothetical case where a company has proposed a solution that is entirely opex-based, avoiding the need for any of the capex that is associated with more traditional delivery methods, and achieving a lower-cost solution overall?

If this test is not satisfied then there would seem to be a strong case for adapting the approach to cost assessment to meet Ofwat's policy intentions on totex and innovation.

The application of this sense check may point to the need for revisions to benchmarking models used for enhancements, consideration of potential adjustments to the results of existing models, or perhaps an approach that places less weight on the results of the benchmarking models for enhancements and more on a qualitative review of business plan submissions.

For future price control review, it may then be possible to increase the emphasis on benchmarking models for enhancements through development of enhancement models that can better cope with differences between companies, and over time, in the mix of opex and capex.