Ofwat's Opinion on Pennon's acquisition of Bristol Water

About this document

This document sets out our opinion as to whether and to what extent the merger between South West Water (owned by Pennon Group Plc) and Bristol Water has prejudiced or is likely to prejudice our ability to make comparisons between water enterprises in order to carry out our functions, and whether that may be outweighed by relevant customer benefits relating to the merger.

About this document

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1. Executive Summary

1.1   On 3 June 2021, Pennon Group Plc (Pennon), which owns South West Water Limited (South West Water), acquired unconditionally Bristol Water Holdings UK Limited and its subsidiaries, including Bristol Water plc (Bristol Water), combining two companies that provide water services in England.[1] Section 33B of the Water Industry Act 1991 ("WIA91") requires us to issue an opinion as to whether a merger will prejudice or is likely to prejudice our ability to make comparisons between water enterprises in order to carry out our functions, and whether that may be outweighed by relevant customer benefits.

1.2   We have reviewed the evidence submitted by Pennon and have carried out our own analysis to understand the impact of the transaction on our ability to make comparisons, applying the Statement of Methods that we published in October 2015 as required by sections 33B and 33C WIA91.

1.3   We consider that this merger will prejudice our ability to regulate the sector. Our analysis indicates that the merger is expected to result in a weakening in the precision of the models we develop to assess costs. In particular, the confidence we can place in the influence of key cost drivers is expected to decline and therefore there is a risk that some companies are provided too little cost allowance and others too much; both of which have negative consequences. This will affect all customers of water companies in England and Wales, not just those of the merged entity.

1.4   We note that Pennon has suggested that the merger will create significant benefits for customers. We consider that the vast majority of these suggested benefits do not meet the stringent criteria required in order for them to be considered as relevant customer benefits under the merger control regime. Nor do we consider the claimed benefits for South West Water's and Bristol Water's customers outweigh the prejudice that is likely to arise for all customers in England and Wales.

1.5   Overall, we consider that the assessment of the impact of this merger is not straightforward and we consider that it will or is likely to prejudice our ability to make comparisons. We can, however, see a prospect of resolution in Phase 1 if clear-cut commitments are offered that address the detriment, and we recognise the need for any such arrangements to be capable of adapting to the evolving regulatory regime.

Impact of the merger on our ability to make comparisons

1.6   The special merger regime applicable in the water sector in England and Wales exists to recognise that a vast proportion of the value chain in the water and wastewater business is a natural monopoly. Continued economic regulation is required to ensure

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[1] As Bristol Water is water only company or WoC, there is no overlap in the provision of wastewater services.

that the price and associated service package for these essential public services protects the interests of consumers and enables companies to meet their obligations. To regulate effectively we place considerable reliance on comparisons between these regional monopolies. In water regulation comparisons are used to determine over 80% of costs, accounting for around 70% of prices charged to customers. International comparators cannot readily be used as substitutes because of significant environmental, geographical and regulatory differences in the provision of water services. The acquisition of Bristol Water, if permitted to proceed, will lead to a loss of an independent comparator.

1.7   We found that of all the areas of regulation where we use comparisons (quality measures, costs, financial metrics), base costs are the most affected by the merger. Comparisons of quality of outputs will also be adversely affected though the scale of the impact is not large.

1.8   There is no material impact on our ability to assess the financing elements of company performance. While we do use comparisons in assessing financial elements of controls and in other areas of regulation, we do not consider that this merger would have a material impact on our ability to compare companies' financial performance.

1.9   Pennon and its advisers, Oxera, have undertaken an assessment of the impact of the merger on our ability to make comparisons. While a lot of the analysis undertaken was helpful, we found it had significant shortcomings which obscured some of the key effects of the merger.

Focus on the industry effect

1.10   The Oxera analysis focusses on the impact of the merger on the industry allowance under the current cost modelling approach. This approach assumes a merger is beneficial if it reduces the overall modelled allowance for the industry and problematic if it increases it.[2] Having found that, on its set of assumptions, the merger reduces the overall allowance for the industry, the Oxera analysis concludes that the Pennon / Bristol Water merger is good for consumers.

Impact on individual company costs estimates

1.11   However, such an analysis overlooks the central purpose of cost benchmarking which is for the regulator to derive a high-quality cost function for the industry that explains the main features of the industry and allows us to determine robustly the extent to which companies manage their assets efficiently. A lower allowance for the industry, while

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[2] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, Table 18 presents the overview of Pennon's case and represents reductions in industry totex as a benefit of the merger. This approach is adopted throughout Pennon's and Oxera's documents.

cheaper for customers in the short run, is not necessarily a positive outcome if it is based on an inaccurate assessment of costs.

1.12 Even if the overall allowance for the industry were to remain unchanged, we would also need to consider the impact of the merger on individual company estimates of costs and whether they can be considered sufficiently robust. Any significant unexplained changes in cost allocations which do not represent genuine efficiency changes could materially damage water companies' ability to undertake necessary work (if too low) or lead to customers overpaying (if too high). Uncertainty about the accuracy of future cost allowances may undermine companies' ability to plan effectively for the long term.

Impact on our ability to understand industry cost drivers

1.13 Our cost models are based on a small number of key drivers, accepted by the industry as critical in explaining costs. These key drivers are: (i) the scale of operations, (ii) the differing population density of the water company regions, (iii) topological differences and (iv) our understanding of the complexity of the activities that are being undertaken in different parts of the network. These fundamental cost drivers have remained stable over time and will continue to drive the costs of the industry whether or not we can capture them through our cost modelling. If we cannot capture each of these cost drivers separately, the impact of the merger will be to reduce the precision of our assessment of efficient cost requirements for each company, with a detrimental impact on our ability to regulate effectively.

1.14 Our analysis suggests that our ability to reflect population density – a key driver of costs in the water industry - in our assessment of efficient costs will be reduced. As a result, other areas with atypical population density will no longer see population density properly recognised in the econometric cost modelling, making it more difficult to identify the impact of density on costs going forwards.

1.15 This finding is not model specific. Absent a reliable solution to the issue, all future models will lose the relevant information that is currently available to us. The changes in allowances that will follow will not be driven by any improvement (or deterioration) in efficiency. Instead, they will be driven by noise created by the loss of precision with which we can estimate industry costs. These losses will be non-trivial: our analysis shows that [REDACTED✂----] would expect to see [REDACTED✂----] by [REDACTED✂----], while [REDACTED] would expect [REDACTED✂----].

1.16 Oxera's approach which finds a benefit relies on the assumption that future performance is random, not due to management input. This approach only finds a benefit because a high weight is given to companies being below our expected level of performance in the future, and removing those companies is presumed to lead to a benefit. Counterintuitively, in this approach, removing any such underperforming company would be expected – on average - to produce a benefit. This approach is

neither consistent with Pennon's stated intention of its management retaining its upper quartile status[3]; nor with the generally accepted logic that fewer observations will lead to worse comparisons. Pennon's counterintuitive approach inherently sets a high threshold through a presumption of benefit from mergers. We consider this to be inappropriate generally and particularly that it would be inappropriate to rely on this for the purposes of a Phase 1 assessment where the Competition and Markets Authority (CMA) would expect to have an adequate degree of confidence in reaching a finding that there is no likelihood of prejudice to our ability to regulate.

Relevant customer benefits arising from the Pennon/Bristol Water merger

1.17   Pennon has suggested significant benefits will accrue to customers of the merged entity as a result of the merger and of the full integration of functions. We note the ambition of the plans but do not consider them in the main to meet the high threshold for consideration as relevant customer benefits that outweigh the prejudice that will or is likely to occur to our ability to make comparisons between water enterprises to carry out our functions. Pennon places considerable weight on an extrapolation of synergies achieved following its merger with Bournemouth, a better performing company a third of the size of Bristol Water. We also have concerns, among other things, about the timely delivery of these synergies. Further, we did not find the evidence persuasive that a number of the benefits claimed could be considered specific to this merger.

Deliverability of merger benefits

1.18   We were pleased to see Pennon put forward ambitious proposals and given the scale of the ambition, we focused on their deliverability. We recognise that mergers in general can provide scope for the reduction of joint overheads and achievement of benefits of scale. The prospect of savings is not in dispute, rather we question the scale of savings that Pennon claims will be achieved and the manner in which it has arrived at its estimates. In order to be confident in its estimate we would expect to see a plan of how savings will be achieved.

1.19   Pennon submitted that it had already managed a similar integration of a water business when it took over Bournemouth Water in 2016. In that merger, Pennon targeted [REDACTED✂----]of savings which it argues it has realised. However, it is not clear how the savings it has highlighted are specifically due to the merger as opposed to savings which would have been made absent the merger, for example as part of the savings made by all companies to meet the efficiency challenge we set at PR14. Also, the benefits from [REDACTED✂----]make up a greater proportion of total savings than

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[3] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, para 3.76

originally planned. This means that operational savings, which factor into bills, are below those the company forecast at the time of the merger assessment.

1.20 Amalgamating Bristol Water will be a different exercise to absorbing Bournemouth Water. Bournemouth Water was a small (around one tenth the size of South West Water) and relatively high performing water company (ranked as the most efficient company at PR14). Bristol Water represents a third of South West Water's size on the water side and is relatively inefficient. Its integration therefore represents a challenge of a different order of magnitude than the integration of Bournemouth Water.

1.21 Pennon runs a cost-efficient water company, South West Water, which has contributed to setting the efficiency frontier at two consecutive price reviews. Part of our concerns in terms of the delivery of swift more positive outcomes overall lies in the risk that the scale of the transformation challenge that Bristol Water represents may jeopardise, at least in the short run, our ability to stretch the industry using South West Water, including in light of areas where South West Water itself must focus during this current Price Review period.

1.22 South West Water has struggled to perform well in wastewater on pollution incidents where it is the worst performer in the sector. Our decision to fast-track South West Water was subject to a commitment to improve its wastewater pollution incidents and environmental performance and achieve a 4 star rating under the Environment Agency's (EA) environmental performance assessment. Achieving this will require considerable management time and attention. It is also monitored closely by the EA which expressed recently its concerns about South West Water's ongoing performance.[4] Pennon's submission has not addressed the management challenges that the integration of Bristol Water will mean for its ability to deliver on its existing commitments.

Comparison of case

1.23 The table below provides a comparison of Pennon's case in its merger impact assessment and the findings of our analysis. For consistency with Pennon's presentation, positive figures represent a detriment in the form of higher revenues, and negative figures represent an indicated 'benefit'.

Table 1: Comparison of case

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[4] Water and sewerage companies in England: environmental performance report for 2020 – GOV.UK

Pennon/Oxera view	Ofwat view	Key differences in approach
Wholesale base cost benchmark catch-up		
Pennon considers the merger will improve our ability to benchmark costs. **Benefit of** [REDACTED✂----]**to** [REDACTED✂----] **(over 30 years).**	**Detriment of** [REDACTED✂----] (but possibly as much as[REDACTED✂----]).	**Pennon places all its weight on the change in performance** approach which it considers finds a benefit and ignores its static analysis which finds a detriment of as much as [REDACTED✂----] over a single control period. **We consider that the change in performance approach has an inherent tendency to estimate decreases in industry allowances** and ought not to be relied upon. Analysis that removes that tendency suggests the detriment may be as large as [REDACTED✂----] over a 30 year period.
Precision		
No detriment: Oxera considers five approaches to measure the impact on precision and finds no impact.	Our analysis **finds detriment to the precision of our models** through a loss of variation of key explanatory variables.	Our analysis suggests that the merger would be expected to lead to material changes in totex for [REDACTED✂----] which suggests the models would be expected to be less precise in the future. This, combined with a loss of variation in key explanatory variables amongst companies leads us to consider there is a risk of a loss of precision.
Retail cost benchmark		
No material impact, no loss of comparator.	No material impact.	**No material difference.** Pennon is not able to set out its ultimate plan for retail activities. However, we do not consider that the merger will impact our ability to compare retail costs.
Enhancement		
Detriment of [REDACTED✂----]over 5 years (static approach, lead standards and metering)[5]. Detriment of [REDACTED✂----]5-year NPV (forward-looking analysis of leakage component of supply-demand balance model).	Detriment of [REDACTED✂----]over 5 years (lead standards and metering). Static analysis of supply-demand balance model shows significant sensitivity.	Our approaches differ marginally, however, **we do not reach materially different findings**.
Outcomes		
[REDACTED✂----] detriment (5-year, excluding C-MeX). [REDACTED✂----]benefit C-MeX (10-year NPV).	[REDACTED✂----]detriment (5-year). No impact on C-MeX.	The difference in our views with respect to the bulk of outcomes examined is driven by a difference in approach. We have considered the impact on the actual performance commitment level used at PR19, whereas Pennon considers the impact on the upper quartile measure. It is not clear that either of these approaches is evidently superior in assessing future impacts, as our approach to outcomes continues to evolve. We differ in our view on the impact on C-MeX. As this is a largely relative measure, it is not clear that there would be a material impact. Therefore while Pennon attempts to measure an impact, we do not.
Benefits		

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[5] This element is not reported separately in table 2 or table 18 of Pennon's Merger Impact Assessment where Pennon summarises its case. Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water.

Pennon/Oxera view	Ofwat view	Key differences in approach
Synergies and small company premium (SCP), total [REDACTED&----] (20 year NPV). [REDACTED&----]annual cost savings [REDACTED✂----]5 year [REDACTED✂----] [REDACTED✂----] [6] (out to 2041).	[REDACTED&----] – synergy. [REDACTED&----] SCP NPV.	**We do not consider that Pennon has adequately evidenced the majority of benefits it puts forward as meeting the threshold required in order that they be considered as relevant customer benefits.** Its assumptions on cost savings seem overly optimistic and its evidence from the Bournemouth acquisition does not support the scale of operational savings it anticipates. Pennon overstates the scale of the SCP and the duration over which it can be assumed an SCP uplift would persist.

Overview of our opinion

1.24 Overall, we do not agree with Pennon that the merger of South West Water and Bristol Water would result in a benefit. We consider that the merger would prejudice our ability to regulate the water sector in England and Wales. Nor do we consider there is sufficient evidence of relevant customer benefits of the merger which would outweigh the likely prejudice we have identified.

1.25 To understand the nature and extent of the prejudice to our ability to regulate the sector that arises from this merger it is important to understand the crucial role that benchmarking plays in the unique UK water sector, especially in light of the lack of international comparators. In this opinion we explain the benefits of comparator information and the role it plays in how we regulate in section 2.

1.26 The impact of the merger on our ability to assess the efficient level of costs for the sector and each company is discussed in section 3.

1.27 Section 4 sets how we expect the merger will affect our ability to set appropriate outcome targets and incentives to ensure companies deliver quality services to customers and the environment.

1.28 Our view on the claimed benefits arising from the merger is set out in section 5.

1.29 In section 6 we examine Pennon's evidence of support gathered from customers.

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[6] [REDACTED✂----]is stated in Table 2 and Table 18 which present the overview of the case, paragraph 9.9 indicates this is [REDACTED✂----]

2. Comparators in the water sector

Benefits of comparators

2.1   As set out in our Statement of Methods, making comparisons between companies is one of our key tools to regulate the water sector. This section sets out why comparisons are crucial to the way we regulate and how we use them in different areas, both within and outside our Price Review.

2.2   Prior to the merger, there were 16 independent private water companies, 10 of which provide wastewater services as well. This is more than is typically available in other price regulated sectors in the UK and means comparative assessment is a robust tool for comparing costs and performance. This is especially important in water because there is not the same option to use international comparators as in other sectors since, among other things, there are significant differences in regulatory requirements, geographic influences and the scale of water and wastewater businesses.

2.3   A key benefit of comparative regulation is that it mitigates the information asymmetry that regulators typically face. Regulated companies can exploit their information advantage to gain undesirable rents. Comparative regulation makes the reward to one company depend on its performance relative to that of other companies. As a result, it induces a form of competition via regulation that weakens the regulated companies' information advantage and allows the regulator to set stretching cost and performance targets to achieve better outcomes for customers.

2.4   Dynamically, comparative regulation incentivises companies to improve in areas where the regulator uses this tool. For instance, it incentivises companies to innovate to reduce their costs or improve their level of service so as to outperform their peers. Comparative regulation helps us mimic market mechanisms in areas where we lack competition.

How we use comparisons

2.5   We rely on comparisons both in our Price Review and outside of it. Within our Price Review comparisons are particularly relevant when we set allowed revenues and outcomes. Outside our Price Review comparisons are also very important for ongoing monitoring, enforcement and spreading best practice. This section describes how we use comparisons in all of these areas.

Comparisons used to set allowed revenues

2.6   This section outlines how we use comparisons to set the key elements in the determination of companies' allowed revenues. In particular, we focus on the role of

comparisons to set efficient cost allowances; calculate the cost of capital; and assess and rank companies' business plans.

Comparisons in cost assessment

2.7   A key building block of our Price Review is to set efficient cost allowances for each company. Our cost allowance includes expenditure related to the day-to-day running of the business ('base costs') as well as expenditure to enhance services for customers and the environment ('enhancement costs')[7]. Making comparisons is crucial to determine efficient cost allowances in the water sector:

- **Wholesale base costs**. Wholesale base costs represent approximately 80% of water companies' allowed total cost (totex). In PR19 we used econometric benchmarking for a significant proportion of wholesale base costs – approximately 90%, £38 billion. Our wholesale econometric models used historical expenditure data and derived best fit equations using explanatory cost drivers. We considered how our econometric equations explained companies' historical costs, and ranked companies in order of efficiency. We used this ranking to set our assumptions of the extent to which companies can catch-up with the best performing companies. We assumed that all companies could attain the same efficiency as the efficiency benchmark company[8]. Our assumption balanced the need to stretch the industry to deliver efficiencies, with that of setting realistic targets.

  The catch-up efficiency challenge in wholesale base costs that we set in PR19 using econometric benchmarking represented approximately a £1.2 billion reduction in allowed costs. Using the next closest, but less efficient, benchmark[9] would have decreased the catch-up efficiency challenge to approximately £450 million, yielding a £750 million increase in cost allowances for the sector. The degree of catch-up challenge is a regulatory choice which impacts the sector materially. In order to make that choice effectively we need to be able to demonstrate the decision is based on sound foundations which in turn is dependent on the confidence that can be placed in the models' ability to accurately forecast costs for each company. These figures illustrate the value of robust models when making comparisons and setting cost allowances.

- **Retail costs**. Retail costs represent approximately 8% of water companies' allowed totex. In PR19 we relied on econometric benchmarking using both historical and forecast data. We calculated the upper quartile efficient level of performance. We applied the average of the historical and forward looking upper quartile efficiency challenges to set residential retail allowances for the 2020 to 2025 period.

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[7] Enhancement expenditure can be for environmental improvements required to meet new statutory obligations, improving service quality and resilience, and providing new solutions for water provision in drought conditions.
[8] In PR19 we used the fourth most efficient company in water and third most efficient company in wastewater.
[9] The fifth most efficient company in water and the fourth most efficient company in wastewater.

- **Enhancement costs**. Enhancement costs represent approximately 17% of water companies' allowed totex. In PR19 we used company forecast data and compared costs for similar activities to set an efficient enhancement cost allowance for each company. We used comparative benchmarking for most of the environmental programmes, most of the costs to improve drought resilience, and metering programmes. In total, this covered 70% of enhancement proposals.

- **Cost adjustment claims**. As part of our PR19 methodology, companies could raise cost adjustment claims where they considered that they had unique or atypical material costs which would not be adequately captured through econometrics. In PR19 we considered these claims and made efficient allowances where appropriate. To make these allowances, we relied on comparisons with other companies where that was feasible and comparative information was available.

- **Cost sharing rates**. In a Price Review we set cost and revenue allowances five years in advance. There are always uncertainties about the future, and hence a risk that we set an allowance that will turn out to be either too low or too high. Cost sharing is an important mechanism by which this risk is shared between customers and shareholders. When a company over or underspends its cost allowance during the Price Review period, it will share the over or underspend with customers. Our cost sharing mechanism in PR19 relied on comparative regulation to incentivise companies to reveal their true costs and dynamically improve their efficiency. In essence, companies that submitted relatively efficient business plans would benefit from more favourable cost sharing rates than companies with relatively inefficient business plans.

Estimating the allowed cost of capital

2.8   We also use comparisons when estimating the allowed cost of capital though we also rely heavily on external benchmarks.

- **Cost of equity**. As part of our calculation of the allowed cost of capital we need to determine an allowed cost of equity. We make use of data from listed water companies to calculate the asset beta - a key element when calculating the allowed cost of equity. At PR19 we compared beta estimates for Severn Trent and United Utilities, the two pure-play water companies.

- **Cost of debt**. As part of our calculation of the allowed cost of capital we need to determine an allowed cost of debt. We make use of comparisons between companies to assess the efficient level of the cost of embedded debt. For instance, in PR19 we used granular company data on pure debt instruments to form our view of the cost of embedded debt in

the sector.[10] We also used external benchmarks from across multiple sectors to influence our estimate for the cost of new debt.

Assessment and ranking of business plans

2.9 Comparative regulation plays a critical role when we assess and rank business plans in the initial stage of our Price Review. In PR19 we set out a series of expectations and requirements for companies' business plans so they really stretched themselves to deliver more for their customers, the environment and wider society. It is also essential in providing an incentive to reveal the true expectation companies have of their potential performance and to address the inherent asymmetry of information between us and the company in question.

2.10 We assessed business plans against three overarching characteristics across nine test areas: high quality, ambition and innovation. Throughout the whole process, comparisons played a crucial role when assessing and rating business plans. Companies' plans could get a 'good' or a 'bad' grade.[11] Where companies' business plans did not meet our expectations, companies were required to resubmit them. Where companies' business plans met, or exceeded, our expectations, they received early draft determinations and financial (in particular a financial reward of 10 basis points of return on regulated equity) and reputational benefits.[12] The process induced competition between companies to submit high quality plans which deliver benefits to customers in the form of improved outcomes or greater efficiency reflected in lower bills.

Comparisons used to improve outcomes

2.11 Our outcomes regime constitutes a core tool to incentivise companies to deliver good outcomes for customers and improve their performance over time. Comparative regulation lies at the heart of this regime and our approach continues to develop. At PR14 we adopted comparative assessment at the stage of final determinations; while for PR19 we predefined those outcomes we treat as common. For PR24 we anticipate placing greater reliance on common outcomes and less on bespoke performance commitments.

2.12 The outcomes regime has two key elements: performance commitments (PCs) and outcome delivery incentives (ODIs). PCs are set by reference to certain core services that customers should receive. PCs can be common for all companies – with common definitions and performance reporting – or bespoke – reflecting individual companies' circumstances and customer preferences. ODIs specify the financial or reputational

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[10] In particular, the point assumption for the cost of embedded debt that we set with reference to the iBoxx index lies within a proposed range that has as its upper end the sector median cost of embedded debt and as its lower end the sector weighted average cost of embedded debt.

[11] The 'grade' categories were: exceptional, fast track status, slow track status, and significant scrutiny status.

[12] This was the case with only three companies.

consequences if companies outperform or underperform against each of these PCs. In the case of financial ODIs, if companies underperform (outperform), they face an underperformance payment[13] (outperformance payment[14]).

2.13 This approach gives companies the freedom to innovate to find the most cost-effective way of meeting these outcomes. Companies propose their PCs, service levels and ODIs. We use a wide range of evidence to set the outcomes package for each company. Comparative analysis is key to enabling us to set stretching PCs and strong ODIs for their delivery:

- **PCs**. Comparisons are crucial in the case of common PCs. In PR19 we set 15 common PCs. We compared companies' proposed levels of performance with each other and, where possible, with past industry performance, in order to set stretching PC levels. In PR19, we set PC levels in three key areas[15] at the forecast upper quartile level in each year of PR19. In the case of bespoke PCs, our ability to compare is more constrained, as, by their nature, bespoke PCs may be unique to a company. However, some bespoke PCs are similar across multiple companies.[16] In these cases we were also able to make comparisons across the sector when setting PC levels.

- **ODIs**. Comparisons are particularly relevant when setting ODIs rates. In PR19 we used comparative analysis to assess companies' proposed ODI rates for common and comparable PCs. We considered that rates of financial ODIs for the same PC might be expected to vary between companies, for example, because of the different values customers place on service improvement. However, we did not consider large variations, which neither we nor companies could satisfactorily explain, to be appropriate. Hence, in setting ODI rates for common or comparable PCs, we used cross sector data to produce reasonable ranges for those rates. We used those rates to check whether companies' proposed rates were out of kilter with the rest of the sector and considered whether to intervene where the proposed rate was an outlier.

Comparisons used in monitoring, enforcement and spreading best practice

2.14 Comparisons are also important outside our Price Review. This is particularly so in the areas of monitoring, enforcement and promoting best practice. In this section we set out some examples:

- **Monitoring**. We regularly use comparisons when we monitor performance in different areas. One recent example from our work on markets is the review of incumbent company support for effective markets (RISE) from 2020. In 2019 we concluded that overall levels of

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[13] Penalty.
[14] Reward.
[15] Water supply interruptions, internal sewer flooding and pollution incidents.
[16] For example on asset health, reducing void properties and carbon reduction.

incumbents' support for markets was unacceptable and we challenged companies to improve. The RISE review found that some companies performed much better than others in supporting markets. We sent letters to each company identifying areas where each had performed well and areas that needed attention.

- **Enforcement**. We also make use of comparisons in our enforcement activities. One example is the review we undertook after the *Freeze Thaw*[17] in 2018.[18] We found that while some companies had been well prepared for the extreme weather event, others had performed badly, causing significant hardship for their customers. The comparative assessment that we undertook led to a set of recommendations for improvements in the areas of emergency planning, preparation, response, communication and payment of compensation. We identified four companies as requiring detailed scrutiny and required them to submit detailed, externally audited, action plans setting out how they would address the issues identified.

- **Promoting best practice**. Comparing companies is key to the promotion of best practice in the water sector. The RISE initiative mentioned above is a good example. We encouraged companies to review each other's letters to learn from the examples of good practice identified to better support markets. There are other recent examples. Each year we publish service delivery and financial monitoring reports that provide comparative information on company performance in the areas of total expenditure and key outcomes delivered to customers.[19] Besides providing comparative rankings – which have a reputational impact on companies – the assessment may also explore the factors driving good and bad performance. For instance, the 2020 report identified good practices on network monitoring which had contributed to reducing leakage. More recently, we have undertaken research to understand more about customers' experiences during the pandemic.[20] Our work has identified some case studies that highlight actions taken by some companies to better support customers in these difficult times. And we have recently published a report on companies' asset management maturity, again drawing out best practice and areas for improvement, looking across the sector as a whole. We also rely on comparisons to promote best practice in the areas of Board leadership and governance, accounting separation and reporting of company data.

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[17] The thaw that followed the 'Beast from the East' in late February and early March 2018 left over 200,000 customers in England and Wales without water for over 4 hours; and over 60,000 customers without supply for over 12 hours. Households, businesses, schools and public organisations across the country were affected by either low pressure or no running water, some for several days.
[18] See Ofwat, 'Out in the cold: Water companies' response to the 'Beast from the East'', June 2018.
[19] See Ofwat, 'Service Delivery Report 2019-20', December 2020.
[20] See Ofwat, 'Listen Care Share: Water customers' experiences during Covid-19', July 2021.

3. Cost assessment

3.1 Cost assessment is a critical element of the price control, determining over 70% of customers' bills and providing companies with the funding to deliver resilient services. We seek to ensure that each company has sufficient funding to meet its statutory obligations to provide essential services to customers, and services which are resilient; while seeking to ensure that costs are not overstated whereby customers over pay.

3.2 For PR19 over £40bn of the c.£50bn of totex was assessed by comparisons across companies. The day-to-day running costs of companies were assessed using econometric models of historical costs and accounted for around £37bn. Over £4bn of spending on new infrastructure was assessed comparing costs across companies where companies would be expected to undertake broadly similar activities.

3.3 Comparators from other companies also play a role where we undertake a specific assessment of the costs of an individual scheme that a company is proposing. Examples of similar schemes conducted in the past, or proposed, by other companies play a critical role in assessing the efficient required costs.

3.4 Further details of the important role company comparisons play in assessing costs in the water sector are outlined in annexes 1 and 2. In those annexes, we also explore the limited scope to use comparators from other sectors and internationally as substitutes for this cross company comparison, largely due to the particular nature of the UK water sector.

3.5 Overall, we find that the merger leads to a significant detriment to our ability to assess costs. Pennon's finding of a benefit is founded: (i) on the positioning of reductions in industry totex as a benefit which we consider to be inappropriate; and (ii) in placing undue weight on the change in performance approach which we explain has an inherent tendency towards finding an increase in the efficiency challenge. We do not consider weight ought to be attached to this approach. The CMA ought to be able to put weight on analysis that provides confidence as to the impact of a merger, and in the context of Phase 1, adequate confidence that the merger will result in no detriment (or that relevant customer benefits outweigh any detriment). Our analysis of the existing suite of cost models suggests that at PR24 [REDACTED✁----] can expect to [REDACTED✁----] and [REDACTED✁----] the merged entity [REDACTED✁----] more. Such a distribution is unjustified.

Econometric models need to explain individual company costs

3.6 The purpose of cost assessment is to derive an allowance for each company that provides each with sufficient funding to enable them to provide resilient services and to

meet their statutory obligations. In this context, the robustness of our approach is of fundamental importance. In focusing on industry average impacts, the analysis by Pennon and Oxera fails to consider the impact on individual companies. Below we present analysis that explores that, and we find there are companies that are notably affected. Specifically, [REDACTED✂----] is expected to receive around [REDACTED✂----] modelled totex, which is equivalent to [REDACTED✂----]. Conversely, [REDACTED✂----] i

3.7 The models from PR19 provide our best indication of the costs required by companies with the data available from companies and therefore, examining the impact on the existing models is our best indication of future possible detriment. These models have been developed over time and subject to significant scrutiny by companies during their development. They have also been reviewed by the CMA in the recent redeterminations and were largely unchanged.

3.8 We have considered if, following the merger, we would be able to achieve the same level of precision in our models. Should our models generate significantly more funding than appropriate, this could lead to customers paying more than necessary and to companies receiving extra funding giving rise to excessive returns. Alternatively, if the models provide too little funding, companies may fail to invest in necessary infrastructure, or it may lead to inappropriately lower returns which could harm investor confidence in the sector. Both of these would be a concern for us. In this case, our analysis indicates that as a result of the merger, the models will produce less precise results.

3.9 While it may be possible to adapt the existing suite of models to mitigate any impact of the merger, it is far from certain that would be possible. Indeed, the robustness of our existing approach to developing models is already well tested. Alternative approaches are considered in the course of the development of the methodology of each price control. While theoretically alternative options such as stochastic frontier analysis and bottom-up modeling could be developed, neither we nor anybody else has identified a clearly superior alternative to date. In developing future methodologies, including for PR24 but also beyond, we expect to keep these options under review. Considering alternative approaches is an extensive task, including involving consultation with the sector, and consequently we cannot be confident at this stage that alternative approaches to assessing costs to take account of this merger would be robust.

3.10 Insofar as it might be feasible to address the detriment we have found, that would require further analysis which would go beyond what might reasonably be undertaken during a Phase 1 merger enquiry, or an agreed solution that would address the potential issue, whilst recognising that the regime may evolve and adjustments could then be made in the ordinary course.
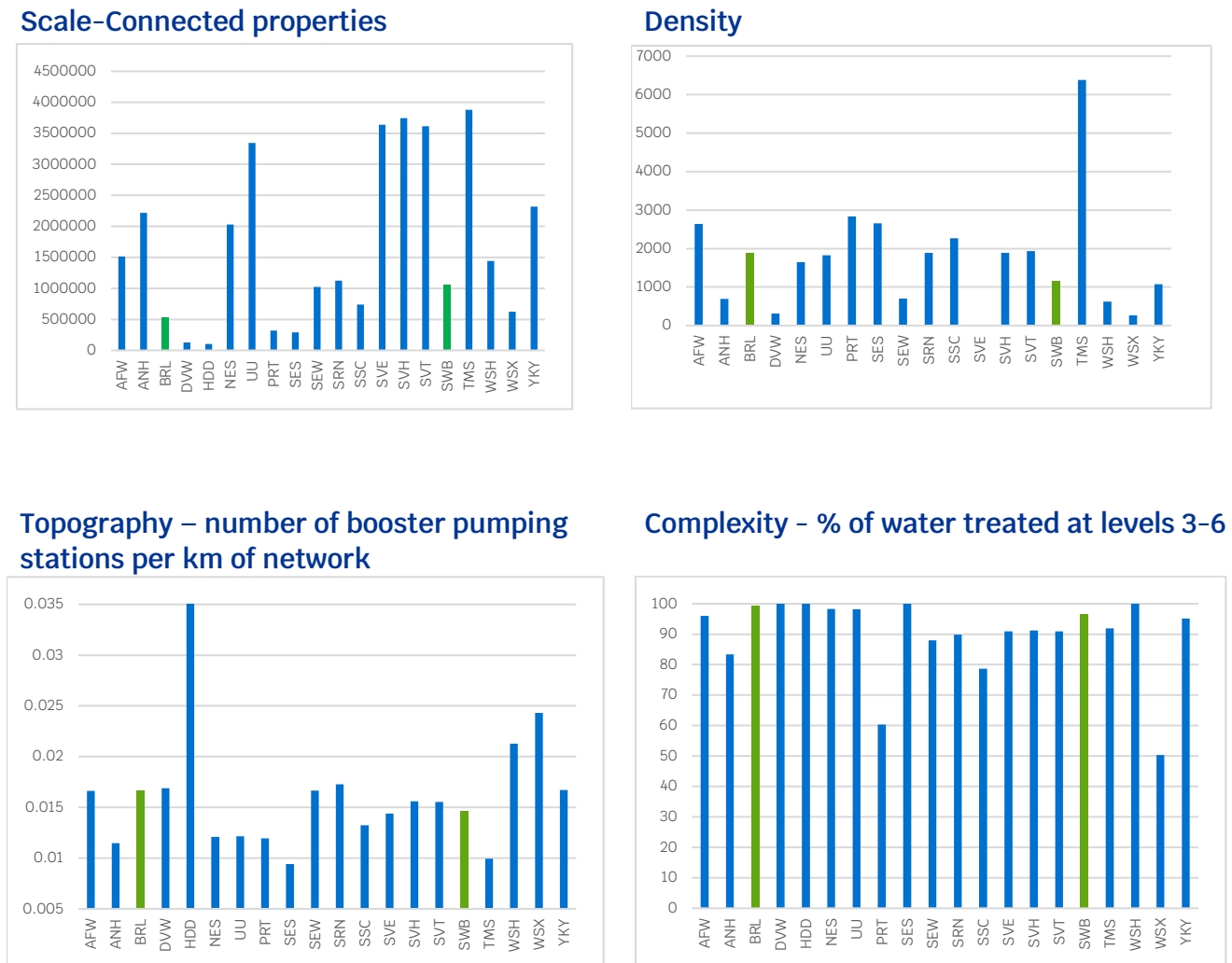
Econometric models need to capture key drivers

3.11 Over a period of time, econometric base cost models developed by us and the industry have been honed but have always contained four key features. These features are essential in providing assurance to the industry as to the credibility of the models in estimating efficient costs:

- **Scale** – larger companies are expected to have greater costs and there may be economies of scale.
- **Density, or sparsity** – companies that have to build, maintain and run networks serving the same number of customers but covering a larger area, because the population is more dispersed, might be expected to have higher costs. Those serving especially dense areas might be expected to incur greater costs in accessing those dense areas.
- **Topography** – water and wastewater (unlike energy) are dense and costly to transport, especially when overcoming gravity which requires expensive pumping.
- **Complexity** – in the context of water, different companies will have access to different sources of water; but drinking water quality requirements are broadly universal and so companies with water that is more difficult to treat have higher costs.

3.12 These four key elements intrinsically drive cost differences between companies. Companies in the UK water sector differ in these four elements and so it is important that these differences are sufficiently captured in the econometric models. Figure 1 below demonstrates these differences. Both South West Water and Bristol Water differ from each other in each of these four key aspects and therefore contribute in individual and specific ways to identifying the impact of each key driver on costs. In particular they are notably different in scale and density.

Figure 1: Key drivers of costs in the water sector

Scale-Connected properties

Density

Topography – number of booster pumping stations per km of network

Complexity – % of water treated at levels 3-6

3.13 In previous merger cases the CMA has recognised that more companies, and more observations, would typically be considered to result in models more capable of estimating accurate costs.[21] [22] In that regard the CMA has noted that there ought to be a presumption that a merger would be detrimental to the models. However, the CMA has gone on to suggest that any given merger might result in an industry structure which is easier to model accurately. While it is feasible that more concentrated industry structures might result in more homogenous companies, and thereby result in more comparable companies, no individual merger would result in a set of companies aligned on any one of the key drivers of costs. Consequently, no single merger would remove the

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[21] CMA (November 2015), A report on the completed acquisition by Pennon Group plc of Bournemouth Water Investments Limited. Pennon Group and Bournemouth Water final report . Paragraph 6.38, page 47.

[22] CMA (December 2016), Anticipated acquisition by Severn Trent Plc of Dee Valley Group plc. Severn Trent Dee Valley ltd . Paragraph 58, page 15.

need to model all of the elements above, and that is certainly the case with respect to this merger.

3.14 Neither would this merger (or any merger in general) remove a distortive outlier in a way which would have a positive impact on our ability to model costs. For a company to have a distortive effect, it would have to have particularly high, or low, costs (atypical costs) because of factors not captured in our models. If that were to arise, companies would seek to have their cost allowances adjusted for those factors, submitting cost claims for those higher (or lower) costs and receiving additional cost allowances to cover them where significant. Few such cost claims have been sufficiently evidenced and accepted by us or indeed by the CMA in the past. Even where they have been accepted, the atypical costs have not been excluded from base cost models. That suggests that there is no compelling evidence of companies being significant outliers on costs and therefore no outlier issue to address. But, even if such a scenario was possible, the merger of comparably sized companies would only mask, rather than expunge, any distortive effects[23]; it would require a significantly larger company taking over an outlier company to make the outlier effect de minimis in the merged entity.

3.15 Although econometric models are also used for cost assessment in the energy sector, there are important distinctions: in particular, there are material differences between these sectors and in water, greater reliance is placed on cost models in undertaking cost assessment. First, the econometric models in water account for a significantly greater portion of the value chain than in energy, by virtue of competition being exploited to control costs in generation and retail (including sourcing energy), meaning only the costs of the core network need to be assessed. Second, energy network companies are typically more homogenous in scale and less affected by local topological and geographical differences which drive differences in costs between water companies. As such, the models in water need to capture more features than in energy, which in turn requires more data.

The impact of the merger on costs assessment

3.16 Pennon's own analysis finds detriment of [REDACTED ✂----][24] arising from the merger when looking at the impact on the models (referred to by Pennon as the 'static' analysis). But Pennon invites the CMA to ignore that analysis in preference to alternative analysis (using 'changes in performance') which it argues disclose a benefit.

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[23] Conceptually, a merger of two equally sized firms would half the extent to which costs are an outlier, but it would increase the influence of the merged entity on the models as there would be one fewer company.
[24] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, Table 4 – impact of the merger using a standard weighting of Bristol Water and South West Water performance and an upper-quartile efficiency challenge

3.17   Having reviewed Pennon's analysis we agree with the finding of detriment using the existing models.

3.18   The alternative analysis put forward by Pennon is highly sensitive to input assumptions. We disagree with these assumptions for the reasons given below. When we make corrections, it also shows detriment which could be around as much as [REDACTED✂----].

3.19   Pennon's overall conclusion that there is no detriment to address is dependent on dismissing the static analysis and placing most, if not all weight on the 'changes in performance' analysis.[25] Pennon's rationale for this is twofold: first the static analysis would show no detriment if Pennon were to realise its proposed efficiency savings; and second more weight should be placed on the changes in performance analysis because it is forward looking.

3.20   We do not consider either of these rationales to be justified. In relation to the proposed efficiencies, it is not clear the scale of the proposed efficiencies will be realised or that they will be delivered in a timely manner. Pennon has not provided a robust plan demonstrating this. Absent such a plan, we do not consider that the detriment indicated in the static analysis can be dismissed on the basis of the prospect of uncertain synergies.[26] Oxera also simply assumes that the merged entity will be as efficient as South West Water in the static analysis, rather than applying the proposed synergies to the historical period. We estimate that Pennon would have to make [REDACTED✂----] of its proposed operational savings to be as efficient as South West is currently. Given our degree of confidence in Pennon's proposed synergies, we would be cautious in accepting Oxera's alternative analysis.

3.21   Pennon also notes that the static approach comes with substantial caveats and suggests that most if not all weight be placed on the change in performance analysis (which has been referred to as 'forward looking' analysis in the past).[27] This seems to be based on a misinterpretation of our, and the CMA's comments, on forward looking analysis in previous mergers.

3.22   While we acknowledge that in principle it may be appropriate to place greater weight on a forward looking approach, as we explain in annex 4, we have a number of concerns with the change in performance analysis undertaken by Oxera. First, it is not evidently forward looking (it relies on historical data going back further than the static analysis). Even if it were, we would not place complete weight on such analysis and dismiss the static analysis as suggested by Pennon, unless it was clear the static analysis was

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[25] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water. Paragraph 10.6, p.82.

[26] It is not clear that a number of the proposed efficiencies could properly be characterised as relevant customer benefits on other grounds in any event.

[27] Pennon (October 2021), Bringing benefits to the greater South West The case for the merger of Bristol Water and South West Water. Paragraph 8.29, p.59.

completely inappropriate, which it is not. Secondly, this change in performance analysis is also highly sensitive to input assumptions and has a tendency towards a finding of a larger efficiency challenge, which Pennon interprets as a benefit. As such it would not be reliable to place weight on it (without adjusting for the inherent tendency), let alone preferable to the static analysis to such a degree that the finding of detriment from the static analysis can be dismissed as Pennon invites.

3.23   We explain the tendency towards estimating a decline industry totex inherent in the change in performance approach below and in annex 4. We also note that Oxera assigns a [70-80]% probability to a scenario in which the merged entity is not upper [REDACTED✂----][28][REDACTED✂----]

The change in performance approach is sensitive and tends towards estimating a decline in industry totex

3.24   When performed in other appropriate ways, contrary to Pennon's arguments, the change in performance analysis can indicate significant detriment. By way of example when conducted with other plausible assumptions, this analysis would indicate the merger would lead to significant detriment of around [REDACTED✂----], see table below.

3.25   As we explain in annex 4 this is largely attributable to Oxera excluding Dee Valley/Hafren Dyfrdwy from its analysis. We see no rationale for excluding Dee Valley, as they are an independent comparator in the historical period considered and consequently essential to determining ranks in past performance. As table 2 shows, simply including all 17 existing companies in the analysis changes Pennon's [REDACTED✂----] (including the use of 19/20 data). Analysis which includes Dee Valley Water and Hafren Dyfrdwy, and updates the measures of probabilities of changing performance to reflect the most recent information results in a [REDACTED✂----] detriment of [REDACTED✂----]when using PR19 data. When including the CMA's changes, including 19/20 data, this results in a [REDACTED✂----] detriment of [REDACTED✂----]. This analysis clearly demonstrates that the analysis is highly sensitive to input assumptions and that it is possible to construct plausible scenarios in which the analysis shows both significant detriment, as well as the suggested benefit Oxera presents.

3.26   All of these scenarios suffer from the analysis implicitly having a tendency towards finding a benefit from losing a comparator: it is counterintuitive to find that, on average, the loss of a company in this analysis is estimated to result in a benefit. This arises because companies have a higher chance of performing below our sector catch-up challenge (typically the upper quartile) in future controls, and the loss of a company performing below our sector catch-up challenge is presumed to generate a benefit. If

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[28] Oxera (July 2021), Forward-looking wholesale model, supporting model 1.1. Scenarios 3,5 and 6 predict the merged entity will not be in the upper quartile. For each price review period considered, over [70-80]%probability is assigned to these scenarios.

we focus our assessment on the impact of losing an upper quartile company this analysis suggests that this merger would result in a detriment of [REDACTED✂----]. The changes we have made are explained fully in annex 4.

Table 2: Detriment from change in performance analysis after updating

Oxera's 1.1 model estimate CMA data	Including all 17 companies in Oxera's model 1.1	Updating the probability matrix	Removing the intrinsic tendency to find a decline in industry totex
[REDACTED✂----]	[REDACTED✂----]	[REDACTED✂----]	[REDACTED✂----]

 Source: Ofwat see annex 4 – Negative figures indicate an expected decrease in industry totex which has been interpreted by Pennon and Oxera as a benefit.

3.27 Finally, the range Pennon has presented as representing the impact on the wholesale benchmark does not seem to align with the Oxera report. The range Pennon includes in the summary of its case is of an impact from [REDACTED✂----] benefit to [REDACTED✂----] benefit. This appears to be based on Oxera's supporting model that uses the initial wholesale model with the addition of Lead Standards and Metering enhancement models. Pennon has chosen this range using inconsistent assumptions when calculating the upper and lower bounds: these concern Oxera's approach to calculating the efficiency challenge and the efficiency of the merged entity. We discuss our reservations further in annex 4.

Pennon's analysis does not explore key concerns which indicate further detriment

3.28 Pennon and Oxera's analysis does not consider the impact of the merger on the robustness of future models, or the accuracy of future costs estimates, for all companies. Instead, Pennon presents two sets of analysis of the impact of the merger based on how the efficiency challenge may change as a result. The first uses the econometric models, but Pennon does not re-estimate them to take account of the merger and so it does not therefore properly capture how the models might be affected.

3.29 In their submissions Pennon and Oxera seek to examine if there are any key features which would be lost as a result of the merger.[29] However, the analysis does not consider how the models might actually be impacted by the loss of South West Water and Bristol Water as independent comparators. Oxera's analysis does not capture the importance of interactions between different cost drivers in the data, and Oxera has not specifically examined how the models would perform post-merger. Oxera has put forward analysis using an econometric technique, bootstrapping, to examine the statistical confidences levels around the parameters in the models.[30] However, the CMA has previously placed

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[29] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water. Section 8.
[30] Oxera (September 2021), Annex B: Precision

no weight on similar approaches, and it is unclear to us if Oxera has addressed the concerns previously raised by the CMA on the usefulness of this analysis.[31]

Impact on specific company estimates due to the loss of an important comparator

3.30   As noted above we consider that any assessment of a merger must take account of how a merger would impact on the confidence we can place in the econometric models as a result of the loss of a comparator and the combination of two comparators. In order to do that it is necessary to re-run the models to determine what our best assessment of the impact might be. This is supported by our academic adviser (see annex 7).

3.31   Annex 2 explains the analysis we have undertaken to assess the impact of this merger on the econometric models. Broadly we re-ran the models, combining data from South West Water and Bristol Water. In one scenario we combined the information from three years prior to the price control, as an indication of what might be expected as the impact at PR24. In another we combined the data for the entire period so only the merged entity is used in the models and South West Water and Bristol Water do not appear independently, as an indication of what might happen at future controls when information from South West Water and Bristol Water would no longer be available to be used in the models. We also considered scenarios which take account of Pennon's proposed efficiency savings and that future costs for companies are likely to change over time.

3.32   Crucially, across all scenarios we find that there are meaningful changes to the cost estimates of [REDACTED✂----] and of [REDACTED✂----].

Figure 2: Merger impact on estimated allowances accounting for assumed cost savings

[REDACTED✂----]

3.33   [REDACTED✂----] predicted to receive [REDACTED✂----] totex, in the simple scenario capturing the effect at PR24. While [REDACTED✂----] may not seem a large change, it is significant [REDACTED✂----] within the regulatory regime. Our methodology allowed companies to bring forward special factor cost claims for totex which amounted to more than one percent of totex.[32] [REDACTED✂----] of modelled totex is equivalent to [REDACTED✂----], which is broadly equivalent to the bills of [REDACTED✂----] customers.

3.34   Conversely, [REDACTED✂----].

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[31] See the CMA's decision in Pennon Group and Bournemouth Water.
[32] See page 149 of our methodology for PR19.

Confidence in cost estimates will be reduced, not increased as Pennon claims

3.35 It is crucial that we are able to have confidence in the models. As our academic adviser explains in annex 7, the regulatory process requires that we are first able to develop models in which we, and the sector, are confident, and then using those models we are able to apply reasonable efficiency challenges. If we (and the industry) cannot be confident in the underlying models, this will impact on our ability to apply an effective efficiency challenge.

3.36 In developing the models we assess a number of factors and we go through a process of testing the models with the sector. While we cannot undertake a full review of the models in the time available we are able to examine the key statistical measures which indicate how robust the models are. That assessment is set out in annex 2.

3.37 Our review of the models finds that the accuracy with which we model the impact of density on costs is diminished by the loss of Bristol Water as a comparator. While the impact might be most noticeable on [REDACTED✄----], this will impact any company with [REDACTED✄----]. If the models under-predict the cost of companies with relatively high density like [REDACTED✄----], then they will overstate the costs of companies with relatively low density.

Minimum number of comparators

3.38 Oxera has argued that rather than be detrimental, further mergers could potentially lead to an increase in the precision of our models. We have already discussed at 3.13 why we do not consider that there should be a presumption that single mergers might be likely to lead to meaningful improvements in the ability to model costs.

3.39 Oxera's proposition goes beyond a single merger and suggests there is headroom in our models and that there could be several mergers before our ability to regulate is adversely impacted. It points to other regulators which use comparator benchmarking with fewer companies, such as Ofgem. And it presents some analysis in which it re-estimates our econometric models but simply drops companies and then examines the precision of the resulting models.

3.40 Overall, we consider it is overly simplistic to suggest that a particular number of comparators is sufficient and to draw an inference that mergers which retain at least that many comparators are not harmful. In a sector with such diversity as water, and as reflected in our Statement of Methods, different transactions could have quite different impacts on our ability to make comparisons, whether in broad or discrete ways. We also do not argue for stasis in industry structure. The assessment under the merger test in

any given case will also depend on the form of regulation as it evolves and the benefits that can be demonstrated to arise.

3.41 Water cannot be directly compared to other regulated sectors. Some other sectors have the benefit of international comparators to help inform their approach. Consequently costs which are not easily compared across UK companies may be comparable to the costs of companies abroad. International comparisons in water have been considered in the past and rejected. Differences in the scale of companies, the regulatory regimes, geographic and environmental factors all mean that high level costs are unlikely to be comparable. It is inconceivable that the cost of providing water in a country like Israel which depends on desalination is meaningful in setting cost allowances in the UK, for example. Closer to home, across Europe water is typically provided by local municipalities, meaning that they do not benefit from the scale of UK water companies, finding data on operating costs on a consistent basis is also typically more difficult as it does not need to be reported and the scope of activities conducted by European providers might not match that of English and Welsh companies.

3.42 The use of comparator information also plays a less important role in other sectors than in water. In the energy sector there is significantly more competition across the value chain than in water, and even for those elements which are regulated the regulator has to rely on methods other than comparator information. This is simply because with fewer companies present, comparator information is simply not available. Consolidation in the energy sector has occurred absent a test of how comparative regulation might be hindered, therefore it is not logical to draw conclusions on how regulation might be affected by mergers from a sector where the broader market context is so different and no equivalent test applies.

3.43 Oxera's analysis, in which it simply drops some existing companies from the existing models, is in our view not a credible way to represent analysis of a more concentrated sector. Mergers would lead to fewer, but larger, companies. Simply dropping some of the existing companies tells us nothing meaningful about regulating a completely different industry structure.

3.44 Oxera also disregards its own analysis. The correct interpretation of the widening of the confidence interval that it finds, even in its simplified analysis, is that fewer companies may make models more or less precise. What the effect is will likely depend on the exact industry structure and therefore it is necessary to undertake assessments of each merger, rather than generalize that fewer companies could possibly result in more accurate models.

Enhancement modelling

3.45 Enhancement costs relate to investment for the purpose of enhancing the capacity or quality of service beyond current levels, which are a significant proportion of totex. At PR19 enhancement costs accounted for c.£10bn of totex. Enhancement projects can vary significantly. Some projects are company specific either because of a unique requirement, or because of the unusual nature of the solution. Many of the drivers of enhancement costs, however, are commonly defined by the Drinking Water Inspectorate or the Environment Agency. Consequently, it is possible to compare a large portion of common activities across companies and we did this at PR19.

3.46 We developed models to examine a number of enhancement areas which both ourselves, and Oxera on Pennon's behalf has assessed. The three models examined cover: Metering, Lead standards and Supply-demand balance.

3.47 Oxera's static analysis for metering re-estimated the econometric model and calculates a weighted average of company costs to assess the impact of the merger. Oxera follows the same methodology for the lead standards model, however, it does not re-estimate the econometric model taking the merger into account. Instead Oxera simply takes the coefficients from the regression analysis as given from the PR19 final determinations. Overall, Oxera estimates a 5-year detriment of [REDACTED✂----]across both models.

3.48 Our analysis considers the suite of models used to assess enhancement costs. Since the enhancement models use forecast data only, we assume the merger to have taken place at the beginning of the forecast period. Our analysis finds a detriment of [REDACTED✂----] to modelled allowances, when considering the metering and lead standards models.

3.49 The supply-demand balance model consists of five components that are assessed separately: 2020-25 supply-demand balance enhancement; long-term enhancement; leakage enhancement; internal interconnections; and investigations and future planning.

3.50 Oxera only considers the leakage enhancement component of the model, and it re-estimates the leakage allowance assuming a weighted average of company leakage performance. Oxera suggests the merger will result in a benefit of [REDACTED✂----]in the leakage enhancement model using the static approach.[33] Our analysis considers all components of the supply-demand balance model that are dependent on industry structure. Further detail on our modelling approaches is discussed in annex 6.

3.51 Our analysis shows significant sensitivity in the supply-demand balance model, producing extreme results. We find that the modelled allowance of the industry decreases by [10-20]% [REDACTED✂----], however the allowance of [REDACTED✂----

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[33] Oxera (September 2021), Annex A: cost benchmark, Section 2.1.3.

]increases from a [REDACTED✄----], an increase of [REDACTED✄----]. Such a significant reduction in industry allowances combined with significant changes in individual company allowances should not be interpreted as a relevant benefit to customers. Overall, the industry would be insufficiently funded to address the critical issue of supply-demand balances. As discussed in paragraph 3.9 there are no obvious alternative approaches that would address the problem this analysis indicates may be expected at future controls.

3.52 Oxera also considered enhancement costs using the change in performance approach.[34] We do not consider this assessment to be appropriate. Enhancement costs are not modelled by reference to the upper quartile, as the Oxera approach considers. We make a net frontier shift adjustment for certain categories of costs. The change in performance approach is discussed further in annex 4 where we explain how it has a tendency to find a decline in industry totex from mergers and as such, we consider that substantially less weight should be placed on these findings.

3.53 Comparing enhancement costs relies on companies' projections of costs, rather than actually incurred costs as is the case with base costs. Using the companies' own forecasts to set allowances relies on companies having a strong incentive to provide realistic estimates of future efficient costs. It is accepted that companies have an incentive to overstate their expected costs. The knowledge that robust comparisons can be made is more likely to encourage truth telling in submitting costs information and the converse is also the case.

Retail cost assessment

3.54 We do not consider that this merger would lead to a meaningful impact on our ability to set efficient cost allowances for retail activities. We note that Pennon has not set out a clear plan for retail activities. As a result it is difficult to determine what the impact might be. Nevertheless, since Bristol Water and Wessex already jointly undertake certain retail activities, it is not evident that any transfer of activities would lead to a meaningful loss of a comparator.

3.55 Pennon presents analysis by Oxera that suggests that the merger would lead to between [REDACTED✄----]of benefit to our ability to regulate retail activities.[35] Pennon

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[34] Oxera (September 2021), Annex A: cost benchmark, Section 3.4.
[35] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, tables 7 and 8

notes that this is a mechanical application of the merger models[36] and it does not include these in its overall assessment of the impact of the merger.[37]

3.56 We do not consider that there would be a benefit to our regulation of retail activities arising from the merger. As we have noted elsewhere, the change in performance approach includes an inherent tendency to find lower industry totex arising from any merger which we consider means that any results from that analysis need to be treated with caution.

3.57 Nevertheless, overall we concur with Pennon that this merger is unlikely to prejudice our ability to regulate the cost of retail activities.

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[36] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, para 8.61
[37] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, table 18

4. Outcome delivery incentives

Potential impact of a merger on our ability to set stretching outcomes

4.1 The outcomes framework is a key component in driving company performance to deliver objectives for customers and the environment. At PR19 we set a number of common performance commitments (PCs) with common definitions, using comparative information from companies to set performance commitment levels and corresponding outcome delivery incentive (ODI) payments.

4.2 A merger could prejudice our ability to make comparisons between companies when setting common PCs. Generally speaking, and regardless of whether we use a specific benchmark for our assessment, with more comparators we are more confident in our ability to identify industry best practice and set stretching targets for the industry.

4.3 This will particularly be the case in relation to PCs that use the upper quartile to set performance commitment levels (PCLs), where a merger could result in a less stretching upper quartile, and in less stretching targets for companies and consequent higher outperformance, paid for by customers, and lower underperformance payments.

4.4 Both our analysis and Oxera's analysis suggest there is the potential for detriment to arise from the merger. The analysis assumes that ODIs are mechanistically derived which does not reflect the process we have adopted at past price controls, or expect to use in the future. At PR24 we are proposing to place less weight on company forecasts, but nevertheless having a large number of comparators will be important in identifying good performance as a basis for setting performance targets.

Pennon and Oxera's analysis

4.5 Based on the Oxera analysis using the 'changes in performance' approach, Pennon suggests that the merger would lead to a benefit in our ability to compare ODI performance. We note that this approach considers only C-MeX and Supply interruptions, as Oxera considered that these are the only directly comparable PCs that would be impacted following the merger.

4.6 As we explain in annex 4 the 'changes in performance' approach suffers from a presumption that any merger would on average lead to a benefit. This is because a high weight is given to companies being below upper quartile in the future, but as set out elsewhere, we do not consider that any weight should be placed on this analysis.

4.7 Oxera also considers static analysis including a wider range of common performance commitments. For that broader suite it calculates a 5-year detriment of [REDACTED] <--

--]arising from the merger.[38] This excludes mains repairs, for which it considers the analysis is highly sensitive.

4.8 In Oxera's static analysis, for the PCs assessed that do not make explicit comparisons by reference to a specific benchmark (median or upper quartile), referred to as 'Other ODIs' by Pennon, we do not consider Oxera's approach of assuming these PCs are set using a comparable benchmark is appropriate.

Our analysis

4.9 Our assessment of the impact of the merger on ODIs has focused on the common PCs impacted by the merger: Leakage, Per Capita Consumption, Water Quality Contacts, Mains Repairs and Unplanned Outage. Our analysis (annex 6), explores the thought experiment of how different ODIs might have been constructed at PR19 had we not had separate information for South West Water and Bristol Water. We place a value on the impact by assessing the expected change in out/underperformance payments across the sector from changing the performance commitment level. This will understate the extent of any detriment/benefit to customers because the outperformance rate and underperformance rate are set below customers' average willingness to pay, so as to ensure customers are not simply indifferent to company performance.

4.10 Unlike Oxera, we have not considered the impact on the ODI on customer outcomes (C-MeX) in the context of this merger. C-MeX is principally a relative measure of performance on customer experience. It rewards companies which provide industry leading performance, and penalises companies which lag behind the industry. Since it is mainly a relative measure, it is not clear that this merger would have a significant impact on outcomes.

4.11 Our analysis finds an aggregate detriment of [REDACTED✂----] arising from the merger across all performance commitments we considered and based on our static approach. That relates to the detriment over one price control period and if it was applied across five price control periods the current value would be [REDACTED✂----].[39]

4.12 Much of our finding of aggregate detriment is attributable to unplanned outages. At PR19 there was a wide range of performance on this metric. Consequently, the specific level set for the performance commitment had a significant impact on incentives. There has been convergence in performance following PR19 and therefore we would not

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[38] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, table 14

[39] Using five control periods is consistent with the 30 year time horizon considered in other areas of estimated detriment by Pennon on the basis of the approach adopted in previous merger assessments.

expect the loss of well-performing companies to have as significant an impact on sector performance at future controls as at PR19.

4.13 The approach to outcomes is also evolving because it is a relatively new inclusion to our price control framework, although one we expect to retain. As such, there is greater scope to adapt as the overall approach evolves to address any impact from mergers, than there is in the context of cost assessment which is more mature.

Table 3: Impact of the merger on outcomes

Performance commitment	Oxera findings (static)	Ofwat view
Water Supply Interruptions	[REDACTED✂----]	[REDACTED✂----]
C–MeX	[REDACTED✂----]	[REDACTED✂----]
Leakage	[REDACTED✂----]	[REDACTED✂----]
Per Capita Consumption	[REDACTED✂----]	[REDACTED✂----]
Water Quality Contacts	[REDACTED✂----]	[REDACTED✂----]
Mains Repairs	[REDACTED✂----] .	[REDACTED✂----]
Unplanned Outage	[REDACTED✂----] .	[REDACTED✂----]
D–MeX	[REDACTED✂----]	[REDACTED✂----]
Total (simple sum)	[REDACTED✂----]	[REDACTED✂----]

4.14 Part of the purpose of the outcomes framework is to incentivise companies to put forward their best expectation of how they can improve performance in the future. While neither we nor Pennon have sought to quantify how this merger would impact the incentives of all companies in the sector, we would expect that fewer companies in general would reduce the incentive to submit more challenging objectives.

4.15 We also note that Oxera's analysis does not capture the special role industry leading companies play in improving overall performance. Industry leading performers influence how confident we can be in selecting a performance benchmark. But crucially, they are the companies against which all others are compared by customer groups, the press and other stakeholders, outside of the regulatory process. This provides a disciplining effect on the senior management of all companies. This is especially true of such high profile, and customer sensitive, measures such as leakage in which Bristol has a track record of leading performance.

4.16 Overall we consider that both our analysis and Oxera's analysis suggest there is the potential for detriment to arise from the merger if ODIs are mechanistically derived. However, we do not mechanistically derive ODIs, and the process of determining ODIs at

future controls ought to mitigate some of the detriment the analysis indicates may occur. At PR24 we are proposing to place less weight on company forecasts, but nevertheless having a large number of comparators will be important in identifying good performance as a basis for setting performance targets. Insofar as costs influence performance we also consider that it is beneficial to be able to consider the influence of performance in our cost models.

5. Relevant customer benefits of the merger

5.1 Pennon submitted an assessment of merger benefits. Overall, we consider that a number of the benefits proposed by Pennon do not necessarily arise as a consequence of the merger. In the instances where the claimed benefits might be specific to the merger, we consider they are not sufficiently evidenced either as being sufficiently likely to occur or for us to be confident that they will be realised at the scale Pennon suggests. Therefore, in summary, we do not consider the benefits that Pennon suggest may accrue to the customers of South West Water and Bristol Water should be considered as relevant customer benefits for the purposes of the CMA's assessment, or to the extent they may be so considered, that they would outweigh the prejudice to our ability to regulate the water sector; such prejudice affecting all customers in England and Wales. We do however welcome the level of ambition.

5.2 We also welcome the commitment to put some of the expected cost synergies up to PR24 through the Watershare+ mechanism [REDACTED✂----]. That does not, however, overcome the need for an assessment of whether these proposed benefits can be considered relevant customer benefits under the merger control regime. Indeed it also serves to highlight that from PR24 onwards, customers may only benefit to the extent synergies are realised in the long term and there is a lack of certainty of deliverability in this respect. We also note that, contrary to Pennon's submission, the vast majority of operational synergies that Pennon wishes to achieve are capable of being achieved with the retention of two separate licences, and two separate price controls.

5.3 Table 4 below provides an overview of our assessment of the benefits submitted by Pennon.

Table 4: Summary of potential benefits submitted by Pennon and our assessment in key areas

Potential Benefit	Is the benefit merger specific?	Is there sufficient evidence on how it will be realised?	Has the benefit been quantified?	Is the quantification convincing / well evidenced?
Removal of the small company premium	Yes, at least over AMP7, but unclear in the future	Yes	Yes	Yes over AMP 7
Long term sustained efficiency improvements	Some	No	Yes	No
Extension of WaterShare +	Yes	Not clear	No	No

Potential Benefit	Is the benefit merger specific?	Is there sufficient evidence on how it will be realised?	Has the benefit been quantified?	Is the quantification convincing / well evidenced?
Improved service performance	Not clear	No	No	No
Environment and resilience	Not clear	No	No	No
Reduced risk to long-term outcomes	Not clear	No	No	No
Increased financial robustness	Not clear	No	No	No
Optimal decisions for customers	No	No	No	No
Improved cost of equity comparisons	No	No	No	No

5.4   Before going on to consider each of these areas in turn, it is worth noting that these benefits, to the extent they are realised, would directly benefit the customers of [REDACTED✂----], should the merger proceed. Yet, the detriment we find impacts the wider sector and the customers of other companies, [REDACTED✂----]. In considering the merits of relevant customer benefits, therefore, we consider it is appropriate to take into account the distributional impacts that are expected to occur.

Small company premium

5.5   Pennon submitted that one direct financial benefit of a fully integrated merger of Bristol Water and South West Water's operations would be the removal of the small company premium of c. 30bps from Bristol Water's embedded cost of debt in AMP7.[40] This would directly translate into lower bills for Bristol Water customers of [REDACTED✂----] (2017/18 prices) each year. In net present value terms, this would be [REDACTED✂----

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[40] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraphs 9.6-9.9.

]over the remaining years of AMP7[41]. Pennon further submitted that in the long run benefits of [REDACTED✂----] a year could be assumed to continue until [REDACTED✂----], providing, in net present value terms, around [REDACTED✂----] of benefits to consumers.[42]

5.6   First, we welcome the commitment to remove the small company premium as soon as possible following conclusion of the CMA process, subject to the CMA's decision. We also recognise that removing Bristol Water's small company premium could provide a benefit to customers over AMP7. We agree with Pennon's calculation and [REDACTED✂----] should be returned to customers over 2022-25 as submitted. However, we do not consider that it is reasonable to assume that a small company premium will be applied to Bristol Water in future Price Reviews up to [REDACTED✂----].[43] [44] Hence, a long-term benefit from the removal of the small company premium is not justified in an assessment of the benefit compared to the relevant counterfactual. We agree that there could be a benefit, but believe that this benefit is much lower than Pennon's [REDACTED✂----] estimate.

Long term sustained efficiency improvements

5.7   Mergers can lead to long-term efficiency improvements. As the 2009 *Cave Review*[45] recognised, mergers can increase efficiency through economies of scale and scope and the transfer of best practice. These improvements in efficiency may benefit customers if they are passed on to them. However, in any given case, it is crucial to provide evidence of the scale and certainty of those benefits.

5.8   Pennon submitted that the operational merger of South West Water and Bristol Water will result in lower costs and thus, through the cost sharing mechanism, lower customer bills across both companies.[46] [REDACTED✂----][47], [REDACTED✂----]it has opted to extrapolate out its own experience of acquiring Bournemouth Water.

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[41] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, Table 17.

[42] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraph 9.9.

[43] The methodology adopted and the overall allowed cost of debt is reviewed every five years and it remains uncertain as to whether Bristol Water (or any water company) would receive a small company premium at future Price Reviews as the methodology is not set.

[44] We note that while South West Water submitted that the Artesian debt matures in [REDACTED✂----], this comprises just under [REDACTED✂----]of Bristol Water's borrowings at 31 March 2021, with the majority of Bristol Water's current borrowings maturing between 2028 and 2033 (Bristol Water plc Annual Performance Report 2021 – Note 21, page 145).

[45] Independent Review of Competition and Innovation in Water Markets: Final report, Professor Martin Cave, April 2009

[46] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraphs 9.10-9.19, 11.20 – 11.40.

[47] See paragraph 9.12 ibid.

5.9 Based on its experience of acquiring Bournemouth Water, Pennon submitted to the CMA a rate of cost savings for the merger of [REDACTED✂----] per annum. These cost savings will be delivered mainly by [REDACTED✂----].[48] Pennon also submitted that the net cost reduction resulting from the merger is anticipated to lower customer bills across both areas by an average of up to [REDACTED✂----] p.a. after 2025 as the reduced costs are passed back to customers. Pennon submitted that these benefits will only accrue through the merger as Bristol Water has been a laggard company in recent Price Reviews and it will be unlikely to drive the necessary efficiencies without the experienced capability and capacity from a leading company in the sector. Pennon also submitted that the benefits will be sustained over the long term.

5.10 We recognise that the ability to deliver economies of scale through greater efficiency by combining functions and sharing best practice may in principle be beneficial. However, we are mindful that the CMA's Merger Assessment Guidelines state that "the merger efficiencies must be likely to be realised. This means that the evidence supporting efficiencies needs to be verifiable"[49]. On careful consideration of Pennon's submission, we have not been persuaded by Pennon's assessment of these benefits for the following reasons:

a) Pennon does not explain how reductions in costs will be achieved. For instance, Pennon submits efficiencies of [REDACTED✂----] per annum in [REDACTED✂----]. However, it does not explain how this will be achieved besides indicating that [REDACTED✂----].

b) It is unclear why all the efficiencies submitted by Pennon are merger specific. Companies can reduce costs in a number of areas assessed by Pennon without merging. For instance, household retail activities can be outsourced to reduce costs, properties not used due to increased home working can be sold without a merger, and companies can reorganize inputs, introduce more efficient ways of working, reduce personnel and central services costs and improve procurement through means other than a merger. Pennon argues that the merger is the only way to achieve these efficiencies because Bristol Water has remained a lower quartile performing company on base costs in PR14 and PR19. Pennon further argues that Bristol Water will be unlikely to drive the necessary efficiencies without the experienced capability and capacity from a leading company in the sector. However, we are not persuaded by this reasoning. South West Water itself was a relatively inefficient company in PR99 and PR04, then improved in PR09 and then again in PR14 (see annex 3). Moreover, Oxera's own approach shows that merged entities can become relatively less efficient post-merger. This was the case following the South West Water- Bournemouth Water merger as we explain in annex 3.

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[48] [REDACTED✂----]
[49] CMA Merger Assessment Guidelines, paragraph 8.13.

c) Pennon's methodology to quantify efficiencies raises a number of concerns, both in terms of the starting point for the quantification exercise and in the appropriateness of the extrapolation then undertaken to calculate the efficiencies that the South West Water – Bristol Water merger would bring.

  i. On the first issue, Pennon has estimated the efficiencies arising from the South West Water – Bournemouth Water merger but does not provide any evidence demonstrating that the cost savings it claims were *effectively* the result of the merger. Cost savings might have been the result of cost reductions identified during the normal course of business and reflecting the regulatory challenge we imposed. Also, we note that the benefits from [REDACTED✂----] following the Bournemouth acquisition make up a greater proportion of total savings than originally planned, suggesting operational savings, which factor into bills on an ongoing basis, were below those the company forecast at the time of the merger assessment.

  ii. Also, Pennon's assessment is inconsistent with Oxera's own analysis of the historical impact of mergers. Using Oxera's approach, the merger between South West Water and Bournemouth Water reduced efficiency (see annex 3), casting some doubt on the presumed efficiencies the prior merger brought about (and hence the efficiencies that the present merger with Bristol Water would bring).

  iii. In terms of extrapolation of the data to estimate assumed savings in this case, we question whether this is appropriate. Such an approach assumes considerable similarities between both mergers and counterparties and that the acquisition of Bristol Water will lead to similar outcomes. We do not consider this assumption can reliably be made. Bournemouth Water was considerably smaller than Bristol Water, around a tenth the size of South West Water when they merged to create the enlarged South West Water area. Bristol Water is around a third the size of South West Water's water business (including the Bournemouth area). It is not reasonable to assume that Pennon will be able to achieve the same proportion of savings in amalgamating Bristol Water as it did with absorbing Bournemouth Water. Bristol Water being larger would already have achieved scale economies over Bournemouth.

  iv. Further, South West Water's assessment also seems overly optimistic. While expressed as a percentage of reduction in costs, and we understand is not intended to refer to [REDACTED✂----].[50] If the weight of cost reduction were to fall[REDACTED✂----], this could negatively impact levels of service and

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[50] Annex_PGII109_206_Big Bang Synergies – DD – FINAL.xlsx in South West Water's Response to Notice under Section 109 Enterprise Act 2002, dated 18 August 2021, Completed Acquisition By South West Water Group Plc Of Bristol Water Holdings UK Limited.

environmental performance. This simply underscores the limited reliability of the overall approach.

v. Pennon's proposal for savings is also not entirely aligned with its wider plan for Bristol Water. For example, it proposes to [REDACTED✂----]. Yet it has not put forward a plan for [REDACTED✂----]

d) Pennon submitted that the net cost reduction resulting from the merger is anticipated to lower customer bills by an average of up to [REDACTED✂----] p.a. after 2025 as the reduced costs are passed back to customers. However, potential efficiencies in retail would not be passed to customers through totex sharing, contrary to what Pennon assumes in its estimation. Moreover, savings beyond 2024 would only be fully passed back to customers if they are reflected in our models, and since our modelling suggests the merged entity would actually have a higher costs allowance, we do not agree with this estimated reduction in customer bills. Otherwise, savings will only be passed back in line with cost sharing rates, insofar as cost savings are achieved, and are not otherwise included in general sector efficiency expectations.

WaterShare +

5.11 Pennon submitted that the merger will allow it to extend the WaterShare+ scheme to Bristol Water customers.[51] WaterShare+ is South West Water's mechanism to share gains from company performance with customers in a transparent way. This includes aspects that are outside formal regulatory mechanisms, with customer benefits arising through bill reductions; the option to receive shares in Pennon; or reinvestment agreed with an independent panel of customer and stakeholder representatives. If South West Water outperforms its business plan there are financial benefits which are shared with customers. Should South West Water underperform, its customers are protected.

5.12 We consider that extending WaterShare+ could provide benefits to Bristol Water's customers and appreciate that Pennon has made a commitment to do so. However, we note there is a risk that [REDACTED✂----] would only lead to distributing a similar amount of money across a larger pool of customers, hence without any aggregate benefit. In principle, there are other means through which Bristol Water could implement a scheme similar to South West Water's WaterShare+ if its customers were interested in the potential benefits arising from it, and it might be questioned whether this benefit would be merger specific. However, we are not aware of any plan Bristol has to implement such a scheme, and given South West Water is the only company with such a scheme it seems reasonable to consider this a merger specific benefit. Pennon has not quantified this benefit.

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[51] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraphs 9.20-9.29.

Improved service performance

5.13 Pennon submitted that the merger will bring together two successful and customer-oriented businesses that will provide even better customer service as a combined entity.[52] Pennon also noted that its plans are to combine the best of both companies and implement changes to improve customer services. This is intended to [REDACTED✂----]. Pennon expects the merger to [REDACTED✂----]. The merger will also allow South West Water to benefit from Bristol Water's [REDACTED✂----].

5.14 We would expect companies to achieve some benefits from sharing best practice following a merger. However, we do not consider that Pennon's assessment meets the CMA's requirements for relevant customer benefits for several reasons. It is difficult to form a view on how significant those benefits would be and whether they are deliverable. Pennon has not explained how these benefits will be achieved, and it has not sought to quantify them. As set out in CMA guidance, quantitative evidence is particularly important in circumstances where it is difficult to judge whether the scale of the relevant customer benefits is such that they outweigh the identified concerns.[53]

5.15 Companies can, and do, improve in service performance absent merging. For example, before the merger between South West Water and Bournemouth Water, both of these companies experienced increases on the SIM index. From 2011-12 to 2014-15, South West Water and Bournemouth Water improved on SIM by 12% and 4% respectively. In fact, these rates were in both cases higher than the ones observed after the merger – from 2015-16 to 2018-19.[54] Pennon also refers to innovation efficiencies. This is certainly an area where mergers can create merger specific synergies in certain circumstances (e.g. when efficiencies are dependent on accessing hard to trade assets or lead to IP complementarities). However, Pennon's evidence fails to indicate that these, or similar considerations, are relevant circumstances in the present case. In particular, Pennon refers to potential benefits arising from Bristol Water's innovation initiatives within the Innovation in Water Challenge. However, any learnings from these current initiatives will need to be shared with all the industry in any event.

Environment and resilience

5.16 Pennon submitted that the merger will produce environmental benefits for several reasons.[55] First, South West Water has an advanced, mature and innovative approach to catchment management and is seen by regulators and government as an industry

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[52] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraphs 9.30-9.44.
[53] CMA Mergers: Exceptions to the duty to refer, paragraph 86.
[54] From 2015-16 to 2018-19, South West Water and Bournemouth Water improved on SIM by 11% and 2% respectively.
[55] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraphs 9.44-9.50.

leader in this field. Second, South West Water can positively contribute to improving the natural environment. Third, South West Water has a long history of comprehensive resource planning and has not had any water restrictions for 24 years. Pennon intends [REDACTED✂----]. Fourth, South West Water and Bristol Water have been leading the industry for many years in the delivery of leakage performance, and more recently Bristol Water has made substantial progress. South West Water will benefit from adopting Bristol Water's practices. Fifth, South West Water has become efficient in delivering customer meter installations, and hence effective demand management and lower consumption and water efficiency. Sixth, South West Water is a pioneer in deploying new technology to improve meter reading efficiency and to better connect customers with their water use. [REDACTED✂----]

5.17 It is unclear why these benefits are merger specific. Some water companies have improved over time in the areas of catchment management, leakage, metering or meter reading technology without merging. Pennon has not put forward robust evidence to support an argument that environmental benefits would be accelerated by the merger. Further, we have some concerns about deliverability in the context of South West Water's track record on environmental outcomes. The evidence indicates that it has been a poor performer on environmental outcomes, in particular on pollution incidents and water efficiency. South West Water was the only company aside from Southern Water to receive a two star rating in the most recent EA Environmental Performance Assessment (EPA).[56] Indeed it is the only company never to have received more than two stars since 2011, ranking as the worst EPA performer over 2011 – 2020.[57] In 2020, South West Water also had the second highest number of pollution incidents (per Km of sewers).[58] In terms of water per capita consumption (PCC), South West Water's PCC has increased the most from 2014-15 to 2019-20 with the fifth highest level of PCC in 2019–20.[59] Bristol Water has been a better performer on water efficiency. This casts some doubt on the deliverability of improvements to the natural environment in Bristol Water's region or to Bristol Water's demand management and water consumption efficiency. We appreciate the commitment by South West Water to deliver as a minimum the service levels committed in the 2019 Final Determination for the rest of AMP7 but this is simply to accept the commitments and standards set out for both companies for AMP7 and the actual outcome cannot be known at this stage.

5.18 Pennon also submitted that the merger will positively contribute to improving Bristol Water's access to water resources and resilience post-merger. We consider that this is a possibility in theory. Water transfers may be hindered or delayed by coordination problems. In fact, in recent years, companies in the West Country Water Resources group have been engaging in discussions to increase water transfers, and progress has

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[56] Source: "Water and sewerage companies in England: environmental performance report for 2020", Environmental Agency, 23 July 2021.
[57] See: South West Water EPA data report 2020 – GOV.UK
[58] Source: Service delivery report 2019-20 – data, Ofwat, 30 December 2020.
[59] Source: Service delivery report 2019-20 – data, Ofwat, 30 December 2020.

been slow. Integration through a merger may well mitigate some coordination problems.

5.19 However, Pennon's proposed benefits are subject to significant uncertainty. In the past, we saw some progress in post-merger resilience following the South East - Mid Kent merger in 2007. In this case we note that South West Water and Bristol Water's regions are not contiguous. This makes interconnection and water transfers more complex. Second, it is unclear whether water transfers between these regions would be cost effective. Bristol Water and Wessex Water had assessed the potential for water transfers from Bristol Water's area to Southern Water's within the West Country Water Resources Group, concluding that they would not be cost effective.[60] For transfers of this kind to be cost effective, their scale needs to be relatively large. We note that none of the strategic regional initiatives currently being assessed by the West Country Water Resources Group involve water transfers from South West Water's region to Bristol Water's region.[61] It is possible that this situation may change, but overall we consider the position is sufficiently uncertain at this stage that it is inappropriate to conclude that this is a relevant customer benefit for merger control purposes.

Other benefits

5.20 Pennon submitted further benefits from the merger as follows.

5.21 Pennon submitted that the merger will contribute to a "reduced risk of outcomes stemming from Pennon's size and experience in the sector"[62] and that "Pennon has sector leading capabilities and an innovation culture that drives how it manages its assets, putting sustainability, customer views, and environmental and social benefits at the heart of its plans and operations". Pennon further noted that South West Water faces very similar water quality risks and challenges to Bristol Water and it is tackling this by investing in leading edge treatment technology to deliver more effective whole life cost solutions. Pennon submitted that the merger will allow Bristol Water to benefit from South West Water's knowledge and technology in this area, leading to better risk management, water quality improvements and efficiency gains.

5.22 We are not persuaded by Pennon's assessment. First, the merger-specificity of these points has not been sufficiently evidenced: companies can improve in this area without merging. We note that South West Water is not a leading performer on water quality. In 2019-20 it had the third highest number of water quality contacts per 1,000 population so it is not clear that a wider benefit can be assured.[63]

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[60] West Country Water Resources Group (2020), *Group West Country North Gate 1 report,* September 2020.
[61] West Country Water Resources Group (2021), *Southern Water transfer SRO Report,* July 2021.
[62] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraphs 9.52-9.56.
[63] Source: Service and delivery report 2019-20 – data, Ofwat, 30 December 2020.

5.23 Pennon submitted that the merger will increase the financial robustness of Bristol Water[64], first, because the merger will [REDACTED✂----]and secondly, because the merger will improve [REDACTED✂----]. Pennon submitted that [REDACTED✂----], thereby increasing financial resilience.

5.24 We agree that customer benefits may arise if Bristol Water's customers are served by a company with an improved level of financial resilience, through [REDACTED✂----]. We merely note that other companies have achieved these benefits through means other than merger (e.g. through introducing new equity and reducing borrowings).[65] Second, the merger may provide some benefits for Bristol Water customers as the [REDACTED✂----]. However, at the same time, there will be a small consequent negative impact on the existing customers of South West Water as a result of [REDACTED✂----]. Pennon has not submitted a quantification of financial resilience benefits.

5.25 Pennon submitted that it takes optimal decisions for customers in the South West, reflecting South West Water's dedicated and long-term commitment to the sector.[66] Pennon further submitted that it is now one of the few companies in the sector that is dedicated purely to the water sector in the UK. We do not consider that this would fall within the type of benefits that would be considered as a relevant customer benefit under the merger regime. Companies can adopt a long-term view without a merger or without investing in the water sector only and Bristol Water is a long-standing dedicated small water company that has been historically committed to the sector. In this respect there is no material change to the counterfactual of continued separate ownership. We have also noted in 5.17 that South West Water has been a relatively poor performer on issues that are key for the long-term performance of the water sector, such as environmental performance and water efficiency.

5.26 Pennon submitted that the merger will improve our cost of equity assessments because South West Water can be used as a third data point as it has now sold its investment in Viridor.[67] We agree that following the divestment of Viridor, South West Water now provides a third data point which may be helpful when we calculate the cost of equity. However, the usefulness of this data point is driven by the sale of Viridor, which created a pure water company, rather than through the acquisition of Bristol Water. Hence this benefit is unrelated to the merger. Pennon submitted that merging South West Water with Bristol Water will increase its size and hence ensures that it is a robust and more significant data point than without Bristol Water. However, Pennon is already a FTSE 250 company, which is actively traded, and therefore the beta information is readily

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[64] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraphs 9.57-9.62.
[65] Severn Trent, South East Water, Anglian and Southern have all acted to reduce gearing.
[66] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraphs 9.63-9.65.
[67] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraphs 9.75-9.76.

available and sufficiently robust for regulatory purposes irrespective of the acquisition of Bristol Water.

5.27 Pennon proposes [REDACTED✂----].[68] We welcome Pennon's proposal to [REDACTED✂----]. Pennon has not ascribed a value to any resulting customer benefits and has not provided evidence to set out the process by which this will be achieved.

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[68] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraph 9.87.

6. Customer support

6.1 Pennon submitted evidence commissioned from ICS on customer views on the merger, both the Bournemouth merger in 2015 and the completed acquisition of Bristol Water.[69] ICS engaged with Bristol Water customers and South West Water customers (including in the Bournemouth Water region) using a mixture of online focus groups and surveys. Pennon submitted that customer evidence demonstrates that South West Water's and Bristol Water's customers support the merger.

6.2 Customer views on mergers might in principle provide useful insight, for example to help us understand the strength of support for a merger and shine a light on areas of specific customer concern about how companies might integrate, which we may be able to address in collaboration with the company. It might also expose the potential for customer detriment. Customers of Bristol Water have previously provided support for retaining a local company. At both PR14 and PR19 Bristol submitted evidence that its customers place a significant value on being supplied by a local company and this is borne out again by the results of the ICS work.

6.3 However, customers cannot reasonably be expected to have the depth of understanding necessary to assess how a merger might impact the effectiveness of regulation. Overall we do not consider that the evidence on customer support changes our view of the impact of the merger on our ability to regulate for the benefit of customers. None of the evidence contradicts the findings from our analysis of the impact on our ability to compare performance. We make the following observations on the research.

6.4 Pennon suggests the engagement demonstrates support for the merger.[70] However we consider this is based on a subjective presentation of the merger in the engagement. Participants are told about the benefits a merger can bring to them, including improvement in services, sharing best practice, reduction in costs and thus bills. These are described in a way that could lead customers to believe they are guaranteed if the merger is allowed.

6.5 Critically, leading questions were posed such as whether customers would support a merger that would reduce their bills and improve service, reduce debt, allow greater customer involvement and improve incident response, which any rational consumer would agree to.[71] However, when the questions asked were more neutral or incorporated a balance between positive and negative outcomes, the research finds that customer

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[69] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paragraphs 7.1–7.36.

[70] Pennon (October 2021), Bringing benefits to the greater South West – the case for the merger of Bristol Water and South West Water, p.40.

[71] As an example, question 18.1 in South West Water's customer survey asks customers: *I would support a merger that reduced bills whilst maintaining service levels to customers*. Customers are asked to respond (i) strongly agree, (ii) tend to agree, (iii) tend to disagree, (iv) strongly disagree or (v) don't know.

support for the merger is weaker or there is a clear lack of support. For instance, when Bristol Water's customers are asked whether they would support a merger that resulted in a lower bill, even if some aspects of service got slightly worse, only [20-30] % agree they would support the merger. When South West Water's customers are asked whether Bristol Water and South West Water should be allowed to merge, [20-30]% do not know and [10-20]%disagree. This last question was not asked to Bristol Water's customers.

6.6   ICS's explanation of the negative impact of the changes in comparing performance of all companies, as result of the merger, is vague.[72] Even where customers have some knowledge of our role in the sector, they are highly unlikely to have a deep understanding of the econometric benchmarking regime we use to set cost allowances, and the subsequent detrimental effect of losing a comparator. They are even less likely to have an appreciation of alternative techniques we could use and their effectiveness. As a result, it is unlikely that customers can provide informed responses on these complex technical issues. We note in this regard, the CMA's views on customer research in the context of PR19 where it said, "research into customer views can play an important element in informing the price review process, including gaining an understanding of ability and willingness to pay, and views on the balance of priorities, but there are some areas where customers may not reasonably be expected to reach an informed opinion on the information, such as complex technical matters."[73]

6.7   Finally, it is not clear that the consumer views are representative of the whole customer base across both companies' areas. The south-west region of England has a higher proportion of 65+ years residents than any other region. Group 1 in the focus group was categorised as those 46+ years. As the focus groups and surveys were carried out online it is possible that the sample was not fully representative with older residents less keen to use online survey tools.

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[72] As an example, one question on this issue raised in the online focus group: *Moderator 2: So now we're going to look at Ofwat's views on the companies merging. Explains Ofwat are comfortable with Pennon buying Bristol Water, listed company. However not necessarily comfortable with them merging – harder to compare others to SWW as benchmark efficient company. How do you feel about that, what does that make you think? Does that make sense, what I've said?.* ICS, Pennon Group (August 2021). The Merger of Bristol Water and South West Water – Exploring Customer Views – Transcripts, p. 51.
[73] See the CMA's Final report.

A1 Overview of Ofwat's approach to benchmarking

A1.1 This annex explains the crucial role that econometric benchmarking plays when setting efficient cost allowances at the price review.

Why use econometric benchmarking?

A1.2 A key building block of our Price Review is to set efficient cost allowances for each company. There is an inevitable information asymmetry between monopoly utilities and the regulator, which can be mitigated by using information from other companies to help determine the efficient costs of each individual company. Cost benchmarking is therefore crucial to our ability to regulate effectively and protect customers, as it is an important component of determining the efficient costs of regulated monopoly utilities, thereby reducing the risk that consumers pay too much for services, or that companies receive too little funding, creating financeability risks.

A1.3 Comparative cost benchmarking analysis is designed to emulate a competitive market (i.e., yardstick competition). Making cost comparisons between the monopoly water companies incentivises companies to outperform one another and deliver efficiencies during the price review, and to unveil efficient costs when developing business plans (i.e., truth telling). It enables us to determine an independent view of efficient costs rather than rely solely on company business plan forecasts, which reduces the incentive on companies to inflate their requested expenditure.

A1.4 Cost benchmarking analysis can range from simple unit cost analysis (e.g. £ per kilometre of water main replaced) to multivariate econometric regression analysis.

A1.5 Unit cost analysis has the benefit of being simple and transparent, but it does not sufficiently capture the complexities of operating a water company. This can make it challenging to conclude that differences in unit costs between companies is the result of 'inefficiency' instead of other factors (e.g., operating environment). As a result, it can be difficult to use simple unit cost analysis to set a stretching efficiency challenge, which is likely to reduce the benefit of the cost benchmarking analysis from a customer protection perspective.

A1.6 In contrast, econometric benchmarking analysis is more complex but allows for multiple factors that drive differences in efficient costs between companies and over time to be captured in the analysis (i.e. by estimating an accurate cost function). This can provide more confidence that the cost differences between

companies that are not explained by the factors included in the analysis are because of inefficiency.

A1.7 Econometric benchmarking analysis is therefore more likely to allow us to set a stretching efficiency challenge, which will increase the power of the cost efficiency incentive created through the benchmarking approach. It will also benefit customers by ensuring that companies are adequately funded to deliver an efficient and valuable service. It is widely used by us and other utility regulators to produce an independent estimate of efficient costs and to set stretching but feasible efficiency challenges.

What is an econometric model?

An econometric model is a specification of a (statistical) relationship between a "dependent variable" (in our case, the cost of supplying a service) and a set of factors that explain the dependent variable.

A simple example:

$$total\ cost_i = \propto + \beta \cdot customers_i + \varepsilon_i$$

Using data on cost and customers from the sample of water companies, we estimate the parameters $\propto$ and β ($\propto$ can be thought of as 'fixed costs' and β can be thought of as 'variable costs').

The "error term", ε_i, is a residual term. It captures all other factors which influence the dependent variable other than the factors in the model (e.g. efficiency and random noise).

Once alpha and beta are estimated, the model can be used to generate a forecast of average cost, as follows

$$(forecast\ total\ cost)_i = \hat{\propto} + \hat{\beta} \cdot (forecast\ customers)_i$$

Why is a large dataset important?

A1.8 Econometric cost analysis does not automatically lead to an accurate estimate of costs. It relies on the availability of a sufficiently large dataset so that the relationship between costs and cost drivers can be robustly estimated.

A1.9 The larger the dataset the more precise these estimated relationships will be, and the greater the number of cost drivers / explanatory variables we can capture in the models. This will increase the precision of our independent view of efficient costs and enable us to be reasonably confident that the model residuals, at least in part, can be interpreted as cost inefficiency. It also reduces the need for companies to

submit cost adjustment claims for 'special cost factors'.[74] This can be beneficial as cost adjustment claims reinforce the information asymmetry between ourselves and the monopoly water companies and reduce the benefits of comparative benchmarking.

A1.10   Consequently, a reduction in the size of the dataset available as a result of a merger (i.e., through a reduction in the number of comparators) would reduce the accuracy of our econometric cost models, and/or could place greater constraints on the number of cost drivers / explanatory variables we can include in the models. The CMA highlighted this point in Bristol Water's 2014 Price Review determination:

"Econometric and statistical analysis have limitations and, to the extent that econometric models can identify and estimate useful estimates of the relationships between cost and the explanatory variables, this must come from inferences drawn from correlations in the data. **The small sample size, combined with a large number of explanatory variables – some of which were highly correlated with each other and show little variation over time – contribute to risks of inaccuracy in the results***."[75]*

A1.11   **A smaller dataset may therefore reduce our confidence in the results of the econometric cost benchmarking analysis**. This could force us to place more weight on company forecasts of efficient costs rather than our own independent view of efficient costs at future price reviews; and/or constrain our ability to set a stretching catch-up efficiency challenge. This would be at a detriment to customers (i.e. higher bills supporting higher company profits rather than enhanced customer outcomes).

Cost assessment at PR19

A1.12   At PR19, our view of the efficient totex allowance for wholesale water and wastewater companies was built up from three main building blocks, as shown in Figure A1.1 below.

### Figure A1.1: Building blocks of our totex assessment

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[74] Factors that explain why a company has higher efficient costs relative to other companies but are not included in the econometric cost models, either because of sample size or data availability issues.

[75] Competition and Markets Authority, 2015. Bristol Water plc. A reference under section 12(3)(a) of the Water Industry Act 1991 Report. Para. 4.50.

A1.13 **Wholesale base costs** (c. £40bn; 80% of wholesale totex) are routine, year-on-year costs, which companies incur in the normal running of the business to provide a base level of service to customers. We distinguished between modelled base costs and unmodelled base costs. Modelled base costs were assessed using econometric benchmarking models that were developed through an extensive model development process, whereas unmodelled base costs consisted of a small number of cost items that we considered were more suitable for separate assessment.

A1.14 **Wholesale enhancement costs** (c. £8.7bn; 17% of wholesale totex) relate to investment for the purpose of enhancing the capacity or quality of service beyond a base level. It may be driven by a number of factors including new statutory obligations and strategic priorities companies develop in consultation with their customers. Our preferred method of assessing enhancement costs was benchmarking analysis of forecast costs. Where the investment area did not lend itself to statistical modelling, we relied more on the evidence provided by companies in their business plans. Overall, **around 50% of wholesale enhancement costs were assessed using benchmarking analysis** (either econometric or unit cost benchmarking).

A1.15 **Residential retail costs** (c. £3.9bn) are incurred by the incumbent water companies to deliver residential retail activities. **100% of residential retail costs were assessed using econometric cost models**.

A1.16 **In total, we developed econometric cost benchmarking models to assess over 80% of companies' costs**. This shows the critical role econometric cost benchmarking analysis plays in effective water sector regulation in reducing information asymmetry.

A1.17 The output from the econometric cost models can be used to set a **catch-up efficiency challenge**, which is a challenge to average and low performing companies to catch-up with high performing companies in the sector. This is illustrated in Figure A1.2 below for totex and an illustrative cost driver.

Figure A1.2: Illustration of catchup challenge
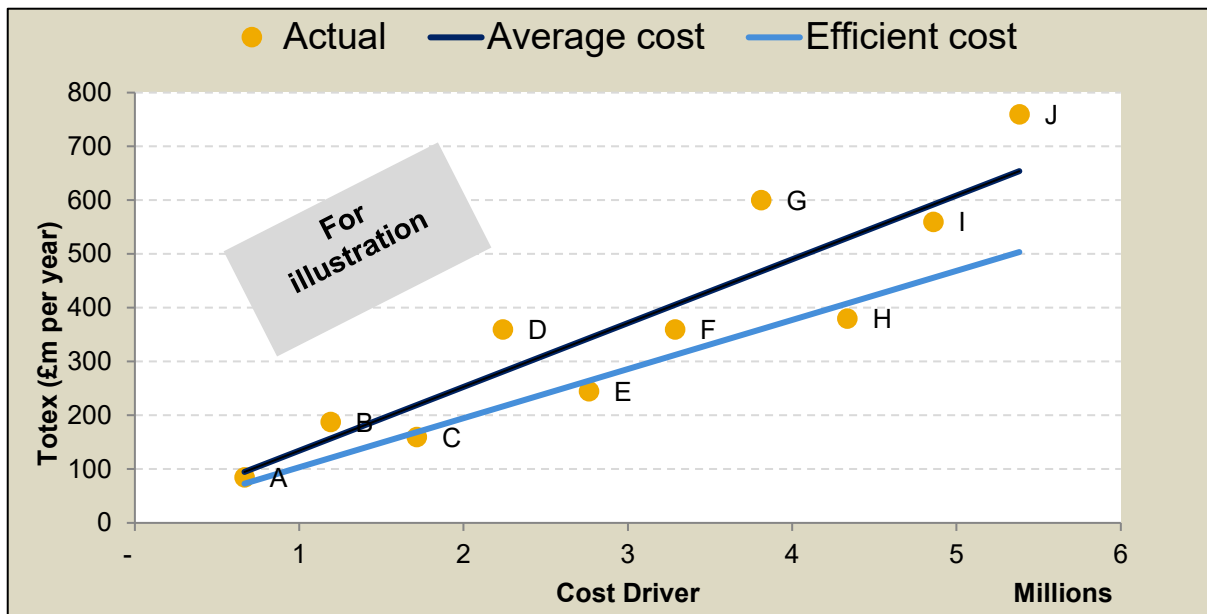
A1.18   The figure above shows the average cost line (i.e. model fitted values), which is a benchmark against which we rank companies' performance from the most efficient company ("frontier" company) to the least efficient company. To set efficient allowances for companies, we shift the average cost benchmark line downwards to reflect the performance achieved by more efficient companies.

A1.19   **The robustness of the econometric cost benchmarking analysis is a key factor to consider when determining the stretch of the catch-up efficiency challenge**. If a model is properly capturing all relevant cost drivers and there is no statistical noise, we can shift our benchmark to the frontier company. In practice, due to the fact that models are imperfect, we shift the line towards the frontier company but not all the way to allow for modelling imperfections.

A1.20   **At PR19 we set our wholesale water base costs catch-up efficiency challenge at the fourth most efficient company in wholesale water**. That is a level of base cost efficiency that four companies have achieved, and thirteen companies are lagging behind. The wholesale wastewater base costs catch-up efficiency challenge was set at the third most efficient company. We considered this provided a stretching but feasible challenge based on the robustness of the econometric cost models and other factors.

A1.21 The CMA in the PR19 redeterminations highlighted "overall model effectiveness" as the key factor in determining the appropriate level of the efficiency benchmark.[76] Our analysis indicates that the reduction in the number of comparators in our dataset as a result of the merger will demonstrably reduce our ability to develop robust econometric cost models. In turn, this could **reduce our ability to set a stretching catch-up efficiency challenge at future price reviews**. We present an illustrative example of the potential impact below.

Impact of catch-up efficiency challenge on allowances: illustrative example

Setting the wholesale base cost catch-up efficiency benchmark at the fourth (wholesale water) and third (wholesale wastewater) most efficient company at the PR19 final determination represented a £1.2 billion reduction in allowed costs relative to average efficient costs (i.e. the average cost line).

Under the scenario that a merger reduced the robustness of the econometric wholesale base cost models and we had to set the wholesale base cost catch-up efficiency benchmark at the fifth (wholesale water) and fourth (wholesale wastewater) most efficient company, the catch-up efficiency challenge would have decreased to £450 million (62% decrease). This would have led to a £738 million (2%) increase in cost allowances for the sector, which would have fed through to higher customer bills.

These figures illustrate the value of being able to develop robust econometric cost models.

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[76] CMA, March 2021. Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations. Final report, paragraphs 4.491 to 4.494.

A2 Assessment of the merger impact using existing totex models

A2.1 Overall, our analysis suggests that the merger will prejudice our ability to regulate the sector effectively, absent any remedy, due to the loss of a distinct comparator. This will have resulting negative impacts on customers.

A2.2 We have carried out a range of analyses consistent with that conducted in previous mergers. Our analysis examines the impact on the level of challenge applied to the sector, the ability to compare performance in the future and the potential impact of the merger on the confidence we can have in setting cost allowances. Our analysis includes a base scenario in which the merger has happened hypothetically given the models as they are. We have also examined scenarios in which we reflect Pennon's proposed synergies as a potential forward looking analysis.

A2.3 In previous merger assessments, analysis using the existing cost forecasting models was referred to as static analysis. There was also analysis, referred to as forward looking, which allowed for potential changes in relative efficiency rankings over time, but which crucially only examined the impact on the efficiency challenge and failed to examine the impact on the ability to compare performance in the future. We view the static analysis as most informative in this context. For the reasons set out below we consider the analysis which allows for changes in performance to have a tendency in favour of finding a benefit from a loss of a comparator. This is both counterintuitive and insufficiently robust to rely upon in the context of a Phase 1 assessment, in which the CMA expects to be confident that no harm is likely to arise to Ofwat's ability to regulate as a result of the loss of a particular comparator (unless this is clearly offset by relevant customer benefits).

A2.4 In this annex we present our analysis using the existing models i.e. the static analysis. In annex 3 we present our findings from the analysis which uses past performance changes as a predictor of future performances changes (previously referred to as the forward looking analysis) and use that to assess the impact of the merger.

A2.5 Our key findings are that:

- Our best estimate of the impact of the merger on cost allowances is that the loss of the comparator would increase total totex allowances by [REDACTED✂----] per asset management plan period (AMP).

- The low end of the range masks effects on the allowances of individual companies since in that scenario some companies receive considerably less totex allowance which nets off those receiving more; the absolute change across the industry would

amount to [REDACTED✂----]. This is of particular importance because the principal purpose of the models is to derive a reasonable cost estimate for each company.

A2.6   Overall, our analysis suggests that the merger could be expected to have a significant impact on our ability to regulate the sector effectively with resulting negative impacts on customers. Significant relevant customer benefits could in principle outweigh such impacts. However, as we explained in section 5 it is not clear that the proposed benefits meet the threshold required.

Impact on our approach to cost assessment

A2.7   Cost benchmarking is a critically important component of determining the efficient costs of regulated monopoly utilities, and thereby reducing the risk that consumers pay too much for services, or that companies receive too little funding, creating financeability risks. There is an inevitable information asymmetry between monopoly utilities and the regulator, which can be mitigated by using information from other firms to help determine the efficient costs of each individual firm.

A2.8   Our modelling already relies upon a relatively small number of comparators when compared to practice in many international regulated sectors.[77] This means that the impact of any further reduction is likely to be substantial.

Assessment of the magnitude of changes to cost allowances for different companies

A2.9   We have undertaken indicative static analysis to assess the impact of the merger on the cost allowances of the merged company, along with the other water companies. In particular, we analysed how cost allowances would differ compared to PR19 modelled allowances at the same point in the regulatory cycle.

A2.10   Using PR19 data, we find an increase in total industry totex allowance of [REDACTED✂----]. Including 2019/20 data, in line with the CMA's redeterminations of four companies, we find a [REDACTED✂----]. These shifts are not due to any changes in fundamental factors but entirely to the effect of the loss of Bristol Water as a distinct comparator and the combination of South West Water and Bristol Water. Large, unexplained changes in industry allowances, whether increases or decreases, are prima facie signs that the merger is reducing the confidence we can

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[77] For example, the German energy regulator Bundesnetzagentur has about 700 comparators available for gas and about 850 for electricity; the Finnish energy regulator EMV has about 77 comparators available; the Austrian energy regulator E-control has about 21 comparators available for gas and about 130 for electricity.

have in our model results. This analysis therefore indicates that the merger is likely to prejudice our ability to carry out our regulatory functions under the Act.

Table A2.1: Change in total industry totex allowance resulting from the merger (2016/17 counterfactual merger)

	2016/17 counterfactual merger
Using PR19 data	[REDACTED✂----]
Including 2019/20 data	[REDACTED✂----]

Source: Ofwat calculation

A2.11   We also examined the impact on the cost allowances of individual companies as a result of the merger. Table A2.2 below shows our indicative analysis of what the counter-factual modelled totex allowance in PR19 would have been if the merger had occurred in 2016/17. We also show the same results for the models used by the CMA, which update Ofwat's figures for 2019/20 data.

A2.12   We find that the effect of the merger on comparator companies has material impacts on the allowances of a number of companies. For instance, according to the CMA models the totex allowance [REDACTED✂----] lower than without the merger. At the same time, modelled totex allowance of [REDACTED] would have been [REDACTED✂----] than without the merger. While the impact on [REDACTED✂----] smaller using PR19 data, with [REDACTED✂----], the increase in [REDACTED✂----] allowance is even greater, at [REDACTED✂----].

Table A2.2: Change in modelled allowances resulting from the merger

Company	PR19 allowance (merger SWB/BRL occurring in last three years of sample)					
	Ofwat PR19 models			CMA models		
	Allowance (£m)	Absolute change (£m)	Percentage change	Allowance (£m)	Absolute change (£m)	Percentage change
Anglian Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Hafren Dyfrdwy	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Northumbrian Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
United Utilities	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Southern Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Severn Trent Water Ltd	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Thames Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Dŵr Cymru	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Wessex Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Yorkshire Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Affinity Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Portsmouth Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
SES Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
South East Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
South Staffs Water	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Bristol Water/ South West Bournemouth	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]
Industry	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]	[REDACTED✂]

Source: Ofwat calculation. Note: 'Ofwat models' are those used for PR19 Final Determinations. 'CMA models' are those used by the CMA, which update Ofwat's figures for 2019/20 data.

A2.13   As a comparison of the magnitude of these changes, a benchmark level for a substantial shift in cost allowances for 'water network plus' is 1% of totex, which we use for cost claims.[78] In our PR19 models, most companies would have seen

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[78] See, for example, Technical appendix 2: Securing cost efficiency, Ofwat, Jan 2019, p 23, which set out the thresholds for each of the controls: retail, water resources, water network plus, bioresources and wastewater network plus

increases in excess of this level. Although the impacts are typically smaller using the CMA models, the impact on [REDACTED✂----] is greater than [REDACTED✂----] Such changes in allowances may be perceived as difficult to justify.

A2.14　We consider the above analysis, in which the companies merge in the last four years of AMP 6, to provide an indication of what might be expected to happen at PR24 if the merger were to proceed without remedy. As an alternative we have merged the two companies for the entire period of our data (i.e. from 2012/13 to 2019/20). This might indicate how the models would perform in the future when there is no relevant data from the separate companies and only data available from the merged entity.

A2.15　Using PR19 data, we find an increase in total industry totex allowance of [REDACTED✂----]. Including 2019/20 data, in line with the CMA, we find an increase of [REDACTED✂----]. These increases are significantly greater than in the scenario where the companies merge in 2016/17 (re-produced below from Table A2.2 above), suggesting that the merger could have a greater impact on future price controls than PR24.

Table A2.3: Change in total industry totex allowance resulting from the merger (counterfactual full period (2012/13) and 2016/17 mergers)

	Counterfactual full period merger	2016/17 counterfactual merger
Using PR19 data	[REDACTED✂----]	[REDACTED✂----]
Including 2019/20 data	[REDACTED✂----]	[REDACTED✂----]

Source: Ofwat calculation

A2.16　The impact on models arises because of the loss of an important comparator. Bristol Water has features which are important in being able to identify the impact of density on costs. This impact is independent of the merged entity becoming efficient (table A2.4 below), and would be expected to increase over time as the existing information from Bristol Water begins to elapse from the model.

Assessment of the effect of different assumed cost savings

A2.17　Table A2.4 sets out the impact of the merger that would be expected at PR24 accounting for different levels of South West Water's assumed cost savings. Net cost savings exclude savings from retail and land sales which are not part of wholesale cost models. It includes transition costs which would be included in the wholesale costs models. It includes all other categories of cost savings, even though some of those costs would likely be achieved in areas other than base costs;

for example savings from capital schemes is likely to be achieved though enhancement schemes which are modelled separately.

A2.18 In all scenarios, [REDACTED✂----] predicted to have [REDACTED✂----] predicted to have [REDACTED✂----] [REDACTED✂----] .

Table A2.4: Merger impact on estimated allowances accounting for assumed cost savings

	Proportion of South West Water's assumed savings included in the model						
	0%	**10%**	**25%**	**50%**	**75%**	**90%**	**100%**
Anglian Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Hafren Dyfrdwy	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Northumbrian Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
United Utilities	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Southern Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Severn Trent Water Ltd	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Thames Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Dŵr Cymru	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Wessex Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Yorkshire Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Affinity Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Portsmouth Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
SES Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
South East Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
South Staffs Water	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Bristol Water/ South West Bournemouth	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Industry	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Ofwat calculation

A2.19 This impact would be expected to become more pronounced over time. The analysis above replicates what might be expected to happen for PR24 at which point the merger would have been in place for three years. There would still be separate information on Bristol Water and South West Water in the models, assuming the eight year period remains. By PR29 however, information from 2020 can hardly be relied upon to determine costs at that time and more data post-merger will dominate the models.

Longer term impact

A2.20 The long-term impact of the merger will be more pronounced as demonstrated in table A2.5. It shows the changes in modelled base allowances after combining South West Water and Bristol Water for the whole period in the data. The changes in allowances cannot be directly considered to be how we might expect future allowances to change because other factors will vary over the long-term. However, these do provide an indication of how future models might be sensitive to removing Bristol Water and South West Water as important comparators.

Table A2.5: Long term impact on allowances

PR19 allowance (merger SWB/BRL occurring for the full period, CMA models)		
	Absolute change (£m)	**Percentage change**
Anglian Water	[REDACTED ✂----]	[REDACTED ✂----]
Hafren Dyfrdwy	[REDACTED ✂----]	[REDACTED ✂----]
Northumbrian Water	[REDACTED ✂----]	[REDACTED ✂----]
United Utilities	[REDACTED ✂----]	[REDACTED ✂----]
Southern Water	[REDACTED ✂----]	[REDACTED ✂----]
Severn Trent Water Ltd	[REDACTED ✂----]	[REDACTED ✂----]
Thames Water	[REDACTED ✂----]	[REDACTED ✂----]
Dŵr Cymru	[REDACTED ✂----]	[REDACTED ✂----]
Wessex Water	[REDACTED ✂----]	[REDACTED ✂----]
Yorkshire Water	[REDACTED ✂----]	[REDACTED ✂----]
Affinity Water	[REDACTED ✂----]	[REDACTED ✂----]
Portsmouth Water	[REDACTED ✂----]	[REDACTED ✂----]
SES Water	[REDACTED ✂----]	[REDACTED ✂----]
South East Water	[REDACTED ✂----]	[REDACTED ✂----]
South Staffs Water	[REDACTED ✂----]	[REDACTED ✂----]
Bristol Water/ South West Bournemouth	[REDACTED ✂----]	[REDACTED ✂----]
Industry	[REDACTED ✂----]	[REDACTED ✂----]

Source: Ofwat calculation

Oxera's analysis of the impact on cost allowances

Static analysis

A2.21 Oxera has undertaken a static analysis of the merger based on our wholesale PR19 final determination models. It finds an increase in cost allowances of [REDACTED✂----]using data from the PR19 Final Determination and an increase of [REDACTED✂<-

---]when including 2019/20 data.[79] Table A2.6 below compares these values with our modelled values presented in Tables A2.2 and A2.3 above.

Table A2.6: Change in total industry totex allowance resulting from the merger (counterfactual 2016/17 merger) – Comparison of Oxera and Ofwat results

	Oxera analysis	Ofwat analysis (full period counterfactual merger)	Ofwat analysis (2016/17 counterfactual merger)
Using PR19 data	[REDACTED✂----]	[REDACTED✂----]	[REDACTED✂----]
Including 2019/20 data	[REDACTED✂----]	[REDACTED✂----]	[REDACTED✂----]

Source: Ofwat calculation

A2.22   We consider Oxera's approach to the analysis to be highly simplified, in treating the impact of the merger as driven entirely by its impact on the catch-up cost efficiency challenge. This does not address the fact that the merger would alter the expected cost estimates resulting from re-running the econometric analysis. This is, however, a key element of our cost allowance modelling.

A2.23   As a consequence, Oxera's analysis is unable to capture any shifts in third-party cost allowances between companies. It implies, for instance, that consumers would be equally well off if, given two hypothetical companies of equal size, we randomly doubled one company's cost allowance while reducing another's to zero. This example, albeit extreme for illustrative purposes, highlights the shortcomings of Oxera's approach. This is even more important, as our analysis (see table A2.2 above) shows that the merger will have just such distributional effects for water companies and therefore consumers in the affected areas, unrelated to any changes in fundamental factors.

Impact on precision of our models

A2.24   We have undertaken analysis considering what has been referred to as the 'Qualitative approach' in previous assessments of our models. This approach considers the change in variation (as measured by the standard deviation) in each of the explanatory variables used across the water models employed at PR19. We have examined both the impact of simply excluding Bristol Water, and considering the simulated merger between South West Water and Bristol Water.

A2.25   We find no meaningful reduction in the overall standard deviations of explanatory variables when dropping Bristol Water from the sample or when simulating the

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[79] Pennon (October 2021), *Bringing benefits to the greater South West The case for the merger of Bristol Water and South West Water*, 3 September 2021, Table 3.

merger between South West Water and Bristol Water, see table below. In general the variance of the explanatory variables tends to increase modestly in the overall sample. This would be consistent with there being no loss of a company with an important feature. However, as we explain below, this analysis does not capture the multivariate nature of our models and so may fail to signal where there is a loss of important variation between cost drivers as it only examines the variation of each cost driver in isolation.

Table A2.7: Qualitative approach – change in overall standard deviations of explanatory variables

	No merger scenario	Drop Bristol Water scenario		Merger scenario	
	Standard deviation	Standard deviation	% level of change in SD	Standard deviation	% level of change in SD
Log of number of connected properties	0.97	0.98	1.6%	[REDACTED✂]	[REDACTED✂]
Proportion of water treated at works of complexity levels 3 to 6	17.71	17.94	1.3%	[REDACTED✂]	[REDACTED✂]
Log of lengths of main	0.95	0.96	1.3%	[REDACTED✂]	[REDACTED✂]
Log of weighted average treatment complexity	0.17	0.17	-0.9%	[REDACTED✂]	[REDACTED✂]
Log number of booster stations per length of mains	0.28	0.28	2.2%	[REDACTED✂]	[REDACTED✂]
Log of population density	0.79	0.81	2.5%	[REDACTED✂]	[REDACTED✂]
Log of population density squared	11.15	11.44	2.6%	[REDACTED✂]	[REDACTED✂]

Source: Ofwat calculation

A2.26 As in the South West Water/Bournemouth Water merger assessment, we consider that the 'between company', rather than overall, standard deviations are the most appropriate for measuring a loss of precision in the qualitative approach. The between company standard deviations of the explanatory variables do reduce in each of the explanatory variables by [REDACTED✂----] as shown in table A2.7. This would suggest that this merger would reduce the comparator information available to develop models at future controls and so there is a risk that our models may become less precise following the merger.

Table A2.8: Qualitative approach – change in between company standard deviations of explanatory variables

	No merger scenario	Drop Bristol scenario		Merger scenario	
	Standard Deviation	Standard Deviation	% level of change in SD	Standard Deviation	% level of change in SD
Log of number of connected properties	1.09	1.11	1.9%	[REDACTED✂]	[REDACTED✂]
Proportion of water treated at works of complexity levels 3 to 6	16.32	16.53	1.3%	[REDACTED✂]	[REDACTED✂]
Log of lengths of mains	1.03	1.05	1.5%	[REDACTED✂]	[REDACTED✂]
Log of weighted average treatment complexity	0.15	0.15	–1.5%	[REDACTED✂]	[REDACTED✂]
Log of number of booster stations per length of mains	0.33	0.34	2.3%	[REDACTED✂]	[REDACTED✂]
Log of population density	0.83	0.84	2.0%	[REDACTED✂]	[REDACTED✂]
Log of population density squared	11.50	11.75	2.1%	[REDACTED✂]	[REDACTED✂]

Source: Ofwat calculation

A2.27   While examining the variance of explanatory variables can help identify where there is no indication of a loss of important variance, it does not necessarily fully capture the multiplicative nature of the relationships between cost drivers and costs which is the reason we use multiple regression analysis. In this regard this analysis might be best considered as a one sided test; a finding of a loss of variance would indicate a potential problem arising from the merger, yet a finding of no loss in variation is not evidence that no problems will arise. Insofar as the extent of variation is used as a measure of the degree of information captured in the data, a reduction in the measure of variation may signal a loss of important information. However, the increase in variation we find from reducing the number of observations (either by dropping Bristol Water or simulating the merger) is counterintuitive, there is not more information on each of the key cost drivers captured in a smaller set of observations.

A2.28   The reduction in the number of observations might be expected to affect the degree of correlation between explanatory variables. An increase in the correlation between explanatory variables would increase the influence of multicollinearity in the regression models. Multicollinearity makes it harder to measure the relationship between each cost driver and costs because it is hard to disentangle which cost driver is impacting costs because the cost drivers are highly correlated.[80]

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[80] See "Econometric Analysis", Greene, WH, Seventh Edition, Pearson, Section 4.7.1 for a discussion of the impacts of multicollinearity on econometric estimates.

A2.29   To study the impact of the merger on the degree of multicollinearity we have examined the variance inflation factor (VIF) in each of the models we use. VIF is an econometric measure that evaluates the degree of multicollinearity for each variable. The cost drivers that are important in the sector already display high levels of multicollinearity in the models we use. As the table below shows, our analysis indicates that following the merger between South West Water and Bristol Water, the measure of multicollinearity (VIF) would generally be expected to increase for the treated water and wholesale water base cost models, but decline for the water resource models. Against a backdrop of prevailing high multicollinearity we consider that any further increase should be treated with caution and is an indication of a potential degradation in the ability of the models to delineate the effects of different cost drivers. Given that treated water distribution and wholesale water account for more costs than water resources, a degradation in those models may be of more concern. Also, the pattern suggests that any degradation cannot be resolved by shifting weight towards disaggregated models (separately modelling water resources, treatment and distribution) or combined models (modelling the whole of water base costs in a single model).

Table A2.9: VIF – % change in VIF measure following merger simulation between South West Water and Bristol Water (2016/17 counterfactual).

	Model/Dependent variable				
	WRP1 Water resources base cost	WRP2 Water resources base cost	TWD1 Treated water distribution cost	WW1 Whole water base cost	WW2 Whole water base cost
Log of number of connected properties	[REDACTED]	[REDACTED]		[REDACTED]	[REDACTED]
Proportion of water treated at works of complexity levels 3 to 6	[REDACTED]			[REDACTED]	
Log of lengths of main			[REDACTED]		
Log of weighted average treatment complexity		[REDACTED]			[REDACTED]
Log number of booster stations per length of mains			[REDACTED]	[REDACTED]	[REDACTED]
Log of population density	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Log of population density squared	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Mean	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Ofwat calculation

A2.30   The changes to cost allocation we find after simulating the merger are driven by changes in the coefficients within the models we estimate. Those in turn are driven by the loss of variation reported above. The most consistently impacted explanatory variables are those linked to density. Consequently, companies with atypical density are more likely to be affected by the merger at future controls. While the changes are not necessarily statistically significant, they are economically significant and statistical significance is only partially informative in models in which efficiency and inefficiency are captured in residuals which will inflate standard errors.

Table A2.10: Proportionate change coefficient following merger simulation between South West Water and Bristol Water (2016/17 counterfactual)

| Dependent variable | Model | | | | |
	WRP1 Water resources base cost	WRP2 Water resources base cost	TWD1 Treated water distribution cost	WW1 Whole water base cost	WW2 Whole water base cost
Log of number of connected properties	[REDACTED]	[REDACTED]		[REDACTED]	[REDACTED]
Proportion of water treated at works of complexity levels 3 to 6	[REDACTED]			[REDACTED]	
Log of lengths of main			[REDACTED]		
Log of weighted average treatment complexity		[REDACTED]			[REDACTED]
Log number of booster stations per length of mains			[REDACTED]	[REDACTED]	[REDACTED]
Log of population density	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Log of population density squared	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Source: Ofwat calculation

Enhancement costs

A2.31   Overall, we find a [REDACTED✂----] on enhancement allowances following the merger simulation. We do not disagree with Oxera's approach to the static analysis, which also finds a [REDACTED✂----].

A2.32   We note that our analysis is based on modelled allowances only. Some companies were modelled using multiple approaches, and we then made a judgement on which assessment method was deemed more appropriate at PR19. Details of the assessment methods used can be found in our PR19 enhancement feeder models.[81]

A2.33   Our key findings are that:

1. The impact on modelled enhancement cost allowances is [REDACTED✂----], which includes analysis from the Lead standards and Metering water enhancement models.

2. The supply-demand balance model is highly sensitive to adjustments, with industry allowances decreasing by [REDACTED✂----] – however the allowance of the merged entity increases by [REDACTED✂----].

3. The impact on enhancement costs is beyond the impact that is calculated using benchmarking approaches, and many enhancement lines include implicit cross-company comparison that will be impacted as a result of the merger. With less comparative information, we are concerned about the incentive of companies to inflate bids when requesting enhancement expenditure.

Assessment of lead standards and metering models

A2.34   For both models, we create simple input sheets from the PR19 final determination models. The inputs are those used for each of the variables in the relevant regression model.

A2.35   We combine all relevant costs and cost drivers for the merged entity, assuming the merger to have taken place in 2016/17. We then run the models and produce the regression outputs, which include coefficients, relevant test statistics and the post-merger allowances for each company.

A2.36   As above, our analysis indicates a [REDACTED✂----] increase in allowances in the lead standards and metering models, respectively.

Supply-demand balance model

A2.37   The supply-demand balance model consists of 5 components that are assessed separately: 1. 2020-25 supply-demand balance enhancement, 2. long-term enhancement, 3. leakage enhancement, 4. internal interconnections and 5.

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[81] PR19 final determinations models, www.ofwat.gov.uk/final-determinations-models

investigations and future planning. Our analysis considers components 1–3, as components 4 and 5 are not dependent on industry structure.

A2.38   We combine all relevant costs and cost drivers for each of the components, taking into consideration the assessment method used for each company and for each component, considering the merger to have taken place in 2016/17. Our analysis calculates allowances for all companies following the simulated merger between South West Water and Bristol Water.

A2.39   As discussed in paragraph 3.51, our analysis produces extreme results, on which we place no weight in terms of the overall monetary impact on enhancement costs. However, we consider that this highlights the fragilities and difficulties with assessing enhancement costs, which the loss of this comparator compounds.

A3 Assessment of Oxera's analysis on the historical impact of mergers on efficiency

A3.1 In this section we assess Oxera's analysis of the historical impact of mergers on efficiency.[82] Oxera suggests that past mergers have resulted in more efficient companies. We do not consider that findings from previous mergers necessarily translate to this merger because all mergers are different. Even if mergers do tend to lead to more efficient companies, that would not negate the need to assess the specific scope of efficiencies in this specific merger. Moreover, when we replicate the analysis, we find that the evidence does not support Oxera's conclusion that mergers have historically increased efficiency.

Oxera's analysis

A3.2 Oxera seeks to explore the historical impact of mergers on efficiency. Oxera's approach consists of comparing the relative efficiency of merged entities to that of their predecessors using data from the last five Price Review Final Determinations. Oxera measures efficiency through an A – E relative efficiency banding system.[83] We used an A – E relative efficiency banding system in PR99, PR04 and PR09 although we did not do so in PR14 and PR19. Instead, we published rankings based on efficiency scores. For PR99, PR04 and PR09 Oxera uses the relative efficiency bands in wholesale water operating expenditure (opex) published by Ofwat.[84] For PR14 Oxera converts the efficiency scores in wholesale water totex published by Ofwat[85] to the A – E bands. For PR19 Oxera converts the efficiency scores in wholesale water botex+[86] published by us[87] to the A – E bands.

A3.3 Oxera looks at three mergers[88] and compares the relative efficiency of the merged entities with that of their predecessors, concluding that mergers have a positive impact on efficiency and that the evidence supports two effects of historical mergers. First, "where the efficiency of the merging parties significantly differs, the relative efficiency of the merged entity is closer to its higher-performing predecessor, for example as in the case of SSC relative to SST and CAM". Second,

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[82] See Oxera (September 2021), *Provisional impact assessment of the SWW-BRL merger*, Section 2.2.

[83] The A – E categorisation to measure a company' relative efficiency has the following definitions: A, 0–5% within the benchmark company; B, 5–15% within the benchmark company; C, 15–25% within the benchmark company; D, 25–35% within the benchmark company; E, 35%+ within the benchmark company. Oxera defines the benchmark as the most efficient company making up >3% of industry TOTEX.

[84] Ofwat (1999), 'FINAL DETERMINATIONS: Future water and sewerage charges 2000–05'; Ofwat (2004), 'Future water and sewerage charges 2005 –10 Final determinations'; Ofwat (2009), 'Future water and sewerage charges 2010–15: Final determinations'.

[85] Ofwat (2014), 'Calculation of efficiency scores and efficiency adjustment factors, water',

[86] Botex+ refers to combined base operating expenditure and capital maintenance costs.

[87] Ofwat (2019), 'Feeder model 2: Wholesale water – Water Catch up adjustment'

[88] South East – Mid Kent (2007), South Staffordshire – Cambridge (2012) and South West – Bournemouth (2015).

"the synergies achieved through merging lead to a more efficient merged entity than either predecessor, for example as in the case of SEW relative to MKT and MSE". Finally, Oxera considers that "if a high-performing company acquires a poor performer, these two effects may be additive, such that the resulting merged company trends to a level of efficiency even better than its more efficient predecessor".

Our assessment of Oxera's analysis

A3.4   We consider that Oxera's analysis is neither useful nor informative to assess the impact of mergers on efficiency and should carry no weight in the CMA's assessment.

A3.5   First, Oxera's analysis attributes all post-merger changes in relative efficiency to the merger itself. This approach is not valid, as there are many other factors apart from the merger that affect post-merger efficiency, including the challenge we set under the regulatory framework.

A3.6   Second, Oxera only looks at three mergers, excluding many other mergers that have taken place in the water industry since privatisation. This risks significantly biasing the results.

A3.7   Third, Oxera focuses on assessing the level of relative efficiency rather than the level of efficiency itself. This raises some concerns. Changes in relative efficiency of a given company are partially determined by changes in efficiency of all the other companies. For instance, a merger may reduce efficiency but depending on how the other companies perform we may observe an improvement in the relative efficiency of the merged entity.

A3.8   Fourth, Oxera's analysis compares relative efficiency across Price Reviews since PR99. However, the methods and data used by us have changed substantially over time. Oxera also compares relative efficiency scores calculated on the basis of opex (PR99, PR04 and PR09), totex (PR14) and botex+ (PR19). Given the different approaches to assessing costs and efficiency, it is not clear that it is appropriate to consider changes in efficiency over time in this way.

A3.9   Fifth, Oxera highlights that the three merged entities included in its assessment "spanned Ofwat's efficiency rankings" in PR99 while they were amongst the most efficient ones in PR19. This type of comparison is flawed. For instance, one of the mergers is from 2015, so it certainly did not have an effect from 1999 to 2014. Oxera also highlights that some of the most efficient companies in PR19 are merged entities. But it neglects that there are also merged entities in the middle of the

distribution and amongst the least efficient firms – two out of the four least efficient companies in wholesale water in PR19 are the result of past mergers.

A3.10   Notwithstanding all the issues noted above, we have replicated Oxera's analysis and we consider that the evidence does not support Oxera's conclusions on the historical impact of mergers.

A3.11   We have applied Oxera's approach to produce relative efficiency bands and assess all mergers that have taken place since 2000 for which data are available. Our sample covers the three mergers assessed by Oxera and four additional ones.[89] Oxera's conclusions do not hold either if we use the small or the large sample.

A3.12   Table A3.1 presents the relative efficiency bands of merging companies and merged entities from PR99 onwards. For the three mergers assessed by Oxera, the band ratings are only the same as Oxera's in one case. Oxera includes Bournemouth in band B in PR14 and South East Water in band A in PR19. However, when we apply Oxera's approach, Bournemouth ought to be in band A in PR14 and South East Water ought to be in band B in PR19. In our assessment we compare the relative efficiency of the merging companies in the final determination just before the merger with the relative efficiency of the merged entity in the PR19 final determination.[90] We also check if results change if we do the comparison with respect to the final determination just after the merger.

A3.13   First, we assess the three mergers assessed by Oxera.

South West – Bournemouth (2015). In PR14 the merging companies South West and Bournemouth were both in band A. In PR19, the merged entity South West Bournemouth was in band A. Hence, it cannot be concluded that this merger increased efficiency - contrary to what Oxera concludes. As this is a recent merger, we can use the more disaggregated ranking stemming from efficiency scores in PR14 and PR19[91] to assess whether efficiency increased or decreased using Oxera's approach. The merged entity ranked 4th in PR19 while the merging companies ranked 1st (Bournemouth) and 2nd (South West) in PR14. Hence, using Oxera's approach, the South West – Bournemouth merger reduced relative efficiency, contrary to what Oxera concludes.

South East - Mid Kent (2007). In PR04 the merging companies South East and Mid Kent were both in band B. In PR19 the merged entity South East Water was in band B. Hence, contrary to what Oxera concludes, the merged entity is not more efficient than either of its predecessors.

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[89] We assess three mergers that took place in 2000 (Northumbrian - Essex & Suffolk, Three Valleys - North Surrey and Yorkshire – York) that Oxera does not include in its analysis, despite having data since PR99. We also assess the Severn Trent – Dee Valley merger in 2016. Oxera excluded this merger because these companies maintain separate licences and kept separate reporting in PR19.

[90] Oxera seems to be choosing PR19 Final Determination as the post-merger period to make the comparison. PR19 seems quite questionable as the post-merger period for mergers that took place in 2000 or 2007.

[91] Oxera uses efficiency scores in PR14 and PR19 to calculate the relative efficiency bands in PR14 and PR19.

It is as efficient. Hence, it cannot be concluded that this merger increased relative efficiency. We consider this case is unclear, hence it is possible that efficiency decreased.

South Staffordshire - Cambridge (2012). In PR09 the merging companies South Staffordshire and Cambridge were in band A and C respectively. In PR19 the merged entity South Staffs was in band A. Hence in this case the merged entity increased efficiency according to Oxera's criteria since the merged entity is closer to its more efficient predecessor.

In sum, using Oxera's approach and its sample we consider that the evidence does not support Oxera's conclusions on the historical impact of mergers on relative efficiency. Only one out of three mergers assessed by Oxera increased efficiency on this basis. In the other two cases, one reduced efficiency and for the other one, the impact is unclear. These numbers are robust to using the final determination just after each merger to make the comparison.[92]

Second, we assess the four additional mergers that have taken place since 2000.

Northumbrian – Essex and Suffolk (2000). In PR99 the merging companies, Northumbrian and Essex and Suffolk, were in bands A and B respectively. In PR19 the merged entity Northumbrian was in band B. This merger did not increase efficiency by any of Oxera's criteria. First, the merged entity is not more efficient than either of its predecessors. Second, the merged entity is not closer to its more efficient predecessor. Rather, it is closer to the less efficient, as it scores B. Hence, applying Oxera's criteria, this merger reduced relative efficiency.

Severn Trent – Dee Valley (2016). Oxera excluded this merger because the resulting companies maintain separate licences and kept separate reporting in PR19. However, Severn Trent and the new Hafren Dyfrdwy are part of the same group and, while they are different entities[93], we can at least consider Oxera's approach by looking at changes in relative efficiency before and after the merger. In PR14 the merging companies Severn Trent and Dee Valley were both in band B. In PR19, Severn Trent dropped to band C and Dee Valley moved to band A. Looking at efficiency scores rankings, Severn Trent dropped from being 8th in PR14 to being 14th in PR19 while Dee Valley moved from being 9th in PR14 to being 5th in PR19. Given that Severn Trent accounts for more than 90% totex of the merged entity, we consider that this merger decreased efficiency according to Oxera's criteria.

Three Valleys - North Surrey (2000). In PR99 the merging companies Three Valleys and North Surrey were in bands C and A respectively. In this case we cannot make the before/after comparison against PR19, as the last PR for which we have individual data on

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[92] If we do this, South East - Mid Kent increases efficiency, but South Staffordshire – Cambridge is unclear.
[93] Hafren Dyfrdwy is not the same licensed entity as Dee Valley.

Three Valleys is PR09.[94] Using PR09, this merger did not increase efficiency by any of Oxera's criteria. First, the merged entity is not more efficient than either of its predecessors. Second, the merged entity is not closer to its more efficient predecessor. Rather, it is closer to the less efficient, as it has a C. Hence, applying Oxera's criteria, this merger reduced efficiency.

Yorkshire – York (2000). In PR99 the merging companies Yorkshire and York were in bands A and B respectively. In PR19 the merged entity Yorkshire was in band A. Hence in this case the merged entity increased efficiency according to Oxera's criteria.

In summary, using Oxera's approach and the larger sample we consider that the evidence does not support Oxera's conclusions on the historical impact of mergers on efficiency. In particular, out of the seven mergers, four – notably including, South West with Bournemouth – reduced efficiency, two increased it and one is unclear. The results do not change substantially if we use the final determination just after the merger to make the comparison.[95]

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[94] After PR09 Veolia Water Central (previously Three Valleys), Veolia Water East (previously Tendring Hundred), and Veolia Water Southeast (previously Folkestone and Dover), all three companies under common ownership of Veolia, changed owner and were rebranded as Affinity Water in 2012.

[95] If we do this, out of the seven mergers, three mergers – notably including, South West with Bournemouth - reduced efficiency, two increased it and two are unclear.

Table A3.1. Relative efficiency bands produced using Oxera's approach for merging companies and merged entities. PR99 – PR19

Merger	Year	PR99	PR04	PR09	PR14	PR19
Northumbrian – Essex & Suffolk	2000					
Northumbrian / Merged entity post-merger		A	B	B	B	B
Essex & Suffolk		B				
Three Valleys – North Surrey	2000					
Three Valleys / Merged entity post-merger		C	B	C	-	-
North Surrey		A				
Yorkshire – York	2000					
Yorkshire / Merged entity post-merger		A	A	A	B	A
York		B				
South East – Mid Kent	2007					
South East / Merged entity post-merger		E	B	A	B	B
Mid Kent		D	B			
South Staffordshire – Cambridge	2012					
South Staffordshire / Merged entity post-merger		C	A	A	B	A
Cambridge		A	A	C		
South West – Bournemouth	2015					
South West / Merged entity post-merger		C	C	B	A	A
Bournemouth		B	A	B	A	
Severn Trent – Dee Valley	2016					
Severn Trent		B	A	B	B	C
Dee Valley		A	B	B	B	A

Source: Ofwat's replication of Oxera's approach. Notes: in the case the merger between Three Valleys and North Surrey, the band in PR09 corresponds to Veolia Water Central, as Three Valleys was rebranded as such in 2009. There is no band in PR14 and PR19 as Veolia Water Central, Veolia Water East (previously Tendring Hundred), and Veolia Water Southeast (previously Folkestone and Dover), all three companies under common ownership of Veolia, changed owner and were rebranded as Affinity Water in 2012.

A4 Assessment of the impact of the merger using the change in performance analysis

A4.1 Overall we consider that the change in performance analysis put forward by Oxera, and relied on by Pennon, contains a number of flaws whereby little or no weight should be placed on it. As such, it does not displace our conclusion that the merger will, as a result of the loss of Bristol Water as a comparator, be likely to prejudice our ability to carry out our functions.

A4.2 The change in performance analysis uses past changes in regulatory rankings as an indicator of how the performance of companies might change in future. It then marries that with an estimate of how the catch-up challenge would vary with fewer companies to provide an estimate of how removing a company might impact future catch-up challenges under future controls.

A4.3 The change in performance analysis is highly sensitive to input assumptions. While Pennon and Oxera present scenarios in which future industry allowances would be lower, we show there are plausible alternative scenarios in which allowances would be equally larger. The analysis is also inherently biased to find lower industry allowances in the future, which Pennon present as a benefit. As we have noted elsewhere, simply reducing industry totex risks underfunding companies and so it is not necessarily a benefit.

A4.4 Ultimately, the analysis doesn't address our primary concern which is the main subject of this Opinion – namely whether the loss of/change in comparators as a result of the merger is likely to prejudice our ability to regulate – which includes the ability to robustly assess required costs.

Pennon's use of Oxera's change in performance analysis

A4.5 The change in performance analysis uses past changes in regulatory rankings as an indicator of how the performance of companies might change in future. It then marries that with an estimate of how the catch-up challenge would vary with fewer companies to provide an estimate of how removing a company might impact future regulatory catch-up challenges in future controls.

A4.6 Pennon's central case finds a benefit in the range of [REDACTED✂----]

A4.7 Pennon's lower bound [REDACTED✂----], refers to using the upper quartile when using 'Forward-looking wholesale model, supporting model 1.9' and assumes there is a [60-70]% chance of the merged entity being as efficient as South West Water.

This model uses the initial wholesale model but adds lead and metering enhancement costs.

A4.8   Pennon's upper bound [REDACTED✂----], uses the same supporting model as the lower bound, but refers to using the upper quintile, and assumes that there is [90-100]% chance the merged entity will be as efficient as South West Water.

A4.9   We consider that this choice of range from the suite of models calculated by Oxera is not representative of the range of Oxera's analysis. First, we consider that it is appropriate to separate out the impact on base and enhancement costs because these are compared separately. Pennon's choice of scenarios mixes base cost with some (but not all) enhancement costs (specifically by including enhancement expenditure from the Lead standards and Metering enhancement models). We also consider that the choice of mixing the benchmarks at which to set the efficiency challenge is inappropriate.

A4.10   Further, as discussed in para 3.20, we consider the assumption that the merged entity will be as efficient as South West Water is unrealistic, at least in the short term. Given the stark difference in efficiency of South West Water and Bristol Water, we would expect it to take a reasonable time to make the combined entity as efficient as South West Water. It seems a stretch to simply use this as a base assumption in this analysis.

A4.11   The actual range of Oxera's analysis is wider than Pennon suggests. Using the data we used for the PR19 final determination, considering only wholesale costs, the upper quartile as the efficiency challenge and the weighted average of the merging firms for the efficiency of the merged entity, Oxera found what it considers to be a benefit of [REDACTED✂----] as a result of the merger, with sensitivity ranging from [REDACTED✂----] When the analysis was updated by Oxera to use the 2019/20 data, in line with the CMA decision in the PR19 redeterminations, it produced an estimate of [REDACTED✂----] benefit, with sensitivity ranging from [REDACTED✂----]

Inherent limitations of the changes in performance approach as a forward looking analysis

A4.12   The change in performance analysis is limited in scope. It only considers the effect of the merger on the potential scale of the catch-up challenge and its impact on overall industry allowances. Crucially, even in that limited context, the analysis does not consider the effects of the merger on the future confidence we can have in the econometric models we produce, on which the extent of this catch-up challenge depends.

A4.13   When considering the likely prejudice of the merger on our ability to regulate the sector, we do not consider simply the changes in allowances and their magnitude. These changes are simply indicative of the imprecision that a merger has introduced. Imprecision is also manifest in our reduced ability to achieve a high-quality estimate of the cost function of the industry. The change in performance analysis presented by Pennon does not consider any of these issues.

A4.14   We are concerned with the legitimacy of the probability matrix approach as 'forward looking' and concerned with the reliance Pennon has placed on this approach when assessing the impact of the merger. Pennon argues that this analysis is more relevant than the static analysis, as the static approach is entirely hypothetical, based on combining two companies that were managed separately and that the static analysis does not account for the possibility of future changes in company rankings.[96] We note that Pennon's static analysis predicts a potential for a large detriment ([REDACTED✂----]per 5 year control period).

Impact on our benchmarking models

A4.15   The predominant way in which we regulate is by comparing companies using econometric benchmarking models. A merger will have several implications for our models including model specification, model accuracy, our ability to set the efficiency challenge and ultimately the impact on totex allowances. Crucially, the forward looking analysis presented by Pennon does not consider any of these issues.

Contradictory assumptions driving results

A4.16   The initial position of the merged entity, before any cost savings (combining an upper quartile South West Water with a lower performing Bristol Water) would be as an average performing company. In [REDACTED✂----] of its 20 forward looking sensitivities, Oxera finds a purported benefit in the form of a more challenging upper quartile catch-up challenge. That would suggest there is a [90-100]% likelihood that Pennon is able to develop the merged entity into an upper quartile company, driven by Oxera's assumptions. That likelihood is inconsistent with the estimate in the model itself which estimates that the probability of any given below upper quartile company becoming upper quartile is only around [20-30]%. While we would expect well performing companies which acquire poor performing companies to improve the performance of the poor performing company, as annex 3 set out it is not clear that has been the case in previous mergers. It is unclear that

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[96] Pennon (October 2021), *Bringing benefits to the greater South West The case for the merger of Bristol Water and South West Water*, page 80, paragraph 10.5.

the extent of the implicit confidence placed in Pennon by Oxera's assumptions is justified.

A4.17 However, it is possible to adopt a similar methodology to the change in performance model and obtain more intuitive results. As a starting point, the merged company will initially have the costs of the separate companies combined which would give it an efficiency score equal to the weighted average of South West Water and Bristol Water's efficiency scores. The merged company would therefore start out as a below upper quartile company, ranked 9th.[97] Oxera's submission finds that this outcome (losing an upper quartile company) results in an average detriment of [REDACTED✂----] per price control.[98]

A4.18 In future price control periods, this detriment will arise unless the merged company becomes upper quartile. The probability matrices presented within Oxera's submission quantify the likelihood of this occurring based on observed past changes in performance. In particular, the probability of the 9th ranked company at PR19 becoming upper quartile in PR24 is equal to [10-20]%.[99] This probability marginally increases in each future price control period to reach [20–30]% by PR44 (the last period considered within the analysis).

A4.19 Combining these probabilities with the per price control detriment figure, we find that the merger results in a detriment of [REDACTED✂----].

Future company performance

A4.20 Within the change in performance model, a benefit arises when the merger leads to the removal of a below upper quartile performing company from future price controls, as this will result in a more challenging upper quartile benchmark. Conversely detriment arises when the merger results in an upper quartile firm being removed from future price controls, which would lead to a less challenging upper quartile benchmark. From this, it follows that Oxera's finding of benefit is dependent on there being a relatively high probability that the merger results in a below upper quartile performing company being removed.

A4.21 Oxera's modelling assigns high probabilities to scenarios in which either South West Water is a below upper quartile company in future price controls, or that the resulting merged company is below upper quartile. For example, in every future

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[97] This equals the average of the business plan efficiency ranking (8th) and the historical efficiency ranking (10th) of the merged company, as calculated using the weighted average of South West Water and Bristol Water's efficiency scores. Source: Oxera, "*Forward-looking wholesale model, supporting model 1.1*", 6 August 2021, Total tab.

[98] This equals the average detriment of losing an upper quartile company, based on historical and business plan data ([REDACTED✂----]respectively). Source: Oxera, "*Forward-looking wholesale model, supporting model 1.1*", 6 August 2021, Total tab, X19 & X46.

[99] Source: Oxera, "*Forward-looking wholesale model, supporting model 1.1*", 6 August 2021, Changes matrices (100%) tab

price control period modelled, there is a greater than [70-80]% probability assigned to scenarios in which the merged company is not upper quartile. Similarly, in every future price control period modelled, there is a greater than [70-80]% probability assigned to scenarios in which South West Water is not upper quartile. This is also inconsistent with Pennon's argument that [REDACTED✂----].

A4.22 The high probability of not being upper quartile is a product of the approach Oxera has adopted to model future performance, in which current rankings are not a strong indication of future rankings. For example, under the approach, the most efficient company in PR19 has a less than 50% chance of remaining upper quartile in PR24. Figure A4.1 below displays the probability of a firm being upper quartile in future price controls, ordered by its rank at PR19.

Figure A4.1: Probability of firm being upper quartile in future price controls, by rank at PR19

[REDACTED✂----]

A4.23 This randomness in future rankings is what drives the high probability of a below upper quartile company being removed by the merger, resulting in a proposed benefit. This is true regardless of the companies which are merging and therefore purely a mechanical effect of the model rather than underpinned by any factual evidence or observation of past performance development. For example, even in the scenario in which the best and second best performers in PR19 merge (the most likely scenario to result in a detriment), the model still predicts that the most likely outcome is for both companies to no longer be upper quartile in all future price controls and for the subsequent merged company to be below upper quartile. This high probability of any company being below upper quartile in the future means that there is a high weight applied to the benefit of removing any company in later controls, and a low weight assigned to the detriment of losing any company. This drives an inherent bias in the analysis to find a benefit from removing companies.

A4.24 We consider that company rankings are likely to be 'sticky' in reality, absent structural changes, with current performance representing a stronger indicator of future performance than the change in performance model suggests. In particular, we find that there is significant evidence of persistence in totex performance, based on data dating back to 2000. Additionally, the distribution of changes in rank that do occur are skewed towards small changes in ranking, further indicating a degree of persistence.

A4.25 We recognise that the 'transitions approach' remedies this to an extent. However like Oxera, when we have attempted to update the transitions matrix, we calculate counterintuitive results – the matrix suggests it is more likely for a company in the upper quartile to move to the lowest quartile than the 3rd quartile.

Sensitivity of the model

A4.26 The change in performance approach is highly sensitive to changes in inputs. For example, on updating the model to include 2019/20 data, our estimate of merger detriment increases [REDACTED✂----], likewise Oxera's estimate of merger benefit grows [REDACTED✂----]. Given that such changes in inputs can result in such significant changes to the outputs, we are further sceptical about the usefulness of this analysis. The sensitivity of this approach is also noted by Oxera[100], though Pennon still invites the CMA to place the most weight on this approach.

Data issues

A4.27 Generally, we consider that the data used for constructing the probability matrix is imperfect. Combining capex and opex rankings to form a view of totex rankings pre–PR14 and then combining these with rankings post-PR14 when we changed our approach to model totex, is mismatching. To remedy this we could consider changes in rankings from PR14 onwards. However, placing weight on data from only 2 price reviews to make predictions for the subsequent 5 price reviews is not a robust methodology.

A4.28 For the reasons discussed above, we consider that the 'probability matrix' approach is not suitable as a sole 'forward looking' model to assess the impact of a merger. As well as considering that the model is not adequate, we consider that Oxera has made some erroneous assumptions when constructing the model. We discuss what we consider the most reasonable set of assumptions for the probability matrix approach below.

Approach to calculating benefit/detriment

A4.29 For the analysis with 100% weight on historical totex, we have reflected on the approach used in the South West Water/Bournemouth Water merger and consider that it needs to be revised. Our previous approach takes totex performance in the first year of the AMP (i.e. in the South West Water/Bournemouth Water merger we used 15/16 data), compared with the Ofwat allowance for 15/16 – multiplying both by 5, and calculating efficiency scores for the AMP. However, that approach:

- assumes every company has the same spending profile over an AMP which is not necessarily the case. Companies often frontload or backload big investment spending over the course of an AMP; one company could overspend and appear inefficient in Y1 and outperform in the other 4 years of the AMP.

- does not factor in external shocks that could occur in a single year of the AMP e.g. disruptions to supply caused by the weather or the Coronavirus pandemic.

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[100] Oxera, "*Annex A: cost benchmark*", 28 July 2021, pages 17, 19 and figure 3.5.

- Does not consider uncertain totex allowances for companies who have appealed their final determinations, e.g. Bristol Water underspent in the first year of AMP6 as the CMA redetermination process was ongoing, but overspent in the remaining years of the AMP - particularly relevant as four companies sought redeterminations at PR19.

A4.30 When calculating £m delta with 100% weight on historical totex, Oxera uses the industry modelled amount multiplied by the change in upper quartile when removing the most/least efficient firm. We consider that historical industry actual totex should be used, as this is the expenditure that companies incurred and for which customers subsequently paid. Using historical business plan values of totex is irrelevant in this context.

Incorrect distribution

A4.31 Oxera has used the probability matrix from our PR19 model.[101] This model creates a matrix based on a distribution where companies can move –17 to 17 places in rankings. However, in the context of this analysis we model 17 companies in the industry, so the maximum number of rankings a company can move is therefore 16. When the distribution is smoothed, totex cumulative probabilities will differ in the two ranges, and –17 and 17 should be excluded from the sample.

Upper quintile

A4.32 Oxera's analysis includes consideration of how the merger might impact the upper quintile: on the 'total' sheet they have calculated delta impacts on the upper quintile, notwithstanding some errors identified in the calculation of the delta above, the approach seems sensible.

A4.33 However, when calculating impacts which are presented on the 'summary and controls', 'Output (0%), upper quintile' and 'Output (100%), upper quintile' tabs – they have used the same probability matrix that calculates the probability of a company being in the upper quartile. We consider that, in order to place any weight on these results, a new change matrix needs to be included with the probability of a company reaching the upper quintile. Nevertheless, since the CMA has noted a preference for using an upper quartile, we have not sought to update Oxera's analysis of the use of the upper quintile.

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[101] Ofwat (2019), 'Company–Specific Adjustment CBA Model'

Our revised analysis

A4.34   Notwithstanding our overall concerns about the change in performance analysis, we have undertaken analysis which seeks, as far as possible, to correct the errors noted above, that demonstrates the sensitivity of the analysis, and analysis which seeks to remove the inherent bias to find a benefit.

A4.35   The two changes which make the most significant impact are how the change in performance matrix is calibrated, and the number of comparators considered in the analysis. We explain the changes we have made below.

Changes matrix – revised approach

A4.36   We have updated the calibration of the change matrix to take into account the most recent information, including the information for the whole of the PR14 price control, and to take account of all companies as they performed at the time. Our approach uses the most recently available data and aligns data on previous rankings in opex and capex when constructing the probability matrix. In calibrating the change-matrix from historical data we have included Dee Valley in the pre-PR19 period because they were one of the independent companies contributing to observed performance differences. We see no reason to exclude Dee Valley's past performance in informing how we use past performance as an indicator of future performance in this context.

Probability matrix

A4.37   Oxera's approach to constructing the probability matrix directly copies the probability matrix calculated in our Company Specific Adjustment Cost-benefit analysis model at PR19.[102] The model was used to test company-specific adjustments that may be required to the cost of capital. This approach benefits from updating to reflect the most up to date information, especially the full information for the PR14 period

A4.38   In the South West Water/Bournemouth case, our approach considered year on year changes in rankings of opex from 2000-2009 and changes in rankings of capex at PR99, PR04 and PR09. In our previous approach a probability distribution is created for a company moving a given number of ranks for opex and capex, and these are weighted to construct a view of a totex probability distribution. This approach requires updating for the following reasons.

- The opex probability distribution considers year-on-year changes whereas the capex probability distribution considers changes at three price reviews, and these

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[102] Ofwat (2019), 'Company-Specific Adjustment CBA Model', https://www.ofwat.gov.uk/wp-content/uploads/2019/02/Company-Specific-Adjustment-CBA-Model.xlsm

are then combined to form a view of simulated historical transitions in totex. Intuitively, combining year-on-year changes with 5-year changes is incorrect. We consider that changes in year-on-year rankings are likely to be volatile, due to external shocks and differences in company spending profiles over an AMP.

- We also consider that the data used for opex and capex covers different periods, capex 1995-2009 and opex 2000-2009, so these should not be combined when comparing rankings.

- Further, due to the change to totex approach at PR14, we do not consider it appropriate to compare changes in rankings before totex with those under totex.

A4.39 Our revised approach uses opex data from 2000-2009, and to mitigate year-on-year fluctuations in rankings (e.g. due to company-specific spending profiles or adverse weather) we take an average ranking from the 5-year periods, 2000-2004 and 2005-2009, to form a view of a PR04 and PR09 ranking for each company. Similarly, for capex rankings we discard PR99, in order to align the years considered for opex and capex rankings.

A4.40 We calculate normal probability distributions for capex and opex, with probabilities for a given company changing a given number of ranks over a 5-year period. Opex and capex probabilities are combined, maintaining the previous capex weight of 60%, to calculate the totex probability distribution for PR04 and PR09.

A4.41 Using totex rankings from our PR14 and PR19 efficiency challenges, we construct a probability distribution based on changes in rankings. This distribution and the PR04 and PR09 distribution are averaged to calculate the totex adjusted probability distribution.

A4.42 We consider that our revised approach addresses the issues identified above, namely surrounding the volatility of year-on-year changes in company rankings.

Number of comparators used

A4.43 Oxera's approach uses only 16 comparators, excluding Dee Valley in the pre-PR19 period and excluding Hafren Dyfrdwy in the post-PR19 period. This has implications for the probability matrix. It also impacts the change in the catch-up challenge expected as calculated for losing an upper-quartile company (in which case the challenge for the sector would lessen), or below upper-quartile company (in which case the challenge increases).

A4.44 We consider that given both us and the CMA used Dee Valley when calculating efficiency scores for the catch-up challenge at PR19 based on performance over

AMP6, that Dee Valley should be used in the context of this analysis when placing '100% weight' on historical totex.

A4.45 Similarly, where analysis draws on the forward-looking period, we have included Hafren Dyfrdwy. It is not clear whether Hafren Dyfrdwy will be used as an independent comparator for determining the catch-up challenge at future controls, but it is not infeasible and is an option to be considered. Consequently, it is at least prudent to consider a scenario in which Hafren Dyfrdwy is used to set the catch-up challenge.

A4.46 As discussed above, the model is highly sensitive to inputs and assumptions, in particular the number of firms in the industry. Our analysis suggests that including Dee Valley and Hafren Dyfrdwy changes the [REDACTED✂----] reduction in industry totex found by Oxera to a [REDACTED✂----] increase, [REDACTED✂----] of the difference between our estimate of [REDACTED✂----] and Oxera's.

A5 Cumulative effects of mergers and the regulatory trade-offs

A5.1 Pennon invites the CMA to consider proceeding on the basis that it is possible to regulate with far fewer comparators, possibly with as few as six.[103] We consider such an approach is inappropriate and would over-simplify the examination of mergers, neglecting the specific impact of individual mergers: the purpose of the test is to assess if a specific merger would be detrimental. In that context, even if it may be possible to regulate with fewer companies, this provides no insight into detriment to the effectiveness of regulation following the proposed merger (or otherwise). A reduction in the number of comparators will typically reduce the robustness of analysis, with corresponding expected detriment for consumers, which may or may not be outweighed by the benefits. It is the weighing of the evidence as to the extent of detriment and benefit of a specific merger that the test requires.

A5.2 There are some general points that are important to bear in mind when making such a case by case assessment, including:

- The **marginal detriment** caused by a merger will typically be higher the smaller the number of companies to begin with – a reduction from 10 to 9 companies may be expected to have more impact than a reduction from 100 to 99.

- While an individual merger may appear to have a limited effect on our ability to draw comparisons in and of itself, the **cumulative effect** of several mergers can be substantial. This is depicted in the figure below which shows the incremental loss of precision and cumulative loss of precision of losing an observation. While the individual loss of precision from losing any single company might appear small (the mergers we have appraised so far led to a detriment in terms of loss of precision of between 1% to 2% when measured against the total industry cost allowance), the cumulative effect of moving from 20 to 15 independent comparators is likely to have been much larger (up to 10% in terms of the cost allowance). Given the total size of the industry, even small percentage numbers represent large sums for customers (the value we assess using econometric benchmarking is approximately over £40bn, of which 1% is £400m).

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[103] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, paras 8.119-8.120

Figure A5.1: Individual and cumulative loss of precision
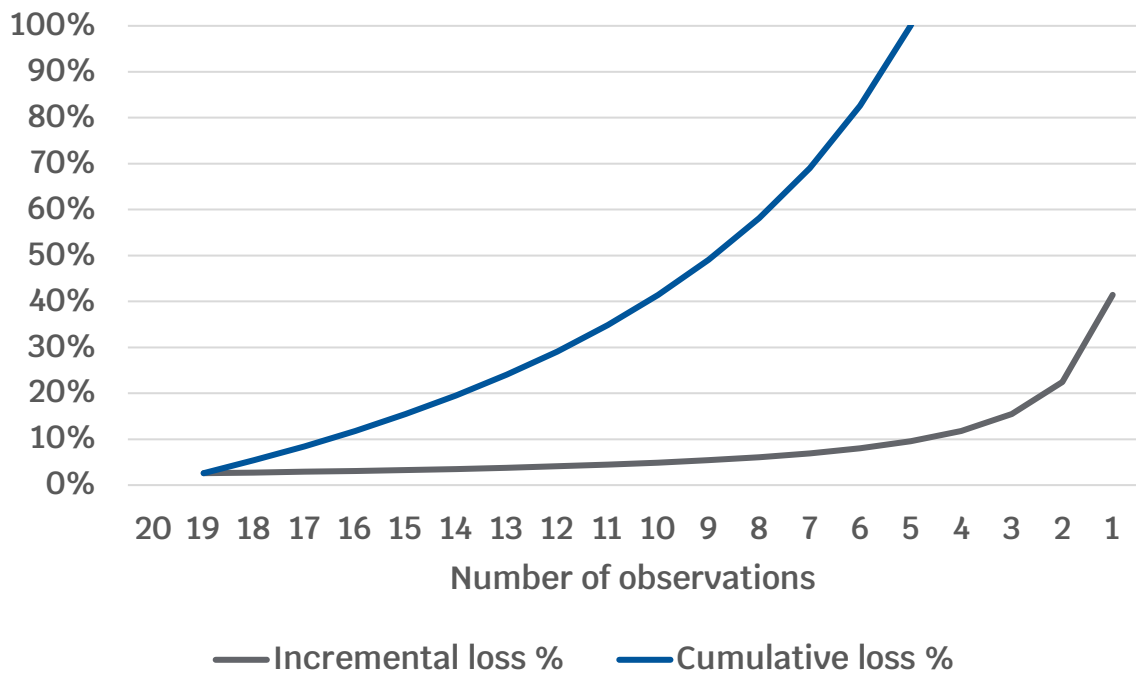
- There is a **limited read-across to other utilities**. The effect of mergers on a regulator's ability to draw comparisons will depend on several different factors, including the purpose for which the regulator makes comparisons, the similarities or differences among firms in an industry, and the number of variables for which the regulator needs to control. This is supported by our review of how different regulators internationally use comparators, which shows a wide range of practices and number of comparators. In Ofwat's case, the extent to which we use comparators (most of the value chain in the water industry is characterised by a natural monopoly), the complexity of the water industry's cost function (and the corresponding range of variables we need to control for), suggest that a crude read across from the practice of other regulators, e.g. Ofgem, is inappropriate.

- The ability of regulators to estimate appropriate cost functions of their industries has improved over time. However, those improvements depended crucially on the availability of sufficient high-quality data. None of these developments suggested that there were easier, better ways of modelling cost functions that required less data than we currently have. As well as affecting our ability to draw comparisons within existing models, mergers can also diminish the range of available options in future – more sophisticated approaches (which may lead to greater customer benefit, in particular if they can more accurately identify efficient costs) may only be feasible when more comparators are available. While it is intrinsically difficult to be precise about what these options could be, this suggests a further reason for

caution in assessing a particular merger and the need to have confidence in clearing transactions at Phase 1 only where there are robust genuine relevant customer benefits or other compensatory solutions that better allow the evolution of the regulatory regime.

Oxera's analysis

A5.3   Oxera has provided analysis suggesting that we need a lot fewer comparators than are currently available. It relies on two main arguments:

- First, Oxera argues that precision would not be significantly reduced by reducing the number of comparators.

- Second, Oxera argues that other possible approaches are available to us to mitigate the effects of a merger.

*Reduction of precision with reduced number of comparators*

A5.4   When we assessed Oxera's counterintuitive finding, we found it appeared to follow from over-fitting within sample as precision counter-intuitively increases substantially as more comparators are lost.

Figure A5.2: Oxera's estimate of confidence interval change with number of comparators

[REDACTED✂----]

Source: Oxera

A5.5   With fewer observations, there is a risk that any model will tend to 'over-fit' the data used for the assessment. Over-fitting occurs when there is too little data to appropriately estimate the model. In the extreme, if there were only two companies, fitting a line would go through the locus of each companies' data points as demonstrated in the figure below.

Figure A5.3: Depiction of over-fitting
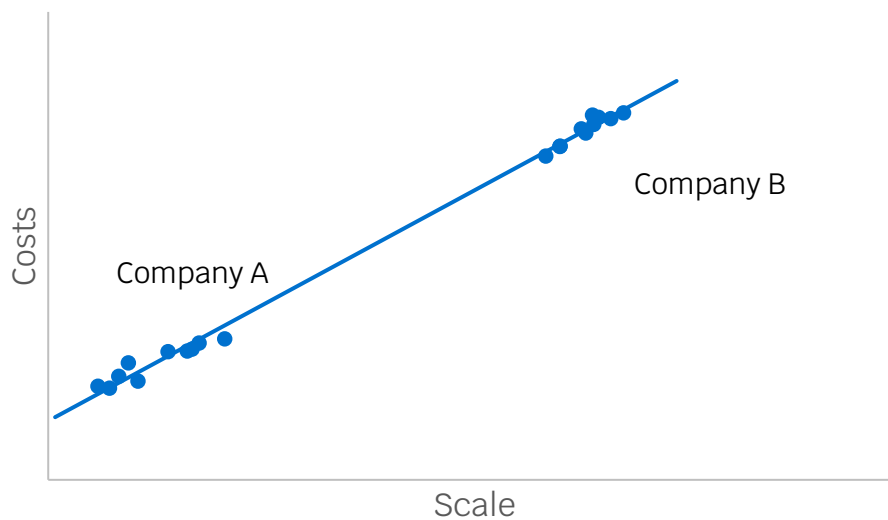
A5.6   In turn, in the context of our cost models, overfitting will tend to result in forecasts which become closer to each companies' own historical costs and further from efficient costs. A model which fits efficiency is not desirable; companies that were historically inefficient will be predicted inefficient levels of costs and therefore will not be challenged to reduce costs. Conversely, companies which were efficient will be predicted super-efficient costs to which an industry efficiency challenge would be applied. Both of these effects would undermine incentives to be efficient in the future.

A5.7   Moreover, even on its own terms Oxera's analysis shows that there is a wide range of potential effects of reducing the number of comparators (while the central estimate suggests a reduction of precision, this estimate has an increasing range of possible other outcomes), suggesting that there is a significant likelihood of further mergers leading to a substantial loss of precision. As Oxera recognises, this is because the impact of mergers will be merger specific and therefore require specific assessment.

Modelling alternatives

A5.8   Oxera argues that other possible approaches are available to us to mitigate the effects of a merger. Oxera does not offer more than a simple read across with other sectors ('Ofgem manages with fewer comparators'). This suggestion does not take account of any of the specificities of different sectors (costs in the water industry are more complex to estimate with a larger number of key drivers[104]), or the trade-offs that other regulators face. We consider other approaches in the course of developing our methodology at each price control, as set out in paragraph 3.9

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[104] See the note of our academic adviser, Prof Andrew Smith.

above, but no clearly superior alternative has been identified to date. Crucially, it does not address the question that the special merger regime in water asks: how will this merger impact on Ofwat's ability to make comparisons and what will the impact on consumers be? As a result, we do not believe any weight should be attached to those arguments.

A6   Analysis undertaken to assess the impact on Outcome Delivery Incentives

A6.1   This annex sets out our view on the impact of the merger on outcome delivery incentives (ODIs). We first present an overview of the analysis conducted for Pennon by Oxera and highlight areas where we disagree with the approach. We then present the analysis we have undertaken to examine the impact.

A6.2   Our analysis finds a detriment of [REDACTED✂----] arising from the merger. This is across all performance commitments we consider are set on the basis of comparisons and based on our static approach. That estimation relates to the detriment over one price control period. Given that the approach to ODIs is not as developed as our approach to cost assessment, it is not necessarily clear that the particular approach to ODIs can be expected to prevail in the same ways as cost assessment. There is greater scope to vary our approach and refine it, to ensure it better incentivises companies to improve performance in line with customer and environmental expectations. Nevertheless, to be consistent with other areas where a 30 year time horizon is considered, as an indication, if the level of detriment we find was applied across five control periods, the current value would be [REDACTED✂----]

Oxera analysis

A6.3   Pennon suggests the impact on ODIs would be a detriment of [REDACTED✂----] based on Oxera's analysis of the impact on six performance commitments: Water Supply Interruptions; Leakage; Per capita consumption; Water Quality Contacts; Unplanned Outage and D-MeX. Pennon also cite a 10-year NPV benefit of [REDACTED✂----] on C-MeX based on analysis by Oxera. For consistency with the analysis on the other performance commitments, we consider that the 5-year NPV calculation should be used from Oxera's analysis. Oxera finds a 5-year NPV benefit of [REDACTED✂----][105] for C-MeX, resulting in an overall [REDACTED✂----] detriment.

Water Supply Interruptions

A6.4   Oxera presents four models to assess the impact of the merger on Supply Interruptions, two using a static approach which are identical in Oxera's calculation and so we consider them as a single piece of analysis, and two using the change in performance approach which provides an upper and lower bound.

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[105] Oxera, C-MeX model (section 4) 6 August 2021.

A6.5   Under the static approach, Oxera uses both the outperformance payment rate and underperformance payment rate on the ODI to test sensitivity. Both approaches result in a similar proposed benefit (in the form of a more challenging performance commitment level) of [REDACTED✗‹----] over 5 years.

A6.6   Oxera applies the change in performance approach in its assessment of water supply interruptions. It estimates an upper bound and a lower bound, which differ in the assumptions used in the change in performance matrices. The estimates are small and broadly the same, between [REDACTED✗‹----].[106]

A6.7   As we explained in annex 2 the change in performance approach is biased toward finding a benefit from mergers. It is also based on the performance of companies on costs and it is unclear why the pattern of past cost performance would be a good indicator of future performance on ODIs. For these reasons we have not sought to replicate Oxera's change in performance analysis in the context of any ODIs and we would not place any weight on it.

A6.8   Notwithstanding our objections to the change in performance analysis we have identified the following irregularities in Oxera's application:

- **Incorrect data used** – On the 'detrimental' tab, the forecast values pre matrix are calculated from the years 2019-20 and 2029-30. However the formula chooses the forecast supply interruptions figures for 2024-25 rather than 2029-30 from the 'forecast computations' sheet. This consistently understates performance over time.

- **Results impacted by outliers** –The results seem to be quite heavily affected by outliers in supply interruption historical data. For example, SES's figure for 2019-20 of 72 seconds per property is exceptionally low. To put it into context, it is lower than: SES's average in the preceding 4 years which was 444 seconds per premises; the next best performing company with a figure of 201 seconds per premises; and it is even lower than SES's aspirational target for 2029-30. Because the recorded figure for 2019-20 is significantly below reasonable levels of future targets, this analysis suggests that SES's performance actually worsens over time.

- **Incomplete analysis** – Within Oxera's analysis[107] there is discussion of performance conversion, however, in the model the calculations do not lead to any outputs and the analysis is seemingly incomplete, see the 'detriment' and 'benefit' tabs. Oxera's write up does not match the modelling itself. However since we disregard the change in performance approach we have not sought to examine this further.

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[106] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, table 12
[107] Oxera (September 2021): Annex C: ODIs and C-MeX

C-MeX

A6.9   C-MeX is an ODI based on customer satisfaction. Unlike other ODIs it is not set with respect to some specific level at the beginning of each control period. Rather the outperformance and underperformance payments are dependent on relative performance across the sector. C-MeX is largely influenced by customers' interactions with the retail arms of companies. Because of the relative nature of the measure, we would not expect a large impact as a result of this merger.

A6.10   As with the assessment of Water Supply Interruptions, Oxera uses both a static analysis and an analysis which uses the change in performance approach, with the exception that the performance commitment level is set based on the performance of the median company rather than the upper quartile. This is because the outperformance and underperformance payments in relation to C-MeX are set by reference to the median firm.

A6.11   Under the static approach Oxera finds a detriment of [REDACTED✂----] over five years. Although this analysis is fairly simple, we consider it is indicative of how a merger might impact the median used in determining C-MeX payments for companies. On this basis Oxera attempts to calculate a measure of the 10-year impact. It estimates a benefit of [REDACTED✂----] using the 3-year average matrix[108] and a benefit of [REDACTED✂----] using the annual change matrix.[109]

A6.12   In the change in performance approach used by Oxera, C-MeX scores are forecast such that they converge over time. The rate of convergence for each company is dependent on each company's relative position on SIM against the best/worst performer in 2015-16 and the reduction in the gap between the worst and best performer on SIM from 2015-16 to 2018-19.

A6.13   As shown in figure 6.1, this approach ensures that the best ranked company in 2019-20 (Dŵr Cymru) remains the best ranked company in each forecasted future year and the worst ranked company remains the worst company in every future year (Thames Water) which we do not consider realistic. The nature of C-MeX is that it is a relative performance measure whereby a number of companies could be the best or worst ranked over the forecast period. While we would expect a degree of persistency, the extent of persistency present in Oxera's analysis, in this respect, does not seem consistent with historical performance which has shown more variation.

A6.14   Also, the convergence of SIM scores results in better performing companies on SIM having lower 'growth rates' in scores over the forecast period and the poorer

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[108] Pennon (October 2021), Bringing benefits to the Greater South West The case for the merger of Bristol Water and South West Water, table 13
[109] Oxera, C-MeX model (section 4) 6 August 2021.

performing companies on SIM having higher 'growth rates' in scores over the forecast period. As a result, Portsmouth who were ranked 2nd on C-MeX in 2019-20 (1st on SIM in 2015/16) are ranked 12th by 2029-30 and Southern who were ranked 15th in C-MeX in 2019-20 (16th on SIM in 2015/16) are ranked 5th by 2029-30. We consider that such a change in scores is unlikely, and although with a relative measure any company can be the best or worst ranked year on year, there is likely to be some degree of persistency of performance as is seen in SIM from 2011-2019.

Figure A6.1: Oxera forecast C-MeX score

[REDACTED✂----]

Analysis of further Performance Commitments

A6.15   Oxera also considered analysis on what it refers to as 'Other ODIs' which includes: leakage; per capita consumption (PCC); water quality contacts; mains repairs; and unplanned outages.

A6.16   Oxera applies a similar methodology to that used in assessing supply interruptions on a static basis. Oxera assumes that for leakage, PCC and water quality contacts, targets are set at the upper quartile and for mains repairs and unplanned outage that targets are set at the industry median.

A6.17   Oxera find the following impacts from its static analysis on ODIs:

Table A6.1: Oxera findings, ODIs static impact

Performance commitment	Oxera findings (static analysis only)
Water Supply Interruptions	[REDACTED]
C-MeX	[REDACTED]
Leakage	[REDACTED]
Per Capita Consumption	[REDACTED]
Water Quality Contacts	[REDACTED]
Mains Repairs	[REDACTED]

Unplanned Outage	[REDACTED]
D–MeX	[REDACTED]

Our approach

A6.18 For the purpose of our analysis, we have applied a single static approach to all the performance commitments (PCs) that we consider as 'common PCs' that are potentially impacted as a result of the merger. These PCs are:

- Leakage
- Per Capita Consumption
- Water Supply Interruptions
- Water Quality Contacts
- Mains Repairs
- Unplanned Outage

A6.19 Our analysis only considers common PCs where we make direct comparisons between all companies when setting Performance Commitment Levels (PCLs) and ODI rates. There are other bespoke performance commitments and although not common in nature, we still make comparisons between companies where relevant.

A6.20 For PR24, as part of the development of our methodology we are exploring the use of common performance commitments across a wider range of outcomes. We have not attempted to capture the impact of this merger on other ODIs, though we do recognise the dynamism of our regime in coming to an overall view of the impact of this merger on ODIs.

A6.21 Our analysis considers the impact that the merger would have had on our PR19 final determinations had the merger occurred prior to PR19 and separate information for South West Water and Bristol was not available. We determine what the expected benefit or detriment to customers would have been for the revised performance commitment level. To do this we use the existing underperformance and outperformance payment rates which can be expected to understate consumer welfare losses and gains as they are set to be less than willingness to pay. There are two steps in our approach, first to determine the extent to which the performance commitment level changes, and then to assess the relevant ODI payment rate. We have applied this approach to all the ODIs assessed.

Performance commitment levels

A6.22 To assess the extent to which the performance commitment level changes we first estimate what the merged entity's performance would have been. To do this we assess the weighted average performance of the merged entity as a combination of the two entities with respect to PCLs. For example, for water quality contacts we calculate a weighted average of the number of contacts per 1,000 premises by dividing the total number contacts for both companies by the total number of premises for the two companies.

A6.23 We then calculate the relevant common performance commitment level that would have been set when comparing performance across all the set of companies including the merged entity rather than South West Water and Bristol Water separately. Comparing this revised common performance commitment level with the actual one set at PR19 tells us how much the performance commitment would have changed because of the merger.

ODI rates

A6.24 To calculate the overall impact we apply each companies' relevant outperformance or underperformance payment rate to the extent by which the performance commitment level changes, for each company separately. We multiply the difference in the performance commitment level of each ODI by either a) the relevant underperformance rate (if the post-merger performance commitment level is less stretching than pre-merger) or b) the relevant outperformance rate (if the post-merger performance commitment level is more stretching than pre-merger).

Results

A6.25 Overall, we find that the merger would have had a cumulative detrimental impact of [REDACTED✂----] across all companies. The impact by ODI is shown in table A6.2 below. A significant contributor to that is unplanned outages, and our intervention at PR19 in that outcome has led to greater convergence of performance across the sector. Therefore, we would not expect future comparisons to display the sensitivity to which company sets the performance commitment level as indicated by this analysis.

A6.26 Our approach to outcomes is evolving and the approach at PR24 is unlikely to mirror that used at PR19. In that context, we can see there may be scope to adapt the regime to mitigate any adverse impact of this specific merger. Accordingly, we recognise that the level of detriment we, or Oxera, find is not necessarily a good indicator of the likely future impact of the merger in this particular context.

Table A6.2: Impact of the merger on outcomes

Performance commitment	Oxera findings (static)	Ofwat view
Water Supply Interruptions[110]	[REDACTED]	[REDACTED]
C–MeX[111]	[REDACTED]	[REDACTED]
Leakage	[REDACTED]	[REDACTED]
Per Capita Consumption	[REDACTED]	[REDACTED]
Water Quality Contacts	[REDACTED]	[REDACTED]
Mains Repairs	[REDACTED]	[REDACTED]
Unplanned Outage	[REDACTED]	[REDACTED]
D–MeX	[REDACTED]	[REDACTED]
Total (simple sum)	[REDACTED]	[REDACTED]

[110] Oxera carried out both change in performance and static analysis for Water Supply Interruptions, this refers to its static approach.
[111] Oxera carried out both change in performance and static analysis for C-MeX, this refers to its static approach.

A7   Expert opinion on cost modelling by Professor Andrew Smith

Note for Ofwat on the impact of mergers on cost assessment

Professor Andrew Smith
University of Leeds
November 2021

1.   Introduction

I have been asked to comment on the question of how the loss of a benchmark might affect the cost assessment process and in turn the ability of Ofwat to set robust, accurate and challenging efficiency targets for water companies. The note sets out some of the general principles that I consider should guide this type of impact assessment and also briefly comments on some of the approaches already set out by Oxera.

2.   Overarching framework

The regulatory benchmarking process can be seen as comprising two key parts:

1. Statistical estimation of a cost function (model) which accurately represents the underlying costs of delivering the service;
2. Determination of the appropriate level of costs of a reasonably efficient company (the efficiency benchmark) based on the dispersion of companies' actual costs around the estimated function.

Previous analyses conducted in respect of mergers has focused on considering how merging companies will impact on the position of the efficiency benchmark (upper quartile and other possible benchmarks) through static and forward looking approaches and also the question of precision, which is considered in various ways (e.g. through the impact on confidence intervals).

However, as a general statement, in my view past analysis does not place enough emphasis on the key challenge that Ofwat and other regulators face in developing a regulatory benchmarking process – namely the challenge of estimating a credible cost function that explains how costs vary according to key cost drivers such as scale, density and other factors.

Once a sensible relationship has been estimated, which has gained the confidence and support of the industry, then there is reasonable confidence in interpreting the residual, at

least in part, as inefficiency; and these residuals can then form the basis for setting the efficiency challenge.

I think it is therefore important that due consideration is made of the impact that loss of a benchmark has with specific reference to the way in which the regulatory benchmarking process operates in practice. This means that greater emphasis is needed on how the merger might affect Ofwat's ability to estimate a credible cost function representation of industry costs. I think that any analysis needs to go beyond some of the summary measures produced by previous analyses e.g. in terms of impact on industry allowances, more towards a richer understanding and narrative on the impact on the cost modelling process.

Below I expand upon these points further, also making reference to analysis set out by Oxera.

3. Impact on the parameter estimates and the model selection process

Preamble and key issues

Experience of past regulatory reviews both in respect of Ofwat and other regulators has shown that a critical part of the regulatory benchmarking process is the development of a credible and robust cost function. Whilst various overall statistical tests are reported as part of the process (e.g. model fit; confidence or prediction intervals - often the latter as part of discussions with the CMA rather than being central to the regulatory model development process) - the main body of work conducted by regulators is concerned with the choice of variables to be included in the model, and the coefficients reported (in terms of their size, sign and statistical significance).

In my view past analysis conducted – including by Oxera - does not pay enough attention to the impact of loss of data on the ability of Ofwat to develop a robust cost function that explains costs with a reasonably parsimonious but credible specification, with credible and (ideally) precisely estimated coefficients.

In the regulatory process, considerable resource is expended to consider a very wide range of model specifications, in consultation with the industry. In the case of water, but also more generally, key consideration is given in the modelling process (or through pre-modelling adjustments) towards capturing the impacts of the following:

- Scale[112];

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[112] Reflects the size of the network and / or the output level – potentially there could be non-constant returns to scale which will mean that unit costs change with size of firm.

- Density[113]; and
- Other cost drivers such as complexity and topography[114].

For each of these drivers prior expectations are set out for the direction and to an extent size of the impact of these factors on costs, and the resulting model in part evaluated based on whether it meets these expectations (which are derived from engineering and business understanding and potentially by past work). It is also acknowledged that, in part, the modelling process is also generating new information on these cost relationships.

A key challenge facing regulators then, with limited datasets (both in terms of the cross-section across companies and time dimensions), is to generate models that are both credible representations of the technology (have enough variables in the model to be credible and capture key cost drivers) and sufficiently parsimonious to enable precise estimates of the different cost drivers to be derived. For many types of cost drivers there can be multiple measures to capture the driver and various different representations of how the different cost drivers might be combined to form an overall model. Additionally, it can generally be seen as preferable to utilise translog-type models; however it has been recognised (including by CMA) that such models use up valuable degrees of freedom and can be hard to interpret in the water sector given the size of existing datasets.

With the datasets at hand it is also acknowledged that there can be challenges in distinguishing between inefficiency and scale or density effects, particularly where the model is relying on 'between' variation in the data and where one firm has few close peers because of its size or density (or some other cost driver).

Overall, the model development process requires a complex set of modelling choices to be made – and the process of making robust decisions on these choices, and arriving at a robust and defendable model, relies on the availability of sufficient and high quality / comparable data. Mergers in general reduce the quantity of data, thus making it harder for regulators to develop robust models.

Proposed additional analysis and narrative

In summary, in my view there needs to be much more consideration and analysis of the impact of mergers on the model development process. This goes beyond simply re–

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[113] Density variables, to cost variation that relates to operating in highly dense areas.

[114] In the case of water, topography (e.g. number of booster pumping stations per lengths of main); and complexity (e.g. water treatment complexity).

estimating previous models and looking at the impact on cost allowances, but requires more specific analysis on how further loss of data through mergers would impact on the model selection process and ultimately on the ability of the regulator to understand and have confidence in the cost function relationship estimated. Here it is important to bear in mind some of the compromises and difficult decisions that have already had to be made in arriving at a set of preferred models given the limitations imposed even by the existing dataset / existing set of companies.

Specifically, the analysis needs to consider how the various model choices made at previous reviews might be impacted and to look at individual coefficients on key cost drivers and how they change in terms of their size, sign and significance; and ask whether the loss of data undermines the regulator's ability to have confidence in the relationships estimated. It is important to remember that the ability to use the model for efficiency purposes depends on the confidence the regulator has in the estimated cost function itself.

The analysis should not simply be about "handle turning" and looking at the impact on overall industry cost allowances, but developing a narrative in terms of how far the regulator can understand the relationship between costs and key cost drivers, and also maintain comparability across a wide range of companies, some of which might already have few peers with similar sets of cost drivers.

Importantly, quite apart from any general impact on overall industry funding allowances, the loss of data could have disproportionate effects on specific firms in the industry in terms of their allowances. In regulatory benchmarking the impact of different models on individual firms is of great importance – thus it is relevant to ask not just whether overall industry allowances are impacted by the change in model, but also what happens to the allowances of other firms who may have been peers with one of the companies to be merged. Again, this kind of analysis needs to be carried out in conjunction with an assessment on the impact on the ability to estimate a credible model, with a narrative – not just the computation of headline numbers. In this respect Ofwat have pointed to the impact that the merger might have [REDACTED✂----].

Further considerations

It is always beneficial for regulators to consider testing a range of factors that might impact on cost. One example would be increased consideration of the relationship between cost and quality. Ofwat has stated its aim to use historical data to analyse the relationship between performance and cost (see Ofwat (2021), PR24 and Beyond: Creating tomorrow, together, Section 10.5). All of these types of analyses – designed to develop the regulatory framework to improve understanding of the drivers of costs and in turn to set challenging but realistic efficiency targets – require data and are made more challenging as data is removed through mergers.

4. Some brief comments on Oxera's analysis

I consider that Oxera has produced some useful comparisons that shed some light on the impact of mergers. However, in general I consider, as noted above, that the main omission is the lack of focus on the impact on the model development process and the cost function parameter estimates. I also note the following:

1. Of the two attempts to compute the impact on cost allowances I find the historical analysis more convincing as it is based on actual, historical data. The forward looking analysis offers an interesting theoretical perspective on what could happen to the efficiency challenge under various different scenarios. However, the assumption that the future relative efficiency position of firms changes in a random way is hard to reconcile with an efficiency benchmarking and regulatory framework that seeks to drive frontier shift and catch-up over time (though I recognise that firm rankings have changed in the past). It was also not clear to me that the analysis takes account of the distribution of the relative efficiencies of the firms (around the upper quartile where this matters for the outcome), though I did not review the approach in detail. Whilst the forward looking approach offers an interesting theoretical perspective, I find it difficult to see that it can be relied upon to give a clear view on the impact of mergers on cost allowances and the regulatory framework more broadly.

2. As noted above, perhaps even more fundamentally a problem with focussing on the impact on cost allowances is that what actually matters is accurately modelling cost, not just whether allowances go up or down. If the loss of data fundamentally alters the model itself, or the choice of the preferred model, then there could be much more substantive implications. Thus neither of these methods (historical or forward looking) addresses the issue of how data loss impacts on the ability to generate a credible cost model.

3. Further, the Oxera analysis focuses on the impact on overall industry allowances and not on whether particular firms might be particularly affected in ways that would cause challenges for the regulatory process.

4. Oxera made some arguments relating to the situation where less data leads to an improvement in model performance. In general it would be considered surprising that less data is a good thing, so to make this more convincing I think that this needs a supporting narrative that explains the point more specifically in the context of the PR19 models and the variables included in those models. Such a narrative can then be discussed / challenged.

5. Since a range of other model performance measures tend to be considered as part of regulatory reviews then these tests should ideally be reviewed as to the impact of loss

of data.

6. Finally, there is discussion about synergies and efficiencies from savings in Oxera's reports. However, in my view there needs to be some consideration of how far they are managerial efficiencies – i.e. driving out savings that really should be possible without merger, versus savings resulting from combining activities. In respect of the latter, these could also be seen as moving along the cost function (e.g. exploiting economies of scale) rather than efficiencies in which case there is an interaction between narratives around efficiency and synergies and also the parameters and shape of the cost function.