

# **CMA Redetermination of Ofwat's 2019 Final Price Determinations**

## **Third party submission to the CMA on Botex cost assessment**

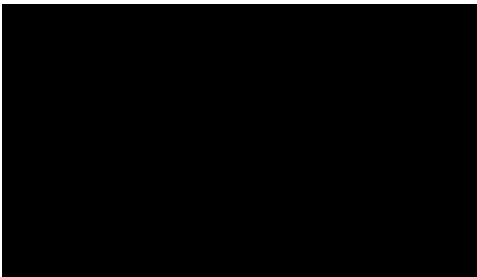
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## Expression of Interest

While we are primarily academics with over 35 years of combined experience in both academic and regulatory application of the modelling of infrastructure industry costs, within the context of this submission to the CMA, we must firstly note that we have been working closely on regulatory cost assessment with Anglian Water since 2017 and continue to do so.

Nevertheless, in our interaction with Anglian Water, we have always made clear our first principle that academic integrity comes before achieving a desired consulting outcome. Thus, our relationship with Anglian Water began in 2017 with our independent academic review of their initial cost assessment models<sup>1</sup>, in which they not only sought but accepted and published our sometimes quite scathing comments on their initial modelling approach. Moreover, as the Price Review continued, this approach continued, with, for example, Anglian Water seeking our academic advice in developing its revised water cost modelling published in March 2018<sup>2</sup>, and commissioning an academic review of Ofwat's IAP modelling.<sup>3</sup> Moreover, it continues today with a recently advertised PhD studentship jointly funded by the EPSRC and Anglian Water.

Thus, while our understanding of the complex factors that influence water and wastewater system costs have been strongly improved by interaction with Anglian Water's operational managers, and even influenced our approach to Japanese wastewater modelling in a Japanese government sponsored academic research project, we strongly believe that we have maintained and Anglian Water has always, not only respected, but valued, our insistence on academic integrity.

In sum, we freely acknowledge our professional relationship with Anglian Water and its implication of making us an interested third party. However, we also emphasise our strongly academic approach to our working relationship with Anglian Water, and the reports that we have published as part of the PR2019 process. Fundamentally, our approach and conclusions are informed and derived from our academic research and its findings. We make this submission independently of Anglian Water as academic practitioners. Our professional lives are dedicated to the application of economic theory and econometric practice to challenges in public policy and our motivation in making this submission is to express our concerns about failings we have observed in Ofwat's modelling of costs for the England and Welsh water and wastewater industry, and in the hope that they can be addressed by the CMA, and thereby deliver a better regulatory policy outcomes for both water companies and water customers.

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<sup>1</sup> Saal, Nieswand, and Ferrari (2017) Independent Review of Anglian Water's Preliminary Regulatory Cost Modelling for PR2019 – Report commissioned and published by Anglian Water as an annex to its initial water cost modelling report <https://www.anglianwater.co.uk/siteassets/household/about-us/pr19-10a-water-industry-cost-modelling-aw-approach-and-initial-results-sept-2017.pdf>

<sup>2</sup> Water Industry Cost Modelling: Update Report" March.2018 <https://www.anglianwater.co.uk/siteassets/household/about-us/cost-modelling-report-2018.pdf>

<sup>3</sup> Saal and Nieswand (2019) A Review of Ofwat's January 2019 Wholesale Water and Wastewater Botex Cost Assessment Modelling for PR19. March 2019 – A report commissioned and published by Anglian Water <https://www.anglianwater.co.uk/siteassets/household/about-us/5a-final-report-assessment-of-ofwat-cost-modelling-for-anglian-water.pdf>

## **Motivation, Time Constraints and the Resulting Approach of this Submission**

Given this context, this submission to the CMA is designed to highlight some key findings, reports, and modelling that build from our academic understanding of water industry cost modelling. It should therefore inform the CMA's consideration of Ofwat's cost assessment modelling, as well as its potential development of its own cost modelling approach as part its price determination case.

Moreover, while we have worked closely with Anglian Water, we believe that the issues and modelling approaches we emphasise in this submission to the CMA, are important for all water companies, and should inform not only the CMA's redetermination decision, but hopefully Ofwat's cost modelling at its next price review.

Thus, with the exception of our separate submission to the CMA focussed solely on Ofwat's final determination sewage collection modelling<sup>4</sup>, time constraints have meant that we have been unable to provide a systematic response to all of Ofwat's comments in response to each water company's statement of case<sup>5,6,7,8</sup> or its response to common issues in companies' statement of case document.<sup>9</sup>

Instead, we have chosen to focus the CMA's attention on our own reports and those findings which are particularly relevant to PR2019 cost assessment and the issues raised by Ofwat. Thus, our below comments only provide a brief indicative comment with regard to how we believe the six submissions detailed below should be considered by the CMA and how they relate to our assessment of Ofwat's approach to cost assessment modelling.

**We finally emphasise that we are open to any and all enquiries from the CMA with regard to our submitted materials, and their implications for its redetermination case.**

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<sup>4</sup> Nieswand & Saal (2020) Scrutinising Ofwat's PR19 Final Determination Models on Sewerage Collection: Economic Invalidity, Triangulation, and Non-transparency of Modelling Principles: Third party submission to the CMA on Botex cost assessment

<sup>5</sup> <https://www.ofwat.gov.uk/publication/reference-of-the-pr19-final-determinations-response-to-anglian-waters-statement-of-case/>

<sup>6</sup> <https://www.ofwat.gov.uk/publication/reference-of-the-pr19-final-determinations-response-to-northumbrian-waters-statement-of-case/>

<sup>7</sup> <https://www.ofwat.gov.uk/publication/reference-of-the-pr19-final-determinations-response-to-bristol-waters-statement-of-case/>

<sup>8</sup> <https://www.ofwat.gov.uk/publication/reference-of-the-pr19-final-determinations-response-to-yorkshire-waters-statement-of-case/>

<sup>9</sup> <https://www.ofwat.gov.uk/publication/reference-of-the-pr19-final-determinations-cost-efficiency-response-to-common-issues-in-companies-statements-of-case/>

## Submissions

### Submission 1: CEPA (2011) Report for Ofwat on Cost Assessment – Use of Panel and Sub Company Data

In 2011 CEPA published a report<sup>10</sup>, which Professor Saal co-authored as an acknowledge academic expert on panel cost modelling and its application to the water industry. We believe that this Ofwat-commissioned report, and particularly the academic annex on water and sewerage cost modelling, warrants close scrutiny by the CMA when it considers the suitability of Ofwat’s current PR2019 modelling approach.

Thus, while our own understanding of water industry cost modelling has deepened since 2011, the issues that must be considered when modelling costs in the industry remain fundamentally the same. Our considered opinion is that the approach taken by Ofwat at PR2019 does not appropriately consider the issues and concerns that this report highlighted.

In particular, we believe the CMA should consider carefully this report’s implications for disaggregated assessment in the presence of cost interactions, potential biases from such cost interactions, and the need for appropriate triangulation of models. These considerations are particularly relevant to Ofwat’s unsupported assertion on page 48 paragraph 3.34 of its response to Anglian Water’s statement of case that it is not possible to develop a robust integrated wholesale wastewater model, and its assertion in the same paragraph that “it did not adopt an integrated wastewater model for statistical and engineering reasons”.

It is our understanding that it is precisely the cost interactions related to the high transportation cost of sewage and sludge that result in the cost-efficient adoption of small treatment plants that cannot operate at the optimal scale to minimise sewage treatment costs. Stated differently, understanding how sewage collection costs influence the siting and scale of sewage treatment works and hence sewage treatment costs in the over 6000 wastewater systems operated in England and Wales is fundamentally required **if we wish to understand and properly model and incentivize the minimisation of overall wastewater system costs.**

In addition, we would note that CEPA(2011)’s emphasis on adequately controlling for firm-specific heterogeneity, is relevant when considering Ofwat’s mechanistic and limited modelling framework, which we believe does not allow and may even foreclose the potential for stronger controls for legitimate heterogeneity. E.g. it argues that:

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<sup>10</sup> CEPA (2011) “Cost-Assessment – Use of Panel and Sub-Company Data” report commissioned and published by Ofwat  
[http://webarchive.nationalarchives.gov.uk/20150603202056/https://www.ofwat.gov.uk/future/monopolies/fpl/prs\\_web2\\_0110616costassess](http://webarchive.nationalarchives.gov.uk/20150603202056/https://www.ofwat.gov.uk/future/monopolies/fpl/prs_web2_0110616costassess)

*“ . . .Application . . . by Saal, Parker, and Weyman-Jones<sup>11</sup> (2007) to a WaSC database, reveals that even after allowing for a fixed group specific heterogeneity term, firm specific operating characteristics still significantly influence input requirements in the water sector” (CEPA, 2011, p 101)*

We also further emphasise that several of our subsequently published academic papers demonstrate the continuing relevance and need to appropriately control for operating characteristics when modelling regulated costs. Thus, while Brea-Solis, et al (2017)<sup>12</sup> allows for company specific 5 year efficiency estimates, it also demonstrates the implication of controlling for leakage and other control factors including average pumping head , unmetered households, mains bursts, water quality, and type of water source in a model of input requirements for English and Welsh water provision. Similarly, Bjørndal, et al (2018)<sup>13</sup> demonstrates using the example of regulated Norwegian electricity distribution companies that when regulated costs are influenced by managerial inefficiency as well as operational heterogeneity, inadequately controlling for operational heterogeneity between firms is likely to result in inappropriate regulatory benchmarking: e.g. inadequately or inappropriately controlling for valid operating characteristics, is likely to result in the inappropriate compensation of firms with favourable operating environments and inappropriate penalties to firms that face less favourable operating environments. Bjørndal et al. (2018) further illustrated that appropriate benchmarking based on a frontier with sound peer selection reflecting the operating environment that a firm faces, improves regulatory outcomes such as firm-specific relative profitability and relative consumer prices.

***Thus, it is our considered opinion that Ofwat’s modelling relies on random effects modelling to “mop up” unmodelled and legitimate heterogeneity that its models do not allow for, and then, given its approach to efficiency assessment, effectively labels what may be legitimate differences in costs due to operating environment as inefficiency. Moreover, as this submission demonstrates, Ofwat should have been aware of this issue since at least 2011.***

We note that as a co-author of what we know to be a scoping report that was commissioned by Ofwat in 2011, as Ofwat was initially developed its panel based cost assessment approaches, Professor Saal would welcome the opportunity to better elaborate to the CMA why he believes Ofwat’s current cost assessment modelling framework and the resulting models are not consistent with this original advisory document that was published by Ofwat in 2011.

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<sup>11</sup> Saal, D. S., Parker, D., & Weyman-Jones, T. (2007). Determining the contribution of technical change, efficiency change and scale change to productivity growth in the privatized English and Welsh water and sewerage industry: 1985–2000. *Journal of Productivity Analysis*, 28(1-2), 127-139.

<sup>12</sup> Brea-Solis, H., Perelman, S., & Saal, D. S. (2017). Regulatory incentives to water losses reduction: the case of England and Wales. *Journal of Productivity Analysis*, 47(3), 259-276.

<sup>13</sup> Bjørndal, E., Bjørndal, M., Cullmann, A., & Nieswand, M. (2018). Finding the right yardstick: Regulation of electricity networks under heterogeneous environments. *European Journal of Operational Research*, 265(2), 710-722.

## **Submission 2: Saal (2018) Comments on CEPA’s Methodological Approach in Its PR19 Econometric Benchmarking Models for Ofwat - Ofwat Cost Assessment Consultation Response**

In May 2018 Professor Saal made a submission to Ofwat’s Cost Assessment Consultation<sup>14</sup>, which raised the following three fundamental issues with regard to regulatory cost determination in the 2019 price review:

1. Concerns with the appropriateness of both Botex and Totex modelling, which falsely aggregate operating costs with capital investment, and therefore do not accurately reflect the true economic cost of regulated activities.
2. Concerns with Disaggregated Cost Assessment and Cost Interactions
3. Concerns with Developing Appropriate Cost Driver Based Cost Assessment Models

Professor Saal’s submission then further commented on CEPA’s (subsequently Ofwat’s) Methodological Approach, and, in the interest of brevity, concluded that :

*“it is my belief that the modelling regime implemented by CEPA in its current work for Ofwat sacrifices this important aspect of appropriate water and sewage industry cost modelling, in favour of adherence to an overly restrictive approach to multicollinearity that may often effectively preclude the ability to adequately model cost interactions between different aspects of the vertical supply chain in water and sewage supply”*

Furthermore, Professor Saal’s submission noted that with regard to appropriate regulatory cost modelling, and in contrast to CEPA’s (subsequently Ofwat’s) modelling approach:

1. It is the conceptual and explanatory quality of the model that matters, and not adopting an *a priori* modelling approach which assumes that a single output variable and other explanatory variables can and must be used to explain what are complex multiple output systems. Such a modelling approach incurs a high risk of excluding appropriate models that would better capture legitimate reasons for differences between firms’ expenditures.
2. It is the conceptual and explanatory quality of a model that matters, and not the difficulty or unwillingness to explain relatively more flexible models that will potentially better explain the complex determinants of firm expenditures in a network industry.
3. It is the conceptual and explanatory quality of the model that matters, and not an arbitrary exclusion of variables based on what appears to be a draconian approach to multicollinearity.

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<sup>14</sup> Saal (2018) Comments on CEPA’s Methodological Approach in Its PR19 Econometric Benchmarking Models for Ofwat – Submission to Ofwat’s Cost Assessment Consultation <https://www.ofwat.gov.uk/wp-content/uploads/2018/03/Professor-David-Saal-consultation-submission.pdf>

4. It is the conceptual and explanatory quality of the model that matters, and not an arbitrary restriction on the number of variables included in it that should matter.

We believe that all the issues raised in this consultation response remain valid. Moreover, they were specifically made about Ofwat's rigid modelling framework, rather than any specific model it had chosen. Furthermore, they were made well before Ofwat first chose the specific cost models it would use in earnest in its January 2019 Initial Assessment of Plans.

*Thus, we would encourage the CMA to consider if the very modelling framework that Ofwat adopted is appropriate and consider the potential use of modelling approaches outside of this framework during its redetermination review.*

### **Submission 3: Saal and Nieswand (March 2019) Review of Ofwat's January 2019 Wholesale Water and Wastewater Botex Cost Assessment Modelling for PR19**

Saal & Nieswand (March 2019)<sup>15</sup> was commissioned by Anglian Water and formed part of its response to Ofwat's Initial Assessment of Plans, as well as its Statement of Case to the CMA.

This report reiterates and elaborates on our concerns with Ofwat's modelling framework that were first raised in the above Submission 2, before providing a detailed and systematic evaluation of the models chosen by Ofwat at the IAP. Moreover, we believe that on balance the issues raised in this report remain in Ofwat's modelling, which changed very little from the IAP to Final Determinations.

We also would comment that, to our current recollection and understanding, the considerable issues, suggestions and concerns raised in this report were on balance not meaningfully acknowledged or addressed by Ofwat, with the possible exception of non-indigenous sludge controls, before its Final Determinations. Thus, despite this report having been submitted by Anglian Water in its IAP response, Ofwat's primary acknowledgment of it has come only in a defensive response after Anglian Water drew heavily on these findings in its statement of case to the CMA.

*As time constraints preclude us from providing a detailed point by point rebuttal of Ofwat's responses to company statements of case, and as we simply do not accept the validity of many of the points that Ofwat has made in its SOC response, we would strongly encourage the CMA to consider this report on its own merits, and would of course welcome the opportunity to clarify our findings and conclusions.*

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<sup>15</sup> Saal and Nieswand (2019) A Review of Ofwat's January 2019 Wholesale Water and Wastewater Botex Cost Assessment Modelling for PR19. March 2019 — A report commissioned and published by Anglian Water <https://www.anglianwater.co.uk/siteassets/household/about-us/5a-final-report-assessment-of-ofwat-cost-modelling-for-anglian-water.pdf>



## **Submission 4: Saal (August 2019a) A Comment on Misspecification and Systematic Bias in Ofwat’s PR19 Draft Determination Integrated Wholesale Water and Wastewater Models**

Saal (August2019a)<sup>16</sup> was commissioned by Anglian Water and formed part of its response to Ofwat’s Draft Determinations, as well as its Statement of Case to the CMA.

While Anglian Water has already submitted this report as part of the evidence base for its appeal, we again would encourage the CMA to carefully consider this report’s evidence with regard to the appropriateness of Ofwat’s modelling as we believe that the piece makes a cogent case on its own. In sum, beyond questioning the validity of Ofwat’s modelling framework for water and wastewater services, which had changed little from IAP, this report raised a series of further issues with regard to Ofwat’s application of random effects modelling for efficiency measurement.

In addition, it further demonstrates systematic biases in Ofwat integrated wholesale water models and argues that more appropriate models can be developed. Moreover, it argues that not only an incremental modelling approach following the suggestions of Saal & Nieswand (2019) can be used to build models that are “conceptually, statistically, and theoretically substantially more robust for regulatory cost assessment than Ofwat’s models” (p. 6) but that an alternative academic approach, which we have adopted to a regulatory cost assessment application by drawing on our own academic findings with regard to regulatory incentives and water loss reduction<sup>17</sup>, yields similarly robust models. Furthermore, while it did not report these alternative models it did report alternative assessments of Anglian Water’s efficient 2021-25 cost requirements based on them.

As, to our knowledge, Ofwat never queried either Anglian Water or Professor Saal with regard to the evidence base for these alternative cost assessments for integrated water that were submitted as part of Anglian Water’s Draft Determination response, we believe the CMA should consider this evidence.

Moreover, in contrast to Ofwat’s assertions and preference for modelling water costs with properties as its only output, the entire body of academic evidence supports the use of water volumes in assessing water industry costs. As a result, we could not more strongly disagree with Ofwat’s comments in paragraph 3.27 of its response to Anglian Water’s statement of case, with regard to the appropriateness of using properties instead of effective water supply (net of leakages) ***to incentivize and cost assess firms with varying levels of leakage while also encouraging further leakage reduction.*** Our last two submissions therefore provide the CMA with full details of these underlying and clearly superior incremental and alternative approaches to Integrated water modelling that underlay Saal’s (August 2019a) conclusions.

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<sup>16</sup> Saal (2019a) A Comment on Misspecification and Systematic Bias in Ofwat’s PR19 Draft Determination Integrated Wholesale Water and Wastewater Models – A report commissioned and published by Anglian Water <https://www.anglianwater.co.uk/siteassets/household/about-us/7a-comments-on-ofwats-draft-determination-ww-and-www-modelling-final.pdf>

<sup>17</sup> Brea-Solis, H., Perelman, S., & Saal, D. S. (2017). Regulatory incentives to water losses reduction: the case of England and Wales. *Journal of Productivity Analysis*, 47(3), 259-276.

## **Submission 5: Saal (August 2019b) A Consideration and Correction of Systematic Bias in Ofwat’s Integrated Wholesale Water Models**

This submission<sup>18</sup> provides evidence of systematic bias in Ofwat’s Integrated Wholesale Water draft determination modelling, which is attributable to the absence of time controls and the inappropriate use of a seven year random effect to assess efficiency for a five year period.

Moreover, it systematically demonstrates that if a statistically inappropriate parameter restriction attributable to Ofwat’s logged booster stations per length of mains variable is removed, Ofwat’s properties output variable actually becomes statistically insignificant in both of its integrated water models.

*In contrast models using effective water as an output and average pumping head as a control for topography yield robust models, which are also consistent with Ofwat’s modelling framework, and should be considered by the CMA as a potential alternative cost assessment model as part is redetermination case.*

## **Submission 6: Saal (August 2019c) Whole System Water Cost Modelling: An Appropriate Model of Water Company Costs for Regulatory Cost Assessment**

The final submission<sup>19</sup> provides an assessment of Ofwat’s modelling approach and variable definitions, and then develops a Whole System Modelling Cost Approach to modelling the cost of Effective Water Delivery (net of leakages) using draft determination data.

*We strongly believe that this approach is superior to Ofwat’s modelling approach and should be considered by the CMA as an alternative to Ofwat’s modelling.*

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<sup>18</sup> Saal (2019b) A Consideration and Correction of Systematic Bias in Ofwat’s Integrated Wholesale Water Models – previously unpublished PowerPoint presentation

<sup>19</sup> Saal (2019c) Whole System Water Cost Modelling: An Appropriate Model of Water Company Costs for Regulatory Cost Assessment – previously unpublished PowerPoint presentation