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4 May 2018

Dear Ynon,

Yorkshire Water response to 'Cost assessment for PR19: A consultation on econometric modelling'

Thank you for providing Yorkshire Water with the opportunity to respond to the consultation on cost assessment for PR19. We welcome the ongoing dialogue that has been present through the development of the PR19 process.

Before setting our substantive comments, we would like to make some initial observations on the consultation.

We welcome Ofwat's publication of the analysis to date, including the information and data necessary to properly replicate and evaluate the work undertaken. We believe that this consultation has greatly improved the transparency of the PR19 process and increased confidence amongst all stakeholders about the application of the methodology and approach to the review.

We look forward to this approach continuing throughout the price review process as further work is done. We note that the botex plus models are out of the consultation's scope and, to the extent that such models will be used in cost assessment at PR19, would welcome an opportunity to comment on them in due course.

We also welcome the refinements that have been made to the model development and assessment criteria, particularly in relation to the wholesale modelling. It is clear that careful and detailed consideration has been given to the limitations of the data available, and therefore the appropriate balance between model selection based on statistical validity and other factors. Since some element of judgment is foreseeable in such an approach, it will be important for those judgments to be made visible if some models are ultimately selected or weighted more than others when used to assess and set company baselines as part of the price review process.

In this letter, we have:

- Set out our approach for arriving at RAG ratings for the both (a) the wholesale and enhancement models and (b) retail models;
- Provided an overview of the RAG ratings we have assigned and our interpretation of them; and
- Summarised our views on the implications of this work for the next stages of cost assessment.

Approach to RAG assessment for wholesale and enhancement models

As requested, we have completed the spreadsheet template with RAG ratings for the wholesale and enhancement cost models set out in Appendix 1. In assessing and assigning a RAG status to each model we have applied the following criteria:

- **Criterion 1:** If the difference between the largest prediction and smallest prediction from the model is more than 50%, the model receives an amber rating.
- **Criterion 2:** If the difference between the second largest prediction and second smallest prediction from the model is also more than 50%, the model receives a red rating. This captures the possibility that the removal of 'outliers' does not bring the under or over-prediction range down below the threshold.

Models that meet both criteria have been assigned a green rating.

Our rationale for this approach is that, although there is no mechanistic link between the size of the under-predictions and over-predictions from the models and their suitability for cost assessment, very large under and over-predictions indicate a risk that relevant cost drivers have not been included and/or other modelling limitations are present. This risk is relevant because the under and over-predictions are ultimately used to derive the efficiency scores for each company. There is a danger that large ranges of estimations would undermine the trust and legitimacy of regulatory decisions made using the output of models with such characteristics.

Although this approach does not provide a fully complete picture of model robustness, it has allowed us to arrive at RAG ratings in a transparent and fair way where all models have been assessed on the same objective basis. Additionally, we consider that the approach also gives a useful indicator to help flag models where further work could be required to optimally use them in any suite of cost assessment models.

We have also provided comments on the models in the spreadsheet, grouped by cost category, to help highlight the possible reasons some models appear to perform relatively well against our criteria compared to others.

Approach to RAG assessment for retail models

Again, as requested, we have completed the spreadsheet template with RAG ratings for the retail cost models set out in Appendix 1. Here, we noticed some variation between the models (provided by both Ofwat and companies) in terms of whether the relevant categories of cost drivers had been included in the models. Therefore, we have used our RAG ratings to highlight models that appear to exclude one or more relevant cost drivers and/or where we believe that better measures of the cost drivers could be used instead.

In arriving at our RAG ratings, we considered the answers the following questions:

- **Bad debt models:**
 - **Criterion 1:** Do the models include a variable for customer numbers?
 - **Criterion 2:** Do the models include a variable for average bill size (or equivalent)?
 - **Criterion 3:** Do the models include a socio-demographic variable to help capture regional differences in the risk of bad debt occurring?
- **Other costs:**
 - **Criterion 1:** Do the models include a variable for customer numbers that controls for economies of scope?
 - **Criterion 2:** Do the models include a metering cost driver?
 - **Criterion 3:** Do the models appropriately control for other relevant cost drivers?
- **Totex models:**
 - **Criterion 1:** Do the models include all variable types from the bad debt and other cost model criteria?

A model is assigned an amber or red status if it excludes relevant cost drivers and/or where better measures of the cost drivers could be used. The specific reasons for an amber or red rating is provided in the detailed comments on the spreadsheet provided. Models that pass the relevant criteria receive a green rating.

Interpretation of our RAG status for all models

Based on this approach to setting a RAG status we would like to offer the following summary interpretation of our ratings:

- **Green:** No immediate concerns with the model, though other valid alternatives may exist and/or more detailed interrogation may be necessary.
- **Amber:** There is some risk that using the model could give rise to misleading results unless adjustments are made to the model and/or the efficiency scores that emerge from it. It may be possible to make such adjustments and/or overcome the weaknesses of the model by triangulating the results from it with other models.
- **Red:** There is a high risk that using the model could give rise to misleading results unless significant adjustments are made to the model and/or the efficiency scores that emerge from it. This is irrespective of whether it is used in isolation or as one model amongst many. It may not be possible to make such adjustments satisfactorily.

Wholesale botex models

Our detailed comments on wholesale botex models are set out in the spreadsheet template.

Our main comments relate to the level of cost aggregation used in these models, particularly in relation to water services. Table 1 provides a summary of our RAG status by modelling aggregation sub-group for wholesale water botex models. Table 2 is the waste equivalent.

Table 1: RAG status count wholesale water – Yorkshire Water

		RAG			
		Green	Amber	Red	All
Aggregation	Water Resources	0	9	7	16
	Water Treatment	0	0	10	10
	Water Resources Plus	0	2	10	12
	Treated Water Distribution	4	11	0	15
	Network Plus Water	16	25	7	48
	Wholesale Water	25	12	5	42
	Wholesale Water (plus)	7	1	0	8
	Total	52	60	39	151

As observed, based on our assessment criteria, the RAG status improves as the level of aggregation increases. This observation does raise substantial questions as to the suitability of these low level of cost aggregation models for cost assessment, particularly given that the models at higher levels of aggregation do not appear to have the same limitations.

It appears that this issue is more pronounced in water than in wastewater. This could be a reflection of the greater variation between companies, i.e. between WaSCs and WOCs.

In general, in wastewater, models do not fail to meet the two criteria above. However, some concerns with models of high disaggregation do remain. For example, the average difference between the largest under-prediction and the largest over-prediction from the high level of cost aggregation models are 19%, whereas it is 41% for the low level of cost aggregation models.

Table 2: RAG status count wholesale wastewater – Yorkshire Water

		RAG			
		Green	Amber	Red	All
Aggregation	Bioresources	22	7	8	37
	Sewage Treatment	8	5	0	13
	Bioresources Plus	7	0	0	7
	Sewage Collection	8	4	0	12
	Network Plus Wastewater	45	4	0	49
	Wholesale Wastewater	35	2	0	37
	Wholesale Wastewater (plus)	4	0	0	4
	Total	129	22	8	159

We note that a few models that have been submitted are the same models in unitised and non-unitised form. Whilst we believe that the use of unitised models should not be disregarded, they can impose invalid restrictions on the estimated relationship between cost and scale, which in turn distorts the benchmarking results. Therefore, we would caution that any results

from unitised models are examined carefully, and compared to the results from non-unitised models.

Enhancement models

We have applied the same assessment criteria as set out for wholesale botex models in assessing the enhancement models presented for consultation. We recognise it is particularly challenging to benchmark enhancement expenditure. The variation throughout the industry, even in the areas that are deemed to be comparable between companies such as those modelled, is large. We also note that the models presented are essentially development models.

Applying the same set of assessment criteria as for botex models, all the enhancement models receive a red rating as set out in table 3. These results suggest the following considerations are important when evaluating the assessment of enhancement expenditure at PR19:

- **Use of other evidence:** Including the results of the other benchmarking models to take a view on a company's relative efficiency position.
- **Sensitivities:** A check on how sensitive the implied baselines are to different efficiency benchmarks.

We are conscious that there are elements of enhancement expenditure which have not been consulted on as part of this consultation process. Whilst we understand that assessing the efficiency of elements, such as statutory environmental quality expenditure, is extremely challenging, further detailed information on how this will be undertaken would be beneficial. Detail on a comparative level to this consultation would increase the confidence that a company's statutory obligations, and company's specific circumstances will be fairly allowed through the cost assessment process.

Table 3: RAG status count for enhancement model – Yorkshire Water

		RAG			
		Green	Amber	Red	All
Aggregation	Enhancement - Lead	0	0	3	3
	Enhancement - New Developments & New connections	0	0	2	2
	Enhancement - First Time Sewerage	0	0	3	3
	Enhancement - Sewage Growth	0	0	4	4
	Total	0	0	12	12

Retail models

We have provided a summary of our RAG status by retail modelling sub-group in table 4. It should be noted that the sum is less than the total number of models consulted on. This is because we have not provided a RAG for models submitted by ourselves, or where the models are duplicates. It should also be noted that whilst most models fall into the amber

categorisation, we are supportive of the approach to assessing retail cost allowances econometrically.

The majority amber status does reflect concerns we have regarding the variables available and those used in several of the models submitted. For example, we are concerned that the variable ‘HHs with default’ has been used in some models. This is partly in management control, whereas other measures may better reflect the (uncontrollable) characteristics of the population and therefore are better suited to efficiency benchmarking. These concerns are not unsurmountable with further development of the models for retail cost assessment.

Table 4: RAG status count for retail models – Yorkshire Water

		RAG			
		Green	Amber	Red	All
Aggregation	Retail Bad Debt	13	10	0	23
	Totex Less Bad Debt	0	12	3	15
	Retail Total Expenditure	0	20	3	23
	Total	13	42	6	61

Concluding comments

Based on our assessment process undertaken for this consultation we think that the following points are important for cost assessment at PR19:

- **Level of aggregation:** Greater weight should be given to models at more aggregated levels. That is not to say that disaggregated models should not be included as part of the final suite of assessment models, only that the influence of these models on the final assessment should be appropriately weighted to reflect the fact that models at a more aggregate level have performed generally more robustly than disaggregated models.
- **Retail:** We are supportive of the approach to assessing retail cost allowances econometrically, however further assessment needs to be undertaken on all models to ensure that the resulting assessment process is as robust as possible. We also feel that the level of aggregation or disaggregation in retail as it stands is appropriate. We would not support further disaggregation.
- **Explanatory variables:** Our opinion is that there are variables available that make sense on an economic, engineering and intuitive basis. However, we consider that the variables included in some models do not make sense on all three bases. Additionally, consideration about what is and is not in management control, with respect to variable choice, is key for choosing cost drivers that are better suited to efficiency benchmarking.

Should you need to discuss any of the information enclosed or clarify any content of this letter please don't hesitate to contact myself or my colleague Dave Darley, Senior Economist (david.darley@yorkshirewater.co.uk).

Yours sincerely,

A handwritten signature in black ink, appearing to read 'W Kimpton', written in a cursive style.

Wendy Kimpton
Head of Regulation
Yorkshire Water

