Our Ref: PK/LAT/Ofwat

Your Ref:

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Dear Ofwat

Response to the consultation on Assessing Base Costs at PR24

Many thanks for this opportunity to respond to the above consultation issued in late 2021.

Please find attached our response to the consultation questions raised and we are happy to engage in further discussion and consultation to improve the methodology in assessing base costs ahead of the issuance of Ofwat's final methodology.

Yours faithfully

Paul Kerr
Group Chief Financial Officer

SES Water response to discussion paper consultation

Q1: Do you agree with our principles of base cost assessment?

Response
We agree with the principles of base cost assessment.

Q2: Do you consider any important principles are missing?

Response
We would add that whenever possible, the principle needs to find supporting evidence from the literature and past practice, both in the water industry and the wider regulated utilities sector.

We would also like to see a justifiable weighting mechanism for different models. We fully understand that there is no perfect model. Models of varying degrees of reliability, stability, robustness should be rigorously assessed and given appropriate weight, rather than giving them all equal weight in triangulation as in both PR14 and PR19 practice. We do not think there is a hard rule for triangulation. However, Ofwat's final methodology and associated determinations should show some rationality for the weighting choice.

Q3: Do you consider the scope of wholesale modelled base costs should be amended at PR24? If so, please explain how the potential amendment/s to wholesale modelled base costs can be justified based on our proposed assessment framework.

Response
We support the PR19 scope of the wholesale modelled base cost. As it is the case for any aspect of a modelling approach, there are pros and cons for this scope. However, we believe the scope is reasonable in covering the most important base costs while remaining parsimonious.

Q4. Would you recommend collecting additional data in relation to growth expenditure (cost and/or cost driver data) to improve cost assessment at PR24? If so, what additional data would you recommend collecting? Please provide definitions alongside suggested data additions.

Response
We do not recommend collecting additional data for growth cost and cost drivers, as we see the cost and time spent on additional data collection and model escalation may outweigh the benefit of unbiased assessment.

Q5: Do you agree that we should utilise the full historical data series available to develop the wholesale base cost models at PR24 (from 2011-12 onwards) unless there is clear justification for using a reduced time series (e.g structural break that cannot be addressed through other remedies)?

Response
We agree that full historical data available should be used to develop the wholesale base cost models. However, we are cautious about using this sample as the only data sample for the final determination, given the changes that take place since the start of the sample. We would recommend to model with 2-3 sub-periods and compare all the results with the whole sample model for robustness, stability, reliability, and prediction power. We suggest the following data samples for modelling:

- 2011-12 to 2018-19 - this period more or less reflects the PR14 characteristics;
- 2019-20 to the lates available period - this sample would reflect the PR19 characteristics;
- Full data series.

We suggest the models developed using the three data series above to be evaluated and compared in terms of

- Robustness. Does adding or removing a period change the model robustness and why? If the robustness differs from one sample to another, which sample is best to be selected for determination? Would a weighting system apply to different sample period? What is the justification, if it does?
- Stability. Do models from different data sample produce the similar relationship between cost and cost drivers? Do they produce the similar efficiency ranking? If not, what drives the difference?

Q6: Should we consider including business plan forecasts in our wholesale base cost model at PR24?

Response

We do not recommend including business plan forecasts in the wholesale cost models. The PR19 business plan data are very different from the actual data submitted every year. Therefore, we do not think that business plan forecast data are reliable enough for cost assessment purpose.

Q7: Do you agree with out proposed target wholesale base cost modelling suite at PR24?

Response

We agree with the proposed target wholesale base cost modelling suite at PR24.

Q8: Do you consider it would be worthwhile attempting to develop wholesale wastewater network pls models for PR24? If so, do you propose any potential wastewater network plus cost model specifications to consider?

Response

We do not recommend this level of cost aggregation for cost assessment modelling. The reason is that it is related to two different set of activities that do not share common characteristics, except for scale. Density variables work differently in sewage collection and treatment. In sewage collection, population distribution matters more than density, while in sewage treatment, density has a clearer effect on cost. Complexity variables that predict both types of cost are difficult to find from the submitted data.

Q9: Do you think we should reconsider the inclusion of APH in the wholesale water base cost models at PR24? If so, should it be a substitute for, or additional to, booster pumping stations per length of mains?

Response

We support the use of average pumping head as a proxy for topology in water models. We understand the challenge of using this technically correct but statistically unstable cost driver in the PR19 cost assessment. However, more recent data and empirical evidence support the statistically significant effect of this variable in predicting energy cost in water.

Using the most recent data added to the full data sample, replacing the booster per length with average pumping head in those models that have it have shown a significant and positive coefficient of average pumping head. (See appendix for specifications).

We would also like to add that average pumping head is strongly correlated with power cost in water, therefore, it is an explanatory variable with significant positive coefficient in the power cost models (where the dependent variable is power cost). However, using average pumping head to explain the total base cost would show weaker effect, as power cost is only 12% of opex (based on industry APR 2020-21), and certainly much less in total base cost. This may explain why this variable did not work in the past in explaining the total base cost.

Based on the results from our analysis, we would recommend the followings:

- Keep booster per length as a cost driver, add alternative models using average pumping head, and use both in the determination;
- Consider pre- or post-modelling adjustment for power cost based on the power cost model with average pumping head as one of the cost drivers, if the base cost models using either of booster per length or average pumping head still cannot satisfactorily explain power cost.

Q10: Should we consider replacing the existing 'load treated in size band 6' variable with 'load treated in band 8 and above' in the relevant wholesale wastewater base cost models?

Response
We suggest that the existing load treated in size band 6 to be replace with the weighted average band size, calculated using the same method as the weighted average complexity in water model. This constructed variable would provide a better approximation of companies' level of complexity.

Q11: Please provide detailed proposals for any additional/alternative cost drivers and explanatory variables we should consider at PR24, including clearly defined data?

Response
We suggest the inclusion of weighted average band size of treatment work, using the proportion of distribution input treated at each band for weighting. This weighted average band size can be calculated in similar way to the weighted average complexity in PR19. This variable would test the economies of scale, an alternative to properties or population density.

Q12: Do you agree that we should maintain the use of random effects to estimate our wholesale base cost models at PR24?

Response
We agree.

Q13: Do you agree with our proposed model selection process?

Response
We agree.

Q14: Do you agree that the cost adjustment claim process at PR24 should be separated between base (wholesale and residential retail) and enhancement claims?

Response
We see that challenge of separating between base and enhancement costs. If the company needs cost adjustment, that means the cost is special and unique, and most likely cannot be categorised into base or enhancement. Ofwat can provide guidance how to specify the type of cost that the claim is aiming for, and companies may specify the cost, following the guidelines as appropriate and if it is possible.

Q15: What base cost adjustment claims (wholesale and residential retail) would you consider submitting if the PR19 base costs models were used to assess efficient costs at PR24?

Response
We would consider submitting the following cost adjustment claims:

- Power cost for water abstraction from the ground, given our topology;

- Leakage reduction cost, given our advanced stage of leakage reduction that costs more than the linear cost-performance relationship would predict;
- Water softening cost, given our unique statutory duty in the industry to soften the water in our serving region;
- Retail cost, given the PR19 retail models do not reflect water-only companies' characteristics, and its severe endogeneity in using average bill as a cost driver.

Q16: What additional cross-sector data should be collected to support the submission of the claim indicated in response to the previous question? Please describe and explain the rationale behind the additional data that you consider should be collected and provide a draft definition?

Response
We do not see the necessity of additional data at this stage.

Q17: How can the cost adjustment claim guidance be enhanced to improve the quality of cost adjustment claim submission?

Response
We are happy with the PR19 guidance for cost adjustment claim and do not have any suggestion for further improvement.

Q18: Would an early cost adjustment claim submission be welcome at PR24?

Response
We welcome early cost adjustment claim submission.

Q19: Do you agree with the different elements / approaches to introducing more of a 'forward-look' into our approach to assessing capital maintenance expenditure? Are there other elements / approaches we could consider??

Response
We agree with the approaches to introducing forward-look into capital maintenance cost assessment.

Q20: Do you have any comments on the proposed long list of asset health measures in Table 5, particularly in relation to their suitability and how feasible they are to collect? Please include any reporting or definition changes you would like us to consider and provide suggestions for other measures not included in this list.

Response
We do not have further comments on the list of asset health measures.

Q21: Do you agree with the high-level approach to determine 'what base buys'? Can you define any additional analysis or information that could support this process?

Response
We agree with the high-level approach to determinate 'what base buys'. However, due to a long list of random factors that affect the performance beyond companies' control, we would recommend applying a range of performance, instead of a fixed and exact level of performance.

We would like to add that for some performance, companies need both base cost and enhancement cost, which tend to interact with each other. Therefore, it is not always clear cut how much performance is achieved by base cost only and how much due to enhancement. Any assessment approach should take into consideration the mutually supportive effect of both types of expenditure.

Ofwat needs to look at the incentive structure. Without an allowance for going for enhanced performance using enhanced expenditure, companies may choose to stay average in terms of performance level at minimum cost. An optimisation calculation aiming for minimum acceptable service at minimum cost is not ideal for customers. One of the unfinished areas in PR19 cost assessment is the allowance for service level. PR24 needs to improve this area by revising the incentives. The decision make question the industry should be asking is "What best service can we provide with the allowed cost?" instead of "How low can we reduce cost while delivering the average service level?"

Q22: Do you consider it would be feasible to assess the 'efficient' baseline performance level for each company for individual PCs such as leakage and PCC through econometric modelling? Are there any other PCs where you consider this could feasibly be attempted?

Response

We think that it is feasible to assess the efficient baseline performance level for each company for individual PCs through econometric modelling.

Preliminary analyses using the latest annual data shows some promising evidence that can potentially be further developed into a performance model. There are some indications that previous year's enhancement expenditures on metering, supply and demand do bring down average consumption. Similar tests can be done for leakage, supply interruption, and mains burst. With proper control variables that help enhance the model specification, the predictive value can potentially be improved. Table 1 provides suggestive control variables for each PC. Exogenous variables such as weather data can be obtained from the Met Office.

Mains burst and supply interruption are potential performance that can be further explored using econometric model.

The objective of this effort is to answer the question: "How much of the performance can be explained by expenditure, controlling for exogenous conditions such as weather and climate?" Like any experimental work, there is no guarantee that it would result in any findings or meaningful conclusion. However, this direction of performance modelling, given expenditure, is worth trying. This effort would account for service level in cost assessment, which was a missing part in PR19.

The annual report data currently do not provide sufficient time series for enhancement expenditures on individual PCs in order to run a correlation matrix that indicates if there is any relationship between expenditure and performance. However, from 2020-21 annual report there are data such as leakage maintenance and leakage reduction that can be used in modelling.

Table 1. Performance level as a function of expenditure and control variables

	Suggestive variable		
Potential PC	Previous year expenditure (expected negative coefficient)	Control/exogenous variable	Other PC specific driver
Leakage	Relevant expenditure on leakage reduction	min/max temperature variance, nr properties/km mains	Network age
PCC	Relevant expenditure to reduce HH per capital consumption	peak summer temperature, days with sunshine	Other PCC determinants
Supply interruption	Relevant expenditure to reduce supply interruption	TBD	Other supply interruption determinants
Mains burst	Relevant expenditure to reduce burst	Days with frost	Other mains burst determinants

In addition to econometric modelling, we would suggest trying ***principal component analysis*** for performance assessment. This modelling technique would give insight about how much of the performance can be accounted for by which of the multiple factors affecting it. The technique would also show whether expenditure on a specific performance makes any significant impact.

Q23: The need to collect further granular data to elucidate the cost-service relationship was highlighted by companies in response to our PR24 May consultation. Can you propose any data it would be proportionate to collect to support the high-level approach outline in this chapter?

Response
We think that the customer research can provide some insight for assessing the cost-service link relationship for customer service or retail performance, although the specific assessment approach still needs to be worked out.

We propose to try the water stress index, published by the Environment Agency per link and contact provided below, to be tested in modelling performance as well as cost to achieve it.
https://www.iow.gov.uk/azservices/documents/2782-FE1-Areas-of-Water-Stress.pdf

Q24: What are your views on attempting to use a composite variable to investigate the cost-service relationship, in the context of the methodological issues and complexities we outline?

Response
We support the exploration of a composite variable that can potentially explain the relationship between cost and service.

Q25: Do you have any proposals for how to make adjustments where a performance commitment level differs from that expected to the delivered from base costs?

Response
The adjustment should take into account both factors that are reasonably within companies control and those that are not. In order to come to a specific approach, we need to know what factors affect the performance in each case.

Appendix. Empirical results from various tests of performance drivers as examples

Correlation matrix

	pcc	avgcon~n	dconsum	leakage	lagenm~r	lagsup~y	lagdem~d	lagpme~r	maxtemp	mintemp	avgtemp	rainfall	frost	sunshine
pcc	1.0000													
avgconsump~n	-0.0888	1.0000												
dconsum	-0.0912	1.0000	1.0000											
leakage	-0.1676	-0.0619	-0.0619	1.0000										
lagenmeter	-0.0125	-0.0828	-0.0839	0.7912	1.0000									
lagsupply	0.0110	-0.0563	-0.0559	0.3259	0.3584	1.0000								
lagdemand	0.0110	-0.0563	-0.0559	0.3259	0.3584	1.0000	1.0000							
lagpmeter	-0.0295	-0.0712	-0.0706	-0.0563	-0.0203	0.0565	0.0565	1.0000						
maxtemp	-0.0054	0.0157	0.0171	0.1182	0.1806	0.1592	0.1592	0.0620	1.0000					
mintemp	0.1329	-0.0205	-0.0216	-0.1689	0.0373	0.0981	0.0981	0.4024	0.3544	1.0000				
avgtemp	0.0590	0.0254	0.0263	0.0572	0.1582	0.1591	0.1591	0.0912	0.9554	0.5684	1.0000			
rainfall	0.1532	-0.0669	-0.0672	-0.1505	-0.1269	-0.1393	-0.1393	0.1079	0.2920	0.5375	0.4204	1.0000		
frost	0.2332	0.1223	0.1239	0.1362	-0.0065	0.0738	0.0738	-0.0194	0.5111	-0.2802	0.3971	0.1601	1.0000	
sunshine	-0.0552	-0.0301	-0.0290	0.0768	0.2021	0.1295	0.1295	0.0860	0.9564	0.5082	0.9716	0.3578	0.3123	1.0000

Variable description:
avgconsumption: water delivered divided by total number of connected properties at year end
dconsum: percentage change in average consumption from previous year
pcc: per capita consumption
leakage: leakage
lagenmeter: previous year's enhancement expenditure on metering
lagdemand: previous year's enhancement expenditure on demand
p_meter: proportion of metered properties in total connected properties
mintemp: minimum temperature in the year for the region where the company serves, from Met Office
maxtemp: maximum temperature in the year for the region where the company serves, from Met Office
avgtemp: average temperature in the year for the region where the company serves, from Met Office
frost: number of days with air frost in the year for the region where the company serves, from Met Office
rainfall: rainfall in the year for the region where the company serves, from Met Office
sunshine: number of days with sunshine in the year for the region where the company serves, from Met Office

A few tests do show that enhancement expenditure on metering and demand in the past do reduce average consumption, controlling for the weather.

```
. reg lnavgconsumption lnlagenmeter lagdemand lagpmeter lnavgtemp

      Source |       SS           df       MS      Number of obs   =       155
-------------+----------------------------------   F(4, 150)       =      4.86
       Model |  .136649336         4  .034162334   Prob > F        =    0.0010
    Residual |  1.05499145       150  .007033276   R-squared       =    0.1147
-------------+----------------------------------   Adj R-squared   =    0.0911
       Total |  1.19164079       154  .007737927   Root MSE        =    .08386

------------------------------------------------------------------------------
lnavgconsu~n |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
lnlagenmeter |  -.0146838   .0051783    -2.84   0.005    -.0249157   -.004452
   lagdemand |  -.0017153   .0010927    -1.57   0.119    -.0038743    .0004438
   lagpmeter |   .0000365   .0000285     1.28   0.201    -.0000197    .0000928
   lnavgtemp |    .366219   .1017371     3.60   0.000      .165196    .5672419
       _cons |  -9.293027   .2352827   -39.50   0.000    -9.757923   -8.828131
```

```
. reg lnavgconsumption lnlagenmeter p_meter lnsunshine

      Source |       SS           df       MS      Number of obs   =       155
-------------+----------------------------------   F(3, 151)       =      3.25
       Model |  .072373216         3  .024124405   Prob > F        =    0.0234
    Residual |  1.11926757       151  .007412368   R-squared       =    0.0607
-------------+----------------------------------   Adj R-squared   =    0.0421
       Total |  1.19164079       154  .007737927   Root MSE        =     .0861

------------------------------------------------------------------------------
lnavgconsu~n |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
lnlagenmeter |  -.0145858   .0053867    -2.71   0.008    -.0252288   -.0039428
     p_meter |   7.55e-06   .0000314     0.24   0.810    -.0000544    .0000695
  lnsunshine |   .1809315   .0886621     2.04   0.043      .005753     .35611
       _cons |  -9.775282   .6502214   -15.03   0.000    -11.05999   -8.490575
```

Test of average pumping head as an alternative to booster per length in PR19

	FD3	TWD3	TWD3	FD4	WW4	FD5	WW5
Business unit level	TWD	TWD	TWD	WW	WW	WW	WW
lnlength	1.069***	1.081***	1.087***				
	{0.000}	{0.000}	{0.000}				
lnboosterperlength	0.126			0.172*		0.227***	
	{0.504}			{0.075}		{0.006}	
lnwedensitywater	-3.403***	-3.749***	-3.403***	-2.400***	-2.390***	-1.927***	-2.038***
	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}
lnwedensitywater2	0.262***	0.284***	0.262***	0.167***	0.164***	0.134***	0.139***
	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}
lnaph_twd		0.102**					
		{0.035}					
lnaph_avg			0.263***		0.159*		0.165
			{0.001}		{0.081}		{0.119}
lnproperties				1.038***	1.056***	1.023***	1.048***
				{0.000}	{0.000}	{0.000}	{0.000}
pctwatertreated36				0.006***	0.004***		
				{0.000}	{0.005}		
lnwac						0.619***	0.416**
						{0.000}	{0.020}
_cons	5.398***	5.679***	3.769**	-0.737	-2.09	-2.411**	-3.476**
	{0.000}	{0.000}	{0.021}	{0.619}	{0.283}	{0.032}	{0.025}
Econometric_model	Random Effects	Random Effects	Random Effects	Random Effect	Random Effects	Random Effect	Random Effects
depvar	lnrealbotextwd	lnrealbotextwd	lnrealbotextwd	lnrealbotexww	lnrealbotexww	lnrealbotexww	lnrealbotexww
N	173	171	171	173	171	173	171
vce	cluster	cluster	cluster	cluster	cluster	cluster	cluster
R_squared	0.957	0.956	0.959	0.972	0.971	0.975	0.972
RESET_P_value	0.29	0.341	0.307	0.405	0.447	0.29	0.423

This analysis replicates the PR19 models for water. Model FD3, FD4, FD5 use the same specifications as the PR19, with additional annual data for 2020-21.

Models TWD* and WW* replace booster per length with average pumping head for comparison.

Power cost models

	re1	re2	re3	re4	re5	re6	re7	re8	re9
Dependent variable	Ln(WR power cost)	Ln(WR power cost)	Ln(WR power cost)	Ln(WNP power cost)	Ln(WNP power cost)	Ln(WNP power cost)	Ln(WW power cost)	Ln(WW power cost)	Ln(WW power cost)
lnaph_wr	0.368**	0.354	0.394**						
	{0.026}	{0.113}	{0.010}						
lnproperties	1.018***			1.059***			0.999***		
	{0.000}			{0.000}			{0.000}		
lnlengthsofmain		1.023***			1.051***			0.989***	
		{0.000}			{0.000}			{0.000}	
lndi			1.030***			1.077***			1.017***
			{0.000}			{0.000}			{0.000}
lnaph_avg				0.637***	0.683***	0.737***	0.552***	0.571***	0.657***
				{0.001}	{0.000}	{0.000}	{0.005}	{0.001}	{0.000}
lnwedensitywater				0.03	0.315***	-0.028	0.069	0.352***	0.004
				{0.565}	{0.000}	{0.461}	{0.143}	{0.000}	{0.897}
_cons	-14.337***	-10.011***	-6.868***	-14.774***	-12.388***	-6.884***	-13.655***	-11.399***	-6.193***
	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}	{0.000}
Econometric_model	Random Effects	Random Effects	Random Effects	Random Effects	Random Effects	Random Effects	Random Effects	Random Effects	Random Effects
depvar	lnpower_wr	lnpower_wr	lnpower_wr	lnpower_nwp	lnpower_nwp	lnpower_nwp	lnpower_ws	lnpower_ws	lnpower_ws
N	177	177	176	171	171	170	171	171	170
vce	cluster	cluster	cluster	cluster	cluster	cluster	cluster	cluster	cluster
R_squared	0.703	0.618	0.716	0.954	0.956	0.964	0.955	0.953	0.967
RESET_P_value	0.808	0.452	0.834	0.545	0.96	0.874	0.583	0.87	0.915

These power cost models use similar specifications to the PR19 models for water. The only difference is the dependent variable, which is power cost for the corresponding value chain, instead of the base cost. The data sample includes 2020-21.