PR24 Cost Assessment Working Group
Cost-service link

Draft for discussion

14th September 2021

Ofwat

Agenda

(1) Welcome and housekeeping (11:00 to 11:05)

(2) Exploring the cost-service link at PR24, Ofwat (11:05 to 11:20)

(3) A potential framework for exploring the cost-service link
- Daniel Chubb, Yorkshire Water, and Christian Speedy, Baringa (11:20 to 11:45)
- Breakout session (11:45 to 12:05)
- Feedback (12:05 to 12:10)

(4) Accounting for the cost-service link: inside or outside of the base cost models
- Carlos PinedaBermeduz, Thames Water (12:10 to 12:20)
- Van Dang, SES Water (12:20 to 12:30)
- Breakout session (12:30 to 12:45)

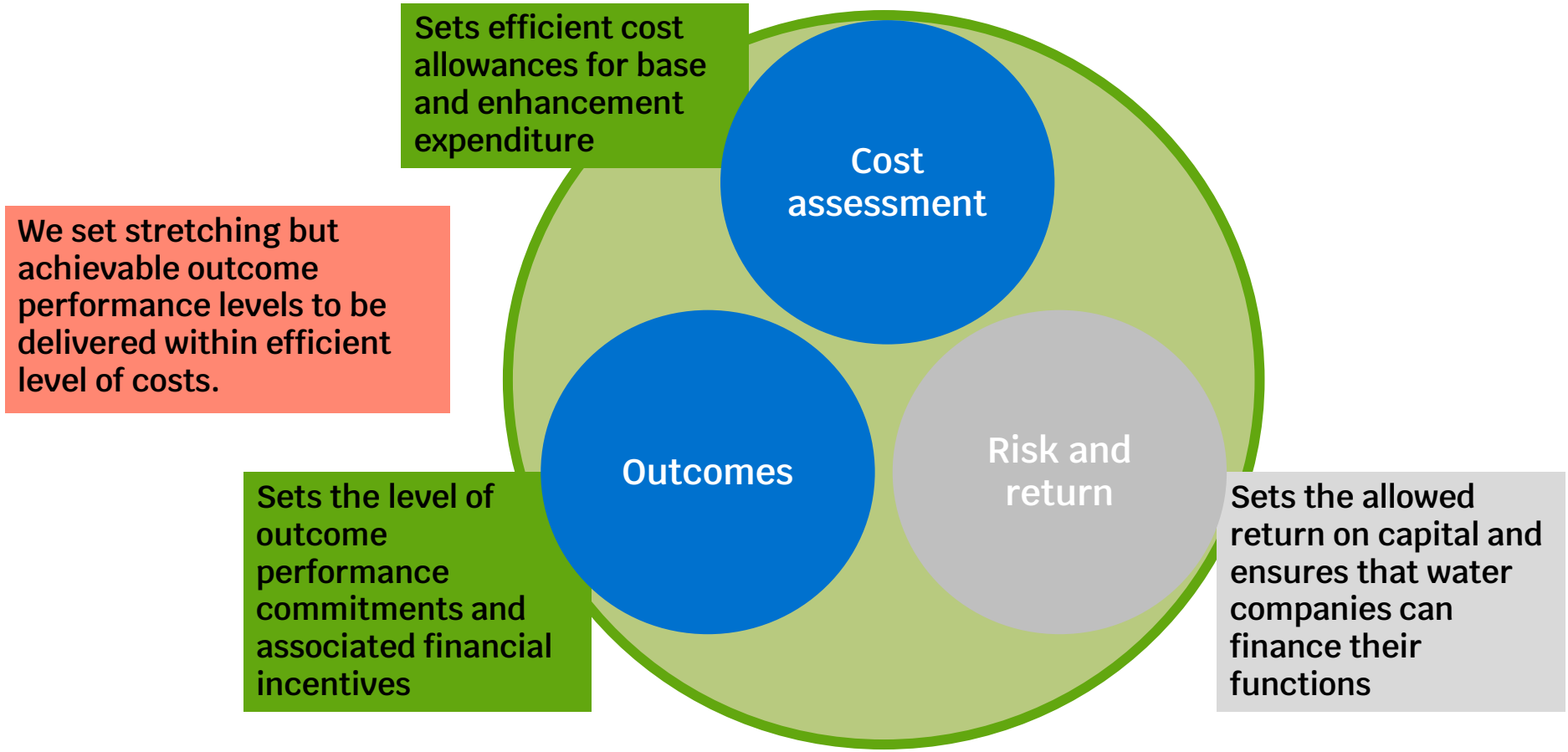
(5) Closing remarks (12:45 to 12:50)

(6) Bonus session: A short deep dive on sewer flooding (12:50 to 13:00)

PR19 background and context, Ofwat

Cost and service link at PR19 (I)

At PR19 we set a package of efficient cost allowances and stretching performance targets. We considered the overall stretch across costs, outcomes and the allowed return on capital. We considered that the overall challenge across costs, outcomes and the allowed return on capital was stretching but achievable, and that the final determinations were financeable.



Performance commitments at PR19

We set PCs using forward-looking business plan and historical data

Common performance level measures	• Water supply interruptions • Pollution incidents • Internal sewer flooding
Reducing water demand	• Leakage • Per capita consumption
Statutory measures	• Compliance risk index (water) • Treatment works compliance (water and wastewater)
Asset health measures	• Mains repairs • Unplanned outage • Sewer collapses • Sewer blockages • External sewer flooding • Customer contacts about water quality • Low pressure
Resilience measures	• Risk of sewer flooding in a storm • Risk of severe restriction in a drought
Vulnerability measures	• The priority services register
Customer experience	• Customer experience measure (C-MeX) • Developer services experience measure (D-MeX)

Cost and service link at PR19 (II)

Apart from leakage, where we challenged companies to consider a 15% reduction, **the majority of companies proposed to improve service on core performance commitments without requesting additional expenditure**.

However, some companies expressed concerns that **delivering the overall stretch on outcomes was not possible without sacrificing cost efficiency**.

Some of the arguments presented by companies included:

- **Improving performance comes at a cost**, which was not reflected in the PR19 base models as they do not include variables for quality of service.
- **The base cost models were based on historical data**, and therefore do not allow for service improvements implied by forward looking upper quartile levels for outcomes.
- The absence of an additional cost allowance for delivering outcome improvements is **equivalent to an additional efficiency challenge**.
- **The overall level of stretch was unrealistic given that no company has delivered upper quartile performance for both costs and outcomes**.

Cost and service link at PR19 (III)

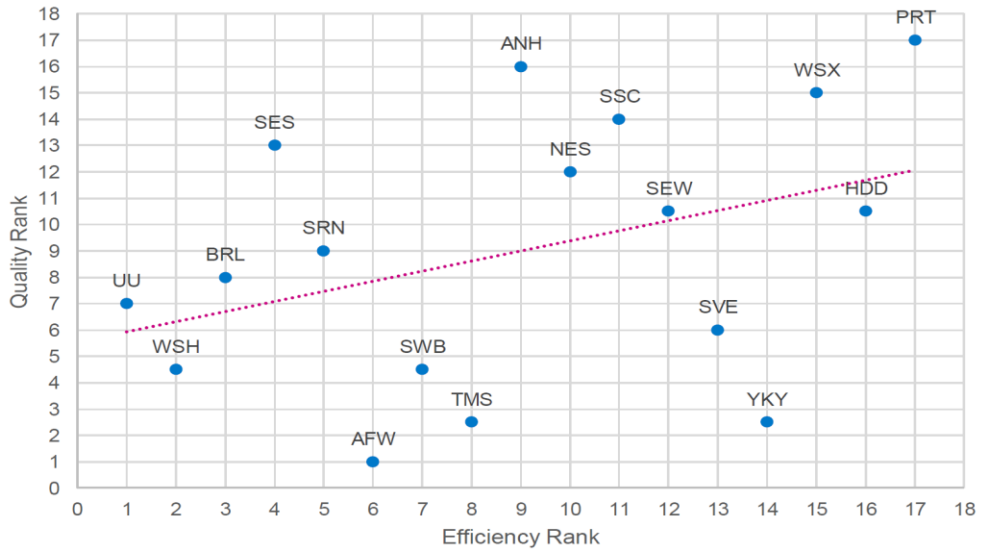
Our analysis showed:

- **Companies achieved their PR14 upper quartile common performance commitments as well as outperforming on their upper quartile based cost allowances**.
- **Better outcome performance should not necessarily increase cost.** A comparison of historical cost and outcomes data suggested there is a positive correlation between our estimates of historical cost efficiency and outcome performance.
- **It is possible to have upper quartile outcome performance and upper quartile cost efficiency**, with some companies performing in the upper quartile for both costs and outcomes
- **Improvements in common performance commitments were generally in line with past reductions.**

Table 10: Achievement of PR14 performance commitments and cost allowances in 2018-19

Company	Wholesale cost	Supply interruptions	Pollution incidents	Internal sewer flooding
Anglian Water	10%			2019-20 target only
Dŵr Cymru	-4%			
Hafren Dyfrdwy	3%	Met 1 of 2 PCs		
Northumbrian Water	9%			
Severn Trent Water	5%	Met 1 of 2 PCs		
South West Water	16%			
Southern Water	8%			
Thames Water	-6%			
United Utilities	-7%			
Wessex Water	10%		-	
Yorkshire Water	0%			
Affinity Water	0%	-		
Bristol Water	4%			
Portsmouth Water	4%			
South East Water	6%			
South Staffs Water	-0%			
SES Water	4%			

Figure 7: Scatter plot of total efficiency and quality ranks



CMA redeterminations

The CMA **broadly agreed** with our approach to setting costs and outcomes:

- "**No clear link in the evidence from AMP6 between the performance against PC and ODI targets, and the costs incurred by the water companies**" (7.92)
- "**In some cases, improvements to service could be achieved at little cost or may be of a recurring nature that would be included in base funding**" (7.94)
- "**Companies have in practice been able to improve service performance by new techniques and/or improving efficiency without associated cost increases**" (7.95)
- "**High performing companies on cost were often high performers on service.**" (7.95)
- "**While we did not find a systematic link between high performance and high costs, we agreed that there are likely to also be examples, including companies already at frontier performance, where improvements in performance will only come at a cost.**" (7.99)
- "**Overall, with the exception of leakage, we found that at a sector level that Ofwat had not imposed targets that were unachievable**." (7.100)

CMA redeterminations: Leakage

For leakage management the CMA redetermination allowed companies £140 million which was 42% of the requested £331 million. This compares to a £104 million allowance (or 31% of requested) we made in our final determination. The main variation from our final determination was the enhancement allowance made to Yorkshire Water.

The CMA stated:

- **"We conclude that companies at or below upper quartile should therefore be able to maintain their current level of leakage without any need for an adjustment to base costs."** (8.58)
- **"The AMP7 leakage challenge is significant (it was characterised by Ofwat as a 'step change') and we decide that this will require companies to incur enhancement expenditure to support this."** (8.119)
- **"We are concerned that neither the companies nor Ofwat have adequately analysed the wider costs and benefits of further reductions in leakage."** (8.199)
- **"In future, Ofwat should seek to estimate each company's efficient costs of leakage prevention, detection, and repair."**(8.202)

In the latest RAG consultation we proposed more granular leakage cost and benefit reporting and held a sector workshop on this issue. The majority of feedback recognises the significant challenge in collecting this data, indicates no 'quick wins', and that further collaboration across the sector will be required to progress in this area.

Exploring the link between costs and outcomes at PR24, Ofwat

PR24 May consultation: our approach to funding service improvements at PR24

In our '[PR24 and Beyond – Creating tomorrow together]' paper we outlined our **ambition to better explore the link between costs and outcomes at PR24**:

> **"How can we better explore the link between costs and outcomes and reflect this in the trajectories for meeting long-term ambitions"**

We expect companies to continue to **improve performance from base expenditure**.

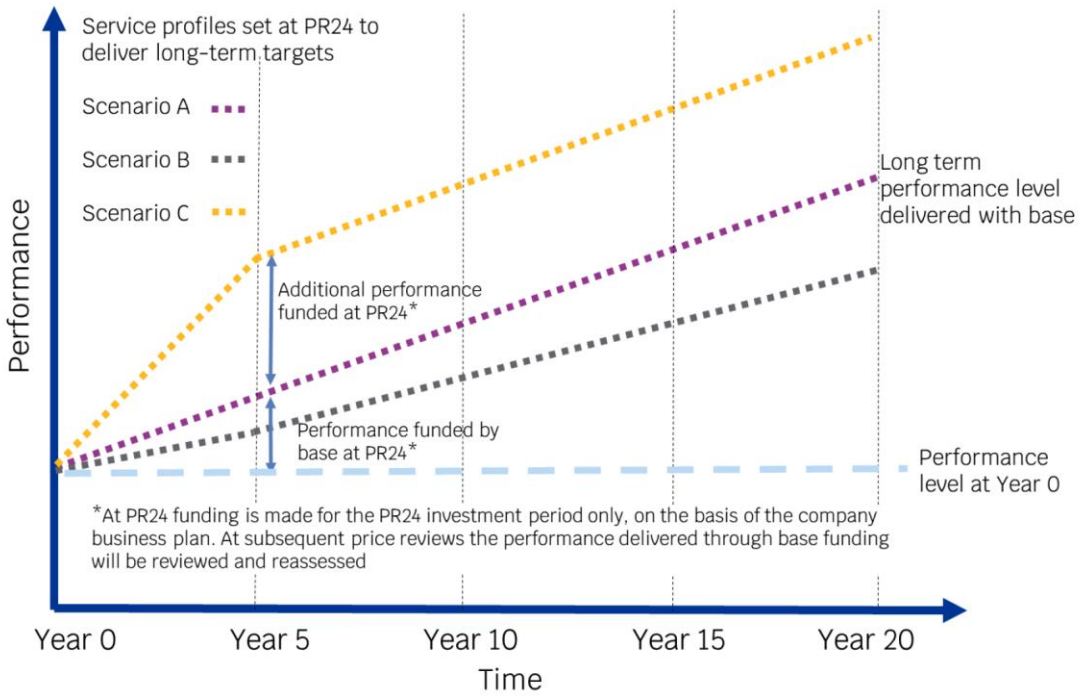
For each PC, we are considering **forecasting the performance level that could be delivered by an efficient company from its base funding**.

We could then consider whether this is the appropriate level of performance and the appropriate level of funding.

We are open to considering a number of ways that companies could be funded:

- **ODIs**
- **Adjustments to the PR24 base cost allowance**
- **Enhancement expenditure allowances**

Figure 10.1 Funding of various performance scenarios



PR24 May consultation: we will adjust company funding where necessary at PR24

It is **important that customers fund an allowance commensurate to the level of challenge** faced by an individual company.

We propose to undertake further work to see if it is possible to **better understand the underlying drivers of differences in service quality performance across companies**, which we aim to enable through an enhanced evidence base.

We expect to make **greater use of symmetrical adjustments** across the sector so that customers are not over-paying for service improvements.

We also intend to **account for service levels where customers have historically funded service improvements** to ensure that customers do not pay twice for the same improvement in service.

Similarly, we will also work to **ensure that historical investments are reflected in the level of stretch** set in individual company performance commitments.

We therefore asked stakeholders for proposals on approaches for making such adjustments

PR24 May consultation: summary of companies' responses

Q10.5: Where can we enhance our evidence base on the relationship between costs and service?

- Generally stakeholders considered the relationship between cost and service to be a **key issue for PR24.**
- Companies emphasised the **requirement to collect further granular data** to elucidate the cost service relationship.
- **Evidence relating to company specific factors was stated as important** in determining the cost service relationship for individual companies, including:
  - **Regional specific factors**
  - **Historical investment allowances**
- For performance above or below base funded levels:
  - **Step changes in performance improvements** need to be adequately funded; and
  - Allowances need to reflect **future cost pressures.**

Q10.6: What mechanisms should we consider for the efficient funding of performance levels, set in a long-term context, that vary from those an efficient company would deliver through its base allowance?

- A number of companies considered there was no need to raise the question as **ODIs and PCs can continue to be used**.
- **Limited** support for including **service drivers in base models**.
- Majority of companies favoured using **adjustments outside of the base models** using existing mechanisms such as:
  - **ODIs/enhancement expenditure to fund improvement**;
  - **Cost adjustment claims** to allow for maintaining 'high' performance levels; and
  - **Two-way/symmetrical adjustment.**
- The mechanism selected will be dependent upon **how the PC level is set.**

High-level cost-service framework ambition

1. What level of performance is deliverable from base costs by an efficient company?

2. How should we account/adjust for factors not captured in the base cost models (i.e., exogenous factors & different starting points)?

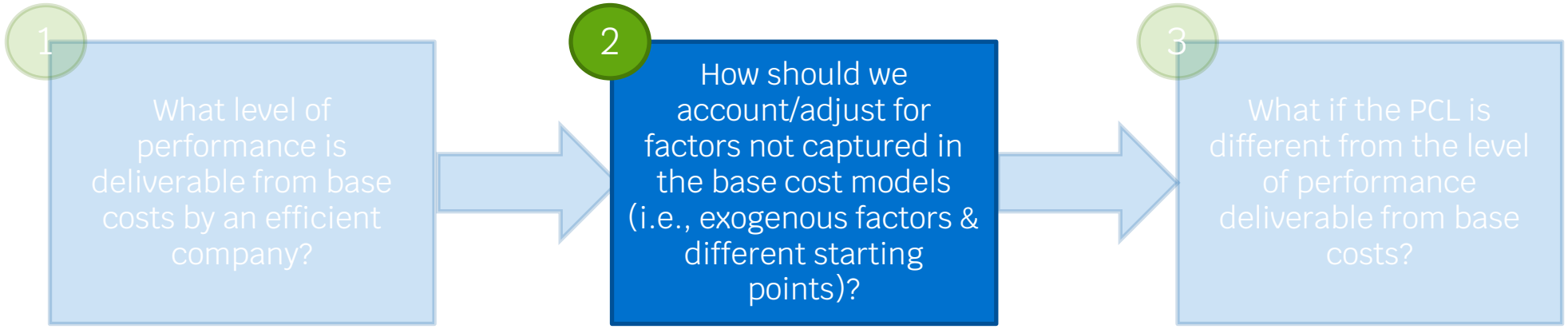
3. What if the PCL is different from the level of performance deliverable from base costs?

e.g., Symmetrical Adjustments.

Need for adjustments may be reduced if service level cost drivers are included in the base cost models. But this approach has proved challenging in the past (i.e., perverse incentives) and was generally not supported in responses to our May paper.

Today's workshop

The focus of today's workshop is mostly on step 2 of the framework.



Yorkshire Water / Baringa, SES Water and Thames Water will now present their ideas on how to explore the cost-service relationship at PR24 and potential adjustments to the PR24 framework

Potential framework for exploring the cost-service link, Yorkshire / Baringa

Baringa
Brighter together

Exploring the relationship between cost and service for PR24

Ofwat Cost Assessment Working Group Paper

September 2021

In collaboration with YorkshireWater

Agenda

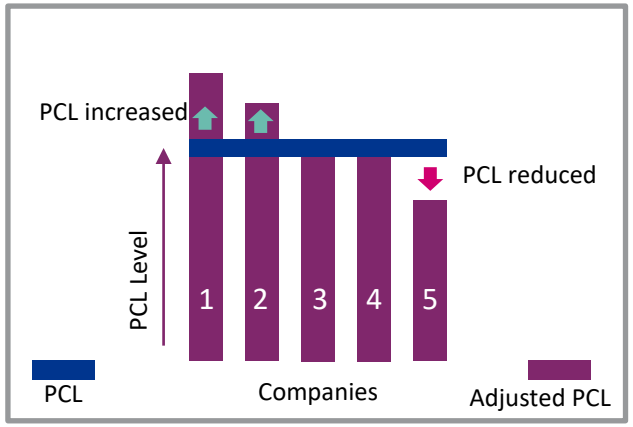
1. Context to the cost service challenge
2. Identifying where performance or cost adjustments may be appropriate – a proposal for a framework
3. Quantifying the cost-performance relationship for adjustments
4. Practical implications for the PR24 methodology
5. Next Steps: questions for the industry (proposed breakout questions)

Regulatory Levers At Ofwat's Disposal

Three adjustment options available

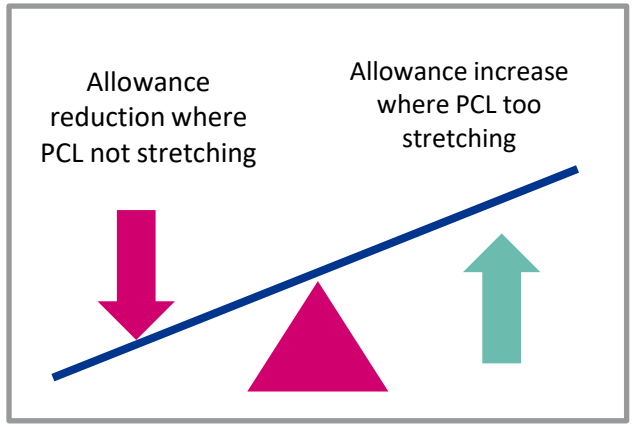
In principle, where there is a cost-service disconnect, Ofwat has the following tools at its disposal

1 Performance Target Adjustment



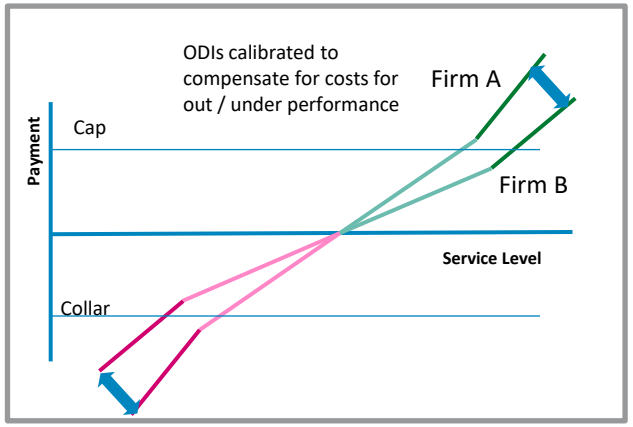
- Performance Targets could be adjusted where PCLs stretch is not equal across companies, taking inefficiency into account.
- Potential for approach to be symmetric with higher PC targets for those with lower costs and lower PC targets for those with higher costs (for example if there are regional difference or different starting points).

2 Cost Allowance Adjustment



- TOTEX would be adjusted to enable funding for performance levels unachievable with base funding.
- TOTEX lowered where firms costs are lowered, raised where they are higher

3 Incentive Adjustments



ODIs adjustments (either rate or use of caps/ collars / deadbands etc.). This may either

- dampen downside risk associated with expected underperformance, or
- compensate firms for the costs of achieving different performance.

Approach useful for final risk /reward package calibration, as at PR19.

In this paper, we explore the first two levers and how Ofwat could consider such adjustments

Potential Issues & Challenges

There are several practical challenges to develop and implement a robust cost performance relationship into the regulatory framework

Performance

- Determining Baseline Performance for initial TOTEX
- Defining The Measure of Performance Improvement
- Measuring investment related performance Improvement

Costs

- Budgets are not aligned to PCs
- Normalising Data (identifying inefficiency)

1 Context to the cost service challenge

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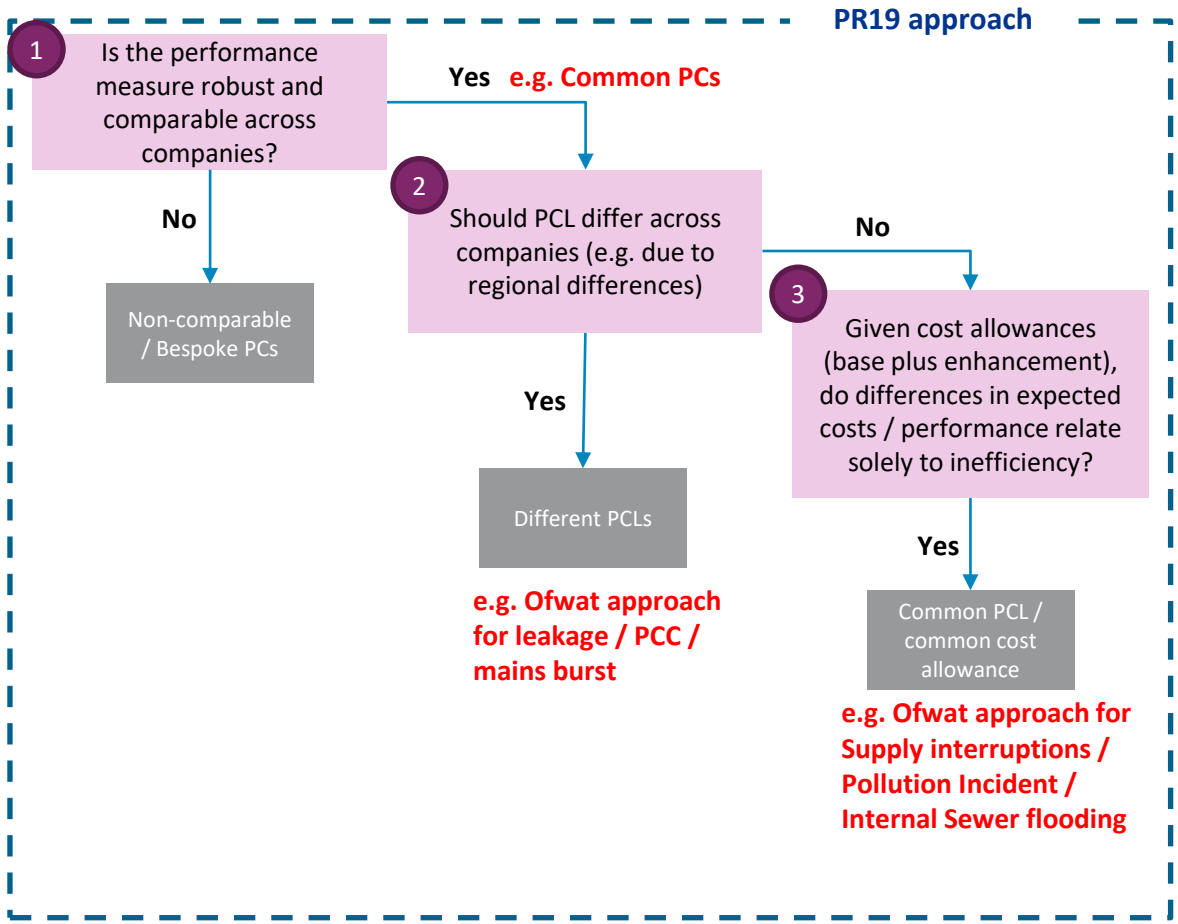
5 Next Steps: questions for the industry (proposed breakout questions)

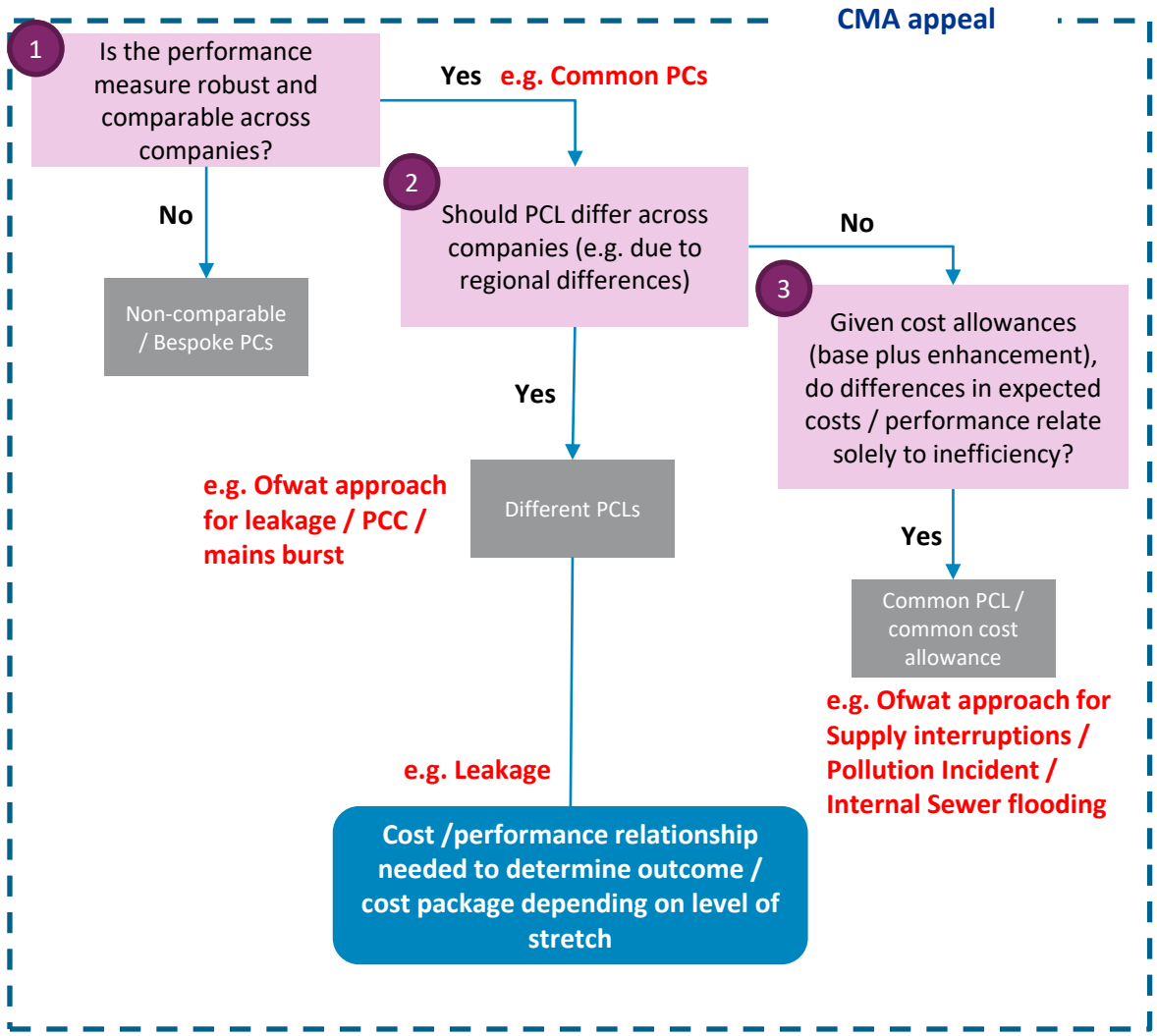
Framework for evaluating PCLs

Approach adopted at PR19



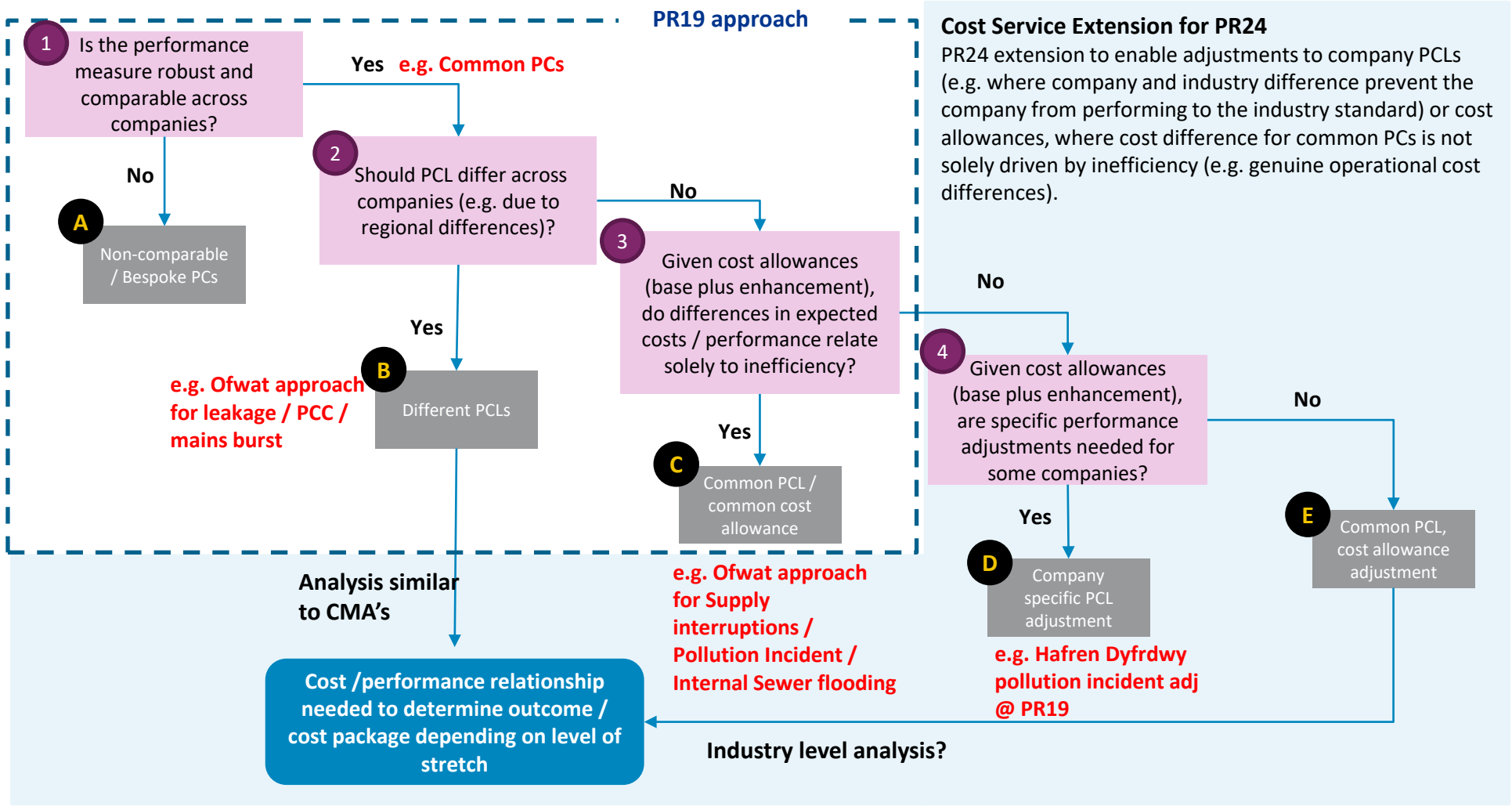
Framework for evaluating PCLs

CMA intervention included additional funding for leakage targets



Framework for evaluating PCLs

PR24 cost service extension considerations



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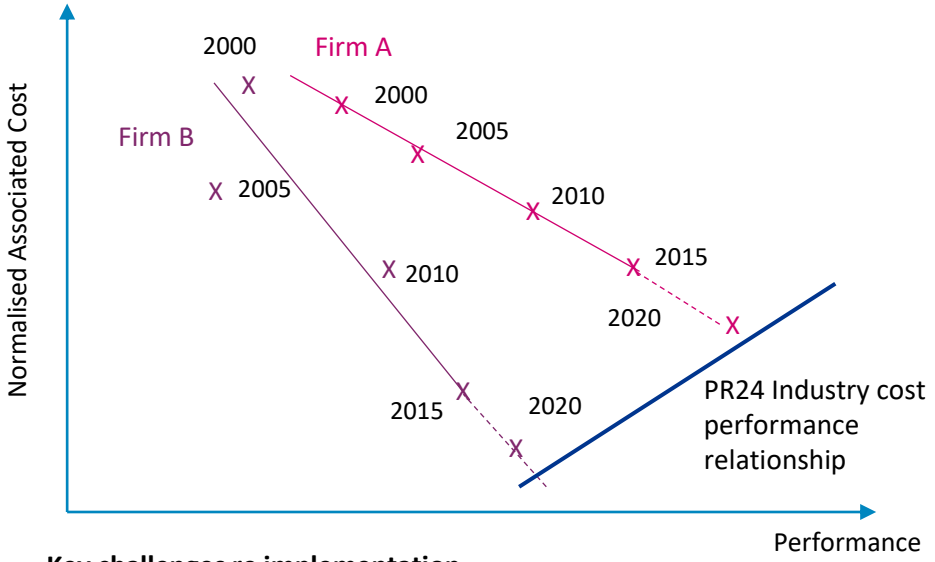
Deriving Cost-Performance Industry Trade-off

How can it be derived in theory and practice? Two possible approaches

A) Industry level cost /performance relationship

- Regression using historical cost and performance data
- Company historical performance and cost data is normalised and regressed
- Industry cost/performance trade-off is derived from forecast regression
- Trade-off curve can be used to compensate companies for incremental performance requirements
- Compensation based on industry cost/performance trade-off rather than at company level

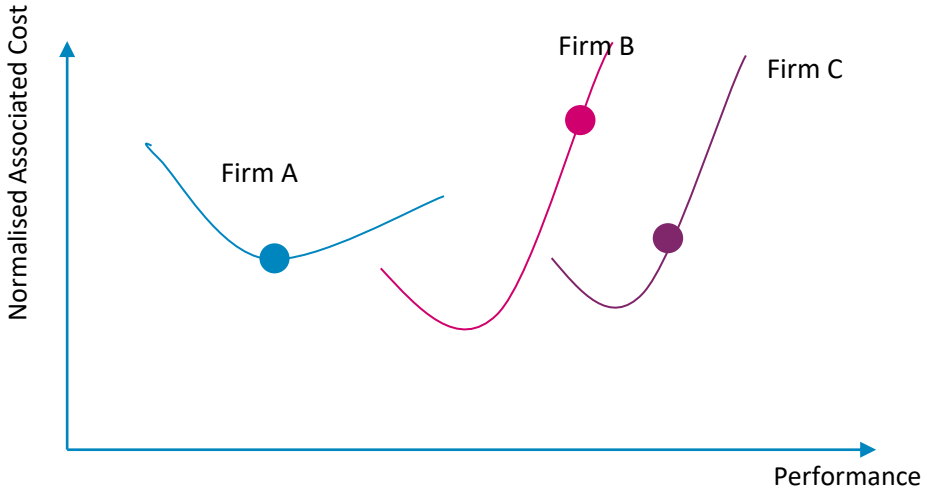


Key challenges re implementation

- Normalisation of cost data at PC level likely to be challenging
- Only likely to be possible for a small number of PCs
- Historical performance data issues

B) Companies provide views on cost performance relationship

- Companies provide data on their current level of performance, current cost and marginal cost
- Expectation for significant differences across organisations
- Ofwat consider whether to compensate companies based on company level information on marginal cost / performance or whether to use this information to determine a cross industry compensation in line with A).



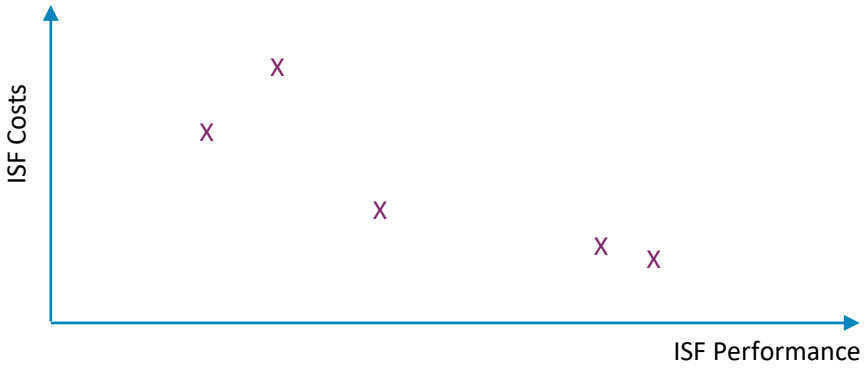
Key challenges re implementation

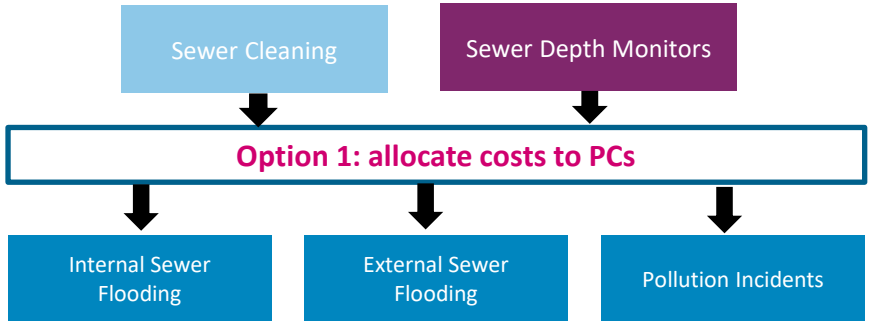
- Companies don't currently measure costs and PCs on a consistent basis
- Challenges for Ofwat to gather and normalise cost performance data across companies
- Defining consistent approach to measure incremental performance and hence marginal cost key issue for some
- Ofwat concern around information asymmetries

We consider 2 approaches to assessing the cost performance relationship

The definition of "performance" and "normalised associated cost" on the previous page could differ depending on the degree to which costs can be attributed to PCs. We consider a couple of approaches which could be adopted depending on this.

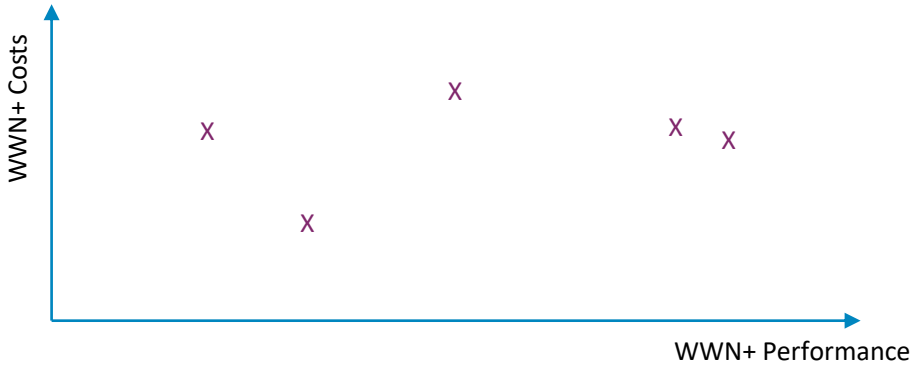
1. Allocating activity cost to PCs

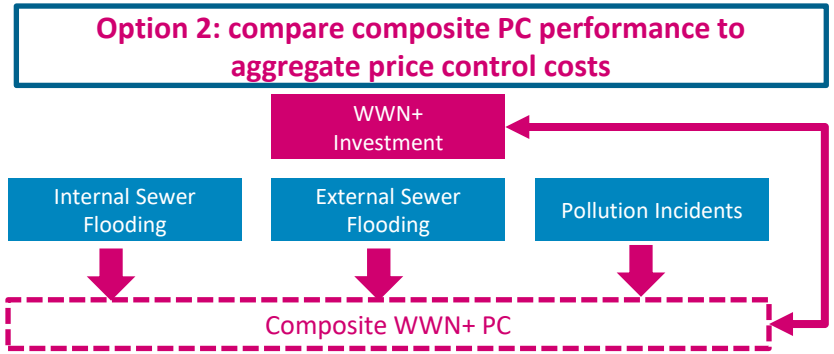




This approach may be appropriate where activities (costs) can be easily attributed to PCs

2. Comparing aggregate costs to composite PC





This approach may be appropriate where costs cannot easily be disaggregated and attributed to PCs

1. PCs that have directly attributable activities

Allocating costs to PCs where activities can be mapped

Mapping costs and PCs

- Some PCs will align more strongly with activities and therefore costs.
- For those subset of PCs where a strong activity mapping is evident, firms can provide data on their cost spend associated with each activity and investment spend on an annual basis
- From these unit calculations and historical performance data tracked by Ofwat it would be possible to calculate the cost associated with each PC
- However, further analysis would be required to understand how changes in cost impact performance.
    - Industry level cost performance relationship might be established through regression
    - Company level relationship would rely on some scenario analysis

Key challenges re implementation of company level assessment

- Regulatory reporting on costs for PCs isn't currently done
- Base performance and incremental performance information would be needed to determine marginal costs for each company
- A key challenge will involve developing an appropriate increment performance change in order to derive a cost performance relationship
- This may involve companies developing scenarios around the incremental cost associate with a performance change
- This could be challenging for performance metrics that suffer from significant noise outside of management control (e.g. weather)
- Cost and performance data from previous years may be helpful to evidence cost/performance relationship, however likely to be too small a data set

PC	Base performance	Opex Activity allocation	Capex Capital programme	Base cost	Incremental cost	Performance change	Marginal cost
Leakage	xxML/d	…	…	…	…	X%	…
PCC	C/HH	…	…	…	…	Y%	…
Mains Bursts	b/km	…	…	…	…	Z%	…

Industry wide consultation may be needed to agree the designated activity and cost mapping appropriate

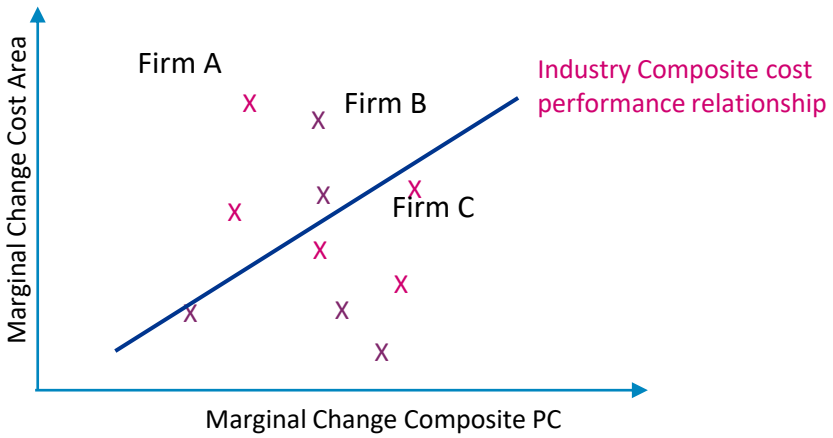
2. Comparing aggregate cost to a composite PC

Developing composite PCs where activities mapping is complex

A single performance measure for each price control

- Spending on specific cost areas impact multiple PCs. For example Waste Water Investment targeting sewer cleaning and sewer depth monitors will contribute to improved performance across sewer flooding and pollution incidents.
- To avoid challenges around cost allocation an alternative approach may involve developing a composite indicator of performance within each price control. For example, there would be a single composite performance indicator for waste water, covering sewer flooding and pollution incidents.
- By developing an industry metric, each company would have historical composite scores based on annual performance and associated cost associated with the relevant price control.
- An industry wide cost performance relationship could then be established regressing change in aggregate performance (using the CI) against change in aggregate costs for the price control.
- This will produce a relationship between the change in cost area spending and the impact on the Composite PC.
- The relationship can then be used to evaluate the impact of different PCLs, through disaggregating the composite PC and comparing with a composite PC associated with the Notionally Efficient Company.
- Different approaches that could be developed to establishing the composite PC including weighting by PC value / improvement

Regressing change in composite performance vs change in cost



Key challenges re implementation

- Defining the calculation for composite PCs
  - Approaches to weighting PCs?
  - Different weightings across companies vs standard industry weighting
- How should a benchmark be established?
  - Against a notionally efficient company
  - Average across companies
  - Against prior year scores

1 Context to the cost service challenge

2 Identifying where performance or cost adjustments may be appropriate – a proposal for a framework

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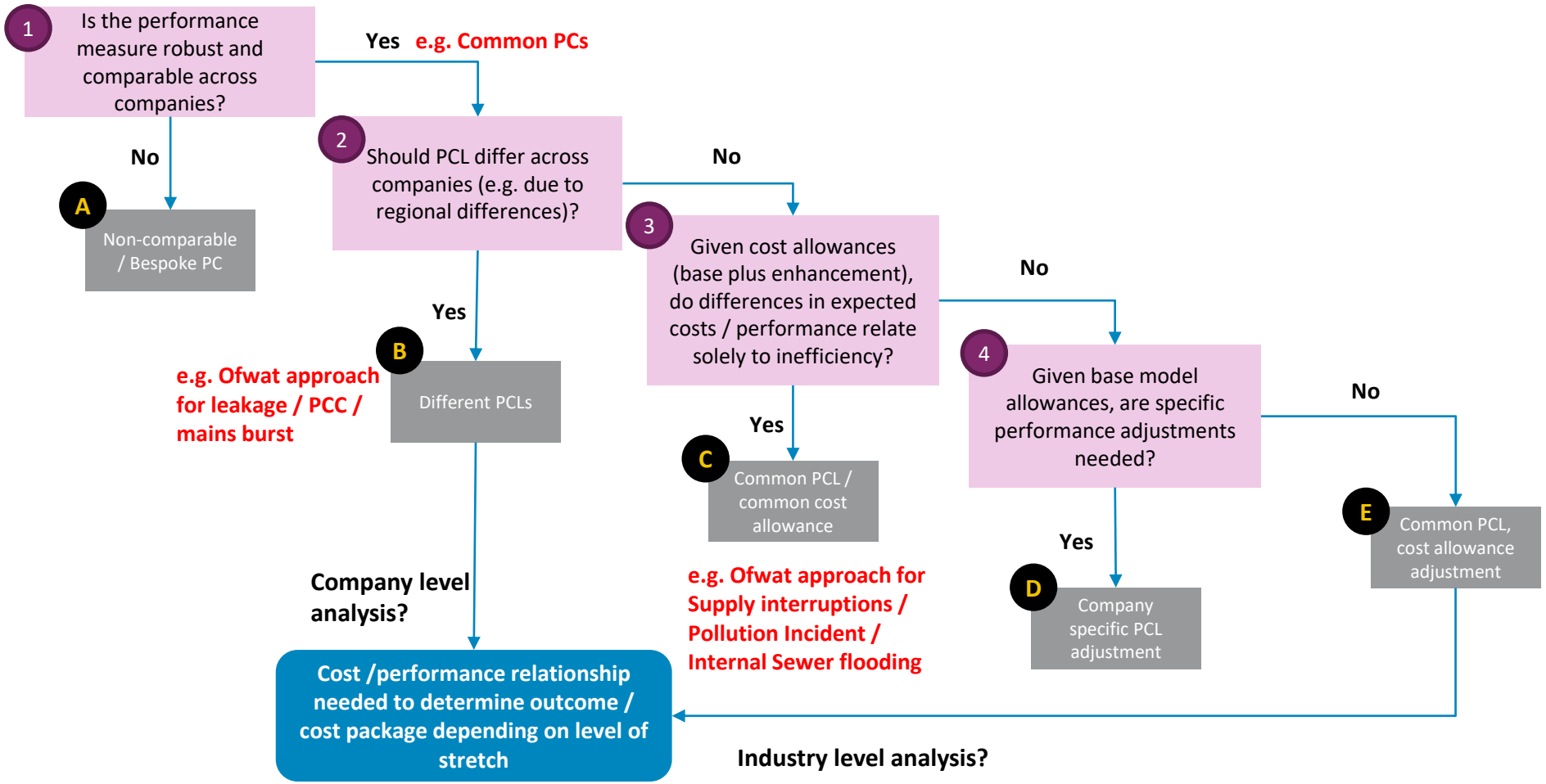
4 Practical implications for the PR24 methodology

5 Next Steps: questions for the industry (proposed breakout questions)

Applying cost/performance adjustments

Framework for evaluating performance commitment setting



Practical Implications

Applying cost/performance adjustments

Step 1
Undertake initial cost assessment benchmarking

Step 2
Initial evaluation of required PCLs using framework

Step 3
For each company calculate difference between company PCLs and the industry benchmark. Compensate based on the established relationship

B Different PCLs

- Analysis required to adjust cost allowances based on required stretch, commensurate with that applied by CMA for leakage allowances

E Common PCL, cost allowance adjustment

Where PCs costs directly attributable

- Cost service relationship established for each company based on company data, with allocation rules based on Ofwat guidance

Where PCs costs are not directly attributable

- Calculate an industry level composite performance indicator based on PCLs determined for each price control
- For each company calculate difference between company composite indicator and the industry benchmark

Step 4
Check overall risk reward balance and consider whether other levers need to be adjusted (e.g. incentives)

Breakout room questions

1. Any further comments or feedback on the framework proposed by Yorkshire Water / Baringa?

2. Can costs be accurately mapped to key PCs? Is it more feasible for some PCs than others (i.e. where there is limited interaction with other PCs)?

3. Where costs can't be mapped to individual PCs,
   - What PCs could be considered for a composite measure?
   - What costs should be included for these PCs?
   - How would we calculate the weights?

Should the cost-service relationship be captured inside or outside of the base cost models?

Cost service link: within model approach

September 2021

Within Approach

In practical terms, we see two alternatives on how quality can be treated in the econometric models or the within approach:

1. Output Quality Adjustment: This will require the adjustment of the output/scale driver in any particular botex model. For example, if the output is water delivered, the correct adjusted method could take the form:

- Output Adjustment: An example is the Efficient Water Delivered = Water Delivered – Leakage.
- The challenge is to take similar approaches for each part of the value chain or the boundaries defined.

2. Quality is multidimensional across companies and between the different parts of the value chain.

- This multidimensionality can be seen within each part of the value chain as follow:
  - In Water:
    - *Resources*: Rivers, boreholes, aquifer (ground v surface water).
    - *Treatment*: Complexity of treatment works 4-6, Mean Zonal Compliance, appearance, taste, hardness, lead (e.g., water customer complaints).
    - *Distribution*: Leakage, pressure, loss of supply, burst
  - In Waste:
    - *Collection*: blockages, collapses, overflows
    - *Treatment*: bathing waters, odour, load treatment in bands 1-3, load with NH3.
    - *Bioresources*: disposal land restoration.

- In this approach we could construct a quality index for each part of the value chain using principal components analysis (PCA) or a simple approach as Ofgem has used in RIIO-GD2 with the Composite Scale Variable approach (CSV) or CQV for our case where Q stands for Quality.

- This could help us to reduce the dimensionality of quality to avoid econometric issues such as multicollinearity and also to deal with small sample or degrees of freedom limitations.

Cost service link: outside model approach

Van Dang

Rationale

- The PR19 base cost models do not include performance variables.
- Adding a performance variable to the base cost models is technically challenging, as it will cause a reverse causality from cost to performance, rendering the coefficients unreliable.
- Using a specific technique in econometrics (instrumental variable) to deal with this endogeneity challenge can be daunting, and may cause more problem than it solves.
- A pragmatic solution can be to model performance separately. The model aims to answer the question: What does it cost to achieve a certain level of performance, holding everything else constant?
- Result from this model, or the coefficient of the cost variable on the right hand side can be used to adjust for any prediction from the main cost assessment model.

Modelling approach to explore

1. Select a few common performance commitments for potential modelling. Leakage, per capita consumption, supply interruption can be possible candidates for water. A few wastewater PCs are to be decided.
2. Just like base cost model, engineer insight for performance drivers to be used on the right hand side is needed.
3. The cost variable on the right hand side should be a lagged variable, since in most cases, the result of investment in performance may not materialise within the same year/period.
4. Lagged performance (previous year) should be added to the right hand side for model specification and unbiased coefficients.
5. Given 3 & 4, the model would be dynamic with distributed lags. The PR24 dataset will have sufficient long time series that allow this dynamic model.

Building Blocks

Performance (P)	Expenditure (E)	Drivers (X)	Control (Z)
Leakage	Relevant expenditures in previous year that are required/attributed to achieve the level of performance	Factors that have direct impact on performance, independent of expenditure, and beyond management control	Overall characteristics, operating environment, specific time period or region (dummy). May not always be relevant, but worth exploring
PCC			
Supply interruption			
Example	mains repair cost, customer education for water saving	nr property/km mains length, proportion of metered properties	Dummy for Covid year, company's scale, located in water stress region

$$P_{it} = f(\propto_{it} + \beta_1 P_{it-1} + \beta_{2i} E_{it-1} + \beta_{3i} X_{it} + \beta_{4i} Z_{1it} + \varepsilon_{it})$$

i = leakage, PCC, Supply interruption, etc.
t = year
α: constant
β: coefficient of expenditure, performance drivers, control variables
ε: error terms

Recommended actions for future model improvement

- Build the main cost models without any performance or service quality variables (as was in PR19);
- Select a few key PCs, probably among companies cost claims during PR19, that require extra cost to achieve (which is not allowed for by the cost models) for further cost requirement analysis;
- Build the performance models for those PCs, with engineer's inputs for performance drivers, and relevant cost;
- Test various specifications of these performance model to answer the questions: Do these PCs really require their own specific cost to achieve? What do the main cost models miss?
- The answers may help decision about any necessary post-modelling adjustments.

Breakout room questions

1. Is there any merit in testing the inclusion of performance variables in the base models?

2. Is there merit in developing separate adjustments for cost/quality outside of the base models?

3. Should we prioritise a subset of PCs to explore cost-performance models? For example:
   - Leakage
   - PCC
   - Sewer flooding

Closing remarks

Closing remarks

- We will consider holding further workshops on the link between cost and outcomes in due course.
- Next Cost Assessment Working Group meetings:
  - **Forward looking capital maintenance (SWB and tbc) – 28th September**
  - **Growth cost assessment (ANH and tbc) – 12th October**
- Please let us know if you are currently working on any relevant papers for the Future Ideas Lab and would like to present an overview of the paper at a forthcoming workshop.

Any further questions or comments?

Bonus session: Short sewer flooding deep dive

Sewer flooding – cost drivers and data

Sewer flooding measures the number of flooding incidents per 10,000 connections. Internal flooding is flooding that occurs within the boundaries of a dwelling (flooding outside a dwelling e.g. in garden is considered as external). The PR19 definition includes severe weather events. - Reporting guidance – sewer flooding

Factors companies have mentioned as **drivers** of sewer flooding costs during PR19:

- **Climate change (rainfall intensity)**
- **Urban creep**
- **Infiltration sealing in chalk catchments**
- **Number of cellars**
- **Population growth**

Data we collect:

- Enhancement expenditure on sewer flooding
- Expenditure on base opex/capex for infrastructure/non-infrastructure

- Common PC performance data

- Number of connected properties
- Length of sewer
- Number of sewer blockages, bursts or collapses
- Number of sewer flooding incidents

Q1. What are the key drivers of sewer flooding costs?

Q2. Which of the drivers mentioned in Q1 do you think are not captured by the base models, and which should we consider symmetrical adjustments for?

Q3. What additional data do you think we need?

Appendix: PR19 Performance Commitment Target Setting

Setting performance commitment targets at PR19

Category	PC	Target setting approach
Common performance level measures	Supply interruptions	• **2025-25 target set to 5 mins**, with a **glide path in first four years**. • Forecast upper quartile too stretching (3 mins).
	Pollution incidents	• **Forecast upper quartile**. • Adjustment for HDD.
	Internal sewer flooding	• **Forecast upper quartile**.
Statutory measures (common)	Compliance risk index	• **Full compliance** (i.e., zero) with **deadband** at 2.0.
	Treatment works compliance	• **Full compliance** (i.e., 100%) with **deadband** at 99%.
Reducing water demand	Leakage	• Ensure the **annual percentage reduction is at least 15% from 2019-20 PC level** • Consider the 2024-25 performance level relative to **forecast upper quartile**
	Per capita consumption	• Consider where 2024-25 performance level is relative to **forecast upper quartile** • Consider **company specific challenges** (water resource challenges, rainfall, demography, and metering penetration)

Setting performance commitment targets at PR19

Category	PC	Target setting approach
Asset health measures	Mains repairs	• Good performance – extrapolate average historical industry performance • Poor performers – set PC levels using the average of their five best historical years • Additional allowance for leakage.
	Unplanned outage	• Good performance – median of 2024-25 forecasts • Glidepath for companies that proposed performance in 2025-25 is worse than 'good'. • Company-specific changes applied in some cases.
	Sewer collapses	• Good performance – set at median of 2024-25 forecasts • Poor performers – UQ percentage improvement
	External sewer flooding	• Good performance – close to the industry UQ level • Poor performers – closest of UQ or UQ of the percentage improvement
	Sewer blockages	• Good performance – extrapolate average historical industry performance • Poor performers – PC level was set on the largest percentage reduction proposed
	Water quality	• Good performance – close to the industry UQ level • Poor performers – closest of the UQ or UQ of the percentage improvement
	Low pressure	• Good performance – close to the industry UQ level • Poor performers – closest of the UQ or UQ of the percentage improvement

Setting performance commitment targets at PR19

Category	PC	Target setting approach
Resilience measures	Risk of sewer flooding in a storm	Intervene if: • Risk is increasing over time - set a flat profile over 2020-25 period. • Risk is flat over time - if less than 70% model coverage and relatively high risk • Risk is decreasing over time - when the company has potential for more significant improvements (i.e., low model coverage and targeting small risk reduction).
	Risk of severe restriction in a drought	• Require starting risk levels to align with WRMP levels. • Intervene when low quality evidence provided and no planned improvement by 2030.
Vulnerability measures	Priority services register	• A min. level of 7% of households on the PSR by 2024-25. • Make contact with 17.5% of households on the PSR in the first year, and 35% of households on the PSR every two subsequent years. • Attempt to make contact with 45% of households on the PSR in the first year, and 90% of households on the PSR every two subsequent years.
Customer experience	C-MeX	• Relative incentive. • Company payments based on C-MeX/D-MeX score relative to median company and either the highest or lowest performing company.
	D-MeX	

Appendix: Cost service link

September 2021

1. Introduction

- Quality is a dimension of the economic output produced (e.g., at treatment, distribution, etc.) and must be reflected in the economic efficiency cost function.

- Cost assessment need to reflect this either *within* or *outside* the models to get consistent estimations of the econometric parameters.

- Ofwat will need to balance the pros/cons of excluding service quality drivers in the cost assessment framework versus adding them explicitly within/outside the models. For example, if excluded from the models as stated by Destandau and Garcia (2014):

> "*Issues related to service quality are crucial for water utility management and regulation. Omitting these aspects, especially when they are treated as exogenous, can lead to large biases in estimating cost functions as well as to misleading information concerning technology*" Destandau and Garcia (2014) "Service quality, scale economies and ownership: an econometric analysis of water supply costs". *Journal of Regulatory Economics*, 46:152–182.

- In the regulatory framework, the consequences are reflected in the efficiency scores, catch-up efficiency frontier and estimation of efficient cost allowances. In econometric terms, the implications are reflected in endogeneity issues (e.g., omitted variables).

2. Approaches

- Each part of the value chain reflects a quality dimension in multiple forms.
- The current PR19 approach of excluding the quality dimension of the output may be limited in time, as companies face more pressures in the long term.
- Besides some obvious reasons of the importance of quality, there are some severe technical econometric implications of excluding these drivers from the models.
- We suggest two visions of treating service or quality into the cost function:
  - *Within* the model: include quality drivers directly in the econometric specifications or models.
  - *Outside* the models by implementing other approaches (see SES slides below).

3. Within Approach

In practical terms, we see two alternatives on how quality can be treated in the econometric models or the within approach:

1. Output Quality Adjustment: This will require the adjustment of the output/scale driver in any particular botex model. For example, if the output is water delivered, the correct adjusted method could take the form:

- Output Adjustment: An example is the Efficient Water Delivered = Water Delivered – Leakage.
- The challenge is to take similar approaches for each part of the value chain or the boundaries defined.

2. Quality is multidimensional across companies and between the different parts of the value chain.

- This multidimensionality can be seen within each part of the value chain as follow:
  - In Water:
    - *Resources*: Rivers, boreholes, aquifer (ground v surface water).
    - *Treatment*: Complexity of treatment works 4-6, Mean Zonal Compliance, appearance, taste, hardness, lead (e.g., water customer complaints).
    - *Distribution*: Leakage, pressure, loss of supply, burst
  - In Waste:
    - *Collection*: blockages, collapses, overflows
    - *Treatment*: bathing waters, odour, load treatment in bands 1-3, load with NH3.
    - *Bioresources*: disposal land restoration.

- In this approach we could construct a quality index for each part of the value chain using principal components analysis (PCA) or a simple approach as Ofgem has used in RIIO-GD2 with the Component Scale Variable approach (CSV) or CQV for our case where Q stands for Quality.

- This could help us to reduce the dimensionality of quality to avoid econometric issues such as multicollinearity and also to deal with small sample or degrees of freedom limitations.

4. Outside Approach

An outside approach from the models could be seen in two forms on how to deal with services and costs:

1. **Quality Cost Functions**: Separate cost functions to assess quality for the different types of quality dimensions (e.g., PCs) could be used. Information on separate type of costs on leakage, supply interruptions etc, would need to be collected and used to benchmark what should be the efficient costs to spend on leakage, etc, while controlling for potential cost drivers affecting each of the most material PCs and reflecting any regional differences.

2. **Performance Commitments (PC) Benchmark**: To establish a benchmark level for each company, we could explore empirical models that explain the efficiency level for the most material PCs. In this way we could provide a baseline that could guide the allowances. This could also be expanded to some Environmental PCs to incorporate in the CA framework.

5. Retail Approach

- **Retail Benchmark:** We also think that there might be an opportunity to understand costs and quality links related to retail services. We could explore unit cost models to understand cost per call, cost per complaint amongst others so that we can benchmark across utilities. This could allow the modelling of trends and potential scenarios. The link between cost and quality should also be considered in the cost models to reflect the efforts of companies in providing quality service to customers.