Part of Appendix 8m:

i. Ofwat Proforma

Author: Yorkshire Water

YorkshireWater

Cost adjustment claim summary form

Name of claim	Bioresources - WINEP enhancement expenditure	
Name and identifier of related claim submitted in May 2018	Not submitted in May 2018 due to WINEP uncertainties, but referenced in our covering letter	
Business plan table lines where the totex value of this claim is reported.	£60.36 m in Bio7, lines 1-4 WWS1 (and 1a) Line 15 WWS2 (and 2a) Line 1	
Total value of claim for AMP7	£60.36 m	
Total opex of claim for AMP7	£0.0 m	
Total capex of claim for AMP7	£60.36 m	
Depreciation on capex in AMP7 (retail controls only)	N/A	
Remaining capex required after AMP7 to complete construction	£0.0 m	
Whole life totex of claim	£57.21 m *Present value*	
Do you consider that part of the claim should be covered by our cost baselines? If yes, please provide an estimate	No. *We have excluded any costs which might be covered within Ofwat cost baselines from the value of this claim. Claims based on Q&R no.269*	
Materiality of claim for AMP7 as percentage of business plan (5 year) totex for the relevant controls.	15.9%	
Does the claim feature as a Direct Procurement for Customers (DPC) scheme? (please tick)	Yes	No
		X

	Brief summary of evidence to support claim against relevant test	**List of accompanying evidence, including document references, page or section numbers.**
Need for investment / expenditure	The investment arises out of the need to treat additional sludge volumes arising from our AMP7 phosphorous removal plan which is required to meet our obligations under WINEP3	*'Appendix 8m: ii. Ofwat Evidence'* *Section 1.2 (all)*
Need for the adjustment (if relevant)	The increased sludge volumes cannot be treated within our existing service and will necessitate investment in significant new digester, processing and dewatering capacity, beyond that required for incremental growth which we do not believe could be captured in Ofwat's modelled baselines or compensated for in the round by other allowed costs	*'Appendix 8m: ii. Ofwat Evidence'* *Section 1.4 (all)*
Outside management control (if relevant)	The investment need arises out of the WINEP programme for phosphorous reductions, the scale and timing of which follow from ministerial direction and as such we consider them to be outside of management control.	*'Appendix 8m: ii. Ofwat Evidence'* *Section 1.2.2*
Best option for customers (if relevant)	We have used scenario modelling together with market testing to identify a plan which will achieve compliance and appropriate levels of resilience at the most efficient cost. We consider that this plan therefore represents the best option for our customers.	*'Appendix 8m: ii. Ofwat Evidence'* *Section 1.5*
Robustness and efficiency of claim's costs	We have used market testing or unit cost benchmarking to identify potential capex efficiencies in delivering our bioresources programme and have applied these to our cost estimates	*'Appendix 8m: ii. Ofwat Evidence'* *Section 1.5.3*

Customer protection (if relevant)	In order to protect customers in the event that investment is cancelled, postponed, or less than expected we propose to return all or part of this to customers. This mechanism is set out in detail in our attached evidence document.	*'Appendix 8m: ii. Ofwat Evidence'* *Section 1.6.2*
Affordability (if relevant)	Overall customer support for our plan is that 86% of customers support our business plan. Of that 76% of our financially vulnerable customers are also supportive of our plan (with a sample of 487 customers classed as financially vulnerable in the survey).	*'Appendix 8m: ii. Ofwat Evidence'* *Section 1.3.3* *'Appendix 8p: Yorkshire Forum for Water Customer Statement of Support'*
Board assurance (if relevant)	The Yorkshire Water Board has reviewed this cost adjustment claim. As part of this they have signed a board assurance statement which includes a statement relating to our use of cost adjustment claims.	*'Chapter 3, Board assurance statement' section of the business plan.* *'Appendix 8m: ii. Ofwat Evidence'* *Section 1.7*

Part of Appendix 8m:
ii. Ofwat Evidence

Author: Yorkshire Water

YorkshireWater

Contents

Bioresources (YKY BR-01)

1. Summary

- Claim: Bioresources - WINEP enhancement expenditure
- Reference: YKY BR-01
- Type: Atypically Large Expenditure
- Totex value: £60.36 million
- Materiality: 15.9 %
- Date: 03 September 2018

1.1. Overview of Claim

In our covering letter presented as part of our early submission of cost adjustment claims in May, we indicated that the impacts of our Water Industry National Environment Programme (WINEP) may require us to submit cost adjustment claim(s) as part of our business plan. Having fully assessed the impacts of our WINEP, we are required to make significant investment to reduce the levels of phosphorus in our catchments to meet the Water Framework Directive (WFD) and Urban Waste Water Treatment Directive (UWWTD) drivers. In complying with these obligations, the treatment technology methods available will generate additional sludge volumes which will have a significant impact on our bioresources strategy, including impacts on sludge dewatering and processing capacity.

This requires a material level of investment to ensure that we can provide sufficient capacity and working headroom to treat the resultant increase in sludge volumes efficiently and in compliance with all relevant environmental regulations. This investment will provide additional digester capacity at Knostrop and additional dewatering capacity elsewhere to address increasing levels of sludge generated by increased levels of phosphorous removal required as part of our WINEP. The capex costs associated with this claim, adjusted for real price effects (RPE), are:

- New digester capacity at Knostrop - £25.31 million
- New assets to manage additional and new types of sludge at 11 sites – £16.82 million
- New sludge dewatering assets at 7 sites - £18.23 million

The amount claimed, £60.36 million is the additional capex required for WINEP related capacity increases, it excludes base maintenance and we are not claiming for any additional opex. We believe that our bioresource strategy for AMP7 will result in efficient opex unit costs which will allow us to match the best in the industry and these should be fairly reflected within Ofwat's modelled allowances and remunerated via the modified average revenue control.

Additional investment will also be required during AMP7 to meet new statutory emission limits contained within the Medium Combustion Plant Directive (MCPD), but we consider this to be enhancement expenditure within the standard Ofwat definition and have treated it as such within our business plan.

We note that in IN18/02[1] and IN18/11[2] it has been indicated that there was no necessity for cost adjustment claims to be submitted for enhancement expenditure, but we also note that in the case of the bioresources price control, in an answer to query reference 269[3], it was confirmed that enhancement expenditure for additional sludge treatment capacity in bioresources would require a cost adjustment claim(s) and we have been mindful of that confirmation in determining how to treat this additional expenditure and in the context of submitting this claim.

The costs submitted as part of this cost adjustment claim, represent in our view, an efficient cost for delivering the most appropriate solution taking account of technical feasibility; risk to customers and the environment and long-term value.

1.2. Need for Investment

1.2.1. Factors Driving the Need for Investment

In December 2015, flooding was experienced in the Yorkshire region which impacted many communities and our assets. We experienced a loss in sludge treatment capacity of up to 50% of sludge demand, which significantly affected our ability to manage our sludge treatment and disposal.

[1] IN 18/02: Price review early submissions on 3 May 2018 for performance commitment definitions and cost adjustment claims

[2] IN 18/11: Enhancement expenditure - setting expectations for well-evidenced proposals and clarifying interaction with cost adjustment claims

[3] PR19 final methodology queries and answers – 24 April 2018, Query reference 269

This lack of capacity and resilience meant that the cost to deliver the bioresource service increased, due in part to the necessity of relying on short-term arrangements with third parties to provide the treatment capacity that was unavailable to us.

Prior to the publication of the WINEP requirements we had already embarked on developing a sludge treatment strategy which would protect the business from such future impacts and provide resilient sludge treatment service with reliable capacity based on a mixture of asset improvements and market-based solutions.

As a result of WINEP3, AMP7 will see us delivering our biggest ever environmental programme, including a significant number of Phosphorus (P) removal schemes. We have sought to maximise the potential for biological P-removal where that is efficient and affordable resulting in our plan to deliver a further 7 Biological Nutrient Removal (BNR) schemes in AMP7. Based on our site by site review however, there are a number of sites where the capital investment required to implement BNR would raise costs above what we consider affordable. The details of this assessment process are set out more fully in 'Appendix 8g: Water Industry National Environment Programme (WINEP)' of the business plan.

To protect customers from excessive cost increases, improvements at such sites will be delivered using chemical P-removal, which will generate additional ferric sludge from the settlement processes. This sludge has different qualities than non-metal indigenous and imported sludge which affects its usefulness and value as a bioresource.

Prior to the impacts of WINEP3 we were anticipating an increase in sludge production of 13,115 TDS from 2020 levels to 166,026 TDS by the end of AMP7 of which 4,549 TDS was attributable to population growth. This would have left us with a potential shortfall in capacity of 2,716 TDS relative to our existing declared capacity (of 163,310 TDS). Our 'pre-WINEP' bioresources plan for AMP7 would have delivered an efficient and flexible provision of capacity sufficient to meet anticipated volumes with adequate headroom to provide resilience to future outage events such as those driven by the 2015 flooding.

The impacts of WINEP3 are expected to increase sludge production from 2020 levels by 24,619 TDS to 177,358 TDS by the end of AMP7, which will create a shortfall of 14,048 TDS of which 11,332 TDS (or 81%) can be attributed to increased sludge production which WINEP3 related P reduction programme will generate.

Given the scale of increased sludge production, we cannot avoid the need for significant enhancement expenditure (which is atypical in nature) in AMP7 if we are to meet these requirements.

1.2.2. Actions Taken to Control Cost

To meet the requirements of the WINEP3 and the concentrated delivery programme within AMP7 which follows from ministerial direction, additional investment in bioresources capacity is now unavoidable. We have made every effort to ensure that we minimise such costs both through optimising the scope and content of our plan and through challenging the delivery costs of individual schemes and solutions within the plan. We believe we have taken all possible actions to control these costs and ensure that our bioresources programme provides the best possible value for our customers.

We have undertaken capacity 'scenario' modelling, looking at a range of asset and market-based solutions in a variety of different combinations. These have then been tested against key selection criteria which include effectiveness, timeliness, resilience and cost of the solution. We have sought to deliver an efficient and resilient bioresource service which can continue to function 'whatever the weather', whilst opening up opportunities for flexible and market-based solutions.

We are also being proactive in delivering schemes to mitigate the risks presented by the 2015 flooding impacts on our bioresource treatment capacity. We have opted to take early action in AMP6 to mitigate risks and will be investing significantly from outperformance to enhance the bioresources capability at two key sites; Knostrop and Huddersfield, with a total of £118m of additional investment in AMP6. This will benefit our AMP7 starting position and ensure that the additional investment in AMP7, claimed here, will only be that driven by the new WINEP capacity requirements.

We have investigated the method of treating the wastewater to remove phosphorous and have completed extensive cost benefit analysis on the technology choice between chemical P and biological P-removal.

We recognise that biological P-removal has a number of advantages over chemical P-removal; such as the reduction in reliance on chemicals and the lower opex costs; reduced quantity and better quality sludge which can be used to produce biogas and an overall better totex outcome.

We have sought to maximise the use of biological P-removal in order to minimise the growth in sludge volumes whilst maximising the value of the sludge generated, however, at many of the sites affected, the costs of installing BNR would lead to an excessive investment requirement and impact on the overall affordability of our programme. Therefore, we have been constrained in the extent to which we can deploy this technology.

Whilst installing BNR at the 20 sites was deemed a technically viable solution that potentially yielded a reduction in required totex investment in our bioresources price control of c.£20m the totex increase across our wastewater service (both wastewater network plus and bioresources) would have been greater than this which would not have been in customers' interests. Therefore, our proposed optimal strategy is installing BNR at 7 sites.

Having made every effort to optimise the efficiency of our P-removal strategy in AMP7, we are presented with a situation where unavoidable increases in sludge volumes necessitate a material enhancement investment in our bioresources programme for AMP7.

We describe in more detail in section 1.5.3 the efforts we have taken to ensure that we minimise the level of cost increase by developing the most efficient overall bioresources strategy given these unavoidable pressures.

1.2.3. Benefits Arising from this investment

The primary benefit from this investment is that it will deliver a bioresource strategy which meets our service needs and regulatory requirements, whilst delivering the resilience and the value for money that our customers expect. In addition, it will enable us to achieve a more competitive unit cost of treatment (£/TDS), which will offer longer-term savings to our customers beyond AMP7.

We will be efficiently fulfilling our regulatory commitments but also ensuring we do it with the future in mind and implementing a strategy that puts us in a much better position to meet future growth. This will ensure reliability and enhance natural capital through the recovery of energy and finite resources thereby supporting a more robust circular economy business. We will be making a significant contribution to the UK Government's strategy for beneficial recycling of natural resources through our performance

commitment to ensure that in AMP7, 100% of our bio-solids sent to agricultural land will be Bio-solids Assurance Scheme (BAS) accredited.

Our strategy also gives us more flexibility in the future market, makes us more adaptable to future drivers and reduces the risks of pollution due to sewage sludge build up in wastewater treatment works and of incurring excessive costs of accessing emergency sludge disposal routes in the event of individual plant outages or external events such as flooding.

1.3. Stakeholder Support for Investment

1.3.1. Engagement with Customers

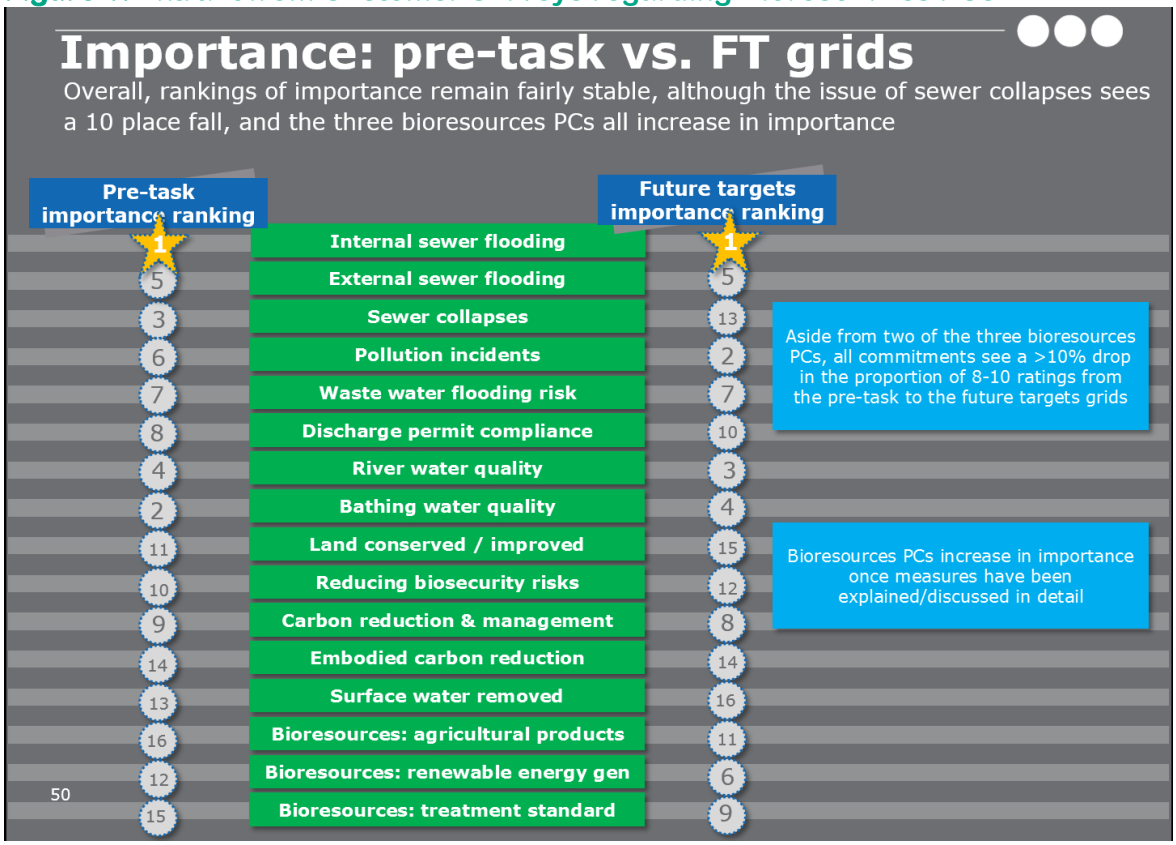
Our research with customers tells us that our activities in bioresources are less well understood than many of the more familiar activities which we carry out, although our customers do tell us very clearly that providing high quality sewage services, in the context of a growing population and extreme weather events is important to them.

Notwithstanding the lack of customer awareness with regards to bioresources, we know, that without the required investment in this area we would be unable to comply with statutory requirements or provide the reliable wastewater services that our customers value and expect us to maintain. We have been mindful of this feedback when considering the affordability impacts of our bioresources programme.

Customer research carried out by DJS research on our behalf, reflected the low-levels of understanding of the bioresources business, however, it was noticeable that once the issues had been explained to customers, the overall ranking of bioresource performance in terms of renewable energy recovery and treatment standards rose significantly, as indicated on slide 50 of the following document:

- ‘Appendix 8m: PR19 Outcomes Debrief 11.04.18 – Extract’, presentation by DJS Research – April 2018 (reproduced below)

Figure 1: Extract from Customer Surveys regarding Bioresources PCs



1.3.2. Engagement with the Yorkshire Forum for Water Customers (YFWC)

As well as engaging widely with our customers, we have also engaged extensively on our cost adjustment claims with YFWC. We gained a letter of support from YFWC for our early submissions in May which included our proposed cost adjustment claims. At this point we had not submitted a cost adjustment claim for Bioresources enhancement expenditure due to the uncertainty and ongoing dialogue with our environmental regulators around our WINEP3.

As flagged in our covering letter, we had been considering a claim of this nature prior to May. We have reflected this in our dialogue with YFWC and ensured that we have made it aware of our intentions and presented the case throughout our challenge sessions as part of the PR19 process. The output of this engagement is that YFWC is supportive of the inclusion of three cost adjustment claims submitted as part of the final plan.

This can be seen from in the YFWC report[4] as well as a further specific letter of support[5] from the Chair of the YFWC relating to our final submission of cost adjustment claims and performance commitments.

1.3.3. Affordability and Acceptability testing

In addition to the above customer surveys and engagement with YFWC we have undertaken further consultation around the scope of our final plan, which included the three cost adjustment claims that we are submitting. The engagement was to gauge customers' overall acceptability and affordability of the plan as a whole.

The results of the testing are as follows where the percentage represents the proportion of customers that are in support of the package as a whole, including our proposed cost adjustment claims.

Overall customer support for our plan is that 86% of customers support our business plan. Of that, 76% of our financially vulnerable customers are also supportive of our plan (with a sample of 487 customers classed as financially vulnerable in the survey).

In addition, 67% of household customers find the plan good value for money. 52% of our financially vulnerable customers also believe the plan is good value for money. It should be noted as well that roughly a third of our customers registered an indifferent response to the value for money question. A full breakdown is below within tables 1 and 2

Table 1: "Question: Please rate how much you support Yorkshire Water's entire plan, based on the Big Goals and the forecast for future bills?"

	Household	Financially Vulnerable
Very supportive	37%	25%
Supportive	49%	51%
Unsupportive	4%	7%
Very unsupportive	3%	7%
Not sure	8%	10%

[4] 'Yorkshire Forum for Water Customers' PR19 Assurance Report, Yorkshire Water's Customer Challenge Group's comments on the company's 2020-2025 Business Plan submitted to Ofwat

[5] 'Appendix 8p: Yorkshire Forum for Water Customers Statement of Support'.

Table 2: "Question: Given the plan that you have seen, to what extent would you say that the Yorkshire Water Business Plan represents value for money?"

	Household	Financially Vulnerable
Very good value for money	17%	10%
Good value for money	50%	42%
Neither good nor poor value for money	23%	30%
Poor value for money	4%	9%
Very poor value for money	3%	7%
Don't know	4%	3%

Please refer to 'Appendix 5a: PR19 customer and stakeholder engagement', section 7.16 of Yorkshire Water's PR19 Submission for additional information.

We note that the values we tested with customers for cost adjustment claims specifically differ slightly to those included in the plan and in this document. As part of affordability and acceptability testing we presented £59m, whereas the final claim value for bioresources is £60.36m following finalisation of costs. We don't believe this would change customers overall acceptability of the plan and the difference is due to the inclusion of real price effects within the claim.

1.4. Need for Cost Adjustment

1.4.1. Atypical cost drivers relevant to this claim

We consider it highly unlikely that the costs associated with addressing the increased sludge volumes generated from our WINEP driven P-removal programme, could be captured within Ofwat's modelled baselines. Investment in additional capacity to accommodate increased volumes of sludge tends to be lumpy and infrequent and can be disproportionate to incremental increases in sludge volumes, particularly where current capacity headroom is at or near the minimum acceptable levels.

Our AMP7 WINEP programme will be our biggest ever with 80 individual phosphorus removal schemes on our wastewater treatment works. These will generate significant amounts of new sludge volumes over and above what might reasonably be expected to deal with as part of normal growth and process changes.

Our pre-WINEP efficient programme costs for the AMP7 bioresources price control would have been as low as £340m in TOTEX terms which we are confident would have been comparable with Ofwat's efficient cost baselines. Furthermore, we recognise that

the average revenue model should compensate us for the efficient level of OPEX required to treat future volumes. However, now that the impacts of WINEP are fully understood, the increased sludge volumes which we are forecasting in AMP7, would have left us with an unacceptable deficit in capacity and exposed the service to unacceptable levels of risk with regard to future resilience. As described in section 1.5.3 we have modelled a range of scenarios to provide additional capacity enhancements which are flexible and include market based solutions but even in our optimised programme, some significant new assets will need to be created in order to ensure we can meet our service needs and regulatory obligations. We need to provide this capacity in the most efficient way whilst maintaining the resilience of our overall bioresources service.

1.4.2. Consideration of allowances in the round

We have set out above the reasons why we consider it unlikely that the factors influencing our costs of addressing increased levels of bioresources from reducing the concentration of P in the wastewater would be captured within Ofwat's econometric models.

We are mindful however, that it is possible that those models may overcompensate Yorkshire Water in other areas and price controls, where our regional circumstances may be favourable relative to other companies. In order to ensure that we are only submitting cost adjustment claims which are prudent and efficient, we have commissioned economic consultants Oxera, to examine the possibility of such overcompensation.

The report found that on a historical assessment basis, there is no evidence to suggest that the claims set out are adequately accounted for in the models produced by ourselves and Ofwat. Further that it is likely that our costs are incremental to those captured in the models. When considered with a history of efficient assessment as set out in the report, that there would not be opportunity to offset the claims through overcompensation in the round.

A copy of their report is appended to this submission and should be considered in conjunction with this claim document and the other supporting evidence we have provided.

1.4.3. Management Control

The costs reflected in this cost adjustment claim relate entirely to the requirement to complete P-removal elements of our WINEP programme in AMP7 as per ministerial direction. We have engaged extensively with both our environmental regulators and other bodies to offer alternative solutions to delivering our environmental obligations and these are set out in 'Appendix 8g: Water Industry National Environment Programme (WINEP)'.

However, the final requirements and scope of the programme are entirely outside management control, although we have sought to identify the most efficient approach to meeting these obligations.

We will continue to engage with the Environment Agency and should opportunities emerge to extend the programme beyond AMP7 we will ensure that we protect customers' interests by exploring alternative strategies which with a longer lead in time, may offer similar levels of compliance at lower cost.

Should this opportunity arise we will ensure customers are protected in the event that our AMP7 investment requirement is reduced as set out in section 1.6.3.

1.5. Identifying Best Value Solutions

Having recognised the need for investment to address the increase in sludge generation in a number of our catchments, we embarked upon an extensive option identification and scenario modelling process to ensure that our eventual solution represented best value for customers, balancing cost and certainty of outcome. We subsequently had to revise our assumptions about future volumes, when the scale and timing of the WINEP

programme became apparent, but the process has been invaluable in ensuring we can identify the best value mix of solutions. This process is described in more detail in the subsequent sections of this document.

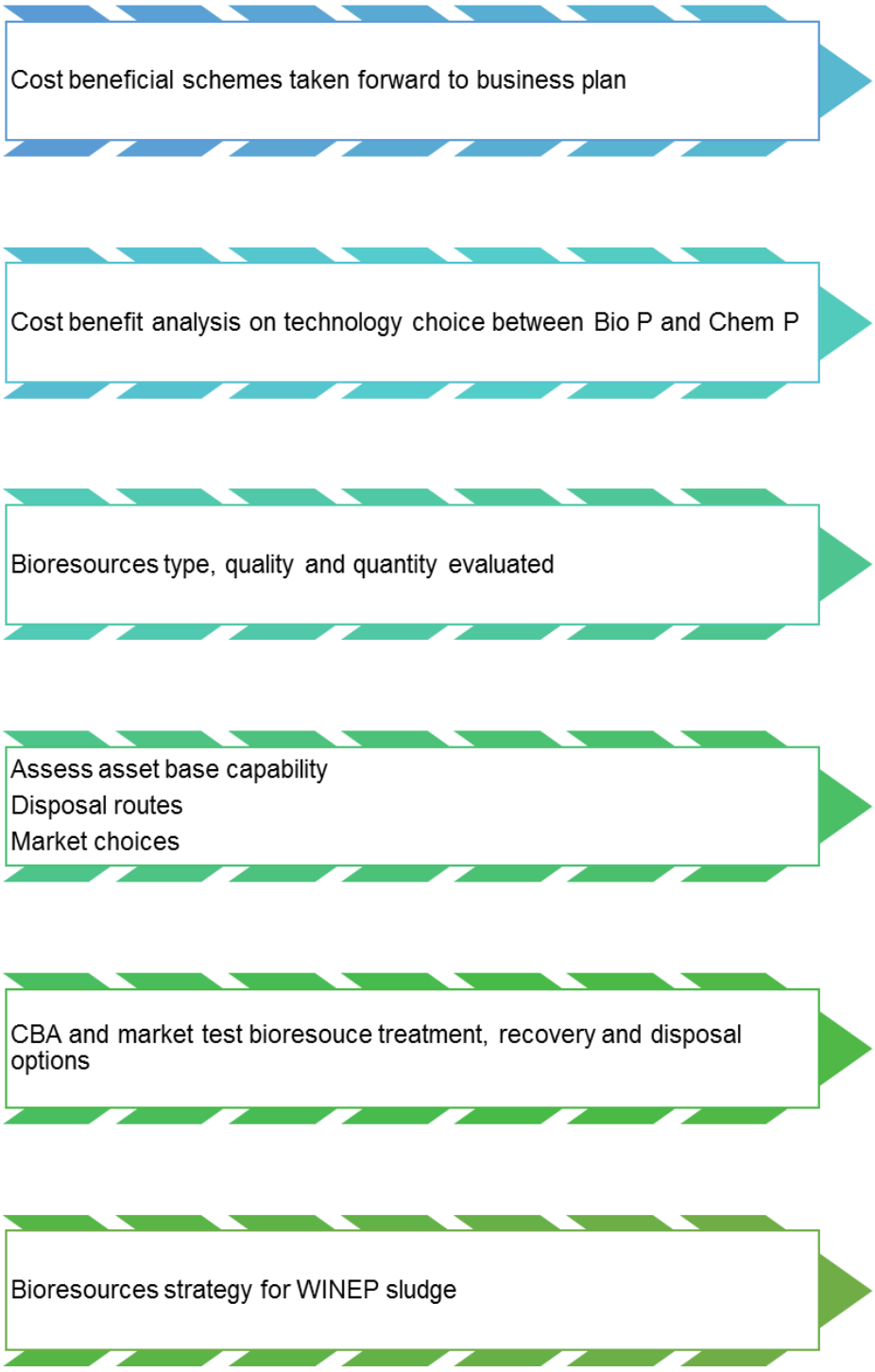
1.5.1. Option Identification and Evaluation Process

In arriving at the final costs, which form the basis of our cost adjustment claim, we have undertaken several steps to ensure that the costs are efficient and that they represent the best value for money for our customers.

1.5.2. Option Selection

Figure 2 below illustrates the option identification and assessment approach used to select our preferred strategy for addressing the additional bioresource generated from an increase in P-removal in the wastewater.

Figure 2: Option identification and assessment approach for addressing additional bioresource capability



On the basis of this assessment we are satisfied that the approach which we are proposing, represents the best value for money for our customers and gives us a more capable and resilient asset base.

1.5.3. Efficient Cost

From consideration of a potential ten wide-ranging capacity provision scenarios, we have developed what we consider to be an optimum programme for our bioresources strategy in AMP7. This balances the use of existing assets, market options and new asset creation.

We have challenged ourselves to transform our bioresources business from a lower quartile performer currently. One of our bioresources objectives is to be one of the most efficient companies by AMP8; we have put a focus on the efficiency and flexibility of our service and on encouraging and incentivising market development to achieve this.

Our approach to delivering this efficiency has been to challenge our existing asset management process by market testing the conventional delivery route and engaging as early as possible with the market to seeking efficient totex solutions.

We have considered a wide range of different scenarios and evaluated them against four key tests for bioresources capacity in AMP7, namely:

- Does the programme meet our 2025 capacity requirement?
- Does the programme meet monthly capacity requirements, with no shortfall, over the whole AMP?
- Will the programme deliver required levels of resilience (i.e. 95% confidence of no sludge shortfalls due to unplanned events)?
- Is the programme the most efficient of the scenarios that meet the above three tests?

Our scenario modelling approach considered a wide range of risks to the bioresources services, the principal ones included unplanned outages; loss of capacity due to flooding and short-term unavailability due to wet weather impacts on sludge disposal to land routes. Our flexible strategy means that we will be able to mitigate such impacts through the effective headroom created; through access to short-term market based solutions when required and through the provision of improved on-site storage to enable us to store more sludge during periods of wet weather.

We undertook Monte Carlo simulations to create a probability distribution of sludge treatment surplus or deficit under each scenario, to ensure we could meet our resilience target of 95% of all events managed with no surplus sludge.

Figure 3 below provides an illustration of the outputs of our scenario modelling approach which considered a range of different capacity delivery routes. Both conventional and market tested options in different combinations, which were technically feasible; resilient and provided sufficient capacity to accommodate anticipated sludge production in AMP7 were considered.

Figure 3: Capacity Scenario Modelling Output

Initiative	Delivery Route	Scenario									
		A	B	C	D	E	F	G	H	I	J
Refurbish Naburn UCD Cost	Conventional YW	Y					Y				
Decommission Naburn	Conventional YW		Y	Y	Y	Y		Y	Y		Y
Outsource North Area Sites (5,000 tds)	Market-Tested						Y				
Outsource North Area Sites (2,000 tds)	Market-Tested					Y				Y	Y
Export Sludge Agreement to WASC	Market-Tested		Y								
Build 5th Digester at Knostrop STC	Conventional YW	Y	Y		Y	Y	Y		Y		Y
Build THP at Knostrop STC (Conventional Delivery)	Conventional YW			Y							
Refurbish OOS 5/6th Digesters at Hull STC	Conventional YW					Y			Y		Y
DBFO THP build at Hull STC (Basic)	Market-Tested							Y			
DBFO THP build at Hull STC (Extended)	Market-Tested										
Build THP Blackburn Meadows STC (Conventional Delivery)	Conventional YW				Y						
DBFO THP build at Blackburn Meadows STC (Basic)	Market-Tested							Y		Y	
DBFO THP build at Blackburn Meadows STC (Extended)	Market-Tested										
Resilience Solutions	Conventional YW	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Total Capacity Provided		170,084	173,263	172,008	169,102	171,018	175,084	171,510	169,018	167,856	171,018
Treatment Demand		167,800	167,800	167,800	167,800	167,800	167,800	167,800	167,800	167,800	167,800
Surplus/Deficit		2,284	5,463	4,208	1,302	3,218	7,284	3,710	1,218	56	3,218
% Sludge Deficit at 95% Confidence Interval (Output Resilience Model		0%	0%	1%	0%	0%	0%	0%	1%	1%	2%

We will ensure that our costs to deliver our strategy are efficient with significant market testing of solutions for our bioresources service. This will see three-quarters of our spend being procured via the market, with new outcome based contracts for efficient treatment capacity, innovative biogas usage, dewatering solutions, and bioresources transport.

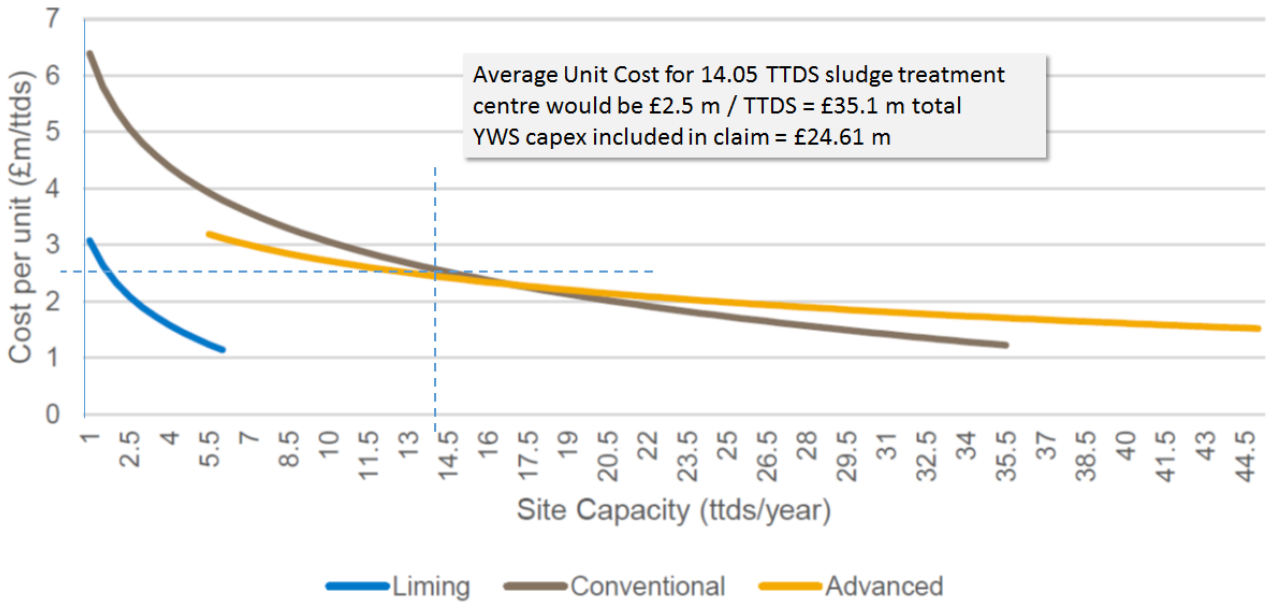
To ensure we have fully understood the potential for market driven efficiencies we carried out a large scale third-party engagement programme designed to market test over 80% of our proposed bioresources programme. We have engaged with the potential supply chain to understand how these could be delivered most efficiently and subsequently modified our plans to suit market delivery.

On the basis of this approach we are confident to apply a significant efficiency challenge to our initial unit cost database assessment of programme costs and will carry the risk of any shortfall in the event that those efficiency assumptions prove optimistic. Our market testing has allowed us to establish an efficient cost benchmark based on a direct delivery, build only solution, for these discrete packages of work.

With regard to the significant investment in new digester capacity at Knostrop we have also benchmarked our costs against the unit cost curves provided by Ofwat in the publication 'Economic value of bioresources assets – feedback to companies' published in February of this year. The value assessed against the Ofwat published benchmark (figure 4) is deliberately an unadjusted value for the digesters at Knostrop, because we are comparing it with Ofwat published benchmark costs which are assumed to be in 2016-17 prices. Therefore, the costs assessed will not reconcile to the costs used in other parts of this cost adjustment claim document.

The combined capacity of the new digesters at Knostrop will be 14.05 TTDS, which based on the data presented in the Ofwat document would have an average capital cost of £2.5 million per TTDS equating to £35.1 million in total (see figure 4 below). We are confident of delivering this new capacity for £24.61 million (in 2016-17 prices), a full 30% below the average cost benchmark.

Figure 4 Comparison of average capital costs for three treatment technologies for different capacities of treatment centres – (unadjusted for real price effects)



Our overall bioresources strategy will allow us to move to a more efficient and competitive unit cost during AMP7 but the 'lumpy', short-term investment we need to make to realise those long-term efficiencies is unlikely to be captured in Ofwat's efficient cost baselines and our AMP7 programme would look comparatively inefficient which is why we need to submit the cost adjustment claim for the additional capital enhancement investment required due to the impact of our WINEP and the corresponding increase in sludge volumes.

Table 3 below shows the key components of our additional capacity investment as a consequence of our WINEP in AMP7 (adjusted for RPE) which form the basis of our claim.

Table 3 – AMP7 Bioresources Capital Investment

Item	Capex (£m)
Build two additional digesters at Knostrop	£25.31
New assets to manage additional and new types of sludge at 11 sites	£16.82
New sludge dewatering assets at 7 sites	£18.23
Cost Adjustment Capex	£60.36

For the additional sludge management and dewatering costs, we applied an efficiency challenge to our initial cost estimates which were derived from our unit cost database. Based on the nature of the scheme and the assessed potential for direct delivery we identified potential efficiencies which have been applied to these costs above. We consider that the total value of the cost adjustment claim has been fully challenged against robustness and efficiency considerations.

The costs submitted as part of this cost adjustment claim, represent in our view, an efficient cost for delivering the most appropriate solution taking account of technical feasibility; risk to customers and the environment and long-term value.

Our future unit cost of treatment will be affected by the cost of sludge processing, treatment and disposal (including transport). The combination of measures we are adopting in our sludge asset base to meet the WINEP3 sludge challenge has been derived to obtain the best value for overall sludge treatment. This includes the ability to recover value from bioresources in terms of biogas, and future ability to recycle P into the local economy.

Having considered a range of options, tested the robustness of our cost estimates, challenged them based on future anticipated efficiencies, and stripped out any costs we consider likely to be included in cost baselines, we arrived at the final quantum for the claim.

Table 4 illustrates the overall cost of our AMP7 bioresources plan (adjusted for RPE) and sets the cost adjustment claim within that overall context. This shows that the additional investment required to address the sludge volumes arising from our WINEP3 P-removal programme amounts to 15.9% of the overall price control, making it material within the Ofwat guidance pertaining to cost adjustment claims.

Table 4 – Costs of AMP7 Bioresources Plan and Cost Adjustment Claim

Item	Value in AMP7 Plan (£m)	Value in Cost Adjustment Claim (£m)	Assumptions
Operating Cost	£209.48	-	Efficient OPEX costs to process anticipated sludge volumes during AMP7
Base capex	£83.57	-	Base maintenance of existing sludge treatment and disposal facilities
Additional capacity capex (WINEP)	£60.36	£60.36	New Knostrop digesters and new processing, and dewatering at 18 sites
Additional capacity capex	£21.16	-	Investment in Hull digesters and creating new dewatering capacity at Naburn
Enhancement capex (MCPD compliance)	£5.68	-	Investment required to comply with MCPD requirements included in enhancement
Total	£380.25	£60.36 15.9%	£60.36m of our efficient costs which would not be covered in Ofwat's efficient baseline costs

As illustrated in Table 4 above, the £60.36 million covered in this cost adjustment claim reflects only a proportion (74%) of the overall investment in capacity during AMP7, which amounts to £81.5 million in total. The total capacity investment is required to deal with a forecast capacity shortfall of 14,048 TDS by the end of AMP7 of which 11,332 TDS (or 81%) can be attributed to increased sludge production due to WINEP impacts. We anticipate that the remaining capacity investment elements will be captured in

Ofwat's modelled baselines for the modified average revenue price control and have therefore excluded them from our cost adjustment claim.

We describe in section 1.6.2, the steps we will take to protect customers from unnecessary costs if our planned investment was to be reduced or delayed because of changes in the final scope and timing of the WINEP programme.

Whilst the nature and costs of the schemes which comprise our bioresources plan do not necessarily meet the thresholds or criteria for direct procurement, as we describe above we will use competitive market-based solutions to deliver our programme ensuring that the cost to our customers is minimised.

1.5.4. Cost Benefit Assessment

Compliance with bioresource treatment standards is not optional and we have to comply with the requirements of WINEP3 including dealing with the consequences of increased sludge production volumes due to additional P-removal.

As discussed in section 1.3.1, beyond a general expectation that we should deliver high quality sewage services, in the context of a growing population and extreme weather events, customers have limited insight into the impacts and value of the bioresources service. As such our approach to the development of our bioresources plan has been to optimise our programme within the context of the four tests set out in section 1.5.3 in order to deliver compliance with our regulatory and legal obligations, at the most efficient cost, consistent with providing the appropriate level of confidence and resilience in future service provision.

Our solution has been developed to maximise cost benefit from the extra sludge arising from our WINEP, by optimising the capital provision for biological P, within affordability constraints. This allows us to maximise the proportion of the sludge which can have value recovered from it in the form of biogas and renewable energy and reduction in the reliance on chemicals, whilst maximising the potential for P recycling. This approach reduces our unit cost of treatment, while optimising sludge business resilience.

The investment in additional capacity will significantly reduce our unit operating costs in AMP7, relative to our pre-WINEP plan. Our total operating costs in AMP7 will be around £37m lower than forecast in our original plan as a result of the new sludge treatment

options which our new plan will deliver. These operating efficiencies will continue beyond AMP7 and our balanced strategy will allow us to deal with any future growth in demand with increasing levels of efficiency.

1.5.4.1. Methodology

The cost-benefit analysis of schemes for the Cost Adjustment Claims (CAC) compares present value costs and benefits in the need or 'do nothing' scenario with present value costs and benefits in the scenario where the solutions are implemented.

1.5.4.1.1. Cost

The costs referred to in this instance are the capital and operational expenditure (i.e. capex and opex, or totex), where the costs in the solution are the same as those presented in this claim and in the relevant data tables. The whole life cost calculation is as follows:

- Using the Spackman approach to discounting, capex is annuitized over 40 years using an annuity rate of 2.4% reflecting the Weighted Average Cost of Capital. This reflects the annual cost of capex if Yorkshire Water borrows money over 40 years to fund capital expenditure.
- Annuitised capex and opex are added together to get totex, and totex values are discounted using the HM Treasury Green Book discount rate of 3.5% for the first 30 years, dropping to 3% for the next 10 years. The discounting adjusts future values into present value terms.

1.5.4.1.2. Benefits

The benefits are measured and valued according to the different service measure impacts on natural, social, human, financial and manufactured capital. The monetary values of the different relevant capitals for each service measure have been estimated using different techniques, including benefits transfer (i.e. using available and relevant information from existing studies and adjusting where necessary), desk-based studies and primary research.

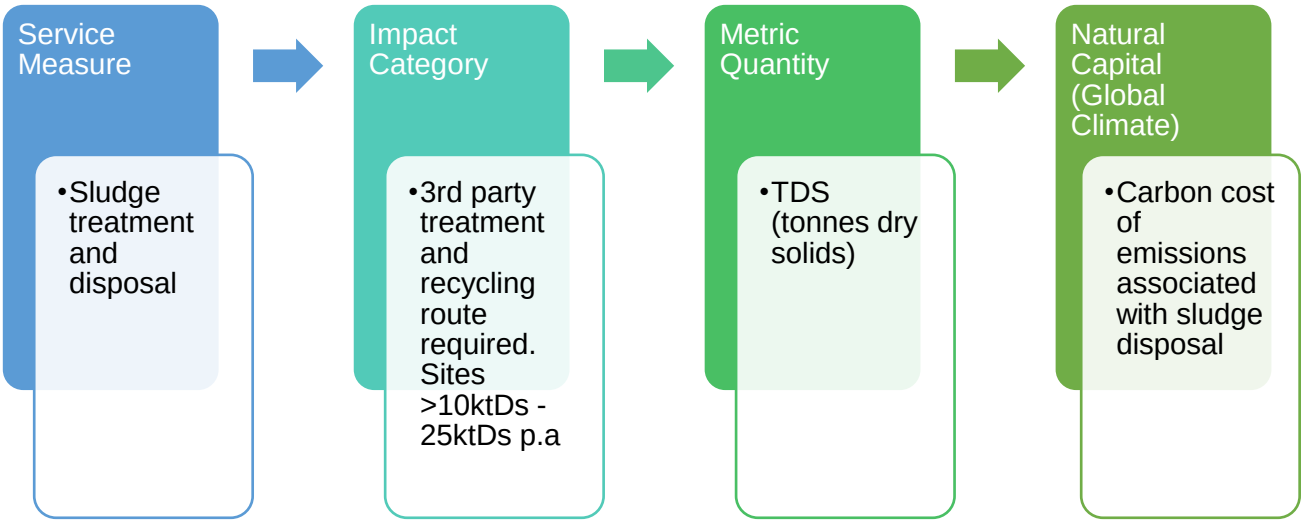
Additionally, different economic valuation approaches were used in the estimation of these values. This includes price or cost approaches (using market price as a proxy for economic value), revealed preference valuation and stated preference valuation.

The diagram below shows an example of how a change in service translates to a benefit impact (please see chapter 9 our business plan narrative called 'Decision efficiency' for a description of Yorkshire Water's Service Measure Framework).

The introduction of a solution leads to an improvement in service relative to the need scenario (e.g. reduction in sludge disposal and associated carbon emissions).

The total benefit value of a service measure impact at a point in time equals the unit benefit value for that service measure impact (e.g. carbon emissions cost per tonne dry solids of sludge disposed) multiplied by the quantity of service impact (e.g. tonnes dry solids).

Figure 5 process flow



As with costs, benefits are also adjusted in present value terms.

The cost-benefit analysis is performed for the needs and associated solutions for each Cost Adjustment Claim, where the net present value benefit is calculated by:

$$\left(\sum PVcost_{need} - \sum PVcost_{solution}\right) + \left(\sum PVbenefit_{need} - \sum PVbenefit_{solution}\right)$$

For a given period, a net beneficial scheme is one where the total present value costs and benefits in the need scenario are greater than the total present value costs and benefits in the solution scenario. We use a 40-year period for the cost-benefit analysis.

1.5.4.2. Cost Benefit Analysis results

The table below shows the results of the cost-benefit analysis for the scheme under the bioresources cost adjustment claim.

Table 5 – Cost Benefit Analysis findings

Investment Need	Cost/Benefit	AMP7 total PV	40-year total PV
Bioresources enhancement expenditure (WINEP)	$\sum PVcost_{need} - \sum PVcost_{solution}$	-£7.577m	-£57.209m
	$\sum PVbenefit_{need} - \sum PVbenefit_{solution}$	£3.414m	£41.391m
	Net benefit	-£4.163m	-£15.818m

The solution cost used in this analysis reflects the proportion of totex associated with the claim net of any real price effects. The reason for using pre-RPE adjusted costs is to ensure that costs and benefits are comparable.

The benefit values are associated with three Capitals: Natural, Financial and Manufactured Capitals. The Natural Capital value is due to the reduction in carbon emissions from sludge disposal.

For AMP7, the present value benefit for Natural Capital is around £304k and £3.7m over 40 years.

On the other hand, the Financial and Manufactured Capitals value is due to avoided private costs (Yorkshire Water) associated with sludge regulation compliance failure. £3.1m of present value benefits due to these avoided costs are incurred in AMP7 and almost £37.7m over 40 years.

Whilst an overall assessment through CBA concludes that the scheme(s) are not net beneficial over 40 years, we would argue that we have ensured that it is the most cost-effective solution to deal with the consequences of complying with our statutory obligations.

Table 6 – Benefit breakdown by associated capital category

Capital benefits	AMP7 total PV (£m)	40-year total PV (£m)
Natural Capital	£0.304m	£3.693m
Financial and Manufactured Capitals	£3.110m	£37.697m
Total	£3.414m	£41.391m

1.6. Protecting stakeholders' interests

1.6.1. Alignment with Outcomes and Incentives

The primary performance commitment that is linked to the bioresources enhancement expenditure cost adjustment claim is our 'Quality Agricultural Products' commitment. Table 7 shows a summary of where we have identified in APP1 of the data tables if our PCs are linked in part or fully.

As shown there are three PCs that relate to this claim, with the secondary PCs being 'Operational Carbon' and 'Renewable Energy Generation'.

Please refer to 'Appendix 19c: Performance Commitments & ODIs' for further details.

Table 7– Links/alignments to performance commitments/outcomes (APP1)

Performance commitment	Bioresources cost adjustment claim
Operational Carbon	Part
Quality Agricultural Products	Part
Renewable Energy Generation	Part

It is clear for this claim that the incentive rate attached to the performance commitment isn't sufficient to protect customers from changes in the investment requirement relating to this claim, therefore to ensure that customers are appropriately protected we have proposed a mechanism in section 1.6.2.

1.6.2. Reduction or Cancellation of Investment

It remains a possibility that the scope of the AMP7 WINEP programme with regard to P-removal could change, pending the outcome of ongoing dialogue with DEFRA and the Environment Agency. Should this situation arise we would be able to reduce our overall investment, thereby reducing our AMP7 revenue requirements. We propose the following mechanisms for determining the reduction in investment. To be clear these mechanisms differ to our proposed unit cost adjustment mechanism for WINEP set out

in Appendix 8g. However, the premise of the mechanisms is the same, in that if our WINEP obligations are reduced, and these are the P-removal obligations, then these mechanisms will reduce our investment requirements accordingly. In the case of our mechanism below it is based on sludge production volumes.

Should the scope of the WINEP programme be reduced such that our forecast sludge production falls by 7,024 TTDS (half the current forecast deficit) we would only require a single new digester at Knostrop reducing our investment needs by £12.65 million. In the event that the scope of the WINEP programme was such that our forecast sludge production falls by 14,048 TTDS we would no longer require any new digesters at Knostrop, reducing our investment needs by £25.31 million.

With regard to investment at the 11 sites where WINEP will drive additional investment in sludge control and the 7 sites where additional dewatering will be required, we would be able to reduce our investment needs on a site by site basis dependent on whether the P-removal schemes at those sites are required to be delivered in AMP7. The investment attributable to each site is summarised in Table 8.

We are confident that the above approach sufficiently protects customer and ourselves in most scenarios. However, should our WINEP change significantly by final decision, for example due to our proposal on ‘catchment sense’ (see Appendix 8g), then we may have to revisit our proposals in this document to ensure that all key stakeholders’ are adequately protected from significant changes in our WINEP and our delivery of the obligations contained within it.

Table 8 – Reduction in investment requirements associated with removal of WINEP phosphorous reduction requirements

Site	Associated Investment Need due to WINEP (£m)
Enhanced Sludge Control	
Aldwarke STF	£2.40
Blackburn Meadows STF	£0.52
Bradford Esholt STF	£0.52
CalderVale STF	£1.40
Dewsbury STF	£3.22
Knostrop E&R facility	£3.50
Lundwood STF	£0.80
Old Whittington STF	£0.92
Sandall STF	£0.96
Woodhouse Mill STF	£1.26
Huddersfield STF	£1.31
Total Enhanced Sludge Control	**£16.82**
Dewatering	
Staveley STF	£3.03
Wombwell STF	£0.71
Sutton STF	£0.76
Castleford STF	£0.69
Harrogate South STF	£0.84
Neiley STF	£0.69
Keighley STF	£11.52
Total Dewatering Control	£18.23

1.7. Assurance

The Yorkshire Water Board has reviewed this cost adjustment claim and satisfied itself that the investment proposals are robust and deliverable and result from an appropriate option appraisal process and that the proposed solution is in the best interests of our customers.

As part of this they have signed a board assurance statement that relates to the whole of the business plan, including a statement relating to our use of cost adjustment claims.

"The Board has made responsible use of cost adjustment claims ensuring that the majority of costs are exposed to the efficiency challenge. It has only proposed claims where there are conditions it considers to be specific to the Company's operating circumstances.[6]

To support this statement relating to cost adjustment claims the board were presented with the findings of our external assurance. All of the cost adjustment claims submitted as part of our plan have been subject to third party independent assurance from Jacobs. We have taken on board all of the audit actions and queries and provided sufficient responses and amendments that means all claims submitted have no outstanding material audit issues (red or amber status).

[6] 'Chapter 3, Board assurance statement', Page 6, paragraph 5.

YORKSHIREWATER.COM

Yorkshire Water Services Limited, Western House, Halifax Road,
Bradford, BD6 2SZ. Registered in England and Wales No.2366682

YorkshireWater

Part of Appendix 8m:

PR19 Outcomes Debrief 11.04.18 – Extract

Author: DJS Research

YorkshireWater

djs research

YorkshireWater

PR19 Outcomes

Debrief prepared for:
Donna Hildreth & Paul Chapman

April 2018

Ali Sims
Research Director

Matt Prince
Research Manager

Emma Lay
Research Manager

3 Pavilion Lane, Strines,
Stockport, Cheshire, SK6 7GH

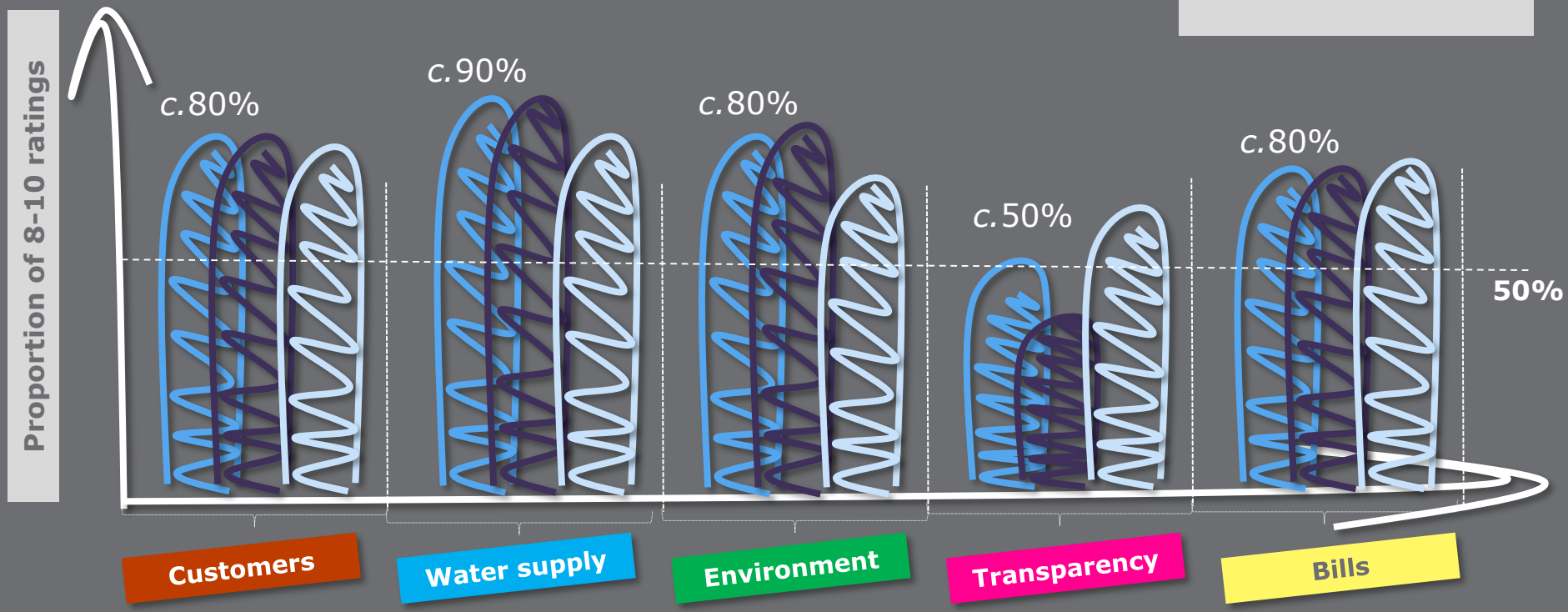
+44 (0)1663 767 857
djsresearch.co.uk

JN 4926

2 Headlines

Support for the five Big Goals

Water supply & Environment are the strongest goals in terms of levels of support, while Transparency is least well supported, overall.



5

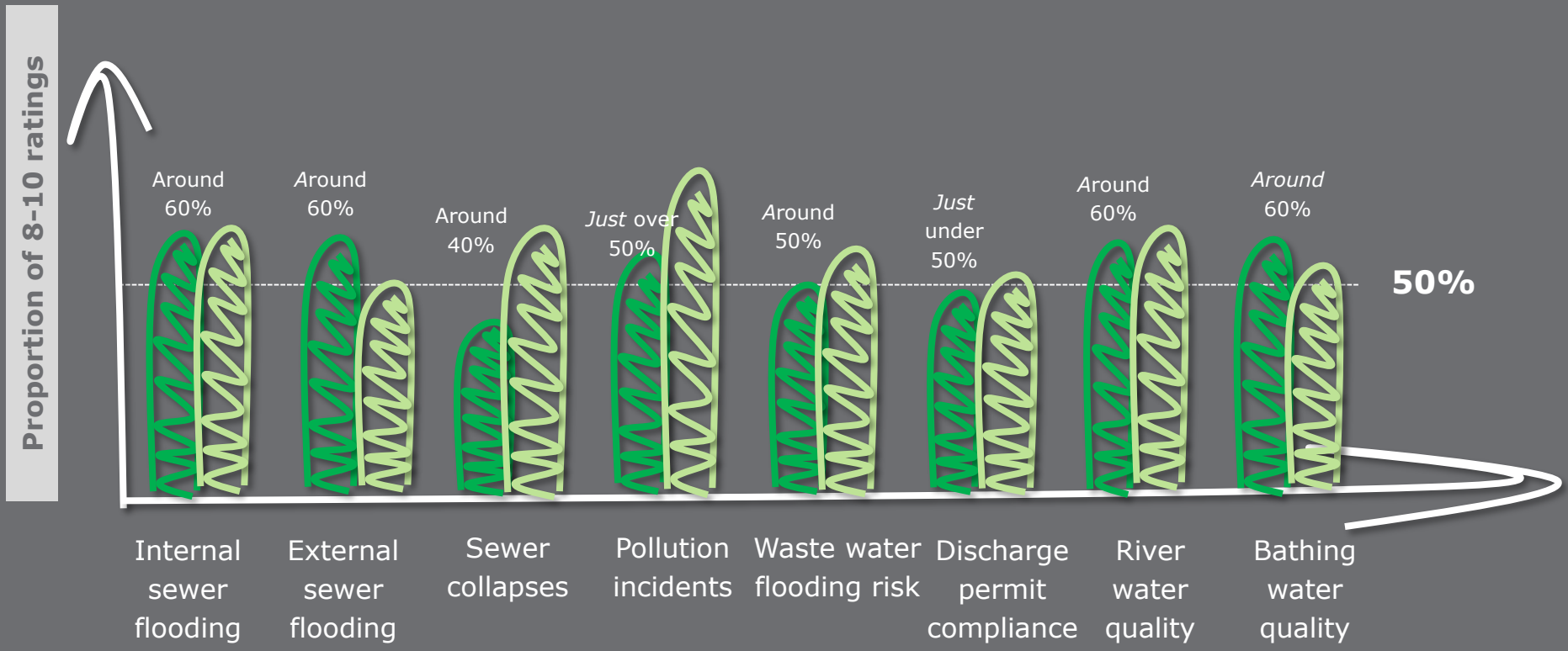
‘Big goals’: in detail

In depth look at each of the big goals and the associated PCs

3.
Environment:
We will recycle all waste water, protecting you & the environment from sewer flooding & pollution.

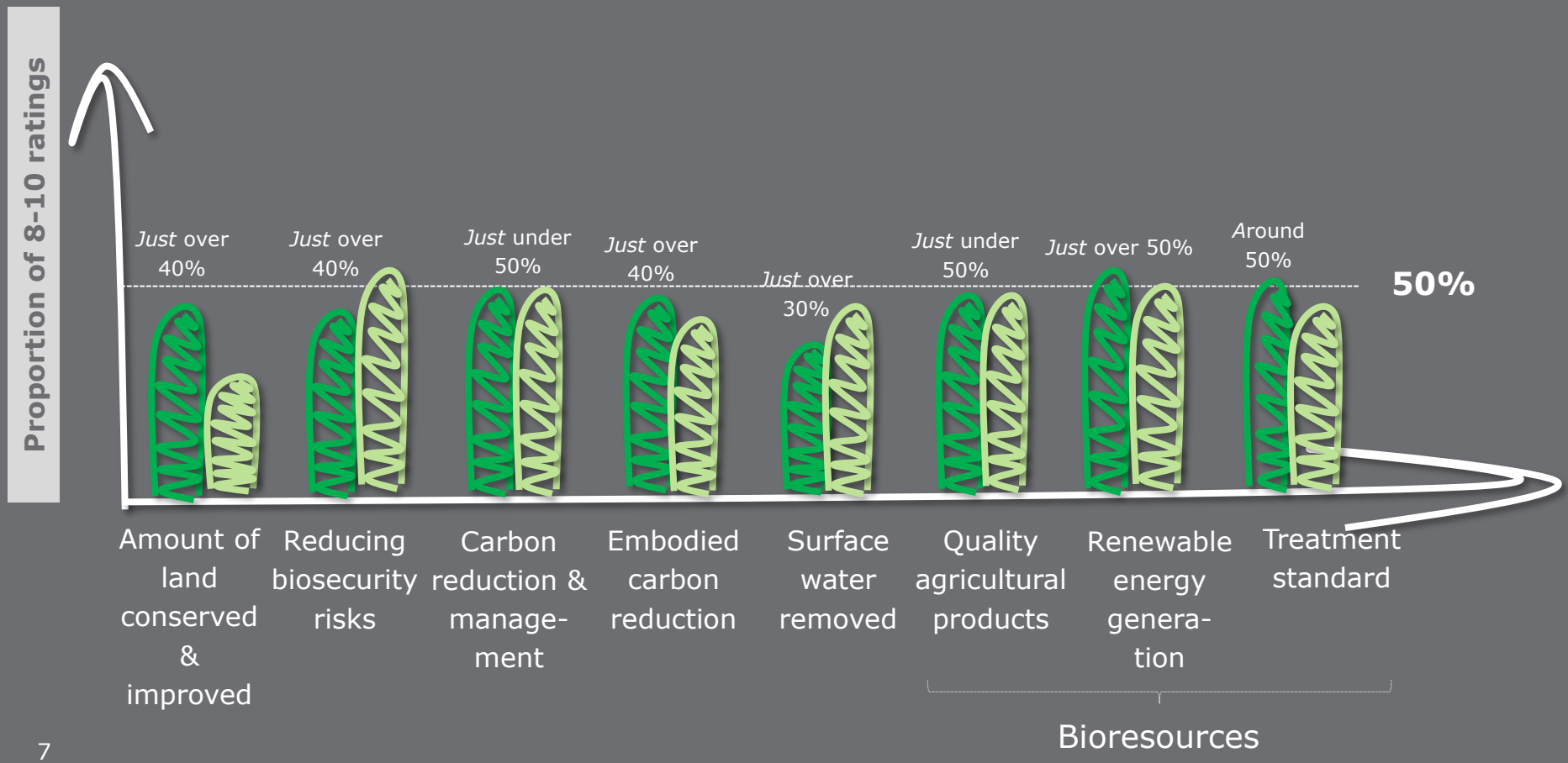
Environment PCs – importance

Internal & external sewer flooding as well as water quality in the environment are some of the most important areas to customers generally although businesses are more likely than household customers to see the importance in pollution incidents



Environment PCs – importance

Surface water removed is the Environmental PC to attract the lowest levels of perceived importance



Importance: pre-task vs. FT grids

Overall, rankings of importance remain fairly stable, although the issue of sewer collapses sees a 10 place fall, and the three bioresources PCs all increase in importance

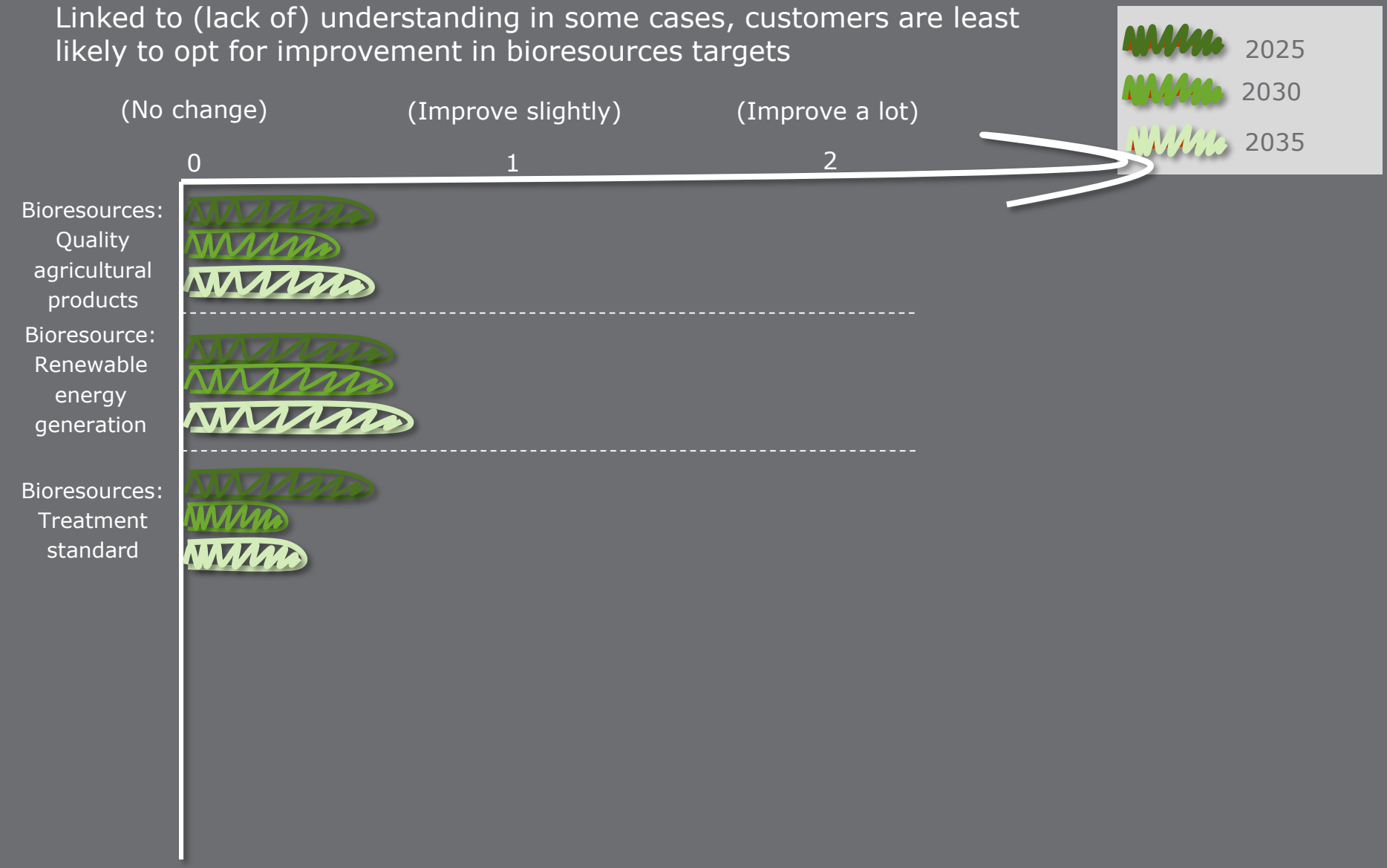
Pre-task importance ranking		Future targets importance ranking
1	Internal sewer flooding	1
5	External sewer flooding	5
3	Sewer collapses	13
6	Pollution incidents	2
7	Waste water flooding risk	7
8	Discharge permit compliance	10
4	River water quality	3
2	Bathing water quality	4
11	Land conserved / improved	15
10	Reducing biosecurity risks	12
9	Carbon reduction & management	8
14	Embodied carbon reduction	14
13	Surface water removed	16
16	Bioresources: agricultural products	11
12	Bioresources: renewable energy gen	6
15	Bioresources: treatment standard	9

Aside from two of the three bioresources PCs, all commitments see a >10% drop in the proportion of 8-10 ratings from the pre-task to the future targets grids

Bioresources PCs increase in importance once measures have been explained/discussed in detail

Future targets & improvements

Linked to (lack of) understanding in some cases, customers are least likely to opt for improvement in bioresources targets



Review of PCs

General thoughts on Environment PCs

- Although customers generally feel that **biosecurity risks** sound like a serious issue, many feel that if it was a wide spread problem (as claimed in the booklet) then they would be more aware of some of the examples given (such as demon shrimp).

- **Carbon reduction & embodiment** is generally felt to be important with those with children noting that it is important think about the implications for future generations. However, some do have concerns over the potential cost implications of the schemes involved.

"Not only is it likely to be very expensive but sometimes you can use more carbon when building things like windmills" – Huddersfield, NHH

- Customers feel that it isn't clear exactly how YW plans to 'help' customers with **removing surface water** so they often felt unable to make an informed call on this PC.

"I don't understand what they're going to do to help – are they going to give people water butts? How will it impact your bill?" – York, HH

- Some customers really struggled to see the benefit to them as customers with **Bioresources**. Some of the information in the section was felt to be a little too much to comprehend and it was felt that it could be reduced into one or two PCs at the most

"It doesn't really mean anything to me but who am I to comment on it – surely they should be consulting people that are better placed to comment on these niche areas"– Sheffield, NHH

Part of Appendix 8m:
Economic value of bioresources assets – feedback to companies

Author: Ofwat

YorkshireWater

16 February 2018

Trust in water

Economic value of bioresources assets – feedback to companies

www.ofwat.gov.uk

About this document

This document sets out feedback to the ten largest water and sewerage companies in England and Wales (companies) on their assessments of the value of their bioresources assets that each company submitted in September 2017.

To provide a level playing field for bioresources trading and processing and to protect customer interests, it is important that a robust and accurate valuation of assets supports the allocation of the wastewater regulatory capital value (RCV) at 31 March 2020 between the network plus and bioresources controls at the 2019 periodic review (PR19).

We expect companies will use this feedback to improve their valuations and proposed RCV allocations that they will submit in their business plans by 3 September 2018.

Contents

1. Introduction

1.1 In April 2017 we provided guidance for water and sewerage companies (companies) to assess the economic value of their sludge assets, propose a RCV allocation to the bioresource price control and provide this information to us by 29 September 2017.

1.2 This document summarises our feedback to companies, which we expect them to use to improve their valuations and consider the RCV allocation that they propose which they will submit in their business plans by 3 September 2018.

1.3 We require a valuation of these assets to set a separate revenue control for bioresources; the 2019 Periodic Review (PR19) is the first time we will do this. Introducing a separate binding revenue control for bioresources will inform, enable and encourage an effective market by revealing improved information.

1.4 Companies have proposed that the RCV is allocated on the basis of a detailed valuation taking account of our guidance. Each company has sought independent assurance to help provide confidence in the information they have provided.

1.5 Our guidance asked companies to complete a forward looking valuation, which required some exercise of judgement. In places companies have taken inconsistent approaches through varying interpretations of our guidance. Where this is the case our feedback clarifies what we expect companies to do.

1.6 Chapter 2 provides a brief background to why we need this information and sets out the five steps of our guidance to companies.

1.7 Chapters 3 to 8 each follow one of the five steps of our guidance. The first step of our guidance is considered in both chapters 3 and 6. In each chapter we summarise our guidance, comment on the information that companies submitted and provide feedback.

1.8 Chapter 9 sets out next steps that we and companies will take to assess the economic value of their bioresource assets and allocate the wholesale wastewater RCV between the bioresources and wastewater network plus price controls.

2. Background

Why set a separate bioresources control?

2.1 Our aim is to promote a greater role for markets in bioresources services, creating opportunities for companies to look beyond traditional company boundaries and their own in-house solutions to meet the long-term needs of customers.

2.2 This should deliver increased optimisation of activities across companies and greater participation from firms operating in wider waste markets. This will drive benefits of greater efficiency, improved resilience in services, and broader environmental benefits.

2.3 We are setting a separate control for bioresources to bring management focus and transparently delineate activities between bioresources and the rest of the wholesale wastewater activities. A separate control will reveal information that will help us to promote markets.

Why do we need to know the value of bioresources assets?

2.4 We use a building blocks approach to setting a price control; calculating the efficient costs companies need to run their business and making sure that customers do not pay more than this. An important building block is the cost of the capital invested in the company, the regulatory capital value (RCV).

2.5 We created this regulatory tool shortly after privatisation for the purposes of setting price controls. The RCV reflects the investment shareholders made at privatisation and the additional finance required by companies since that date. The RCV tends to be a lower value than provided by other methods of valuing the assets of water companies.

2.6 We currently have a single value for the wastewater RCV that reflects the value of the capital that is invested in all of a company's wastewater assets, including bioresources assets. We need to allocate this RCV between the new bioresources and wastewater network plus price controls that we will set in our 2019 price review. The allocation is only for the purpose of setting price controls and is at a company level rather than site level.

2.7 In **Water 2020: our regulatory approach for water and wastewater services in England and Wales**, May 2016, we set out we will take a focused approach to the allocation of the RCV to the bioresources control. This is where the allocation is based on the value of the assets used. A focused allocation means that the RCV allocated to the bioresources control is not influenced by the historical discount to the RCV at privatisation (i.e. the difference between the value of the RCV and the value of the assets).[1]

2.8 We set out the objectives in allocating the RCV in May 2016 as:

- **Ensuring a level playing field for sludge transport, treatment, recycling and disposal** so that third-party service providers have clarity and confidence that they are participating in markets on equal terms with WaSCs.
- **Ensuring a level playing field for wider markets and protecting the interests of wastewater customers where WaSCs are involved.** A WaSC could use assets that exist at 31 March 2020 to offer services to customers outside its existing area or for nonregulated activities. One example is providing organic waste treatment outside the core area of wastewater treatment.
- **Avoiding over-recovery of gains from legacy asset sales/purchases** by WaSCs.
- **Maintaining consistency** between charges and cost recovery.

What did we ask companies to do?

2.9 Our guidance set out that companies should assess the economic value of their bioresources assets.

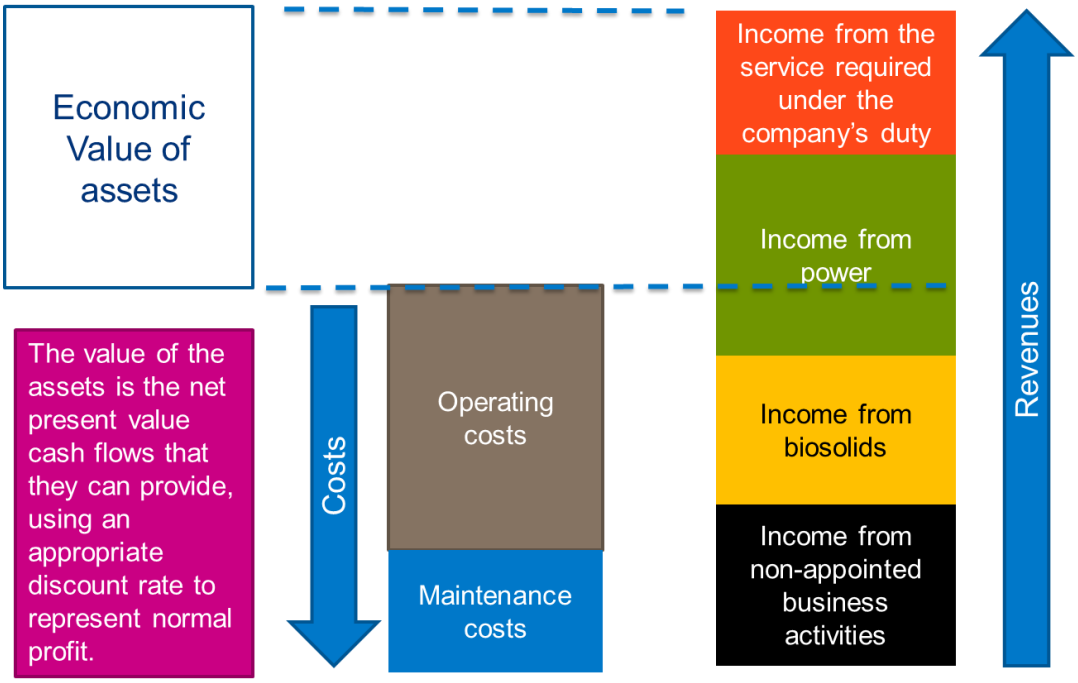
2.10 The value of the sludge assets is not simply that they are part of providing a basis for costing an essential service for protecting public health and the environment, but that they can yield value in energy generation and the ultimate biosolids product.

2.11 The economic value of an asset can be derived from the income less costs (net income) that the asset generates over time, as shown in figure 2.1. This is a forward looking concept that fits well with the development of markets. The

[11] The cost of replacing water industry assets with those of similar capabilities – as measured in modern equivalent asset value (MEAV) terms – is materially higher than the RCV. This is because, when the industry was privatised in 1989, the RCV was set based on the companies' market capitalisation after 200 days. Further background to the RCV is set out in RD 04/10: Regulatory capital values 2010-15.

economic value can be calculated as the present value of future net cash flows from the asset by adjusting the net income over time by the return that an investor would require to provide capital.

Figure 2.1 Illustration of the economic value of bioresources assets

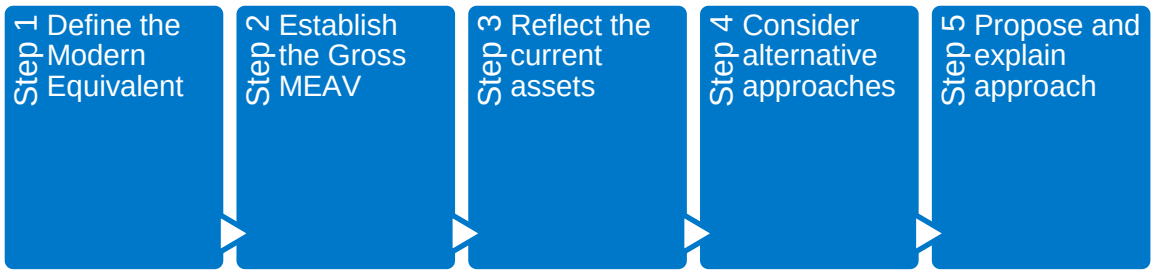


2.12 As we set out in our guidance calculating the economic value directly is difficult in practice. In the guidance we therefore set out that companies should value their assets using an alternative approach, which under certain assumptions, can provide equivalent values

2.13 The derivation of the alternative process is set out in detail in appendix 1 of our guidance document. The essential point is that the cost of the assets that a new market entrant would require to provide the same services helps provide a hypothetical local market price for the regulated services the company provides. These assets are called modern equivalent assets.

2.14 We set out a five step process for companies to follow to propose an RCV allocation to the bioresources price control.

Figure 2.2 Process for companies to propose an RCV allocation



2.15 Step 1 is to decide what modern equivalent asset would provide the same service as the current assets. Important decisions are the capacity that the assets need to have and the technology that should be used.

2.16 Step 2 is to estimate the capital cost of the modern equivalent assets that the company has defined. This estimate is the gross modern equivalent asset value (MEAV).

2.17 Step 3 is to adjust the gross MEAV to reflect the current assets. There are three main reasons why adjustments are required:

- The current assets may have different age profiles and remaining economic lives than new modern equivalent assets.
- There may be differences in the maintenance and operating costs of new modern equivalent assets compared to what the existing assets are already delivering.
- There may be different expectations of the external income that could be earned by modern equivalent assets from energy generation and from selling the bioresources end product as opposed to what current assets can receive. By external income we mean income which is in addition to the revenue collected from its wastewater customers.

2.18 The gross MEAV is reduced if current assets have shorter economic lives; or would earn less income; or would cost more to operate than modern equivalent assets. In these cases the current assets have net cash flows that are lower than the modern equivalent assets would have and therefore a lower economic value.

2.19 The opposite is also the case and where current assets have longer economic lives, would earn more income or be cheaper to operate than modern

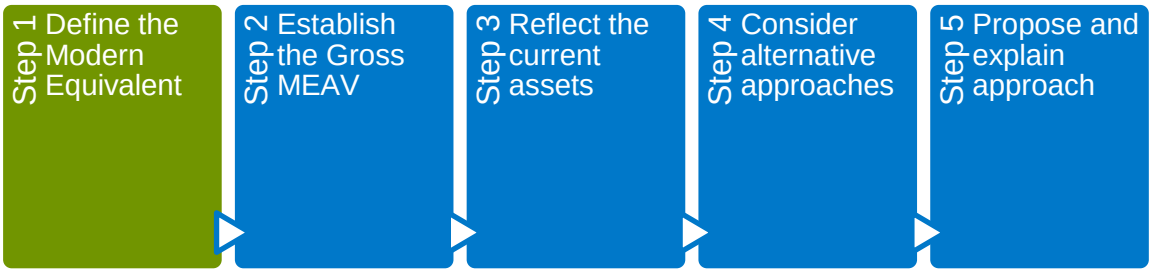
equivalent assets, positive adjustments to increase the gross MEAV are required.

2.20 Step 4 of our guidance is that companies should undertake cross checks to provide assurance that the RCV allocation based on economic value is appropriate and protects customer interests. These included testing if the allocation has an impact on customer bills or on the company's ability to set charges in line with both charging rules and competition law.

2.21 Step 5 is for the company to propose the RCV allocation. Where companies identify an issue with allocating the RCV on the basis of economic value, we ask them to propose an alternative RCV allocation. We expect them to explain how the allocation they propose will protect consumers' interests, including by promoting a level playing field for markets.

3. Step 1: define the modern equivalent asset (capacity)

3.1 In this chapter we consider a key assumption that companies made in defining modern equivalent assets that a new market entrant would require to provide the same regulated services, which is the capacity of the modern equivalent.



3.2 We will consider a further key assumption, the choice of technology, in chapter 6. This is because the choice of technology depends to a large extent on costs and revenue that are discussed in chapters 4 and 5.

3.3 In our guidance we set out that companies should consider what they would put in place based on their own assumptions of what would represent the best economic value for the market they operate without the constraint of the existing bioresources assets on the site.

3.4 While the modern equivalent assets must provide the same services as the existing assets, they do not need to be in precisely the same location and can be assumed not to have the existing local constraints that arise from historical investment decisions. To reduce complexity and judgement, we asked companies to start by considering modern equivalent assets as close as possible to their actual assets.

3.5 It is important that companies exercise judgement to identify when it is appropriate to diverge from the constraints of their actual sites. The modern equivalent asset is required to be realistic for the local market circumstances – in other words how a third party would provide efficient services. Unnecessary constraints of a particular site that are driven by past investment decisions should be relaxed if they are significant and unlikely to be faced by a third party.

Capacity

Key considerations

3.6 Capacity is a key assumption in the definition of the modern equivalent asset as it will have a direct impact on the cost of new assets and therefore on the resulting economic value.

3.7 There are a number of options to how companies might define the capacity of a modern equivalent asset. These range from the lowest possible capacity required to treat the expected throughput of bioresources to the maximum capacity of the current assets, whether they expect to use the capacity or not.

3.8 We asked companies to define modern equivalent assets with a capacity that was the same as the potentially useful capacity that they expect current assets to have at 31 March 2020. This is because how assets are used in the future may change, indeed the purpose of introducing a separate price control is to support a greater role for markets in bioresources services so that services can be optimised across the sector.

3.9 We expect capacity that is not useful and has no economic value to be excluded from this. This includes mothballed incinerator sites that are not expected to be used under any circumstance.

3.10 Company practice may affect the capacity of an asset, both in terms of the resilience required and the way assets are operated.

3.11 To provide a **resilient service**, companies may choose to maintain headroom between the volume of bioresource they expect to treat annually and the theoretical capacity of their assets. Volumes treated at bioresource treatment centres over a year are not constant week by week. Seasonal variations of production may occur due to factors such as temporary changes in population from tourism, natural variation in wastewater treatment processes. And for some companies variations in treatment capacity reflect the inability to dewater bioresources to the same extent in winter. Companies may also need to have spare capacity to manage both planned and unplanned maintenance. Companies could provide this headroom through contracts with third parties, spare capacity across a number of different sites or even dedicated assets.

3.12 Company **operation of assets** can also affect the capacity that is available from it. The main treatment process for the majority of bioresources is to keep it

in large tanks to allow biological processes to make it safe – primary anaerobic digestion. How long it is kept in those tanks will directly affect capacity. This is normally around 15 days, but, according to company data, ranges from 9 to 24 days. A site that retains bioresources in tanks for 24 days will have less than half of the capacity of a similar sized digester that retains bioresources for 9 days.

3.13 We checked that all companies' definitions of modern equivalent assets included all potentially useful capacity.

Observations on capacity

3.14 Three companies, Southern Water, Severn Trent Water and United Utilities proposed that the hypothetical capacity that they value should be less than the actual capacity they expect to have at 2020. In addition Wessex Water did not include a site that it does not expect to normally use, but that it will keep for resilience purposes.

3.15 As well as considering the capacity reported by companies, to assist comparisons we have normalised the capacity across companies. As set out above certain assets may have different assumed capacities depending on company practice. Assets that are most affected are digestion tanks and we have normalised capacity to adjust for the differences in how long companies retain bioresources in treatment. We have also normalised capacity to adjust for different approaches by companies to required headroom.

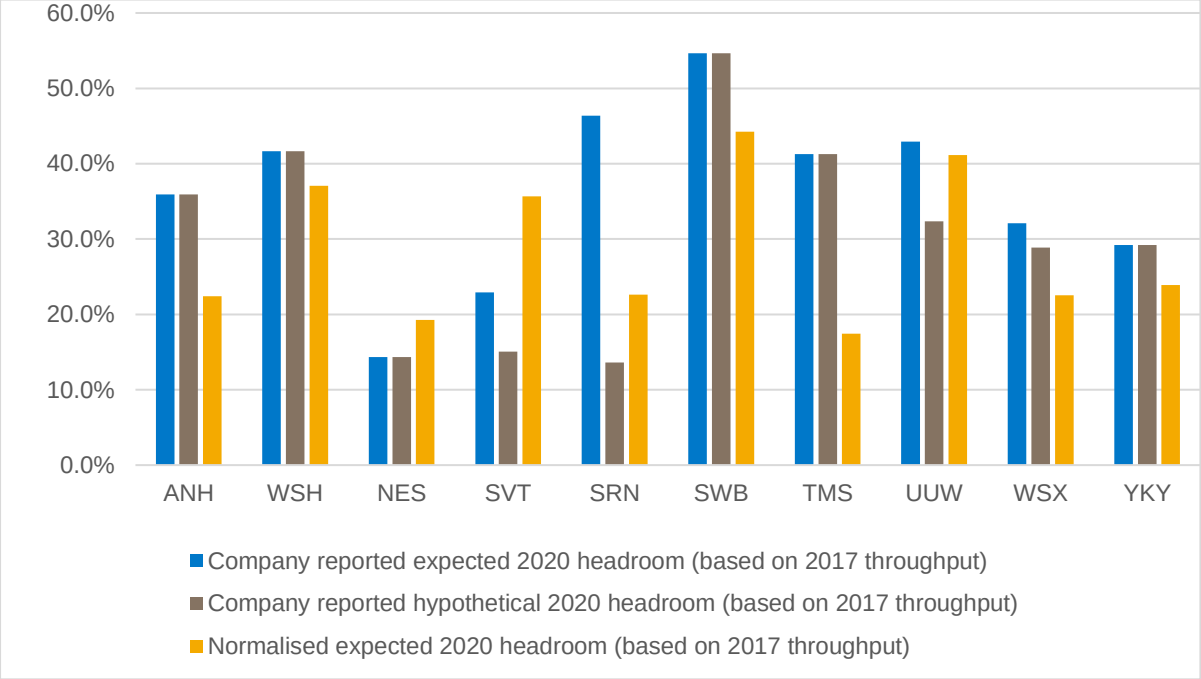
3.16 We have normalised capacity by calculating the capacity that companies would have if they retain bioresources in primary digestion for 15 days. We reduced capacity by 15% to reflect the required headroom to cover all other factors. We have used the same approach for both advanced and conventional digestion. We found no clear difference across the sector in hydraulic retention and required headroom between these different technologies, even though we would expect the retention time for advanced digestion to be shorter. For liming we have allowed a 15% required headroom factor. We have not adjusted for any other factor. We do not suggest the assumptions we have made should be taken as a standard. Each company should keep its own design and operational assumptions under review.

3.17 In figure 3.1 we present the percentage of additional headroom. These calculations are based on both the capacities companies reported and the normalised capacity. By additional headroom we mean headroom in addition to

the required headroom that companies include in their design assumptions or included in our normalised capacity.

3.18 To produce figure 3.1 we have used the throughput that companies reported in annual performance reports for 2016-17. Strictly we could use the expected throughput at 2020 to calculate utilised capacity. However the reported figures for 2016-17 are the most robust comparable figures that we have on the bioresources that companies treat in a year. We calculated excess headroom as the additional capacity available above the throughput volume. This is presented as a percentage of the throughput volume.

Figure 3.1 Comparison of additional headroom of expected assets at 2020 compared to company proposed hypothetical assets using information on utilised capacity from 2016-17.



3.19 There is significant headroom across the industry. We accept some variation in headroom may reflect requirements of dispersed populations which may have remote assets and so less flexibility to economically transport bioresources to different sites. We consider the four companies that propose to value modern equivalent assets that have a lower capacity than the capacity of their actual assets are not clear outliers against the rest of the sector. This is either on each companies' assessment of actual headroom, or on our normalised basis.

3.20 Defining the modern equivalent with a lower capacity than actual assets implicitly carries the judgement that the excluded capacity has no economic

value. The four companies that have excluded capacity (Southern Water, Severn Trent Water, United Utilities and Wessex Water) have not provided compelling evidence that their capacity should be treated differently to other companies. We therefore consider that companies should value the capacity of all assets they anticipate may be used to provide bioresource services.

Feedback on capacity

3.21 Our guidance set out that companies should consider the economic value of all their capacity at 2020. We expect that all companies will value modern equivalent assets with the same capacity as their expected actual assets at 2020. This excludes assets that are not expected to be used in any circumstance and therefore have no economic value.

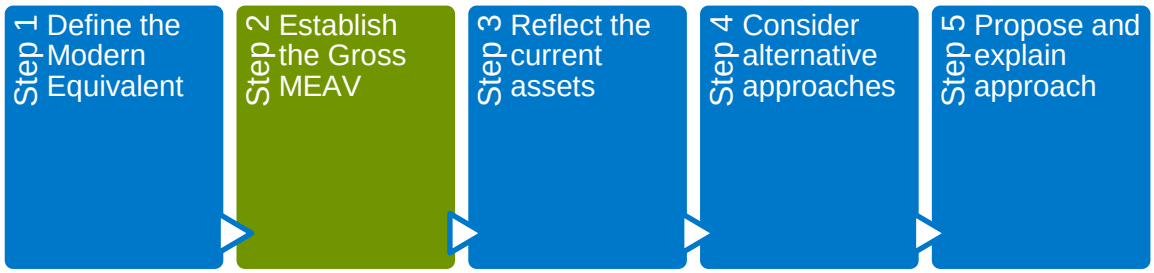
3.22 Our guidance allows companies to ascribe varying levels of value to the capacity of different assets. In practice no company has done this, and to do so would be overly complicated. Companies have either ascribed the same value to capacity or no value. For simplicity, we recommend that companies ascribe the same value to all potentially useful capacity by including it in the definition of the modern equivalent.

3.23 Assets that are not expected to be used in any circumstance, for example unused sludge lagoons or mothballed incinerators, should remain in the network plus business.

3.24 We expect companies to value modern equivalent assets that are retained purely for resilience purposes. We see no distinction between required headroom maintained across a number of assets for resilience purposes and a single site being retained solely to provide resilience. We consider that the extra capacity has value from the resilience that it provides.

4. Step 2 – Establish the gross modern equivalent asset value

4.1 Step 2 is to estimate the costs of building modern equivalent assets defined in step 1.



4.2 We would expect some similarity between companies' estimates of gross value for similar assets. Key differences will occur because of the capacity of assets, the particular technology used and, to a lesser extent, company factors such as regional costs.

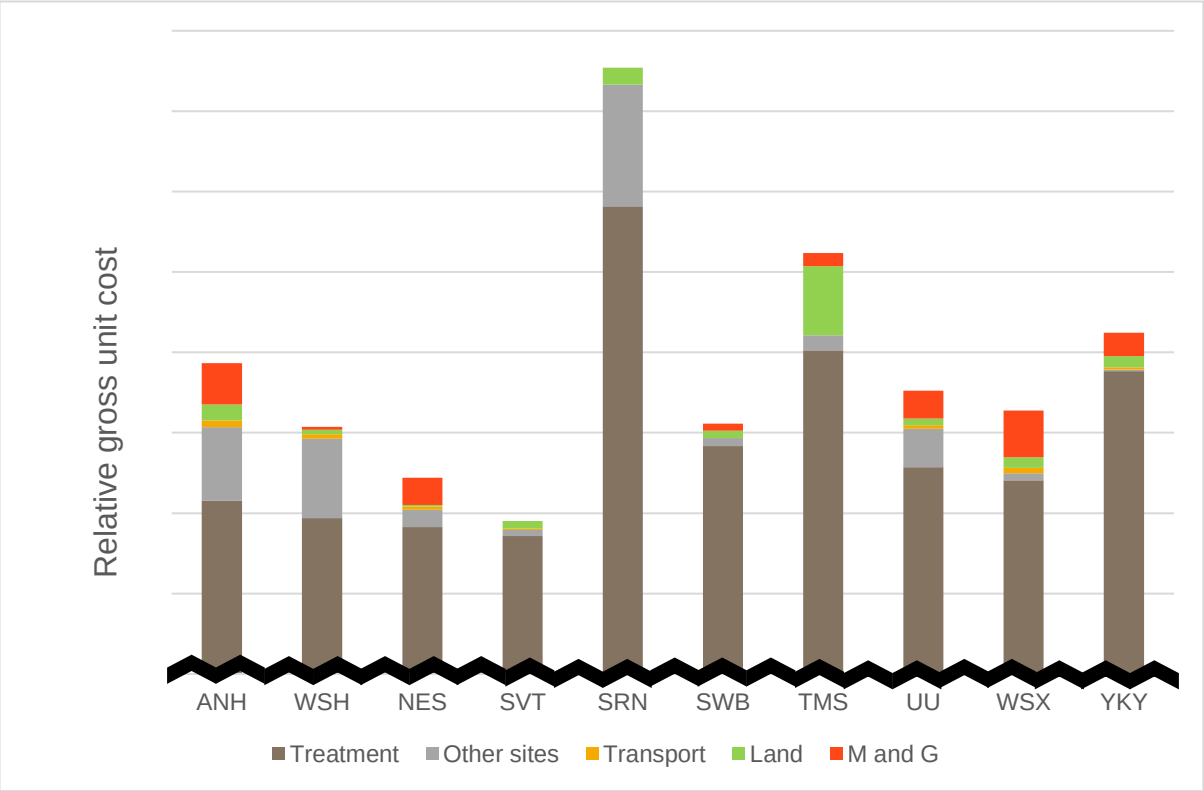
4.3 Bioresource treatment centres make up more than 75% of the value of modern equivalent assets. We have compared company assumptions on the costs of treatment centres by calculating unit costs using the normalised capacities that we used in assessing step 1. We have differentiated between the types of technology used.

4.4 We have also reviewed other company assumptions which can be significant cost drivers such as land and management and general costs.

Observations on gross MEAV

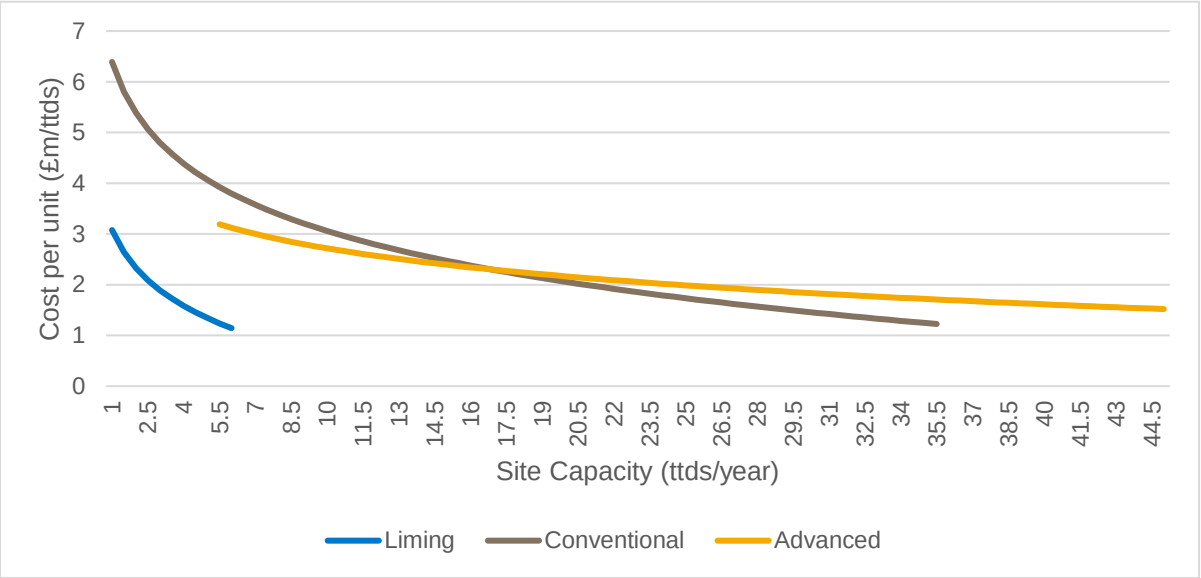
4.5 Figure 4.1 compares companies' modern equivalent costs per unit of normalised capacity.

Figure 4.1 Relative capital cost of modern equivalent assets per unit of normalised capacity



4.6 We have compared the capital costs for the three main bioresource treatment technologies: liming; conventional digestion; and advanced digestion, based on data supplied by the companies. Advanced digestion processes use a pre-treatment which typically allows greater biogas generation from digestion, higher quality resulting biosolids, and often a reduced volume of treated biosolids to recycle. Using such pre-treatment can also provide pathogen reduction meaning that secondary digestion is then not required to meet microbiological standards.

Figure 4.2 Comparison of average capital costs for three treatment technologies for different capacities of treatment centres.



4.7 As expected, liming has the lowest capital costs. We expected that the capital costs for advanced digestion would be higher than conventional digestion, but this is not always the case. When outlier sites are removed the two curves converge. It may be that the extra costs of the pre-treatment for advanced digestion is offset by the reduced costs of not needing secondary digestion that is typically required for conventional digestion. The cost of land, is not taken into account in figure 4.2.

4.8 Overall, it appears that there is little difference between the capital costs of conventional and advanced digestion treatment technologies. We remain cautious of this result as it could be influenced by company and site specific factors. We note that, when considering whether to implement advanced technologies at a conventional digestion site, most companies' decisions will be influenced by sunk costs on site, such as secondary digestion assets.

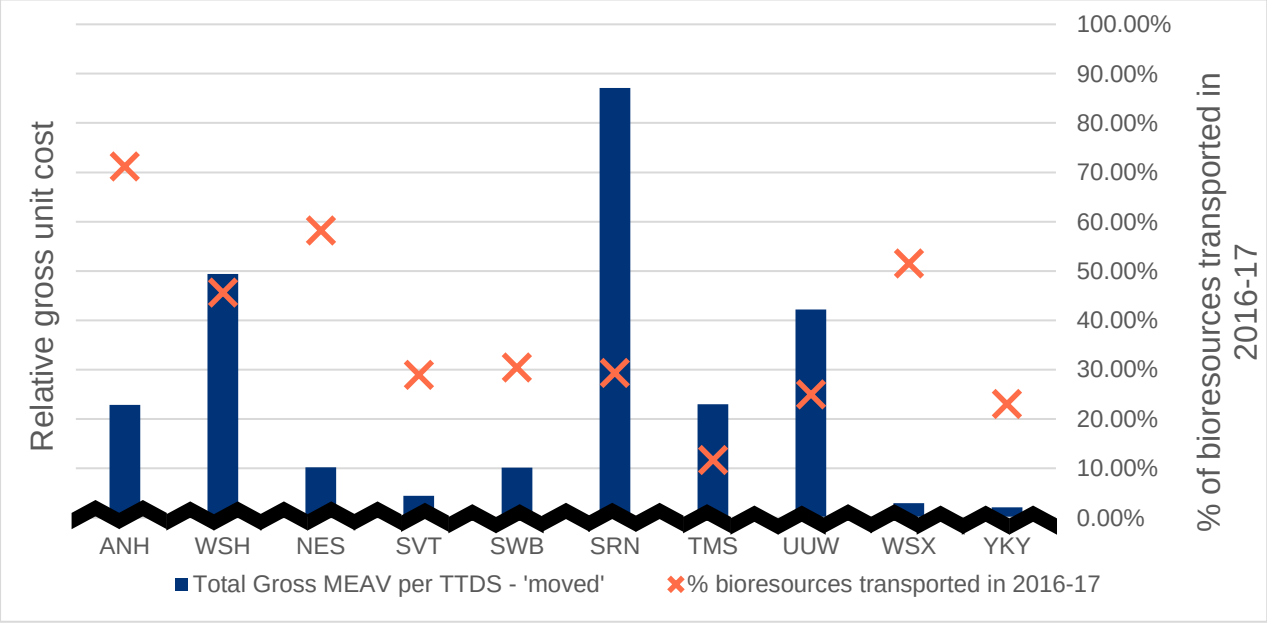
4.9 We provide further details of gross costs of treatment in the accompanying spreadsheet to this report.

4.10 As well as reporting modern equivalent costs of treatment sites we also asked companies to specify the costs of any other sites used by the bioresource business unit that are not used for treatment of bioresources. The majority of these other sites are intermediate thickening sites. Companies have more than 6,000 wastewater treatment sites, but fewer than 200 sites that treat bioresources. When transporting bioresources over large distances,

intermediate sites can be used to thicken bioresources to reduce the volume carried. The modern equivalent asset capital costs of other sites are less than 10% of gross costs across the industry. But for companies with large rural areas these sites can account for up to a third of gross costs.

4.11 We have compared the capital costs of other sites per unit of bioresources transported, to reflect that intermediate sites are likely to be linked to the transportation of bioresources. We would expect the unit cost to be similar between companies. However, there are large differences between companies' unit capital costs. We note that not all other site costs will be intermediate thickening sites and not all of the bioresource that is moved is thickened at an intermediate site. However, it suggests that there is variation in the capital costs companies have assumed for intermediate thickening sites that is not explained by how rural companies are.

Figure 4.3 Relative unit cost of gross capital costs of other sites per unit bioresources transported in 2016-17



4.12 There are large differences between management and general costs across companies. These costs include the allocations of shared assets within the overall wastewater business to particular bioresources sites. Often bioresource sites are co-located with wastewater treatment sites and therefore share assets such as power connections to the grid. For most companies management and general costs make up less than 5% of the economic valuation. For United Utilities and Wessex Water these assets make up over 10% of the economic

valuation. These two companies did not provide us with compelling reasons why their management and general costs are so large.

4.13 Anglian Water considers it is inconsistent with the regulatory accounting guidelines (RAGs) if the RCV allocation reflects shared assets where the bioresources business unit is not the principal user. The RAGs ask companies to report assets by business unit on a principal use basis. An operating charge is made to other business units that use the assets. Wastewater network plus is likely to be the principal user of most assets shared with bioresources. Therefore if the bioresources RCV reflects a proportion of these shared assets and the bioresource business unit also pays an operating cost to the network plus business unit, the same costs would be reflected twice.

4.14 There is a variation in the values companies have assumed for land. Companies provided reasonable evidence to support this.

Feedback on gross MEAV

4.15 All companies should consider the information we are publishing and test the assumptions they have made on gross costs.

4.16 We will consider further Anglian Water's view that shared assets, where the bioresources business unit is not the principal user, should not be included in the economic valuation. We expect all companies to identify a proportional allocation of the capital value of shared assets where the bioresource business unit is not the principal user. We will amend business plan table WWS12 to allow companies to report this information. We discuss amendments to WWS12 further in paragraph 5.73.

4.17 Companies should consider whether the proportional allocation of shared assets is reasonable, especially if the cost of shared assets are greater than 5% of their overall valuation. We expect companies to provide independent assurance on their allocation of shared assets if they account for more than 5% of the economic value of bioresource assets.

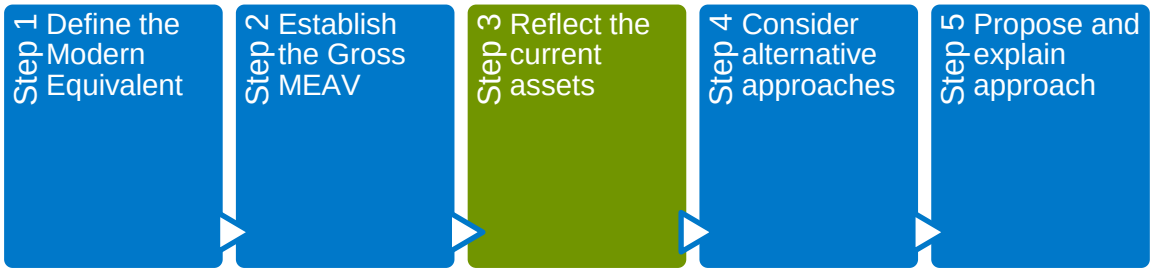
4.18 As set out in paragraph 8.8 all companies should take a view as to whether the RCV allocation should include or exclude a valuation of shared assets. Companies should comment on whether they consider the approach they suggest would lead to double counting on costs within the bioresources business unit, and if so to what extent, on the basis of the current regulatory accounting guidelines. We will consider company business plan submissions

and will propose a consistent approach in our PR19 draft determinations. As long as a company has provided appropriate reasoning, companies' inclusion (or exclusion) of a proportionate allocation of shared assets will not negatively affect our initial assessment of plans.

4.19 Where significant costs are driven by the specific nature of a site that a third party would not face, these constraints should be relaxed in producing an estimate of the cost of the modern equivalent. If site costs appear atypical compared to industry data, we expect companies to provide business plan commentary on whether there are site specific factors driving costs.

5. Step 3 – Reflect the current assets

5.1 Step 3 is to make adjustments to reflect the differences between current and modern equivalent assets.



5.2 There are three main reasons why adjustments to gross modern equivalent asset values are required.

- The current assets may have different age profiles and remaining economic lives than new modern equivalent assets.
- There may be differences in the maintenance and operating costs of new modern equivalent assets compared to existing assets.
- There may be different expectations of external income that could be generated by modern equivalent assets compared to current assets. By external income we mean income which is in addition to the revenue collected from its wastewater customers such as income from energy generation and selling bioresources end products.

5.3 The gross MEAV is reduced if current assets have shorter economic lives; or would earn less income; or would cost more to operate than modern equivalent assets. In these cases the current assets have net cash flows that are lower than the modern equivalent assets would have and therefore a lower economic value.

5.4 The gross MEAV is increased where current assets have longer economic lives, would earn more income or be cheaper to operate.

5.5 This chapter considers each of the reasons for adjustments to asset values:

- asset lives;
- external income from bioresources; and
- operating and maintenance costs;

5.6 Each section considers what companies submitted and then provides feedback. The chapter then updates our guidance on how companies should calculate adjustments.

Asset lives

5.7 Companies' existing assets may have different service lives to modern equivalent assets. In our guidance we stated that companies should adjust the capital value of modern equivalent assets to reflect the different time period over which the actual assets and modern equivalents will deliver value.

5.8 We asked companies to split information between 16 different processes in the information they provided to us.

5.9 How companies compare actual and modern equivalent assets can have a significant impact on the adjustment. Processes on a site tend to have different lives. If companies calculate the average age of the entire site and make an adjustment on this basis it will give a less accurate asset life adjustment than if they calculate asset lives for each process. Processes in turn are made up of different components and companies can therefore consider life at even more granular levels than the 16 processes we requested.

5.10 We asked companies to make the asset life adjustment at the lowest level at which they can derive equivalent robust information for actual assets and the modern equivalent assets.

Observations on asset lives

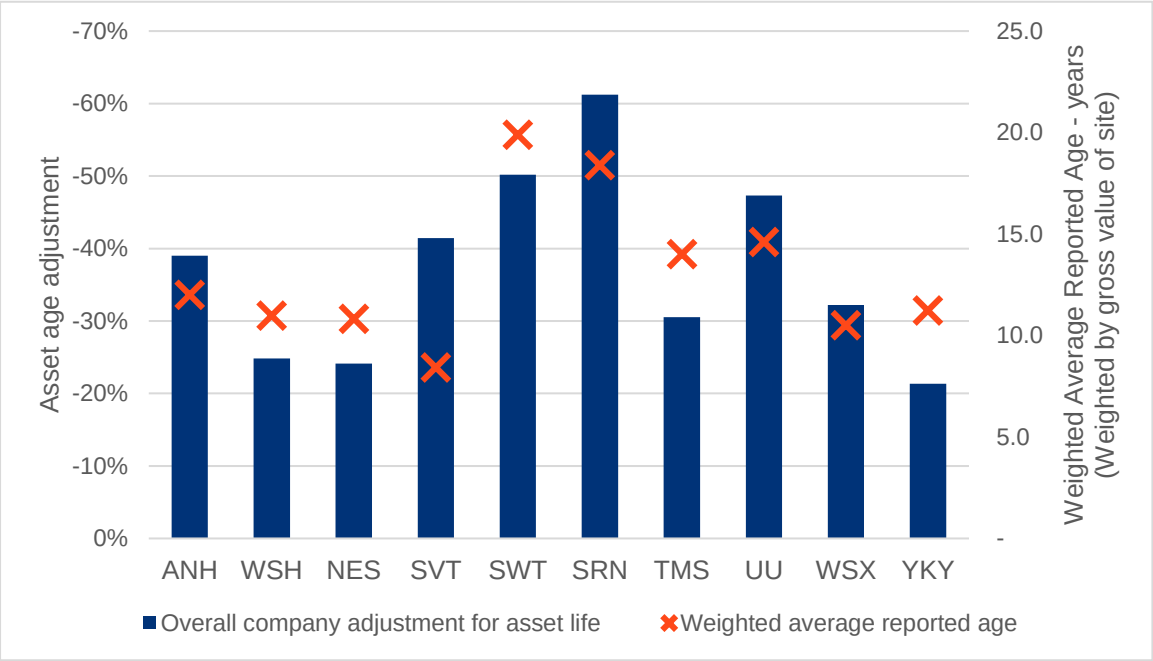
5.11 In this section we first compare the overall adjustments that companies have made to reflect asset age and then consider the assumptions that companies have made in calculating these adjustments. These are principally company assumptions on modern equivalent asset lives and the remaining economic life of existing assets.

5.12 At a high level, company asset life adjustments are broadly in line with our expectations. However, our confidence is reduced as there is considerable variation in companies' underlying assumptions that are unexplained.

5.13 Average age is a useful comparator because it requires less judgement than either the expected life of modern equivalent assets or the remaining life of

actual assets. As we have observed, we expect companies with older assets to have larger adjustments. This gives us some confidence in company adjustments.

Figure 5.1 Comparison of adjustment for asset life compared to weighted average reported age of assets at 2020



5.14 While at a high level company adjustments appear reasonable, the approaches and assumptions companies have used in calculating these adjustments vary considerably.

5.15 All companies stated they had followed our recommended approach to making adjustments. Companies applied the information at different levels of granularity. Some companies did not have confidence they could allocate information between the 16 processes we set out and completed the adjustments at a site level. Some completed it at the process level and others used more granular information.

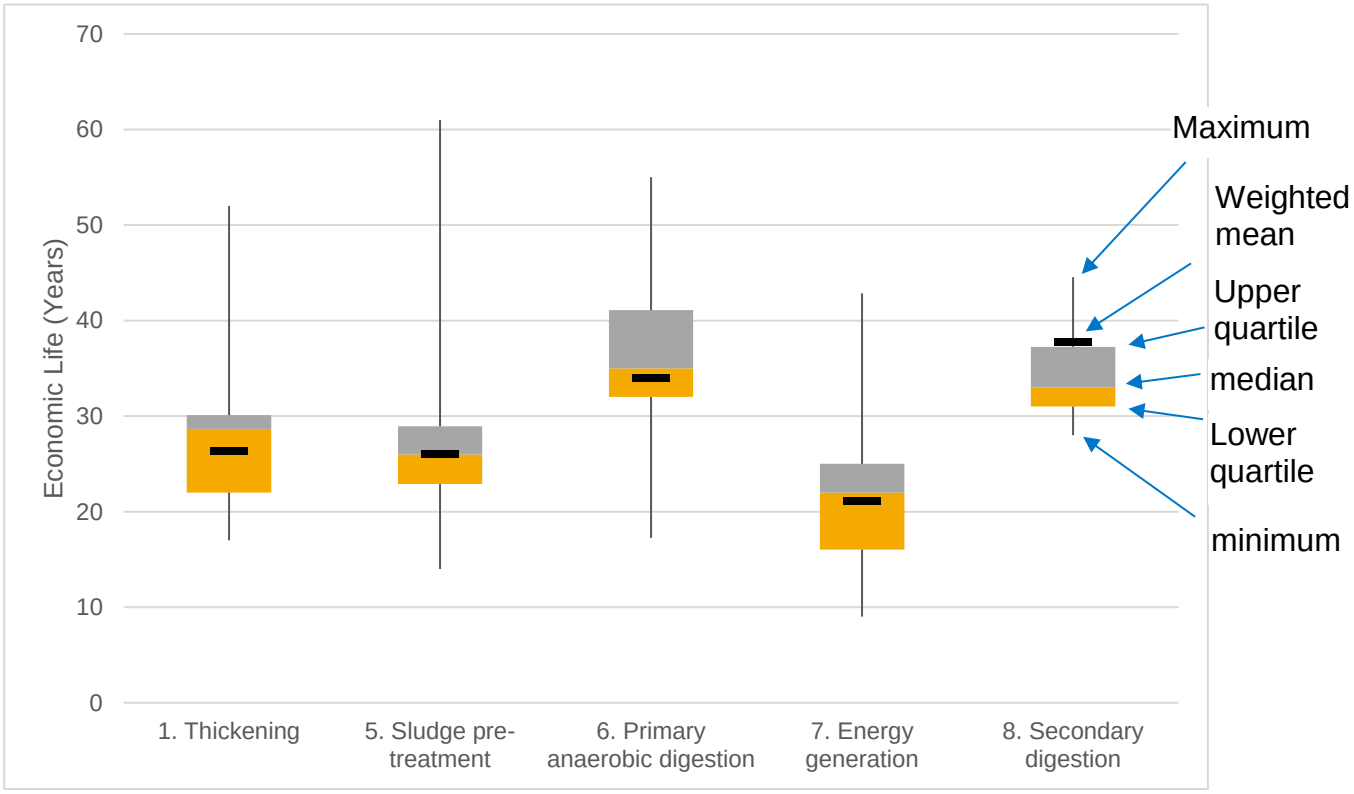
5.16 Company expectations of modern equivalent asset age are derived from their internal bottom-up systems. It appears that these are largely influenced by the proportion of a site classed as civil structures (long life) as opposed to mechanical or electrical systems (short life).

5.17 The variation between companies is significant and more than we expected for what we assume are similar assets built at the same time. Figure 5.2 shows the

variation between different companies for five of the key processes. Further information is provided in the supporting spreadsheet.

5.18 While anonymising each company's data, we have illustrated the variation in asset lives using box and whisker charts. For each process we have ordered the asset lives in ascending order and identified the lowest (minimum) value, the median (middle) value, the lower and upper quartile and the highest (maximum) value. We have also calculated the mean value by weighting asset lives by each site's gross capital cost. Sites with higher gross capital costs have a larger impact on this average.

Figure 5.2 Distribution of reported modern equivalent life by process (box and whiskers chart with added weighted mean life)



5.19 We had expected that differences between the lengths of asset life would be due to the trade off with cost. For instance a company might be willing to incur a higher capital costs for a longer asset life or pay less for an asset that would not last as long. However, we could not find any relationship between cost and asset life.

5.20 The other piece of information required to make an adjustment is the remaining life of actual assets.

5.21 Three companies (Dŵr Cymru, Northumbrian Water and Yorkshire Water) assumed that, where their actual assets were similar to the modern equivalent asset, then they would have the same overall asset life. The remaining life was therefore provided by subtracting existing asset age.

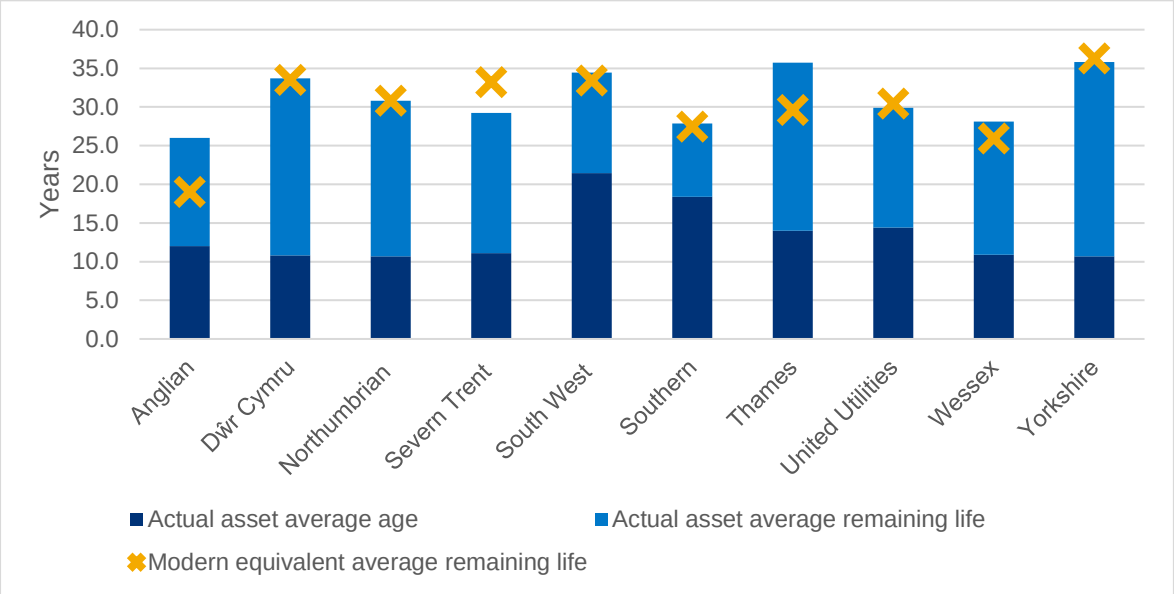
5.22 Companies have used different definitions of asset age. Some companies count age since first installation, whereas other companies count age since the last major refurbishment. There are also cases of companies including assets in the average of asset lives that they do not expect to use to deliver bioresource services at any point in the future. An example are sludge lagoons, which have long lives and therefore increase the average life of assets.

5.23 Anglian Water and Wessex Water started with a similar approach (modern equivalent life less actual asset age), but adjusted the results based on expert judgement. Southern Water also stated with a similar approach and made adjustments to asset life, but in a way we did not expect. We expected companies to reduce the number of years of remaining life for assets in a poor condition and increase the life for assets with better than expected condition. Instead Southern Water made a percentage change to the value of the asset. This is a less transparent approach and makes comparisons between companies more difficult.

5.24 United Utilities and South West Water used asset management systems to assess asset life and Severn Trent and Thames Water used values based on the remaining accounting life of their assets.

5.25 Figure 5.3 compares actual and modern equivalent average asset lives. We have weighted asset lives by the capital value of modern equivalent assets, as the adjustment for asset life is applied in proportion to the capital value.

Figure 5.3 Average asset lives of modern equivalent and actual treatment centres



Feedback on asset life

5.26 Companies should reconsider if their reported modern equivalent asset lives are realistic in the context of their RCV valuation. In particular if site specific aspects are unduly affecting modern equivalent asset lives the company should consider relaxing these constraints. For consistency, if a company makes changes to its asset life it should also consider if it should change its assumptions on cost.

5.27 Companies should consider if it is practicable to cross check remaining lives of existing assets against information on asset condition/serviceability. If companies make adjustments based on asset condition/serviceability then they should adjust the remaining life in direct proportion to asset condition/ serviceability. For example if a company considers that the condition of a particular asset is worse than normally expected and likely to reduce the economic life of the asset by a quarter, it should reduce the assumed life by a quarter.

5.28 We expect that companies will only base their asset age adjustment on assets they expect to use after 2020. We expect this to include all assets that provide resilience. Assets that are not reflected in the modern equivalent assets, such as unused sludge lagoons, should not affect the adjustment for asset life.

5.29 We expect companies to calculate asset age as the time since the last substantial change to the asset. For example when the accounting net value increased by more than 50% following capital works.

5.30 We expect companies to seek independent assurance regarding their adjustments to reflect asset life, including the underlying assumptions made on both actual asset remaining life and modern equivalent life.

5.31 Further feedback on the discount rate to use in the recommended calculation is set out in the last section of the chapter.

External income from bioresources treatment activities

5.32 Companies can earn income by generating renewable energy and selling the biosolids produced for fertiliser. Companies are therefore able to gain income which off-sets the cost to customers of treating bioresources.

5.33 Many bioresources treatment sites generate a source of renewable energy, biogas, through the process of anaerobic digestion. Biogas can be cleaned up and injected into the national gas grid, or it can be burned in combined heat and power (CHP) engines to produce both heat and electricity. Companies can either sell the energy or use it on the bioresources treatment site or on a co-located network plus site. Much of the energy production attracts renewable energy incentives.

Key considerations

5.34 If companies installed CHP engines to generate electricity from biogas before 1 April 2017 they receive income from renewable obligation certificates (ROCs). This income is typically guaranteed for 20 years from the commissioning date of the CHP assets. While companies can no longer receive income from ROCs for new assets, there are other renewable incentives available to companies. One incentive is the renewable heat incentive (RHI) for injecting biogas into the national grid.

5.35 It is not clear what renewable energy incentives will be available for new assets from 31 March 2020. Companies have therefore made judgements on the incentives they would receive.

5.36 To compare companies that might make use of energy in different ways, we asked companies to include the value of energy as income whether used by the

bioresources business unit, used by a different business unit within the regulated business or sold outside the regulated business.

Observations on external income

5.37 All companies receive a benefit from generating electricity or producing biogas.

5.38 Where companies expect to sell energy to the national grid they have used the export price. It was not always clear how companies had valued energy that it used itself. Generally companies used the average import price for the value of energy “sold” to any co-located sewage treatment works or used on bioresources sites.

5.39 The impact of income from renewable incentives is marked and is likely to be a significant driver of economic value.

5.40 Companies have taken different approaches to their assumptions about future income from renewable incentives. Some companies assumed that there will be no income from incentives for new modern equivalent assets; some assumed ROCs reduce and RHI continues; some assumed ROCs and RHI continue at the same rate for 20 years; and some assumed there will be a new incentive regime for the hypothetical assets that will replace ROCs, giving an equivalent income to that enjoyed by the company’s current assets.

5.41 Companies can also receive income from the sale of treated biosolids when they are recycled to agricultural land. For all companies this is not significant compared to the income from energy. Income also varies between companies depending on the treatment technology used and the demand from agriculture.

Figure 5.4 Relative annual average income per unit of throughput for modern equivalent and actual STCs, excluding the impact of renewable energy incentives

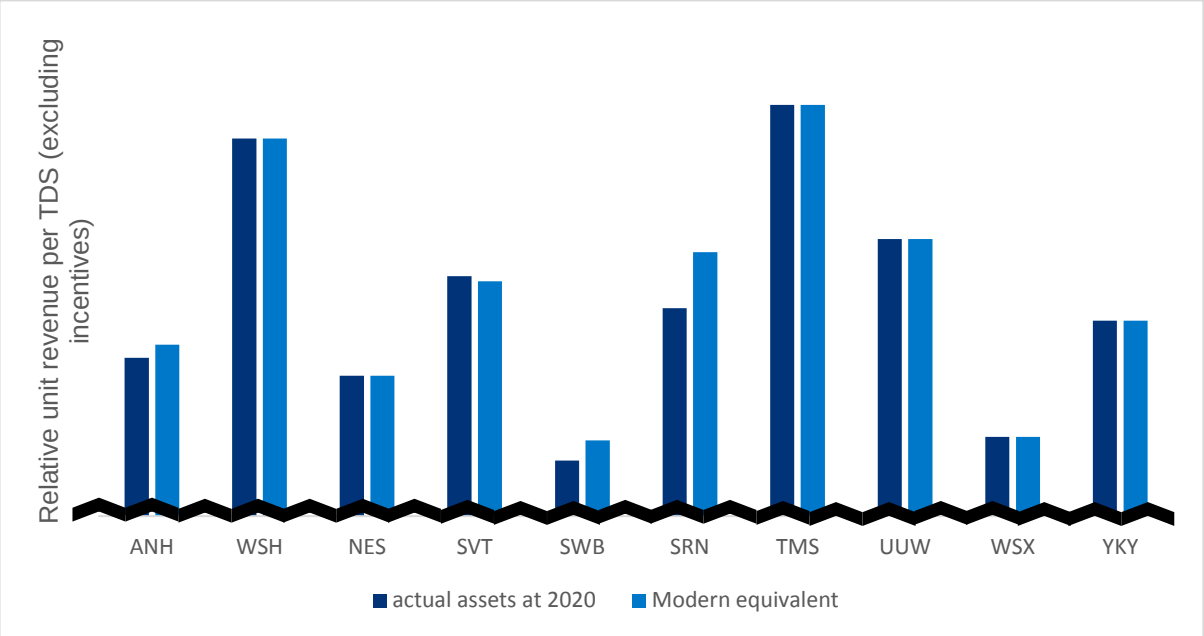
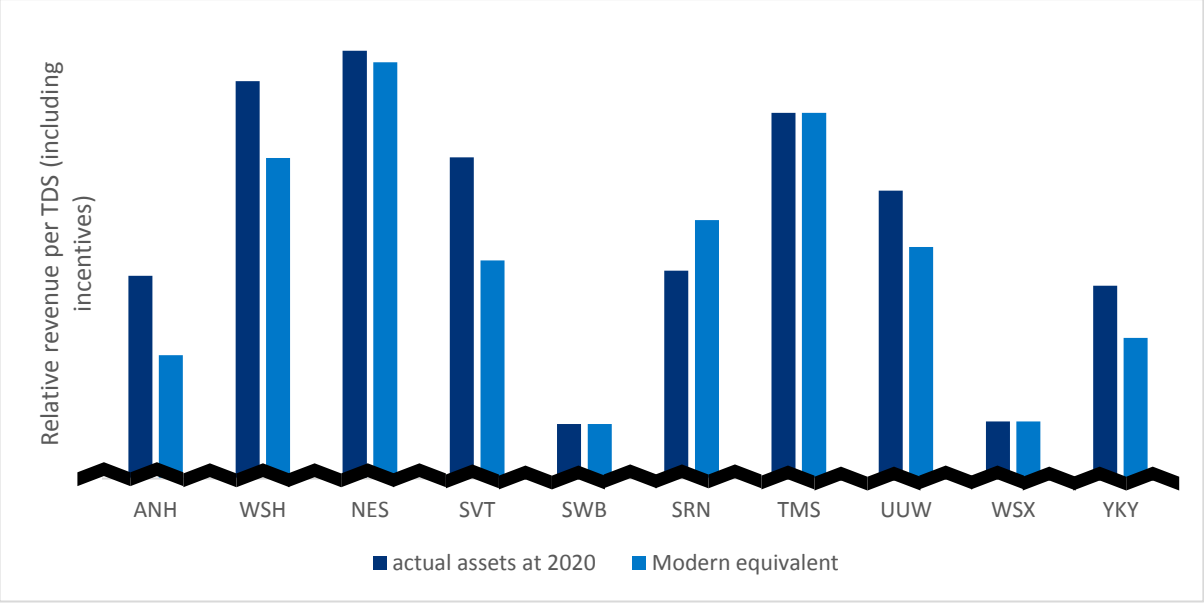


Figure 5.5 Relative average income per unit of throughput for modern equivalent and actual STCs, including income from renewable energy incentives



Feedback on external income

5.42 We expect companies to base the incentives available for existing assets and modern equivalent assets at 2020, according to what is set out at 30 April 2018. This includes what the government may indicate will apply at 2020 and companies should assume that the government will enact any commitments made by this date. Companies should consider the full range of incentives that may be available for modern equivalent assets.

5.43 We expect companies to assess the renewable incentives that they will receive for actual assets from 2020.

5.44 We expect companies to make a separate assessment of the available incentives for new modern equivalent assets.

5.45 If incentives are available for actual assets, but not for the modern equivalent, then this will lead to an upwards adjustment to the valuation.

5.46 For example, modern equivalent assets built at 2020 will not receive income from ROCs. If a company currently receives ROCs at a site, but the modern equivalent asset would not receive income from renewable incentives, we expect the company to make an upwards adjustment. It is important to make this adjustment to reflect the value that the actual assets have from receiving a cash flow that a modern equivalent asset would not receive.

5.47 To aid consistency, we expect all companies to use their average import price for the value of the energy generated and used by the appointed business, whether it is used on a bioresources site or “sold” to any co-located wastewater treatment works.

5.48 This may mean that a company assesses the value of the energy “sold” to the network plus wastewater treatment works is greater than the value it could achieve for electricity on the open market.

5.49 We expect all companies will use the actual export price for the value of energy sold to National Grid.

5.50 Further feedback on how to make the adjustment is set out in the last section of the chapter.

Annual costs

5.51 We asked companies to provide information about expected gross annual average costs of their bioresources treatment centres from 2020 and the gross annual average costs of modern equivalent assets. We expected companies to consider both average annual operating and capital maintenance costs.

5.52 We also asked for actual costs for two years, 2015-16 and 2016-17. Capital maintenance costs for a particular year are unlikely to be exactly the same as the annual average. Therefore we requested that actual costs should exclude capital maintenance costs.

5.53 While it is only the difference between the annual costs of companies' actual and modern equivalent assets that is important for valuation purposes, we asked for cost information on all sites to assist comparisons.

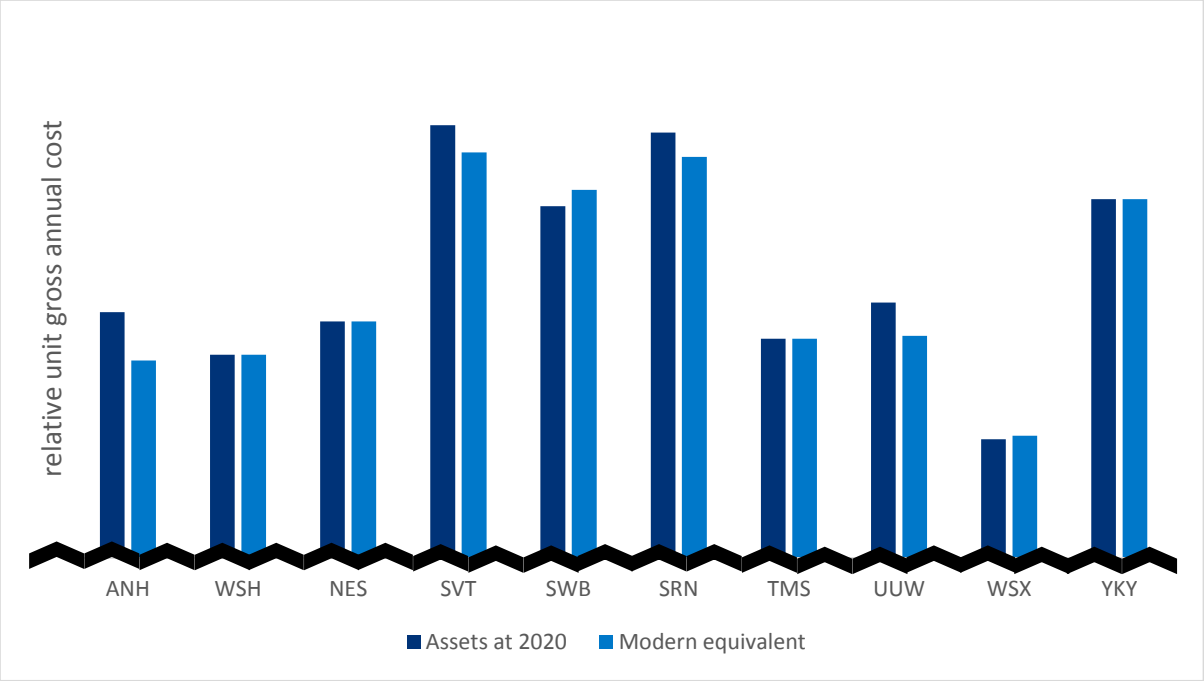
5.54 Annual costs need to reflect the value of electricity used by the bioresources site, even if the electricity is generated on site. This allows comparisons between different sites that may have different arrangements for using or selling generated energy.

Observations on annual costs

5.55 In general it was not clear to us if companies had considered whether there were likely to be differences in forecast capital maintenance costs between actual and modern equivalent assets over the remaining life of their assets. This may explain some of the variation in unit costs between companies.

5.56 Two companies, Anglian Water and United Utilities, noted that they expected modern equivalent assets would have lower costs of disposal than actual assets and had reflected this in their valuations.

Figure 5.6 Relative average annual cost per unit of bioresource throughput for modern equivalent and actual bioresources treatment centres



Feedback on annual costs

5.57 We expect all companies to consider if capital maintenance costs are likely to be different between actual and modern equivalent assets.

5.58 We expect companies to make adjustments for non-sites costs, such as disposal costs, where companies consider that there would be significant differences between the costs of actual and modern equivalent assets.

5.59 We expect all companies to use their average import price to value electricity that they use to operate bioresources sites even if they generate it themselves. Companies should not calculate the cost of the heat generated by CHP engines which they may use to heat the digestion process.

Calculation of adjustments

5.60 Companies should adjust the gross modern equivalent asset value to reflect the differences they have identified between actual and modern equivalent assets. The adjustment should reflect the period over which the differences in costs

and income would be expected to occur; normally the remaining life of actual assets.

5.61 The value of money is not constant over time; receiving a payment at some time in the future normally has less value than receiving a payment today. Companies used present value calculations to take account of the time value of money.

5.62 Our guidance asked all companies to use the real cost of capital from the 2014 Price Review for the purposes of this exercise and to provide a valuation in 2016-17 retail price index (RPI) financial year average prices.

Observations on calculations

5.63 As set out in the preceding sections some companies assumed that there would be no difference between the costs and income of the actual assets and their modern equivalent assets. If actual assets and modern equivalent assets have the same costs and income no adjustment to the gross modern equivalent asset value is required.

5.64 We asked all companies for further details of their calculations at a site level. Some companies calculated the adjustment for costs and energy generation using a different time period than the remaining life of the assets they had stated in their submissions. Most companies that identified differences used the excel formula “PV” to calculate the adjustment.

5.65 Anglian Water explained that in addition to the differences in costs it had reported at a treatment site level it had also identified consequential impacts in disposal costs. We only requested detailed information for treatment sites and so it had not reported these differences in the costs it reported. It did however include these cost differences in adjusting the gross MEAV.

5.66 One company had originally assumed that the costs for power would increase by more than other costs over time. It later changed its approach. One of the issues that led to this change was a concern over the appropriate discount rate to use in this situation.

Feedback on calculations

5.67 The RCV will be allocated between the network plus and bioresource price controls as a midnight adjustment as at 31 March 2020, however, the business plan tables require companies to report RCV allocations in the business plan tables in 2017-18 year end prices. As the price controls will switch to CPIH indexation from 1 April 2020, adjustments for inflation should reflect RPI until 31 March 2020 and CPIH from 1 April 2020.

5.68 Present value calculations require a discount rate. If companies carry out calculations in nominal terms then the nominal wholesale weighted average cost of capital should be used as a discount rate. If companies work in real terms, then we would expect companies to use the real wholesale weighted average costs of capital on a CPIH basis as a discount rate. The cost and revenue streams are from 1 April 2020 and we consider that that the appropriate indexation to use is CPIH. Our early view, in our PR19 methodology, is that the nominal wholesale WACC is 5.37% and the real wholesale WACC on a CPIH basis is 3.3%, assuming a long term CPIH of 2%. This replaces the guidance we provided for the September 2017 submission.

5.69 We consider it acceptable for companies to complete present value calculations using a constant real average annual cost or revenue. Attempts to forecast changes in costs over time (real price effects) may be spurious, especially in the longer term.

5.70 If companies have used differing assumptions of how various costs or revenues will change over time this should not affect how it deflates from nominal to real prices or the discount factor it uses in its present value calculations.

5.71 Table 5.1 shows the steps companies can take. Companies can choose to work in nominal prices or real prices. The first column shows the calculation in nominal prices. The second column shows the adjustment based on constant real prices.

Table 5.1 Method to produce a 2020 present value in 2017-18 FYE prices (RPI)

	Method 1 (Calculations in nominal terms)	Method 2 (Simplified – real terms)
Initial adjustment to price base	Inflate to 2019-20 FYE prices using RPI	Inflate to 2017-18 FYE prices using RPI
Adjustment for general inflation beyond 31 March 2020	CPIH	None
Discount Rate used to produce present value at 31 March 2020.	Nominal Wholesale WACC = (1 +CPIH) * (1+Real wholesale WACC CPIH basis)	Real Wholesale WACC CPIH basis
Adjustment to price base for reporting	Deflate from 2019-20 FYE to 2017-18 FYE using RPI.	None

5.72 Table 5.2 shows a worked example assuming that there is a difference between the actual and modern equivalent asset of £2 million per year in 2016-17 financial year average prices.

Table 5.2 Worked example to produce a 2020 present value in 2017-18 FYE prices (RPI) assuming that net cost is in 2016-17 FYA prices.

Inflation indices	Index
2016-17 FYA RPI	264.99
(assumed 2017-18 FYE RPI)	277.4
(assumed 2019-20 FYE RPI)	294.3

Year	Constant	Unit	2020-21	2021-22	2022-23	2023-24
Method 1 (Calculations in nominal terms)						
Net annual difference in cost (2016-17 RPI FYE)		£m	2.000	2.000	2.000	2.000
Net annual difference in cost (2019-20 RPI FYE)	1.1106	£m	2.221	2.221	2.221	2.221
Net annual difference in cost (Nominal prices- CPIH at 2%)	2.00%	£m	2.266	2.311	2.357	2.404
Net present value as at 31 March 2020 (2019-20 CPIH FYE)	5.37%	£m	2.150	2.082	2.015	1.951
Total net present value as at 31 March 2020 (2019-20 CPIH FYE)		£m	8.198			
Total net present value (2017-18 RPI FYE)	**0.9426**	**£m**	**7.727**			
Method 2 (Simplified – real terms)						
Net annual difference in cost (2016-17 RPI FYE)		£m	2.000	2.000	2.000	2.000
Net annual difference in cost (2017-18 RPI FYE)	1.0468	£m	2.094	2.094	2.094	2.094
Net present value (as at 31 March 2020) in 2017-18 RPI FYE prices	3.30%	£m	2.027	1.962	1.899	1.839
Total net present value (2017-18 RPI FYE)		**£m**	**7.727**			

5.73 Companies could also choose to use the excel formula “PV” which if the difference is constant over time can calculate the present value in a single step.

5.74 Where differences in costs/revenues relate to a combination of processes on a site, such as the ability to generate electricity, the period companies should use to make the adjustment is the average remaining life of the actual assets on the site. This should be consistent with the adjustments for asset age.

5.75 Where a company receives income from renewable incentives, that a new site would not receive, it should make a positive adjustment to increase its valuation. It must consider the time frame that it will be entitled to receive the income. If this is less than the remaining life of the site it will need to ensure its calculations are adjusted accordingly. Income received from selling energy must be considered over the average remaining life of the site and the income received from renewable incentives over the period that these will be received.

5.76 Companies should identify the impact of different factors on the valuation. This extra information should help to reduce the need to query companies following receipt of business plans. We will amend the business plan table WWS12 to collect the following information.

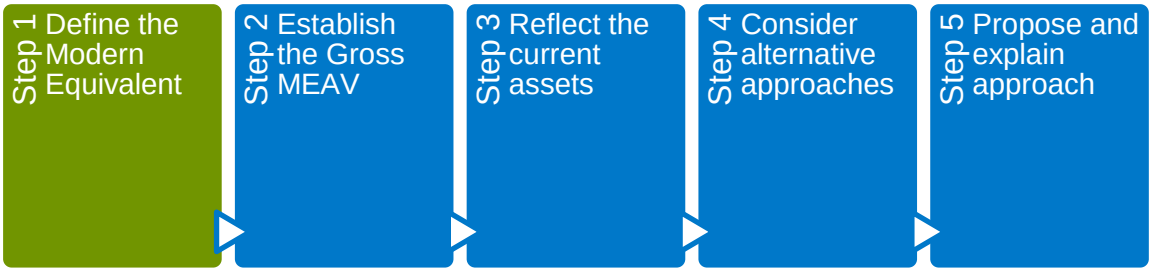
Definition	Unit	Decimal places	Price Base
Gross cost of modern equivalent assets owned by appointed business excluding shared assets where the bioresource business unit is not the principal user.	£m	3	2017-18 FYE (RPI)
Adjustment for the difference in the remaining economic life of actual and modern equivalent assets at 2020.	£m	3	2017-18 FYE (RPI)
Adjustment for the difference between actual and modern equivalent assets gross operating costs on bioresource treatment sites – By gross cost we mean the cost as if no electricity was generated on bioresource sites and no income is received from other business units or third parties.	£m	3	2017-18 FYE (RPI)
Adjustment for the difference between actual and modern equivalent assets in capital maintenance costs on bioresource treatment sites	£m	3	2017-18 FYE (RPI)
Adjustment for the difference between actual and modern equivalent assets in non-treatment site costs. This includes all other differences in costs, for instance where companies have identified significant differences in the operating costs of transport, thickening at intermediate sites or disposal.	£m	3	2017-18 FYE (RPI)
Adjustment for the difference between actual and modern equivalent assets in income from electricity and gas produced. This includes where electricity or gas is used on site or provided to associated companies within the wider group.	£m	3	2017-18 FYE (RPI)
Adjustment for the difference between actual and modern equivalent assets in income received from renewable obligation certificates (ROCs)	£m	3	2017-18 FYE (RPI)
Adjustment for the difference between actual and modern equivalent assets in the income received from other incentives	£m	3	2017-18 FYE (RPI)

Adjustment for the difference between actual and modern equivalent assets in other income including income from sale of biosolids	£m	3	2017-18 FYE (RPI)
Economic valuation of bioresources assets excluding the allocation of shared assets (sum of the above)	£m	3	2017-18 FYE (RPI)
Proportional allocation of the net value of shared assets where the bioresource business unit is not the principal user	£m	3	2017-18 FYE (RPI)
Economic valuation of bioresources assets including an allocation of shared assets (sum of above two lines)	£m	3	2017-18 FYE (RPI)

5.77 Where a company expects that the income or costs in any of these categories would be the same between the assets that are expected to exist at 2020 and the modern equivalent it can simply report this and does not need to complete a calculation.

6. Step 1: define the modern equivalent asset (technology)

6.1 In this chapter we return to step 1 to consider the assumptions on the treatment technology that companies have used in defining modern equivalent assets.



6.2 We expect companies to choose the technology that will represent the best economic value for the services they operate without the constraint of the existing bioresources assets on the site.

6.3 We consider this issue now as the preceding two chapters provided a number of observations that we expect companies to consider when deciding on the technology of their modern equivalent assets.

Observations on technology

6.4 Anglian Water, United Utilities and Wessex Water made significant changes to the choice of technology of modern equivalent assets compared to their actual assets. United Utilities has assets driven by investment decisions many years ago that it states would not be repeated now. Wessex Water proposed that modern equivalent assets would use more advanced technologies. Anglian Water proposed the modern equivalent would use a consistent advanced technology while its actual sites have slightly different technologies that have developed over time.

6.5 Most other companies considered the technology of the assets that they would have by 2020 was appropriate for the modern equivalent assets. Some of these have, or will, complete a programme of changing technology by 2020. Others considered, while they used a wide mixture of different technologies, that these were the most appropriate. One company set out that advanced technologies were only likely to be the best option for very large capacity works. A further

company considered that changing technology at any works would make little difference to the overall assessment of economic value.

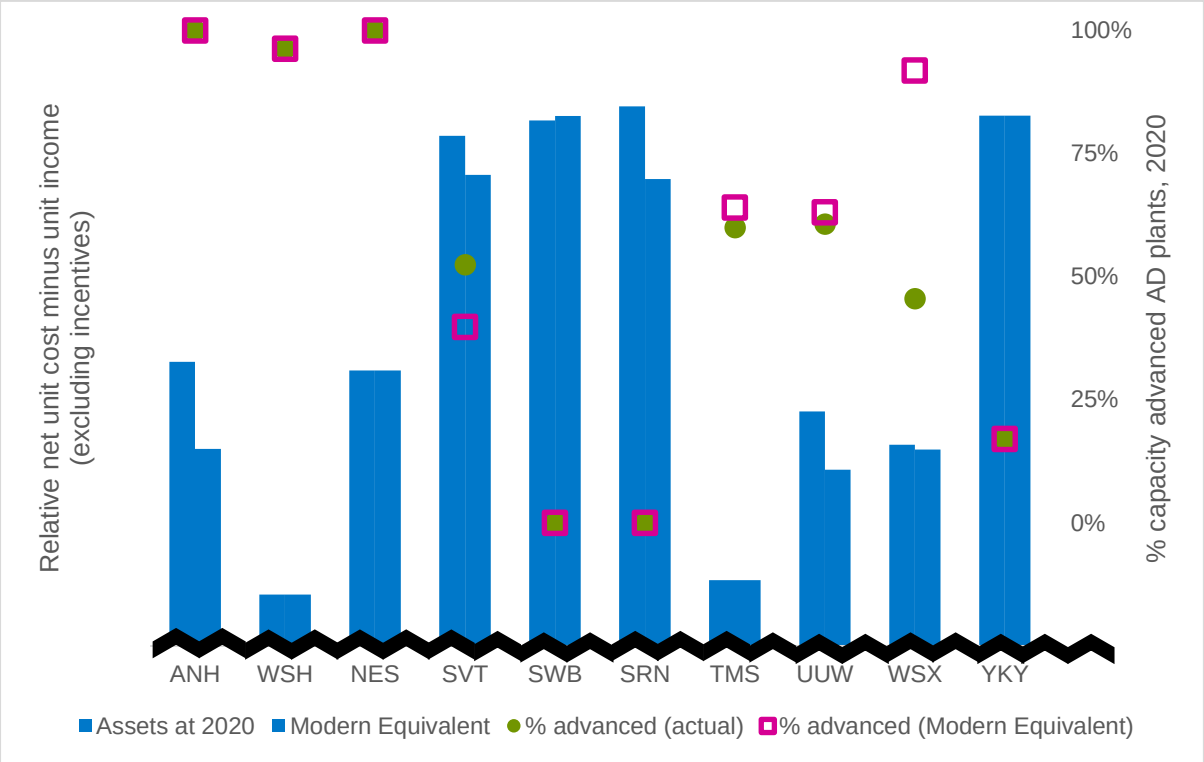
6.6 In paragraph 4.7 we noted that we could not identify a difference between the gross capital costs of conventional and advanced digestion sites. Furthermore companies have not identified differences in asset age depending on technology. This implies that the potential future cash flows of different technologies could help to determine the choice of modern equivalent technology.

6.7 To understand potential future cash flows we have calculated annual net costs as operating costs, including capital maintenance, less external revenue. We have excluded income from renewable incentives. This allows us to make a fairer comparison between companies as not all treatment sites are able to receive the same level of renewable incentives.

6.8 Companies should consider whether a modern equivalent asset could receive renewable incentives. We expect it to do this on a site specific basis. What incentives could be available may depend on factors such as the proximity of the site to gas mains. If a company is able to receive renewable incentives it could further reduce its net costs.

6.9 Figure 6.1 shows annual net unit cost by dividing annual net cost by the throughput. It also shows the proportion of bioresources capacity provided by advanced anaerobic digestion plants in 2020.

Figure 6.1 Relative net unit annual cost (excluding renewable incentives) per unit of throughput and proportion of bioresources treated using advanced technologies.



6.10 Figure 6.1 suggests that the higher the proportion of bioresources treated with advanced technologies, the lower its net unit cost of operation. It should be noted that this excludes the income from incentives. Advanced technology will tend to produce more biogas and so has a greater potential to receive income from renewable incentives.

Feedback on choice of technology

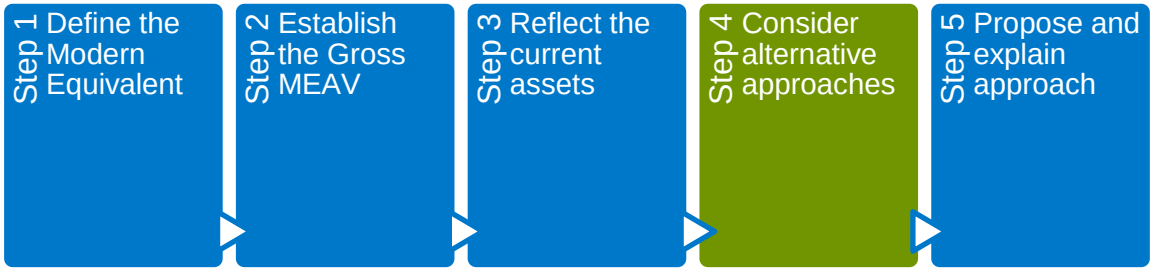
6.11 After considering the industry data provided in this feedback, we expect all companies to consider whether their choice of technology for modern equivalent assets is appropriate. The industry data implies that the new build cost of conventional and advanced digestion sites are similar, but the net annual cost of an advanced digestion site tends to be lower, even without income from renewable incentives.

6.12 We expect companies to consider the full range of incentives that could be available for each site in choosing the modern equivalent asset, based on what is known at 30 April 2018.

6.13 We note that modern equivalent assets will not necessarily reflect companies' actual investment strategies. Sunk costs, especially in secondary digestion, may lead to differences between what is optimal in modifying an existing site and what should be built if starting afresh. It is important that all companies consider the definition of modern equivalent assets irrespective of their sunk costs.

7. Step 4: Consider alternative approaches

7.1 The fourth step of the process is to undertake cross checks to provide assurance that the RCV allocation based on economic value is appropriate and protects customer interests.



7.2 Companies have considered a number of ways to cross check that the RCV allocation based on the economic value will be robust and protect customers. In some cases companies noted that they would complete checks for final business plans and did not fully complete all cross checks at this time.

7.3 Our guidance asked all companies to consider the potential impact that the RCV allocated on economic value could have on customer bills.

7.4 In addition to this we expect that all companies would explain how the valuation has moved compared to the previous full revaluation carried out at PR09.

7.5 Companies should consider additional checks depending on their individual circumstances and the information available to them.

7.6 This chapter is split into the following sections:

- Customer bill impact;
- Comparison to previous valuation; and
- Other cross checks.

7.7 Each section considers the cross checks that companies have completed and provides feedback.

Customer bill impact

7.8 We would expect the allocation of the RCV to only have a noticeable impact on customers' bills where the valuation exercise has revealed that the consistency between charges and cost recovery can be improved.

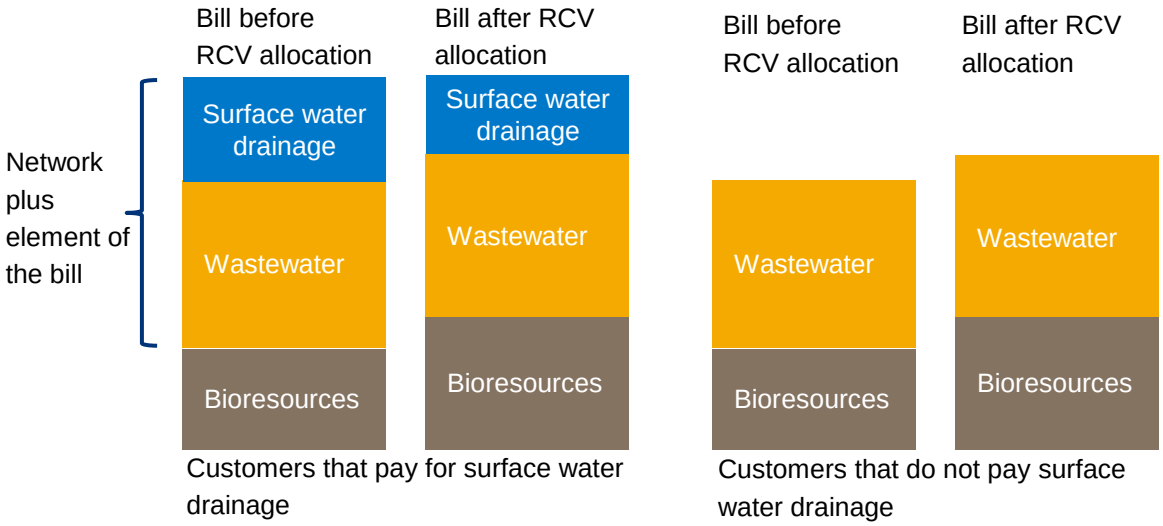
7.9 Where the valuation exercise produces new information that allows bills to be more cost reflective it is important that any significant impact on customers is phased over time.

7.10 If all customers paid a single average charge for both bioresource and wastewater services that recovered all of companies' costs there could be no impact on bills from the RCV allocation. A change in the part of the charge for bioresource services will be offset by an opposite change in the part of the charge for wastewater network plus services. This would keep the overall cost recovery the same.

7.11 The majority of customers may approximate to this circumstance. Most customers pay an average charge that covers both bioresource and network plus services, with companies not setting separate bioresources and network plus charges.

7.12 An example of a group that may be impacted are customers that do not pay surface water drainage charges. This would be the case if, for example, the change in the RCV allocation leads to an increase in the bioresources part of the charge that was offset by a reduction in surface water drainage charges. While there may be no impact for the majority of customers that pay surface water drainage charges, there would be an impact for customers that do not pay surface water drainage charges. Figure 7.1 illustrates the potential impact.

7.13 Figure 7.1 Example of how the bills of customers that do not pay surface water charges could be impacted from the RCV allocation



7.14 Trade effluent customers are a further example of customers that could be impacted by the allocation of the RCV. Trade effluent customers pay different charges to the majority of customers. Trade effluent customers' bills vary according to the suspended solid content of discharges. The suspended solid content directly impacts the bioresources service required. As the bioresources part of trade effluent bills depend on the actual service received, the corresponding change to the network plus part of the bill may not necessarily be equal and opposite leading to an overall impact on bills.

Observations on customer bill impact

7.15 Nine of the companies commented on the impact of the valuation on their customers' end bills. Some companies noted that they would complete further analysis alongside their business plans.

7.16 Two companies, Wessex Water and Yorkshire Water, considered the potential impact of the change to end customer bills in detail. One company provided evidence that the impact on any customer bill would be small. The other company identified potential impacts for certain of its trade effluent customers. To smooth bills the company intends to start adjusting tariffs in the coming charging year. This gives it an extra year to phase in the tariff changes to smooth the impact on customer bills.

7.17 The impact on bills will depend on a number of factors and requires careful consideration by companies.

7.18 An important factor that could affect customer bills is the difference between how companies will recover capital costs following the RCV allocation and the implied (or explicit) recovery of capital costs for bioresource under their existing charges.

7.19 Companies also need to understand the relationships between cost recovery for different services. It is possible that the cost recovery of these services and hence charges will not be directly proportional to a different RCV allocation. For instance if capital charges are allocated according to MEAV, an increase in the RCV is likely to have a greater impact on wastewater collection as opposed to wastewater treatment. This is because the cost of replacing all sewers would be far greater than replacing all treatment plants.

Feedback on customer bill impact

7.20 While we note that companies have stated that more information will be available at business plan stage we commend Wessex Water and Yorkshire Water that considered the issue in detail. This allowed one to take early action to smooth bill the impact on the small number of customers affected.

7.21 We accept that impact of the RCV allocation on charges will be less of an issue for companies that expect to significantly reduce bills to all customers from 2020. As the general reduction in bills could more than offset any increase that individual customers would see from the RCV allocation.

7.22 It is essential that all companies carefully consider whether the allocation of the RCV will have significant impact on any customer's bill. To do this companies need to consider how the change may affect its underlying charges including how they allocate the recovery of capital costs within its charging structure.

7.23 Where companies identify customers that would see bill increases, we expect companies to consider how to phase in the bill change to minimise the customer impact.

Comparison to past valuations

7.24 Most sludge assets last decades. Therefore an asset valuation, even ten years earlier, will have some relevance to a new valuation. We used previous valuations in price setting and they had an impact on customers' bills. It is therefore important we understand the reasons for differences between past and current valuations before we accept the new values.

7.25 We expect companies to be able to identify the reasons for significant changes in asset valuations over time. We expect that companies should be able to both quantify and reconcile the differences between asset valuations. This will help provide confidence in the accuracy and robustness of the new valuation.

Observations on comparison to previous valuation

7.26 Companies referred to their previous valuation of assets required for the 2009 Periodic Review (PR09). Companies' explanation of the difference between their PR09 valuation and their current valuation varied significantly. The best company submissions attempted to quantify the reasons for the differences that they identified and commented on the remaining difference.

7.27 Most companies considered both the difference in gross values and the difference in net values. Other companies only considered the difference between net values.

7.28 The main reasons companies gave for differences in the gross value were:

- changes in assets since the last valuation;
- that the previous valuation was focused on replicating the assets that companies have, but the new valuation is focused on the assets required to deliver a service – hence different considerations of obsolete assets can lead to significant differences;
- that available inflation indices used to update the previous valuation do not necessarily accurately reflect how the costs of bioresources assets change over time; and
- land was not included in the previous valuation.

7.29 The main reasons companies gave for differences in the net value were:

- differences in the calculation of asset lives, including that the new approach focuses on remaining economic life, which may ascribe value to assets that are fully depreciated in accounting terms;
- differences in the way that the adjustment for asset lives is taken into account. The method in our guidance leads to a higher net valuation compared to more traditional accounting treatment such as straight line depreciation;
- that the economic valuation includes an adjustment for future cash flows which was not included in the previous valuation; and
- inaccuracies in how annual additions and removals of assets have been reflected in the previous valuation over time.

Feedback on comparison to previous valuation

7.30 Understanding the principal reasons for differences between the proposed economic valuation and the previous valuation of bioresource assets provides an important cross check on company proposals. It is important that these cross checks are carried out on both a gross and net basis to understand what is driving the differences in valuations.

7.31 We expect all companies to estimate the impact for each of the reasons they identify for differences between the current and previous valuation. We expect companies to explain on the residual unexplained difference. Companies should consider both the difference in gross valuations and net valuations Companies may want to provide a range rather than a point estimate for each of the reasons that they identify.

Other cross checks

7.32 Our guidance asked companies to use available information to cross check their valuations. This will increase the confidence that the allocated RCV is appropriate. We expect companies to consider what cross checks would have most value for their own circumstances.

Observations on other cross checks

7.33 Companies used a variety of information to undertake cross checks, including:

- Sensitivity of the valuation to alternative assumptions, such as different methods to produce asset ages;
- Comparing the valuation to the historical book value of assets at the company level;
- Reviewing the consistency of the gross unit costs of assets proposed;
- Reviewing the assumed gross values against the company's own recent data on asset values;
- Comparing publicly available information on the definition of modern equivalent assets such as that in OJEU notices and previous reported information on past valuations provided by other companies; and
- Reviewing the valuation against the PR19 key themes: affordability; innovation; resilience; and customer service.

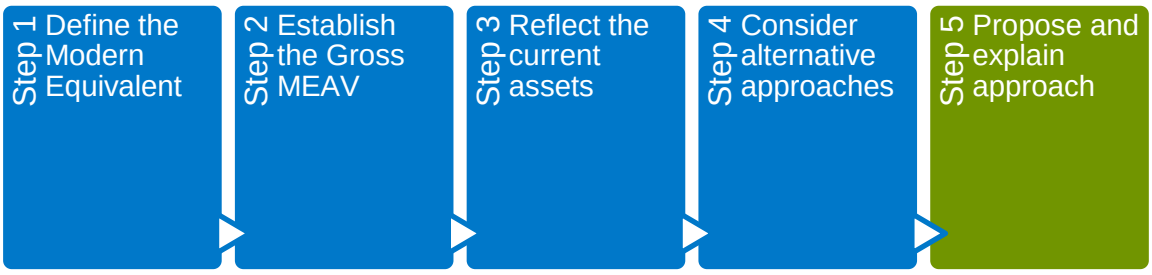
Feedback on other cross checks

7.34 We see value in companies continuing to consider a range of cross checks. The most appropriate cross checks will depend on each company's circumstances.

7.35 The cross checks that appeared to provide most confidence in asset valuations were the sensitivity of the valuation to alternative assumptions and cross checks on the gross values of modern equivalent assets companies had assumed.

8. Step 5: Propose and explain approach

8.1 The final step is for the company to propose an RCV allocation and explain the approach taken.



8.2 If companies identify an issue through applying a cross check, our guidance asked companies to consider if an alternative allocation of the RCV allocation would better protect customers including by promoting a level playing field for markets. If companies identify an alternative approach to allocate the RCV that better protects customers then companies should propose this.

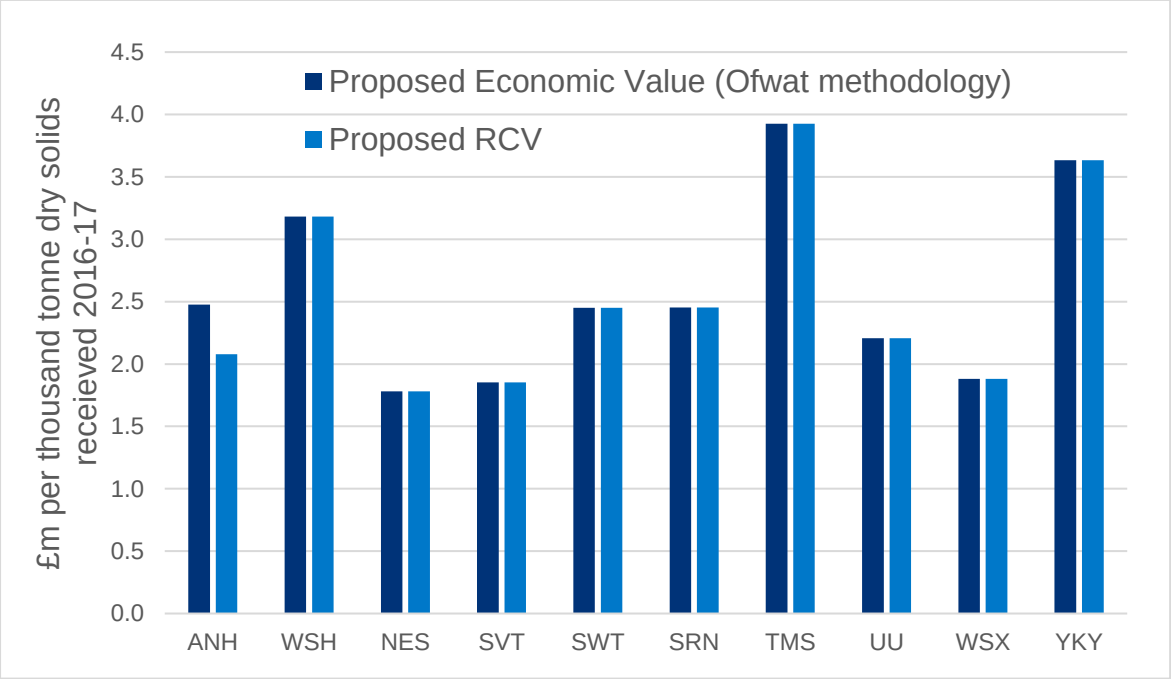
8.3 Companies have all proposed to allocate the RCV based on the economic value of their assets.

8.4 Anglian Water suggested that its economic value should be lower than the value it derived by following our methodology because of two issues.

- Our methodology set out that companies should allocate a proportion of the capital value of shared assets to bioresources. When allocating the RCV, Anglian Water removed the value of shared assets from its valuation.
- Our methodology set outs that where actual assets receive income from renewable obligation certificates (ROCs), but new modern equivalent assets would not be eligible to receive renewable incentives, actual assets have a greater value than modern equivalent assets. When allocating the RCV, Anglian Water removed this increase in the value of its actual assets because of income from ROCs.

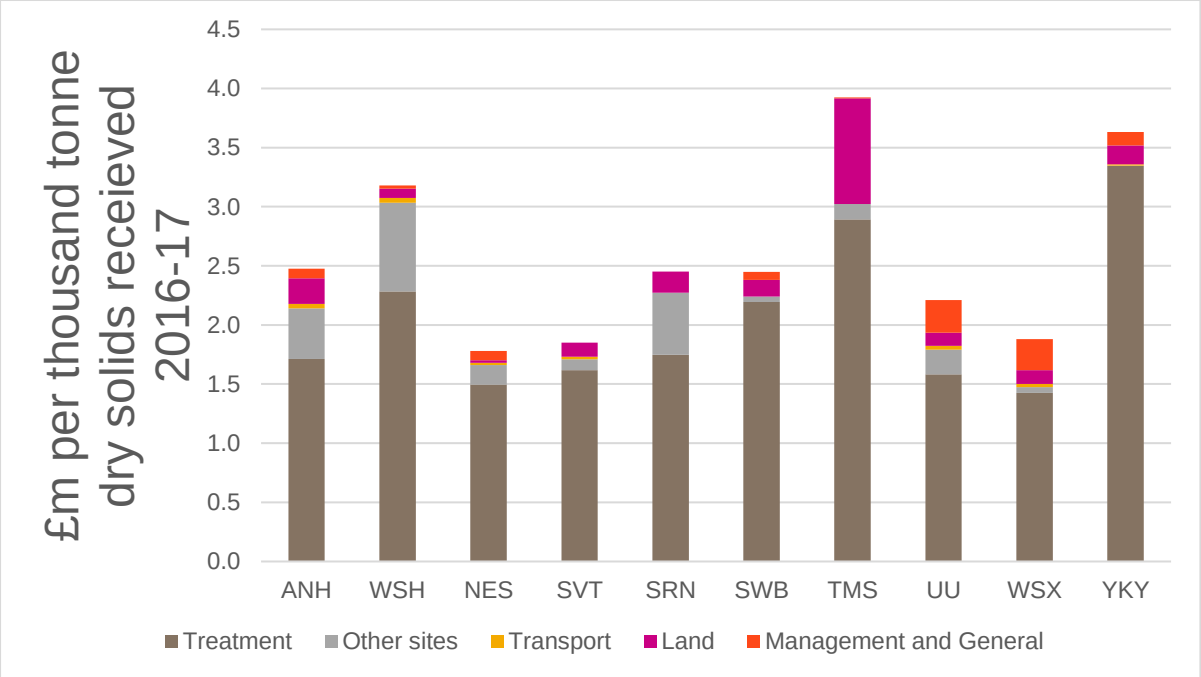
8.5 Figure 8.1 sets out companies' proposed RCV allocations to the bioresources control and how they compare to economic value.

Figure 8.1 Comparison of economic value and proposed RCV allocation



8.6 Figure 8.2 shows company estimates of economic value split between different asset types.

Figure 8.2 Economic value associated with different assets (£m per ttds)



Feedback on RCV Allocation Proposals

8.7 We expect companies to continue to consider if an alternative allocation of the RCV allocation would better protect customers including by promoting a level playing field for markets.

8.8 Companies may propose to allocate the RCV based on an economic value that includes a proportional allocation of shared assets or excludes shared assets for which the bioresource business unit is not the principal user. We will consider company business plan submissions and propose a consistent approach in our PR19 draft determinations. Companies' inclusion (or exclusion) of a proportionate allocation of shared assets for which the bioresource business unit is not the principal user in their proposed RCV allocation will not negatively affect our initial assessment of plans as long as a company sets out a considered view to support its decision.

8.9 We disagree with Anglian Water's view that the RCV allocation should not reflect the value of its assets from receiving renewable incentives that modern equivalent assets would not receive. We set out the approach that companies should follow in paragraph 5.45.

9. Next steps

9.1 We expect companies to include transparent, well evidenced and acceptable proposals on pre-2020 RCV allocation.

9.2 We expect companies to consider this feedback and where appropriate improve their valuation of their bioresource assets and the associated cross checks that they submit as part of their business plans. Companies should also identify if they have any new information which they should reflect in their valuations and their business plans.

9.3 As discussions could include commercially confidential information we are happy to meet companies individually to discuss feedback on their proposed RCV allocation.

9.4 We expect companies to submit updated summary RCV information in the business plan tables in September 2018. As set out in our guidance on business plan data tables this is to include a reconciliation to the information they provided in September 2017. We also require companies to provide information to check the potential impact on a customer's bill.

9.5 We are limiting the information we are requesting for business plans on the basis that we expect most companies to be able to address the points we make in our feedback. We expect this feedback to be appropriately addressed in company business plans.

9.6 If this is not the case, we may ask a company to update the full set of detailed RCV tables either before or after it submits its business plan. In addition, companies may decide to submit the full set of detailed RCV tables alongside their business plans. Companies should do this if they make significant changes to their valuations, or otherwise do not have confidence that we will be able to understand the changes they have made from their business plan tables.

9.7 In providing information on their economic valuation in their business plans we expect companies to follow the assurance requirements set out in chapter 13 of our final methodology.

9.8 As part of the initial assessment of business plans we will assess the appropriateness of companies proposed pre-2020 RCV allocation between

bioresources and wastewater network plus. This will take into account of the guidance and feedback we have provided.

9.9 We will confirm the allocation of RCV to the bioresources control and wastewater network plus control as part of PR19 determinations.