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Trust in water

Delivering Water 2020: consultation on PR19 methodology Appendix 6: Bioresources control

**Appendix to chapter 6:
Targeted controls,
markets and innovation:
wholesale controls**

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1 Summary

The 2019 price review (PR19) is the first time we will set a separate control for bioresources. The control will apply to the 10 Water and Sewerage Companies (WaSCs) for whom we set separate controls for retail and wholesale activities at PR14. Key decisions on our approach to bioresources were set out in our May 2016 decision document, following extensive consultation. Details of our decisions and our impact assessment can be found in the [May 2016 appendix 2](#).

This appendix provides further detail on our approach to implementing the bioresources form of control. It expands on the material set out in Chapter 6 of the main document.

We do not cover all aspects of how the bioresources price control will be implemented in this appendix. Our approach to assessing the efficient cost of providing bioresources services, for example, is covered in the Securing cost efficiency chapter (Chapter 9), while issues related to the cost of capital are covered in the Aligning risk and return chapter (Chapter 10) and our approach to assessing Pay-As-You-Go (PAYG) and Regulatory Capital Value (RCV) run-off in the Aligning risk and return: financeability (Chapter 11). We reflect this throughout the appendix by cross referencing to other sections of the methodology document.

The appendix is structured as follows:

- Section 2 provides the background to the bioresources control
- Section 3 provides an overview of our proposals on how the average revenue control will work
- Section 4 provides more detail on our key elements of our proposals

Table 1 summarises our decisions and proposals for the water resources control and provides references to where further detail on them can be found.

Table 1 – Summary of our decisions and proposals for the bioresources control

Decisions		
Topic	Confirmed approach	Further detail
Type of control	Separate, average revenue control to be set at company level; this will reflect the volume of sludge produced by water and sewerage companies (WaSCs)	Section 2.2
Length of control	Five years	Section 2.4

Decisions		
Topic	Confirmed approach	Further detail
Boundary of control	See Regulatory accounting guideline (RAG) 4.06 and paragraph 2 of companies' licence condition B for definitions of the activities that could be covered by the bioresources price control.	Section 2.4
Inflation Indexation	Annual adjustment to reflect any percentage change in the relevant inflation index	See Risk and Return Appendix for further details
Trading incentives	We will not introduce explicit sludge trading incentives at PR19	Section 2.5
RCV allocation	Allocate the RCV to the separate bioresources control using a focused approach Determine the bioresources RCV using the concept of forward-looking economic value of the assets. We set out the approach companies should take when proposing their bioresources RCV allocations in April 2017 Determine allocation of RCV to the bioresources and network plus wastewater control (the remainder) as part of PR19 determinations	Section 2.6
Protecting the pre-2020 RCV	We propose to extend our protection of past, efficiently-incurred investments included in the wholesale wastewater RCV, up to 31 March 2020. However, we have concluded there is no need to create a specific regulatory mechanism at PR19	Section 2.7

Proposals		
Topic	Topic	Topic
Post-2020 investment	Building-block approach. The return and depreciation on efficiently incurred investment will be recoverable in the 2020-2025 period. Post-2020 investment incorporates all investment. We are not making a distinction between maintaining existing bioresources treatment capacity and building new capacity	Section 3.1
Allowed average revenue	For each company, calculate the average revenue in £/TDS, using an NPV approach. Divide the NPV of five year total revenue by the total five year forecast of sludge volumes in TDS Revenue for bioresources will be net of both income (transfer price) from any trading activity and costs of undertaking any non-appointed business Index the average revenue figure by the relevant inflation index through the form of control	Section 3.1
Forecasting accuracy incentive mechanism	Apply a penalty for significant inaccuracies in sludge volume forecasts in companies' business plans for variations greater than $\pm 3\%$ from the forecast used in setting the revenue control.	Sections 3.1 and 4.1

Proposals		
Topic	Topic	Topic
	<p>Returning revenue to customers where five year total sludge volumes are greater than 7% of those used in setting the revenue control.</p> <p>These adjustments will be applied as part of the 2020-25 reconciliation at PR24.</p>	
In-period true-up for revenue variance	<p>A company should collect the revenue associated with the volume of sludge it produces through treating wastewater. This revenue equals the company-level average revenue, in £/TDS, multiplied by the measured tonnes of dry solids produced.</p> <p>We propose to limit the total revenue companies can collect. Where required, alter the average revenue, £/TDS, in subsequent years to correct for any under- or over-recovery in an earlier year</p>	Sections 3.1 and 4.2
Accounting for income from bioresources trading	In-period sharing of profits from using appointed assets for treating other waste or sludge trades.	Sections 3.1 and 4.3

2 Background

In our decision document '[Water 2020: Our regulatory approach for water and wastewater in England and Wales](#)', May 2016, we set out our decision to introduce a separate control for bioresources. Following extensive consultation and options appraisal, we stated that at PR19 we would introduce an average revenue control for bioresources activities, placing limits on the revenue per unit of sludge produced. We also stated that the average revenue control would apply for five years between 2020 and 2025. These decisions were confirmed by the April 2017 change to condition B of the conditions of the appointment ('licence') for each of the 10 largest water and sewerage companies (WaSCs) in England and Wales. All 10 WaSCs agreed to the licence modification.

We expect that, combined with a greater role for markets, the price control will help deliver resilient bioresources services for customers and the environment in the long-term. Our Impact Assessment in May 2016 set out that by promoting markets, we would expect this to deliver benefits of between £372 million and £1,386 million over a 30-year period.

Since we published our decision document we have continued to engage with stakeholders in developing our regulatory approach to implementing the average revenue control. We have held a number of working group meetings with interested parties, and a targeted workshop on the detailed mechanics of the bioresources control. We invited members of the working group to give presentations and facilitate the discussions. We have published materials from these events on [our website](#).

In this section we discuss:

- the role of markets in bioresources services;
- the rationale for a separate bioresources control;
- the licence change to enable a separate control;
- how we will set the bioresources revenue control;
- the boundary of the control;
- the allocation of the pre-2020 RCV to bioresources; and
- protecting the pre-2020 RCV.

This summarises the positions that we consulted on in December 2015 and decided upon in May 2016. On both occasions we published detailed supporting appendices setting out our options appraisal and impact assessment of our decisions which can be found on our website. Readers of this document may find it helpful to also read the detailed discussion in the [December 2015 appendix 1](#) and the [May 2016 appendix 2](#).

2.1 The role of markets in bioresources services

Bioresources services are an important part of the treatment of wastewater, where there are opportunities to create economic value from production of renewable energy and agricultural fertilisers that return essential nutrients to the land.

Our revenue control will provide a framework to protect the interests of customers, while also enabling greater collaboration between companies and other firms operating in wider waste markets to maximise this value.

In our [December 2015 Water 2020 consultation](#) we identified a number of opportunities where WaSCs could trade with third parties – the organic waste sector and other WaSCs. We also set out the main issues preventing effectively functioning markets in this area. In the May 2016 decision document we set out that, on the evidence available, the benefits of acting to remove barriers to effectively functioning markets far outweighed the costs. The December 2015 document built on the [2011 Organic Waste market study](#) carried out by the OFT, exploring how barriers to the effective functioning of the bioresources market were preventing the companies from maximising value from the services that they provide. Details of our analysis can be found in Appendix 1 of the December 2015 document.

Our May 2016 decisions took into account feedback from our December 2015 consultation. We decided to:

- introduce information remedies, asking companies to publish market information to help third parties to identify trading opportunities;
- adopt a separate price control for bioresources at PR19;
- set an average revenue control (regulating the average revenue per unit of sludge) in place for a five-year period, applying at company level;
- set the average revenue control using a building-block approach, such that we will:
 - use a focused approach to allocate the regulatory capital value (RCV) of the wholesale wastewater business, between the bioresources and network plus wastewater control to enable a separate price control to be set; and
 - protect appropriate returns on the pre-2020 bioresources RCV, but not to create a specific mechanism for doing so in the 2019 price review.

In our decision document we identified that the costs of implementing this package were between £29 million and £58 million. This compared to the likely financial benefits of between £372 million and £1,386 million over a 30-year period.

We have reviewed our assumptions underlying the benefits of introducing this package and consider that the benefits still remain within the range we set out in our decision document.

Our calculated benefits assumed, at least initially, that most benefits would be delivered by trades taking place between water companies. Since our decision document, we have been pleased to see a high level of interest from water companies on possible trading opportunities. We are aware of companies discussing possible trades. We are also pleased to see that at least one company has published a draft of its market information to facilitate discussions with others. This suggests that we may begin to see the benefits from such trades during the next price control period.

We also assumed that some of the benefits would be delivered through trading with the other organic waste sector. During the sludge working group meetings¹ we discussed the framework of environmental regulations covering these activities. Environmental regulators have informed us that co-treatment of different materials is not prohibited. However, the regulations that apply to treating and recycling co-treated materials reduce the likelihood of WaSCs and other organic waste operators entering into trades where the regulations impose different requirements. There is no current programme of work to align the environmental regulatory regime in the short term, but this may change in the future,

2.2 The rationale for a separate bioresources control

We set out our decision and the rationale for introducing a separate bioresources control in the decision document. A separate control for bioresources will help support the development of bioresources markets over time. It should also increase transparency and reveal more information on companies' bioresources operations that will help strengthen the incentives under our regulatory framework and increase management focus. Our experience of setting separate retail controls at PR14 suggests that having a separate bioresources control could foster an increased commercial focus in this area.

¹ Terms of reference and materials from the working group meetings can be found on the Ofwat website.

A separate control will support the development of the market. It will delineate the costs and revenues associated with bioresources activities from other wastewater activities. In addition, the potential overlap with the wider organic waste markets means that the risk of cross-subsidy is a particular concern as we look further ahead. A separate price control should give confidence to third parties entering the market that there are strict boundaries between the bioresources and network plus businesses, to ensure that there is no cross-subsidy. The binding nature of the price control means that a company will not be able to subsidise its bioresources activities from the network plus revenue controls. This places bioresources activities on a similar footing to other organic waste operations. WaSCs will need to demonstrate compliance with the two revenue controls in their annual reports throughout the price control period.

As the market develops over time, we will observe development of contract based commodity prices. This would be similar to the gate prices that are currently set by the organic waste sector to treat different materials. In line with this, we intend to explore setting price limits based on 'gate fees' for bioresources services at PR24, as an alternative to regulatory building blocks approach.

2.3 The licence change to enable a separate control

We have made changes to condition B of the conditions of appointment ('licence') of each of the 10 water and sewerage companies in England and Wales. All 10 water and sewerage companies agreed to the modification.

The modification allows us to set separate binding controls for wastewater companies for Bioresources and Network Plus Wastewater activities for periods starting on or after 1 April 2020. The licence condition sets out:

- how the activities which could be covered by each control are defined and the extent to which this can be changed;
- the form of the controls and the extent to which Ofwat can determine this when it sets the controls; and
- the duration and indexation of the controls.

The modification does not specify the detailed form of bioresources control. This was to allow us flexibility to develop and refine our thinking on how the price control would work in practice and how we might define key parameters, taking account of stakeholder feedback. The new licence conditions for the companies came into effect from 15 April 2017.

Chapter 6 of the main document, and this appendix, are the consultation on some of those detailed elements that influence how we implement our May 2016 decisions. We set out in section 3 below the activities we propose to designate as bioresources activities and welcome any comments on the designation.

2.4 The bioresources revenue control

The form of the price control refers to the high-level structure we adopt for setting price limits. It involves a number of different elements covering, amongst other things, what is controlled and how that is achieved. Table 2 details the elements of the control we have already made decisions on following previous consultation. Information on the options that we considered, our assessment and decisions is provided in the [May 2016 appendix 2](#).

Table 2: Decisions made previously on elements of the bioresources control

Element of the control we considered	What decision was made
What is controlled and how it is controlled.	We will set an average revenue control to regulate bioresources, which will reflect the volume of sludge produced by WaSCs.
Whether it would be set at company level or site level.	We will set the bioresources price control at a company level rather than site level.
Volume measure of sludge.	The volume would be measured using tonnes of dry solids.
The period of time the control covers.	We will set a five-year price control at PR19.
Reflecting inflation in the price control.	We decided that the average revenue control would be indexed by inflation. Chapter 10 discusses our proposals for the relevant index.

2.4.1 What is controlled and how it is controlled

Our price control framework plays a vital role in delivering benefits to customers, the environment, and wider society. Our approach to this reflects our statutory duties (including our duty to further the resilience objective), and is aligned with our strategy, our enduring price control principles, the UK Government draft strategic priorities and Welsh Government policies and draft objectives.

The bioresources price control will protect customers while enabling a greater role for bioresources markets to create value. In an unregulated market, we would expect providers of bioresources services to be fully exposed to volume risk. We therefore

expect companies to take on volume risk in the bioresources control as part of this transition towards markets. Our December 2015 consultation considered the following approaches:

- a volume adjustment factor applied to a total revenue control (as with the PR14 household retail control);
- an average revenue control; or
- a price cap.

In the May 2016 decision document, we decided to set an average revenue control linked to the volume of sludge produced. Our approach provides a link between the price control and the wider market, creating incentives for companies to optimise the processing of sludge within and outside their own facilities to drive benefits. It creates an opportunity to reveal better information in relation to bioresources activities in the transition towards a more market led approach over time.

We also decided that we would use the same form of control in Wales and England. This will enable Dŵr Cymru to work effectively with other providers of sludge transport, treatment and recycling.

In our decision document, we also set out that we would use a building-block approach to calculate the average revenue control, based on expected totex, funding for the RCV and expected sludge volumes.

2.4.2 Volume measure for the control – tonnes of dried solids

We have considered the measure of sludge volume that would be the basis for the bioresources average revenue control. We considered two measures:

- tonnes of dry solids (TDS); or
- population equivalent served by sewage treatment works.

In May 2016, we set out our preferred option to link bioresources revenues to sludge volumes measured on a tonnes of dry solid basis. However, we explained there are concerns over the robustness of TDS data in terms of consistency between companies and over time. Currently TDS is not directly measured in all locations and is often estimated. For example, it is sometimes calculated from other measurements using assumptions about the impact of elements of the treatment process on volumes. This creates challenges to the way in which we might set our average revenue control at PR19.

We set out that we will use population equivalent served by sewage treatment works as a cross-check. This check would be used to compare TDS per head across the industry, and could be used to moderate data used for setting the average revenue control.

All stakeholders generally agreed with the use of TDS as the measure for setting the average revenue control, but raised a number of points in responding to the May 2016 document, including:

- sludge transport costs are driven by liquid volume, rather than dried volume;
- current inaccuracies and inconsistent measurement of TDS across the industry could lead to over- or under-recovered revenue; and
- a combined approach to measuring TDS could be used where large works would be based on a measurement of TDS, but small works could be estimated using population equivalent.

Although we did not ask a specific consultation question on the use of population equivalent as a cross-check, we received comments on this from some stakeholders. Those that commented all considered it sensible to use population equivalent as a cross-check for TDS.

Since May 2016 we have developed our definition for TDS in consultation with stakeholders, in particular with the sludge working group. We set out our final definition in the April 2017 [Information Notice IN 17/04](#). For clarity, this definition is repeated in the box below.

Definition of tonnes of dry solids

Sludge production in tonnes dry solids for the PR19 average revenue control:

- is a measure of untreated sludge (primary, secondary and tertiary) produced by in-area wastewater treatment processes in a year;
- does not include the grit and screenings removed through preliminary wastewater treatment processes; and
- is measured preferably at the boundary between network plus and bioresources as defined in RAG 4.06, or if not at the point of treatment. There should be continuous measurement via instrumentation rather than by composite or spot sampling.

Reference: Information notice IN 17/04: Preparing for wholesale market

Under an average revenue control, the total revenues that a company is allowed to earn will vary according to the volume of bioresources it produces by treating wastewater in its area. In the final determination, we will set the average revenue limits for each company, expressed in £/TDS. We expect the company will set its bioresources charges based on the best available forecast of volumes and other relevant information. The company should aim to ensure that the average revenue they will earn from these charges is consistent with the average revenue control. In section 3 we discuss the need for companies to provide accurate forecasts of sludge volumes in their business plans to enable us to set the average revenues.

2.4.3 Length of the control

We decided in our May 2016 decision to set the bioresources control on a 5-year basis at PR19. This will be revisited as part of developing our price control approach at the 2024 price review (PR24).

2.5 The boundary of the bioresources control

We have worked with stakeholders through the sludge working group and the regulatory accounting guidelines (RAG) consultation process to review which activities should be within the scope of the bioresources price control. Following this engagement process we expect the bioresources control to cover the assets and activities within the definitions of sludge transport, sludge treatment, and sludge disposal in [RAG 4.06](#). When sludge liquors are returned to a wastewater treatment works, the activity of treating the liquors is a network plus wastewater activity. Companies should prepare business plans on the basis that these boundaries will be consistent with the detailed definitions in [RAG 4.06](#).

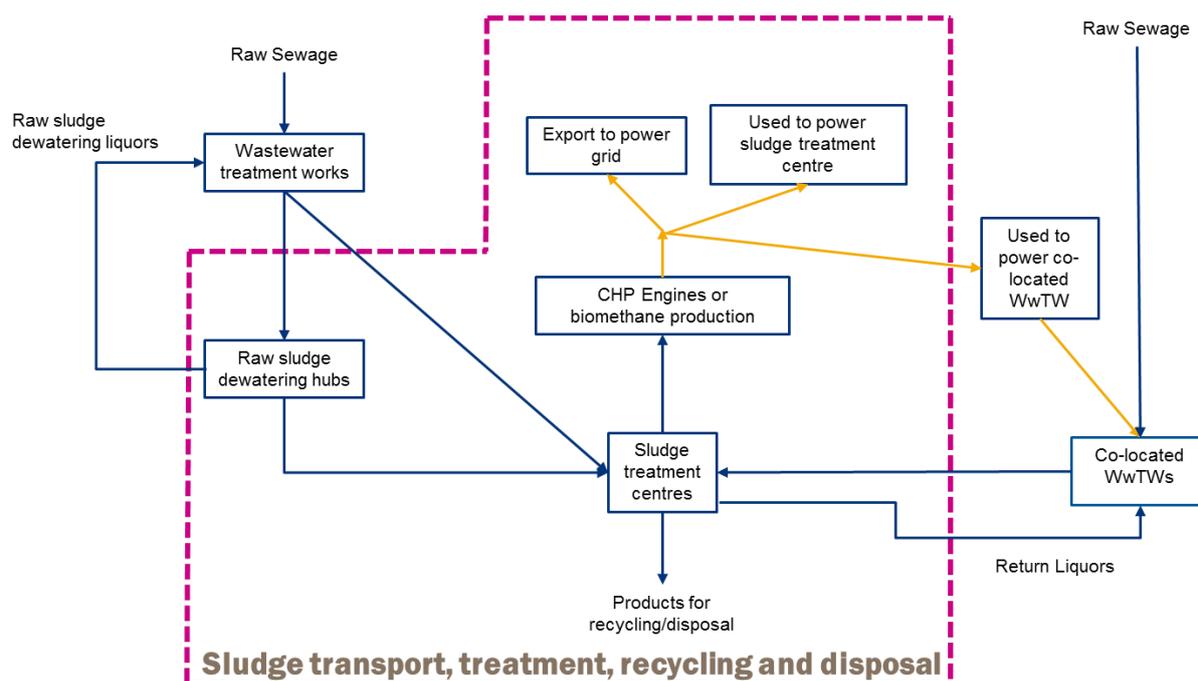
The distinction between activities that could be designated as falling under the bioresources price control and those remaining under the wastewater network plus price control has been decided through the licence change process which all ten water and sewerage companies agreed to through a formal consultation process. The activities that could be designated as Bioresources activities are defined in paragraphs 2 and 3 of companies' licence condition B, and [RAG 4.06](#). Future changes to the RAGs will not change the scope of price control activities. Companies should prepare business plans on the basis that these boundaries will not change from the detailed definitions in [RAG 4.06](#).

We have applied these same definitions to the assets and activities in the April 2017 document, '[Economic asset valuation for the bioresources RCV allocation at PR19](#)',

where we explain the approach we expect companies to take to determine the proportion of the wastewater RCV to the bioresources price control.

Figure 1 shows the general boundary between those activities that we expect to be covered under the bioresources control and which sludge-related activities would remain part of wastewater network plus.

Figure 1: General bioresources boundary



We summarise the activities that we expect to be covered by the bioresources control and its boundary points in Table 3 below.

Table 3: Activities expected to be included in the bioresources price control

Activity	Description	Boundary point
Sludge transport	This service includes the transport of sludge from the sewage treatment plant to the sludge treatment plant. All types of transport, and associated fuel costs, are included within this service. However, transport within the sludge treatment plant or between sludge treatment plants is not included in this service, which is instead an activity of the 'sludge treatment' service.	Start: point of discharge of sludge from indigenous thickening processes, indigenous sludge holding tanks or directly from sewage treatment process into pumps and pipework or tankers for transport to sludge treatment processes. End: input of sludge into sludge treatment works.

Activity	Description	Boundary point
Sludge treatment	<p>This service includes all the activities related to sludge treatment. While different technologies exist for sludge treatment, sludge treatment is defined as a technology-neutral service for the purpose of accounting separation. Includes incineration of non-treated sludge.</p> <p>Any thickening or dewatering of treated sludge is a sludge treatment activity.</p>	<p>Start: storage of sewage sludge in blending or holding tanks and input into sludge treatment sites.</p> <p>End: Point at which the treated sludge is collected for disposal.</p>
Sludge disposal	<p>The collection of treated sludge from collection point, onward transport and disposal to landfill, agricultural land, land reclamation sites and to other end users in various forms including:</p> <ul style="list-style-type: none"> • treated sludge; • incinerated sewage sludge ash (ISSA); • composted sludge; and • sludge cake. <p>If incineration of completely treated sludge takes place, then this should be included in 'sludge disposal'.</p>	<p>Start: Collection from treated sludge holding tanks or cake storage facilities at sludge treatment works; or collection of untreated sludge that is taken directly for disposal such as via landfill sites.</p> <p>End: Sludge disposed or recycled to land.</p>

Companies should assume that for the purposes of preparing their business plans we will designate bioresources activities on the basis set out above. We shall formally designate bioresources and network plus activities as part of the final determination process. Subject to no material new information and evidence this will confirm the activities set out above. However, we might make minor changes around the boundary if we find new evidence that informs our thinking, including from the annual performance report companies provide to us in July 2017, and in the consultation responses to the 2017-18 Regulatory Accounting Guidelines.

2.5.1 Costs and revenues crossing the network plus/bioresources boundary

In [May 2016 appendix 2](#) we discussed the most material flow across the network plus / bioresources boundary, namely sludge liquors. We proposed that companies develop an appropriate method for calculating liquor treatment charges, using the characteristics of the liquor in their calculations. These calculations should be cost-reflective and transparent, and should provide a level playing field with third parties.

When sludge liquors are returned to a wastewater treatment works, the activity of treating the liquors is a network plus wastewater activity. We note that to promote a level playing field, liquor treatment costs should be costed in a way that is consistent

with a company's charges to other third parties for liquid waste received at a wastewater treatment works.

There are other significant flows of costs and revenues crossing the boundary between wastewater network plus and bioresources that companies will need to account for in a cost reflective, open and transparent manner. We would expect companies to reveal these costs and revenues through their annual regulatory accounting data, using the latest principles and guidance set out in our regulatory accounting guidance (RAGs). These items include:

- energy, particularly if wastewater network plus uses energy generated through sludge processing on a co-located site; and
- any grit or screenings removed as part of sludge processing which network plus may treat or dispose of alongside the grit and screenings removed in the preliminary wastewater treatment process.

Such costs and revenues will also need to be accounted for in a similarly transparent way if they are transferred to other parties, such as associate companies, and should comply with transfer pricing principles given in RAG5. We will expect to develop reporting guidance on these issues through future RAG consultation processes.

2.6 The allocation of the pre-2020 RCV to bioresources

We currently have a single value for each company's Regulatory Capital Value (RCV) for wastewater assets, including bioresources assets. The RCV captures the capital invested in the business and forms part of our building block approach to price controls. It is used in price controls to determine the level of revenue that a company is allowed to recover.

In our Water 2020 decision document we decided to allocate the RCV to the bioresources price control using a focused approach. This means the allocation of the RCV to bioresources will be based on the economic value of the assets employed.

Following a targeted review of the companies' sludge and water resources accounting separation data, [published in March 2016](#), we consulted on the detailed approach to allocating RCV to bioresources. This was developed with input and challenge from companies and other stakeholders at the sludge working group. Copies of the slides and minutes of this group are available on our [website](#).

In April 2017 we published '[Economic asset valuation for the bioresources RCV allocation at PR19](#)', where we set out how we expect companies to value their bioresources assets and to inform their proposed allocation of the legacy wastewater RCV to the bioresources price control.

We will confirm the allocation of RCV to the bioresources price control and network plus price control (the remainder) as part of PR19 determinations.

We have committed that our price control framework for PR19 will provide the same nature and degree of regulatory protection as at present, for the RCV allocated to bioresources at 31 March 2020. This RCV allocation is only for the purpose of setting price limits and is at a company level. It will not necessarily have an implication in any future valuation of individual assets or sites.

Given the importance of this issue, we have continued to engage with the companies extensively. The timetable that we set out for RCV valuations will allow us to give feedback to companies prior to their submission of business plans.

2.7 Treatment of the pre-2020 RCV and post-2020 investments

The protection of returns on RCV that water and wastewater companies have enjoyed is not typical in the market for providing organic waste treatment services. As we promote markets in bioresources services we are seeking to bring market forces to bear on company decision-making. We are seeking to introduce an element of company risk on investment to mimic the market conditions that will deliver customer benefits. However, the PR19 price control is the first step towards the market approach and we want to ensure that our approach allows a reasonable return on efficient investment in the 2020-25 period, without fettering our discretion about how we undertake any future price reviews.

In December 2015 we stated that the RCV allocated to bioresources services at 31 March 2020 would receive the same type and degree of regulatory protection as it would have received under the wholesale wastewater revenue controls. This means that where efficiently incurred expenditure cannot be recovered on a standalone basis from bioresources revenues, we would allow it to be funded through the wastewater network plus control.

We stated that efficiently incurred investments from 1 April 2020 would not receive the same regulatory protection. Also, the revenues to fund the post-2020 RCV would need to be recovered on a standalone basis from bioresources activities. Post-2020

investments would be exposed to the market for bioresources services and it would not be appropriate to provide explicit regulatory protection.

In our May 2016 decision document, we confirmed our proposed approach and set out that we would use a RCV-based building block approach to calculate allowed revenues. Companies will still have direct control over who treats their sludge, whether themselves or third parties, so we consider that there is limited scope for RCV stranding risk at PR19. However, companies will face some volume risk around the volume of sludge produced from treating domestic and business wastewater. The volume risk comes from variations in sludge produced by treating wastewater from domestic and business customers, which is expected to be modest based on historical evidence. This approach should ensure that companies can earn a reasonable return on their RCV. We note that prior to 2010, companies were exposed to volume risk across all price controls.

Our May 2016 decision document set out that a specific mechanism to protect pre-2020 RCV financing costs at this stage could lead to perverse incentives. For example, companies could be incentivised to trade primarily to obtain RCV protection payments, to the detriment of customers. Similarly, WaSCs might ignore the sunk costs in their existing bioresources RCV when deciding whether to treat sludge or trade. Although this could kick-start the market, it would result in customers funding the return on the existing bioresources RCV through the mechanism as well as paying the return on the assets being used to treat sludge.

We recognise that there might be a greater risk of stranding once the market has developed and if the regulatory framework changes. We will therefore reconsider the need for any specific mechanism at PR24.

3 Overview of our implementation proposals

In this section we provide an overview of how we propose to implement the May 2016 decisions on the bioresources form of control. Here we provide a brief explanation about our preferred implementation approach. For key decisions the next section provides an overview of the options we considered, our assessment of them and more detail on how our proposed implementation would work.

3.1 Proposed approach to implementing the bioresources average revenue control

We propose to use a building-block approach to calculate allowed revenues for bioresources at PR19. Figure 2 below illustrates the bioresources building blocks, which incorporate:

- returns and depreciation to the pre-2020 bioresources RCV;
- an assessment of:
 - efficient totex during the 2020-25 period, which would reflect company forecasts of the volume of sewage sludge produced by wastewater treatment;
 - funding expenditure to be recovered within the period (determined by the PAYG ratio); and
 - expenditure recovered in future periods (return and depreciation on post-2020 RCV); and
 - a tax allowance.

We would set an allowed average revenue for the five year period by expressing the revenue as £/ TDS based on sludge volume forecasts.

Figure 2 – The building blocks of the bioresources average revenue control

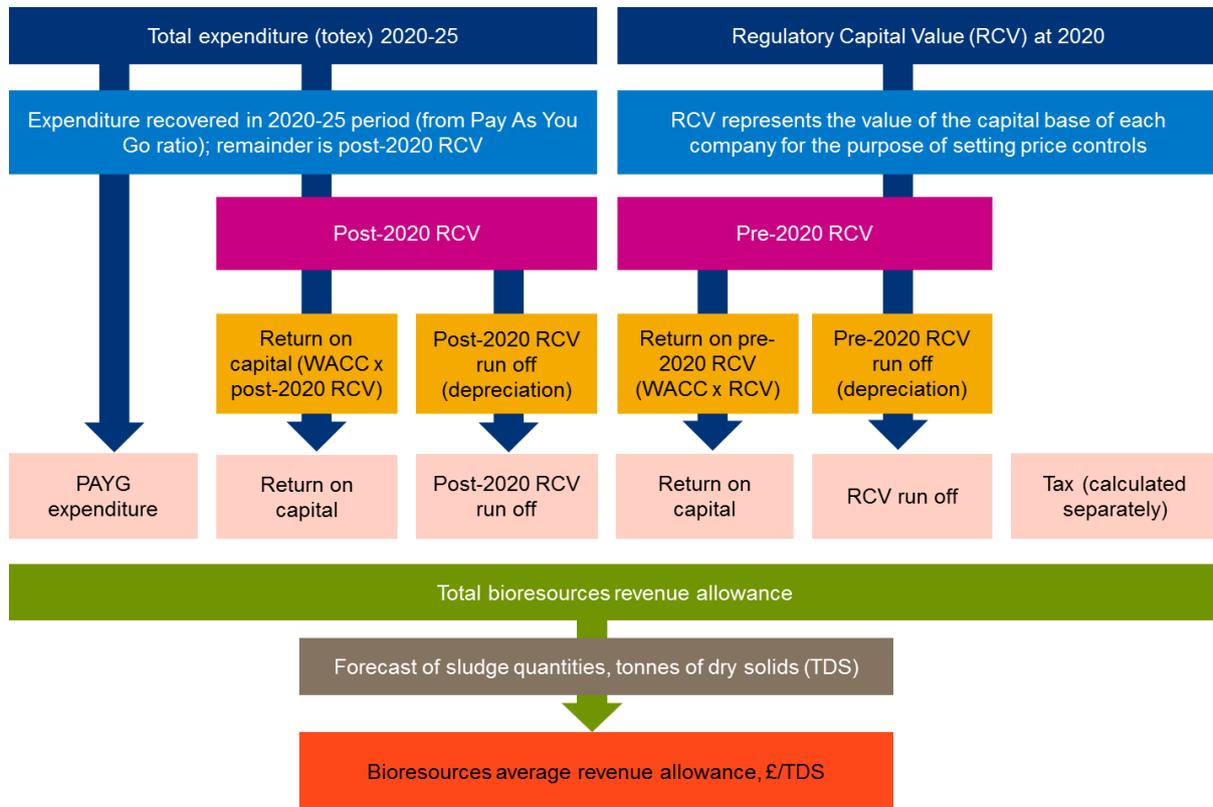


Table 4 below gives an overview of proposals for the bioresources price control that we explain elsewhere in the methodology consultation.

Table 4: Proposals for the bioresources control that we discuss in other sections of the methodology document and appendices.

Proposal	Approach
Outcomes for bioresources	As set out in chapter 4 companies would need to show how they would be held to account for the revenues they receive for each price control by ensuring they have performance commitments that cover all relevant price controls. These performance commitments would not necessarily need to be specific to each control, but all price controls would need to be covered (including bioresources).
Totex for bioresources	Efficient costs for bioresources would be assessed using the same approach as for other company costs. The detail of the methodology for cost assessment and efficiency analysis is given in chapter 9.

Proposal	Approach
Cost sharing	We are proposing that cost sharing would not be applicable to the bioresources price control, which would ensure that there is no dilution of the association between revenues and the volume of sludge a company produces.
PAYG rate for bioresources	The choice of PAYG rate for bioresources activities is discussed in chapter 11.
Inflation indexation of the RCV	As explained in chapter 10, we propose to inflate 50% of the 2020 bioresources RCV by RPI and the other 50% by the relevant inflation index. The post-2020 RCV would be fully inflated by the relevant inflation index only.
Post-2020 investment	As set out in chapter 6 of the methodology, expenditure in the 2020-25 period that is not recovered at the time would be added to the post-2020 RCV. Our building-block approach would fund the return and depreciation on efficiently incurred investment for expected sludge volumes.
Calculating the average revenue	<p>As set out in chapter 6 of the methodology consultation, we propose calculating the average revenue for each company as the sum of total revenue divided by the 5-year total of forecast TDS to get a single £/TDS for each company on an NPV basis. Companies should then collect the revenues associated with their measured TDS in each year.</p> <p>We think this is the best way to calculate average revenue. However, this approach would lead to a lack of flexibility in being able to adjust bioresources revenue profiles to reflect particular expenditure profiles.</p>

The following sections give an overview of proposals for the bioresources price control which are not discussed elsewhere in the methodology consultation.

RCV midnight adjustment

Generally, when we set revenue controls at each price review, we make an adjustment to the value of a company's RCV to reflect its performance in the previous period. This is known as a midnight adjustment. The adjustment can create a step change between the closing RCV at the end of the previous price control and the opening RCV for the new price control.

However, the opening RCV for the bioresources price control is being set on a focused basis and will reflect the outcome of the companies' economic valuation of their bioresources assets. For this reason, past performance is not a relevant consideration and it would be inappropriate to distort these opening values by applying a midnight adjustment. We propose that midnight adjustments relating to performance against the wholesale wastewater control are applied to the network plus wastewater RCV.

Operation of the average revenue control

We propose calculating each company's average revenue allowance by determining the total revenues needed to fund the efficient costs of providing bioresources services for a given forecast volume of sludge over the period, expressed as a single £/TDS figure on a net present value (NPV) basis. The revenue control would be linked to the volume of indigenous sewage sludge produced from wastewater treatment and exclude volumes of sludge treated on behalf of the non-appointed business.

We propose that the bioresources average revenue control would be expressed as a value in real terms. We would index this annually for inflation, linking the real average revenue to the relevant inflation index through the form of control. In chapter 10, we propose to adopt CPIH as the relevant index.

Unlike our other wholesale price controls, which limit total revenues, we would not apply a revenue forecasting incentive mechanism to bioresources revenues. We propose:

- a revenue correction mechanism to adjust the average revenue limits for variations between average revenues earned and the average revenue limit in an earlier year. This would be applied mechanistically.
- a volume forecasting incentive mechanism to address the uncertainties in the volume of sludge that will be produced at a company's wastewater treatment works during each of the years of the price control period.

We do not intend to apply cost-sharing arrangements with customers for companies' under- or over-spending on bioresources activities. This recognises that the bioresources revenue limits are linked to changes in volumes in a way that other wholesale controls are not. This should encourage companies to find the most efficient solutions to their bioresources needs and to explore trading opportunities.

It is important that companies provide robust estimates of the volumes of sludge that they expect to produce. Significant under- or over-forecasting of volumes can distort our calculation of the average revenue control at PR19. We would apply a series of cross-checks to ensure that company forecasts are consistent across the wastewater activities, but also comparable across companies.

We expect companies to improve sludge production measurement during the price control period. This could mean that changes in sludge volumes may relate to better measurement information rather than physical changes in what is processed or the costs incurred by the company. It is important that companies are incentivised to improve measurement accuracy, but that the changes in measurement do not provide windfall financial benefits.

Forecasting accuracy incentive

It is the first time that we will set a separate price control for bioresources, based around recently defined activity and accounting boundaries. Companies may have broadly reliable historical data on the total costs associated with bioresource activities, but uncertainties over historical volume measurement means that meaningful data on unit costs may not be available, and where it is available it is unlikely to be consistent across companies. As a result, we are expecting companies to provide forecasts of costs and associated volumes based on consistent definitions. This makes our calculation of the average revenue control reliant on the accuracy of company volume forecasts.

We expect to scrutinise the forecasts in business plans using relevant sources of information, for example, comparison with historical data, comparison across companies, and using population equivalent cross checks. As explained in chapter 6 we expect companies to provide a rigorous explanation of methods and data they use to derive their business plan forecast of TDS.

To protect customers from excessive bill variation driven by differences between forecast and measured sludge volumes, we are proposing a forecasting accuracy incentive that would be based on the variation between actual and business plan forecast volumes over the five-year period.

We propose to apply a financial penalty for significant variations, above 3%, between actual and forecast five year total sludge volumes. Our preferred approach is to apply the penalty symmetrically to differences above or below the forecasts of sludge volumes.

We expect that companies will be measuring their bioresources production from the start of the control period. However, since the definition of sludge volumes and measurement at the network plus / bioresources boundary is new, we recognise that companies will improve the accuracy of their measurement of sludge volumes over time. The transition to more accurately measured volumes of sludge may contribute to variations between reported and forecast volumes, although there is no evidence that this increases the risk of companies being penalised under the proposed forecasting accuracy incentive.

We therefore propose to apply the forecasting accuracy incentive to any difference greater than 3% between measured and forecast sludge volumes. However, where a company can provide evidence within the first two years of the control period that material variations in recorded volumes from the forecast are the result of measurement improvements rather than forecasting error then we would consider adjusting the way the forecasting accuracy incentive is applied. We would expect a company to set out a clear justification why it could not reasonably estimate the impact of measuring sludge volumes when preparing its sludge volume forecasts. We would not consider any representation that discusses forecasting errors that do not relate to the impact of improved measurement.

We would calculate the absolute value of the penalty to apply, once the variance is greater than +/-3% of business plan forecasts, using this formula:

$$\text{BFAI} = -\text{PR} (\text{ATDS} - \text{FTDS})$$

BFAI Bioresources forecast accuracy incentive. The overall penalty to apply to company revenues would be determined at the end of the price control period and applied to company revenues in the following price control period. We shall adjust the final penalty by inflation but not the average weighted cost of capital.

PR Penalty rate is equal to a percentage of the allowed revenue per tonne of dried solids (£/TDS) in year one of the price control.

The penalty would only occur when the difference between actual tonnes of dry solids (ATDS) over the price control period is three percent greater or less

than the company's forecast of tonnes of dry solids (FTDS) in its business plans:

$$\left| \frac{\text{ATDS}-\text{FTDS}}{\text{FTDS}} \right| \geq 0.03$$

ATDS Actual tonnes of dry solids produced by wastewater treatment (provided on the same basis as FTDS) over the whole of the price control period (2020-2025).

FTDS Forecast of tonnes of dry solids over the whole of the price control period (2020-2025) used for the purposes of determining the average revenue control.

This financial penalty would apply symmetrically where the total volume varies from the forecast used to determine the average revenue control. We would apply the penalty as part of the reconciliation of 2020-2025 performance.

We propose to vary the penalty rate according to the size of the variance between forecast and measured volume, much as the 2014 wholesale revenue forecasting incentive mechanism (WRFIM) had a variable penalty rate. The penalty rate would increase the further away from the forecast volume the measured volume was.

As we transition to a volume-based approach, and are proposing to use a new volume measure, it is appropriate that we protect customers from bill increases driven by measured volumes of sludge being materially more than forecast. We therefore propose an additional feature of the penalty to protect customers. If total measured sludge volumes for the five year period exceed 107% of the total five year forecast volumes, then we would cap the total revenue that companies can collect by effectively applying a penalty rate of 100% to the additional volume difference. For example, if total sludge volumes were 109% of the forecast volumes, we would apply a penalty rate of 100% to the additional 2% volume variation. This would return all associated revenues back to customers from any company measuring the additional greater than 7% more than its five year total forecast volume.

These financial incentive adjustments would be applied as part of the reconciliation of 2020-2025 performance. We provide further details on this mechanism in section 4.1 below.

In-period revenue correction mechanism

We expect that companies will set charges in advance, based on the best volume information available at the time and to ensure that the revenues that they earn are consistent with the limits determined by the bioresources average revenue control.

If a company's charging scheme is aligned to the average revenue control, then it is unlikely that average revenues earned would differ significantly from the limits of the average revenue control. Nevertheless, companies may adopt charging schemes that are cost reflective around the services that they provide. This may mean that the average revenues that wastewater companies earn from bioresources may vary from the average revenue allowance. In this case, a revenue correction mechanism would be required to correct for under- or over-recovery in average revenues.

Our preferred approach is that companies would adjust the allowed average revenue, £/TDS, in subsequent years to correct for any under- or over-recovery of average revenue in an earlier year. This would be similar to the PR14 WRFIM, although unlike for WRFIM, we do not envisage also applying a financial incentive for large variations in average revenues collected when compared to average revenues allowed. We would set out how it would work in our final determinations.

Accounting for income from bioresources trading

As the market in bioresources develops, we expect that companies will optimise their activities by trading across boundaries. If a company treats another company's sludge, or other organic waste, this is open to competition and falls outside our economic regulation. As such, the treatment activities, costs and revenues would fall within the non-appointed business, since there is no duty on water companies to engage in such trades.

A company may wish to use the assets of the appointed business in order to treat another company's sludge or other organic waste. This would mean that the appointed business would be acting on behalf of the non-appointed business. Company licences stipulate that such transactions between the appointed and non-appointed business are carried out at arm's length, so that the non-appointed business neither gives to nor receives from the appointed business any cross-subsidy. A transfer price is the price set internally to remunerate the appointed business for the costs that it incurs.

In our [2017-18 RAGs consultation](#) we proposed guidance around transfer pricing for bioresources trades. Our preferred option is that any transfer price should ensure

that an appropriate share of the margin made on the sale of bioresources or organic waste processing would be transferred to the regulated business (over and above incremental costs). This share should reflect the risks incurred by the appointed and non-appointed business respectively. It should also ensure that customers of the appointed benefit share in the benefits of trades.

The income from the transfer price is treated as a negative cost to the appointed business and therefore the net profit of the transfer price is a cost saving to the appointee. Being a volumetric price control, we propose that cost-sharing arrangements should not apply in relation to the bioresource price controls. As a result, without accounting for this net profit in calculations of revenues received, companies would retain the benefits of trades in the short term and customers would wait until the 2024 price review to share in the efficiency savings that importing sludge or organic waste provides.

We propose that customers should share in the benefits of trades that have been passed on to the appointed business. We propose that a proportion of the profit margin be passed on to customers directly to share in the financial benefits of treating another company's sludge. This could be done within the period or as an adjustment at the end of the period. Our preferred approach is to include in the sum of revenues received the net benefit from trading. Companies would use this sum of revenues to calculate the average revenue collected in any year and compare it with the allowed average revenue. This would return benefits from trades to customers closer in time to when they are realised.

The RAGs consultation closes on 19 July 2017. We plan to review responses to the RAGs consultation and publish final RAGs on 31 October 2017. This timetable would allow us to incorporate the final RAGs decision on bioresources transfer prices into our final PR19 methodology.

4 Further detail on our proposals

This section sets out further detail on how we propose to implement the average revenue control for bioresources, the options that we have considered and the reasons for our proposed approach in each of the key policy areas. We cover:

- a forecasting incentive mechanism;
- recovering revenues for bioresources services; and
- accounting for income from bioresources trading imports.

4.1 The forecasting accuracy incentive

4.1.1 What issues we are seeking to address

It is the first time that we will set a separate price control for bioresources, as part of a transition towards a more market based approach in the longer term. The average revenue control relies on companies providing accurate estimates of sludge production for the 2020-25 price control period. Material under- or over-estimation of sludge volumes is likely to distort the average revenue control, in terms of the levels at which the average revenue allowance is set and the charges that customers pay.

As the 2020-2025 period progresses, we expect companies will improve their measurement of sludge volumes. This may result in a change in reported sludge volumes due to better information rather than a real difference in sludge produced. We want to incentivise companies to both measure and forecast sludge volumes accurately.

4.1.2 What options have been considered

Option 1: Do nothing

We would rely on companies providing accurate forecasts of sludge volumes for the purposes of setting the average revenue limits for bioresources activities. We would not make an adjustment to company revenues due to the size of any variation between measured volumes of sludge produced and the forecast volumes used in setting the level of the average revenue control.

Option 2: End of period reconciliation for measurement changes

We would assess the variation between measured sludge volumes and the forecast volumes to remove measurement effects arising from changes in the way companies record volumes compared with their approach to forecasting. Our adjustment would be limited to correcting for volume changes arising from changes in the measurement approach. The company would not face any end of period adjustment for difference between actual and forecast sludge volumes recorded on a like for like basis.

Option 3: Volume forecasting incentive

We would apply a financial incentive to significant variations between measured sludge volumes and the forecast volumes to incentivise companies to accurately forecast sludge volumes. This would involve setting a dead-band around the forecasts, where variations would not trigger an incentive payment. Within this we have considered:

- whether the financial incentive should apply symmetrically or only to under-forecasting of volumes;
- whether to limit the bill impact of volume forecasting inaccuracy by imposing a cap and/or collar to the amount of forecasting variation that is reasonable;
- whether to apply the incentive annually within the period, at the end of the period or mid-period; and
- whether to apply the incentive to the total variation of volume differences reported.

This approach has similarities with the wholesale revenue forecasting incentive mechanism introduced at PR14.

4.1.3 Our assessment of the potential options

We prefer option 3, a volume forecasting incentive to ensure that companies are incentivised to measure and forecast sludge volumes accurately. It sets an expectation that non-robust, inaccurate, unsupported forecasts would not be acceptable. We set out the detail behind our recommendation in Table 5 below.

Our analysis suggests that a penalty-only incentive applied to volume variance would be appropriate to discourage poor forecasting, as reputational incentives would not be strong enough. We have considered a reward for forecast accuracy, however a financial reward for very accurate forecasts is likely to deter the transition to improved measurement and data quality. It is important that companies are not disincentivised to measure volumes accurately and better understand the costs of

bioresources. We therefore propose that any variance outside a volume dead-band would be subject to a penalty. We propose applying the penalty to total volumes over the five year period. We would apply the penalty as part of the reconciliation of 2020-2025 performance.

Table 5 Options appraisal for the sludge volume forecasting incentive

	Option 1 “Do nothing”	Option 2 “volume reconciliation”	Option 3 “forecasting incentive” Preferred option
Achieving our objectives	Relies on reputational incentives to encourage accurate forecasts. Companies that have accurate measurement and forecasting systems are disadvantaged – may disincentivise companies to seek data quality improvements ahead of 2020. ✓	Similar characteristics to option 1, but actively removes incentives to measure volumes (due to the revenue reconciliation adjustment at the end of the period) x	Provides incentives to encourage companies to forecast total sludge volumes accurately by permitting variations within a deadband (+/-3%) providing a small but meaningful financial incentive for variations greater than this when measured on a like for like basis. We propose to cap the amount that reported volumes can be greater than forecast at +7%, to protect customers from large forecast inaccuracy. ✓ ✓
How our objectives are achieved	Companies incentivised to adopt conservative forecasts, as the average revenue control will adjust revenues in line with volumes. Distortion of the average revenue control – likely to provide greater upside benefits to companies with inaccurate volume forecasts. x	As with option 1 – no significant incentive to forecast accurately. Companies actively discouraged from improving measurement accuracy. x	Companies incentivised to adopt accurate forecasts, and minimise the distortions to the average revenue control. Incentive applied on a like for like basis allows companies to retain the benefits of improved measurement quality (subject to a cap). Does not limit companies’ ability to earn more revenue for greater sludge volumes provided that they have forecast the volume growth accurately.

			✓✓
Practicality	<p>Significant burden on the assessment of company forecasts at PR19. Once set, no additional burden on companies</p> <p>✓✓</p>	<p>Requires companies to report measured volumes and volumes recorded on the same basis as the volume forecasts</p> <p>Some complexity in making the adjustment at the end of the period.</p> <p>✓</p>	<p>Requires companies to report measured volumes and volumes recorded on the same basis as the volume forecasts</p> <p>Complexity in making the adjustment at the end of the period for forecast error and capping benefits of improved data accuracy.</p> <p>✓</p>

Calibrating the triggers for the volume forecasting incentive

In our 2014 price review we decided to use a forecasting accuracy incentive for revenues the companies collect from their customers, (WRFIM). We [consulted on the approach](#) in April 2014, setting out evidence of regulatory practice for revenue forecasting accuracy incentives across a range regulated industries. This analysis showed a range of 3-6% as the threshold for the penalty applying and a penalty rate of 0-4% of revenue. At PR14, we introduced a revenue forecasting incentive for the wholesale revenue controls with a 2% deadband threshold based on analysis of the variance around previous company performance on forecasting and collecting revenue. The penalty rate was variable from a starting value of 2% up to a maximum of 3%.

For the bioresources volume forecasting incentive, we are proposing to use a similar approach to calibrate the deadband and penalty rates that we used to determine the revenue forecasting incentives elsewhere.

We propose using a 3% threshold beyond which the penalty would apply, and a variable penalty rate which would start at 2% and increase to 3%. This would provide a small but meaningful financial incentive to forecast sludge volumes accurately.

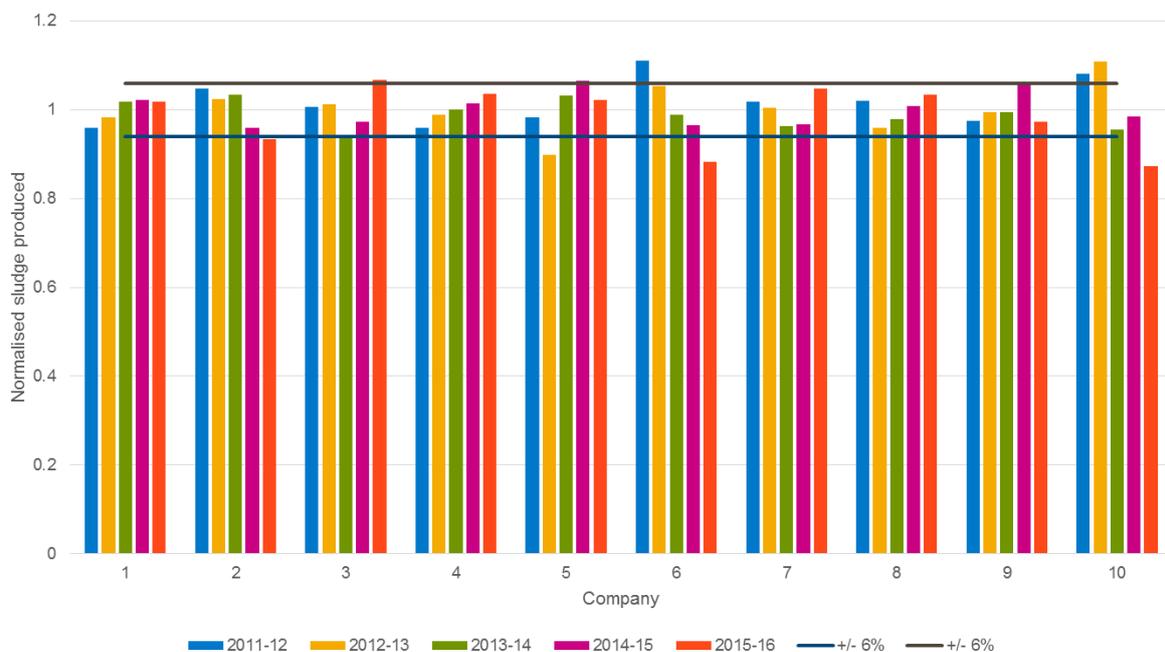
We have three sources of bioresources data that we can consider when calibrating other elements of the incentive, including any limits on permissible variation in the total volume of sludge produced relative to the five-year forecast. These are:

- Variance around historical reported sludge produced figures (6%);
- Information about current measurement equipment accuracy (7%); and

- Historical differences between forecast and actual sludge production (10%).

Firstly, we expected to see an upward trend over time in sludge produced reported by the companies due to population growth, but the total sludge produced by the industry in 2015-16 was only 0.3% greater than that reported in 2011-12. The annual variability for each company was typically within +/-6% of the mean. Figure 3 shows normalised sludge produced with the +/-6% variation overlaid. Much of the annual data points are within +/-6%, with the total over the 5 year period broadly in line with the mean. In line with this we consider that a deadband of +/-3% of total volume variation would be appropriate for the purposes of triggering incentive payments and that in line with this, a cap of 6% of the total volume could be appropriate as a basis for limiting the impact on bills for large inaccuracies.

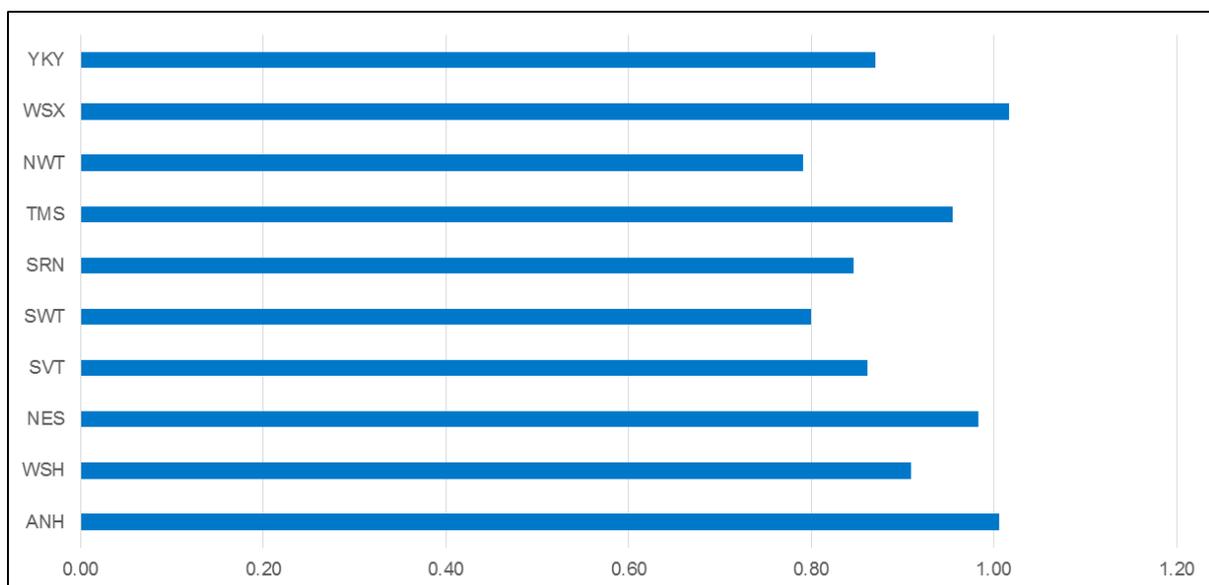
Figure 3 Variation in reported sludge produced, normalised by company mean



Secondly, we have compared historical reported information with potential impacts of shifting to increased measurement of sludge volumes. In a survey of the WaSCs, several noted that measurement devices are often certified to a broad accuracy range and that in light of this, sludge volume measurements will be accurate to between 5% and 8%, and typically around 7%. However, we still expect that the implementation of measurement system will improve accuracy of volumes. The key issue is the extent to which measurement data varies from historical calculation processes. We would not expect that measurement devices would drive significant variations in volumes.

Thirdly, we have analysed data from a five year period, 2008-09 to 2012-13, of the volume of sludge recycled or disposed of by each company compared with its forecast in 2009 business plans. At an industry level there was a 10% reduction between forecast and actual volumes recycled or disposed – see Figure 4 below. Some of this volume change relates to the economic downturn in the early part of the period which has driven down the volumes of trade effluent treated. However, other effects, such as the performance of treatment technologies, may also drive down the volume of sludge recycled or disposed of. While it is a useful cross check around the scope for volume inaccuracy over a 5 year period, it is not on a comparable basis to the way we intend to set the price control at PR19.

Figure 4: Five year total (2008-09 to 2012-13) sludge disposed as proportion of PR09 forecast sludge disposed



On balance, taking these different sources of information into account **we consider it appropriate to apply the financial incentive at +/-3% based on the historical data reported over the 2010-15 period and apply a cap at +7% for the additional revenues that can be earned by differences between forecast and measured volumes.** Given that we intend to apply a simple revenue correction mechanism for variations in average revenues, the impact of our proposed 3% volume forecasting incentive is broadly consistent with the revenue forecasting incentive that currently applies to the PR14 wastewater control.

Our proposed financial incentive acknowledges that as companies improve measurement this may influence variations from volume forecasts relative to the differential suggested by Figure 3 above, although we would not expect this to go beyond 7% for the five year total. We would look to therefore increase the

incremental penalty rate to 100% where the total five year measured sludge volumes exceed 107% of the total five year forecast of sludge volumes.

We welcome views on this approach. Where respondents consider that an alternative deadband or cap should be applied, we would expect them to provide evidence to support their position.

4.1.4 How our proposed approach would work in practice

The proposed forecasting incentive would work as follows. If a company's five-year total measured volumes (2020-21 to 2024-25) of sludge produced in tonnes of dry solids is more than 3% higher or lower than the business plan forecast total TDS for the same five-year period, we would apply a penalty as part of the reconciliation of 2020-2025 performance.

The penalty would be expressed as a percentage of the average revenue £/TDS. The financial penalty would be calculated by multiplying the penalty percentage by the average revenue and by the difference between the forecast and actual total tonnes of dry solids. The penalty would apply symmetrically, in other words both for instances where the measured actual sludge production is greater than 3% higher and greater than 3% lower than business plan forecast levels.

We would calculate the absolute value of the penalty to apply, once the variance is greater than 3% of business plan forecasts, using this formula:

$$\text{BFAI} = -\text{PR} (\text{ATDS} - \text{FTDS})$$

BFAI Bioresources forecast accuracy incentive. The overall penalty to apply to company revenues would be determined at the end of the price control period and applied to company revenues in the following price control period. We shall adjust the final penalty by inflation but not the average weighted cost of capital.

PR Penalty rate is equal to a percentage of the allowed revenue per tonne of dried solids (£/TDS) in year one of the price control.

The penalty would only occur when the difference between actual tonnes of dry solids (ATDS) over the price control period is three percent greater or less than the company's forecast of tonnes of dry solids (FTDS) in its business plans:

$$\left| \frac{\text{ATDS}-\text{FTDS}}{\text{FTDS}} \right| \geq 0.03$$

ATDS Actual tonnes of dry solids produced by wastewater treatment (provided on the same basis as FTDS) over the whole of the price control period (2020-2025).

FTDS Forecast of tonnes of dry solids over the whole of the price control period (2020-2025) used for the purposes of determining the average revenue control.

We propose to vary the penalty rate according to the size of the variance between forecast and measured volume, much as the 2014 wholesale revenue forecasting incentive had a variable penalty.

To align with the PR14 WRFIM our preference is to use a penalty rate that starts at 2% and increases to 3%. We propose a linear rate of increase such that the 2% penalty starts once the volume variance is +/-3%. The penalty rate would be 3% once the variance is +/-7%. If the total five year volume of sludge is less than 93% of the total five year sludge volume forecast, the penalty rate would remain at 3%.

However, where the total five year volume of sludge is greater than 107% of the total five year sludge volume forecast, we are concerned that customers face higher bills as a result of the higher volumes, but also where the average revenue limits are otherwise higher than they should have been due to material volume errors. We propose protecting customers from large bill increases by capping the total revenue that companies can collect. To do this we propose an additional feature of the penalty. If total measured sludge volumes for the five year period exceed 107% of the total five year forecast volumes, we would apply an incremental penalty rate of 100% to the additional volume difference. For example, if total sludge volumes were 109% of the forecast volumes, we would apply a penalty rate of 100% to the additional 2% volume variation. This would return all associated revenues back to customers from any company measuring greater than 7% more than its five year total forecast volume.

4.2 Recovering revenues for bioresources services

4.2.1 What issues we are seeking to address

We expect that companies will set charges based on the best information available at the time and to ensure that the revenues that they earn are consistent with the limits determined by the bioresources average revenue control. Companies set wastewater charges in advance of the start of the year, based on the best information available to ensure that their expected average revenues from charges are aligned with their average revenue allowance of the price control. Nevertheless, actual average revenues that wastewater companies earn from bioresources may, depending on the design of company charging schemes, vary from the average revenue allowance. It is important to address these variations to ensure that customers are protected within the price control and that the limits are complied with.

4.2.2 Options considered

There are two options that we have considered:

- A simple revenue correction mechanism – adjusting future revenue limits to correct for past variations between revenues earned and revenues limits in those years; and
- A revenue forecasting incentive mechanism.

Option 1 – Revenue correction

If a company's charging scheme is aligned to the average revenue control, then it is unlikely that average revenues earned would differ significantly from the limits of the average revenue control. In simple terms, companies may set bioresources charges as a simple unit price equal to allowed average revenue (set by the bioresources revenue control) and invoice for the volume of sludge that it treats. This would align revenue recovery to the price control.

Nevertheless, companies may adopt charging schemes that are cost reflective around the services that they provide. This may mean that the average revenues that wastewater companies earn from bioresources may vary from the average revenue allowance.

A revenue correction mechanism would adjust the allowed average revenue, in £/TDS, in subsequent years to correct for any under- or over-recovery of average revenue in an earlier year.

Option 2 – a revenue forecasting incentive

This would be similar to the PR14 wholesale revenue correction incentive mechanism, applying a financial disincentive for large variations in average revenues. This is expressed as a variable penalty rate for deviations away from a deadband. Under a revenue forecasting incentive there would also be the ability to change revenues in future years to adjust for past under- or over-recovery of revenues. This would correct for revenue variance due to companies' charging approaches failing to recover the right revenue (calculated from the allowed average revenue in £/TDS multiplied by the measured sludge volume, in TDS).

We have compared these approaches in Table 6 below.

Table 6: revenue adjustment options

	<p style="text-align: center;">Option 1 “Revenue correction mechanism” Preferred option</p>	<p style="text-align: center;">Option 2 “Revenue incentive mechanism”</p>
Achieving our objectives	<p>Option 1 allows companies to ensure that, after reconciliation, revenues collected for bioresources match those allowed for under the average revenue control.</p> <p>Recognises that volumes are a key driver and proposed to incentivise these elsewhere so a correction is more appropriate.</p> <p style="text-align: center;">✓✓</p>	<p>Provide incentives for accurate forecasting of revenues but likely to create perverse incentives due to the interaction with the volume forecasting incentive.</p> <p style="text-align: center;">✗</p>
How our objectives are achieved	<p>The average revenue control reflects the average revenue required to treat, transport, and recycle a unit of sludge. It encourages companies to set volumetric charges for bioresources services aligned to unit cost structures.</p>	<p>The average revenue control reflects the average revenue required to treat, transport, and recycle a unit of sludge. Adjusting the allowed revenues for revenue accuracy is likely to distort volumetric charges for bioresources services. This distortion will not be significant in the short term, but could be more significant as the market develops.</p>

	✓✓	✓
Practicality	Option 1 will require companies to demonstrate how they adjust charges from those allowed in the determination but it should be straight forward for them to do so. Ownership sits with the companies. ✓	Complexity from the interaction with the volume forecasting incentive. Companies may be penalised twice for adjustments in revenues driven by volume changes. x

4.3 Accounting for income from bioresources trading

4.3.1 What issues we are seeking to address

As the market in bioresources develops, we expect that companies will optimise their activities by trading across boundaries. If a company treats another company's sludge, or other organic waste, this is open to competition and falls outside our economic regulation. As such, the treatment activities would fall within the non-appointed business, since there is no duty on water companies to engage in such trades. The total profits from trades agreed by the non-appointed business are a function of the market operation and not regulated by our price controls. However, a company may wish to use the assets of the appointed business in order to treat another company's sludge on behalf of the non-appointed business.

Company licences stipulate that transactions between the appointed and non-appointed business are carried out at arm's length, so that the non-appointed business neither gives to nor receives any cross-subsidy from the appointed business. A transfer price is the price set internally to remunerate the appointed business for the costs that it incurs and should provide an appropriate share of the returns.

In our [2017-18 RAGs consultation](#) we proposed guidance around transfer pricing for bioresources trades. Our preferred option is that any transfer price should ensure that an appropriate share of the margin made on the sale of bioresources processing would be transferred to the regulated business (over and above incremental costs). This share should reflect the risks incurred by the appointed and non-appointed

business respectively. It should also ensure that customers of the appointed business share in the benefits of trades.

The income from the transfer price is treated as a negative cost for the appointed business and therefore the net profit of the transfer price is a cost saving to the appointee. As a volumetric price control, we propose that cost-sharing arrangements should not apply in relation to the bioresources price controls. Without an additional mechanism, companies would retain the benefits of trades for the duration of the price control period and customers would wait until the 2024 price review to share in the efficiency savings that trading provides.

This approach would allow companies to retain 100% of the benefits from trades during the price control period, regardless of whether it is importing or exporting sludge volumes. Where a company treats another company's sludge using the assets of the appointed business, this arises because the transfer price income is a negative cost to the appointed business and the cost saving is retained by shareholders, whereas customers of the appointed business are sharing the risk.

We propose that customers should share in the benefits of trades that have been passed on to the appointed business. We propose that a proportion of the profit margin be passed on to customers directly to share in the financial benefits of treating another company's sludge. This could be done within the period or as an adjustment at the end of the period. Our preferred approach is to include in the sum of revenues received the net benefit from trading when calculating the average revenue and comparing with the allowed average revenue limit within the period. This would return benefits from trades to customers closer in time to when they are realised.

4.3.2 Options considered

Option 1: End of period profit sharing mechanism

An end of period adjustment could be applied as part of the end of period reconciliation, minimising the burden on companies while ensuring an appropriate share of profits is returned to customers. The downside of the approach is that it might distort the market by applying a single lump sum adjustment in the future.

Option 2: In-period profit sharing mechanism

An in-period adjustment mechanism is potentially more burdensome and requires companies to return profits on trades in previous years. Phasing of profits returned

would minimise the distortion to the market but may add complexity in transitioning to a more market based approach at PR24.

Our preferred approach is option 2: adjust the average revenue limit within the period to return benefits from trades near to when they are realised, and phase the impact to limit the impact on the market. We would welcome your views on our proposed approach.

We set rules on transfer pricing, including between non-appointed and appointed business, in the RAGs. The 2017-18 RAGs consultation closes on 19 July 2017. We plan to review responses to the RAGs consultation and publish final RAGs on 31 October 2017. This timetable would allow us to incorporate the final RAGs decision on bioresources transfer prices into our final PR19 methodology. Any in-period mechanism would be set out as part of our final determinations.

Table 7 shows our assessment of the two options we considered for the profit sharing approach.

Table 7: Profit sharing options

	Option 1 End of period profit sharing	Option 2 In period profit sharing Preferred option
Achieving our objectives	<p>Furthers the consumer interest by ensuring customers benefit from use of appointed assets for non-appointed business, but customers have to wait to see that benefit</p> <p>✓</p>	<p>Furthers the consumer interest by ensuring customers benefit from use of appointed assets for non-appointed business, and benefits are more immediately returned to customers than for option 1.</p> <p>✓✓</p>
How our objectives are achieved	<p>Insufficient focus on customer impacts, as an end of period adjustment risks a step change in bills.</p> <p>x</p>	<p>Option 2 is more focused on customer impacts than option 1. Using a mechanistic approach risks a lack of flexibility.</p> <p>✓</p>
Practicality	<p>Option 1 would delay changes but would not be unduly costly to</p>	<p>Mechanistic approach is straight forward to implement, and allows a quick response to market development</p>

	implement through an end of period reconciliation. ✓	✓✓
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