



Welcome to 6<sup>th</sup> sludge working group meeting

8<sup>th</sup> September 2016

	Agenda Item	Time
1	Introductions	10am to 10.05am
2	Form of control: Discussion of issues, facilitated by Daniel Davies (Welsh Water), Stewart Carter (Thames Water) and Jake Wood	10:05am to 11:40am
3	Form of control: Tonnes of dry solids, facilitated by Dave Musco, Yorkshire Water	11:40pm to 12:30pm
	Lunch	12:30pm to 1pm
4	Sludge market: market information, facilitated by Frank Grimshaw, United Utilities	1pm to 2:30pm
5	Environmental regulations: facilitated by Environment Agency	2:30pm to 3pm
6	Actions and setting future working group sessions (facilitated by Ofwat)	3pm to 3:30pm

# Sludge price control

How will it work in practice?

Ofwat Sludge Working Group  
8 September 2016

Daniel Davies

## Purpose of presentation

- Explore Ofwat's proposals and draw out questions regarding practical application of the sludge price control.
- Makes assumptions about Ofwat's intentions and how they intend to put them into practice – may or may not be correct.
- Walks through the steps from setting the price control to reconciling outturn revenue with allowed revenue.



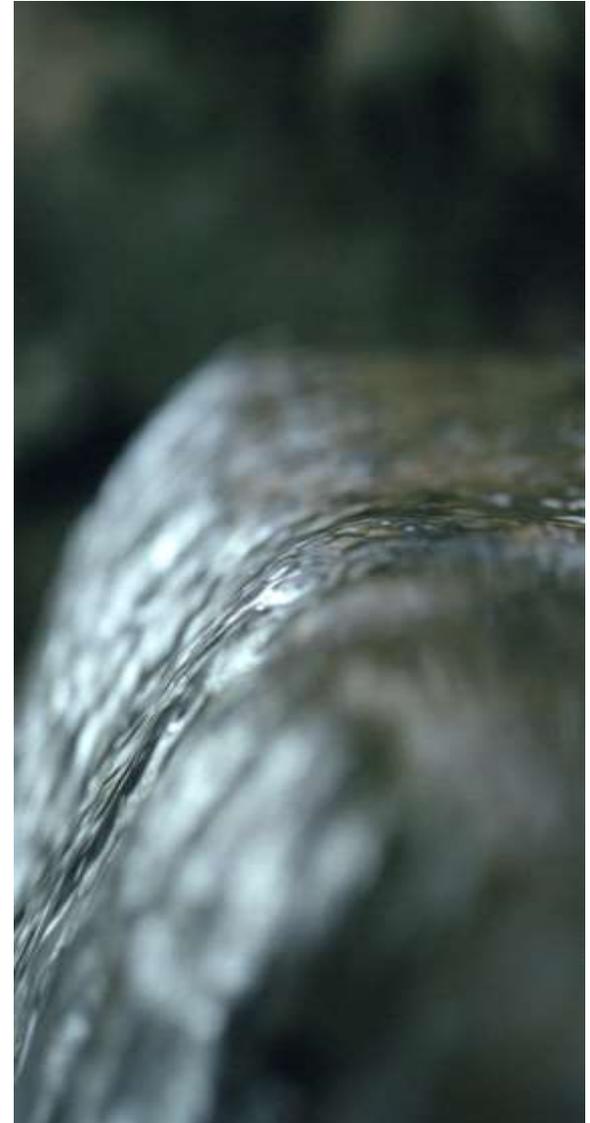
## Assumptions

- Average binding revenue limit (£ per ttds)
- “Sludge revenue” will be recovered from customers (or retailers) through charge multipliers
- Sludge revenue is determined separately through tariffs established in advance (not just lumped together with network plus revenue in determining charges).
- For simplicity, assume no trading (for now)



## What is a binding price control – our understanding?

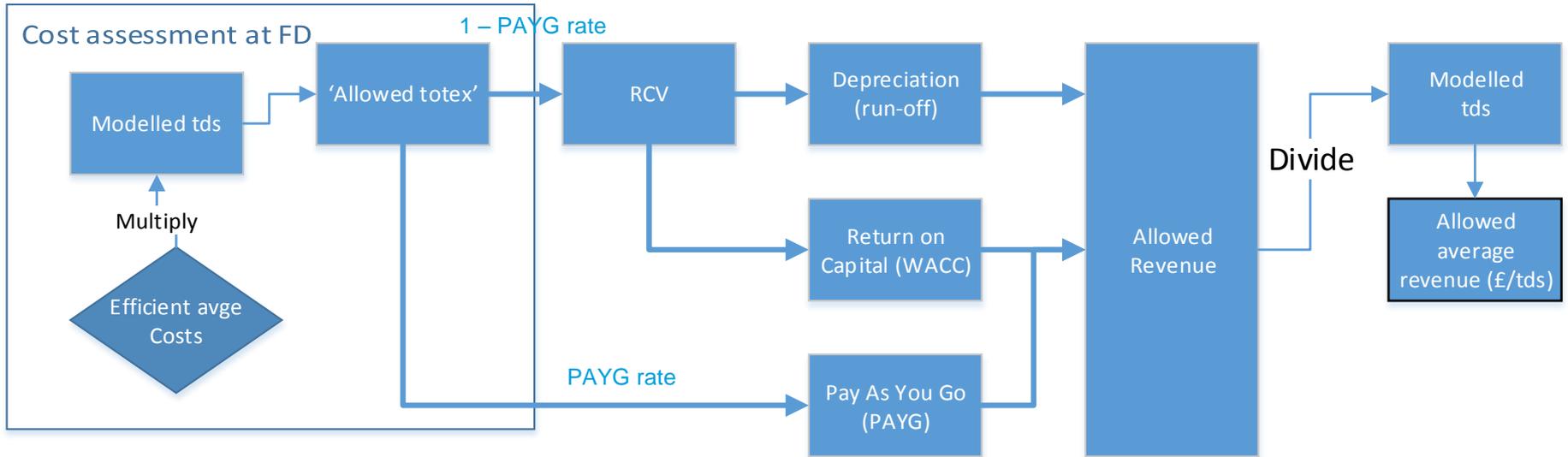
- Companies not allowed to recover from customers more than the amount determined by the control (in this case, £ per ttds) to cover the costs of the activities defined within the control.
- Implies separate ‘till’ for sludge revenue – as is the case currently for retail vs wholesale.



Cost assessment could be based on

1. Cost-modelling exercise as at PR14
2. Observed average total cost in 2017/18 (or average over a number of years); or
3. Stand-alone estimate of long-run average cost.

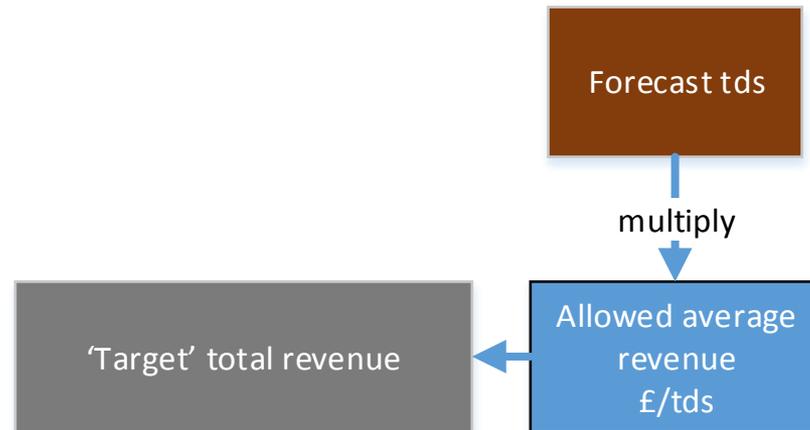
**Step1: Calculation of control for first year  
(At PR19 determination)**



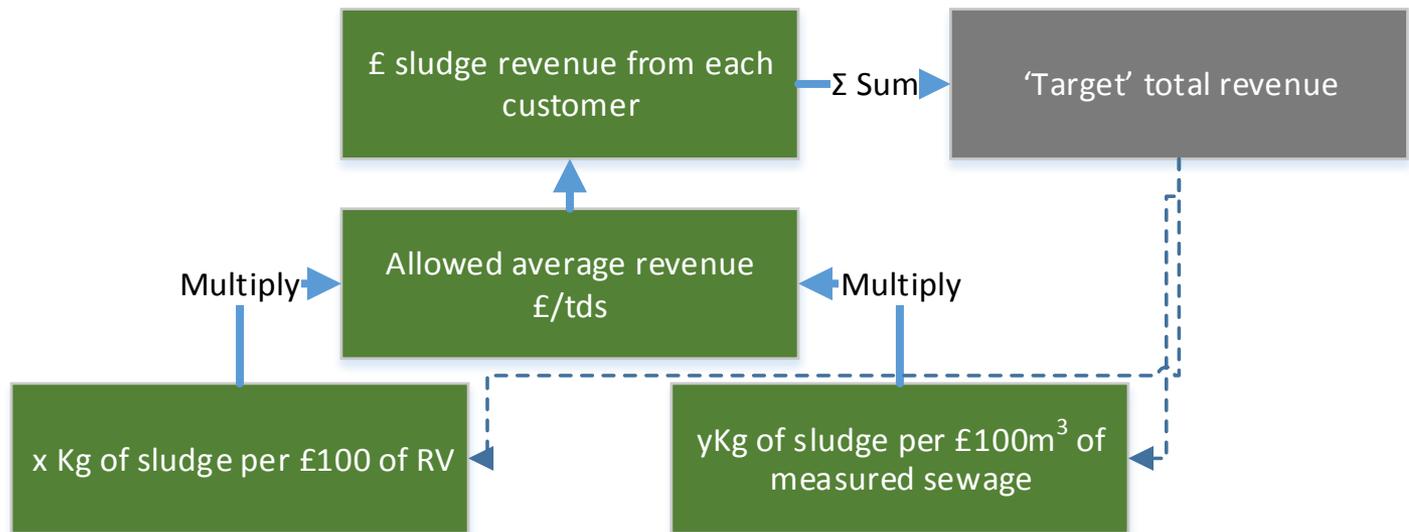
NB excludes tax and other adjustments (for simplicity)

**Step 2: Calculation of target sludge revenue for charging purposes (internal to company)**

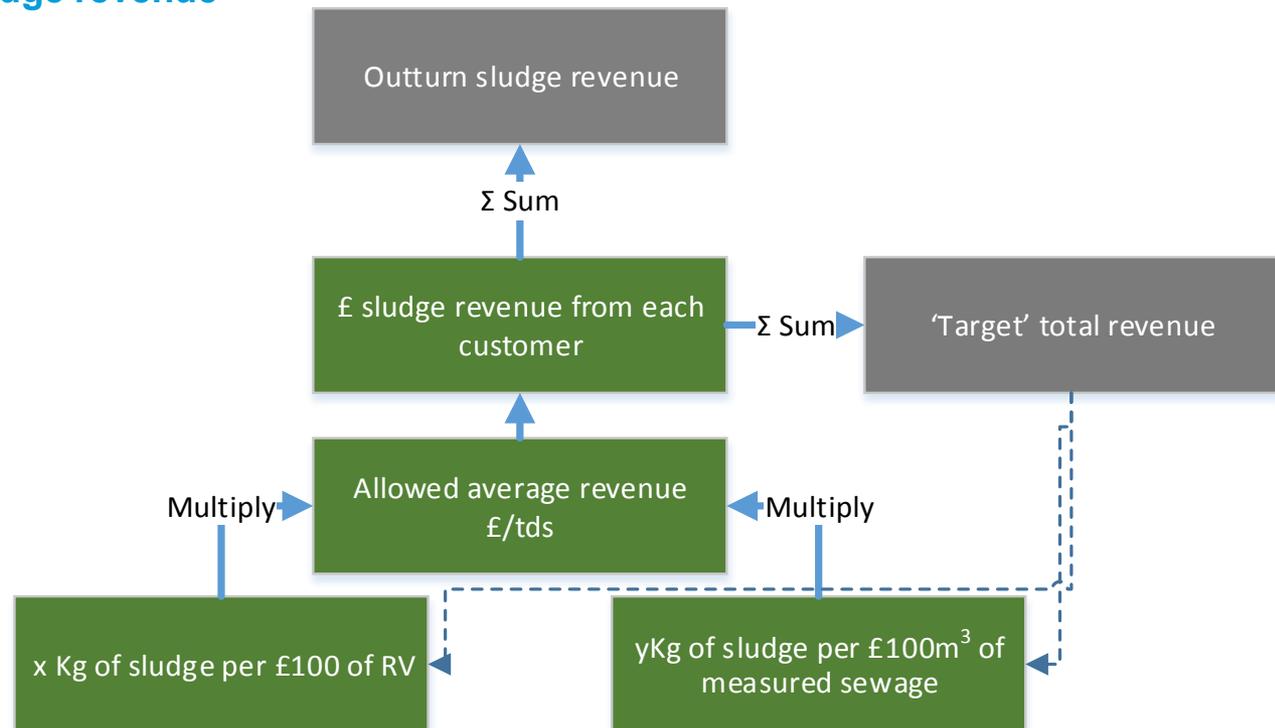
(Ahead of year 1)



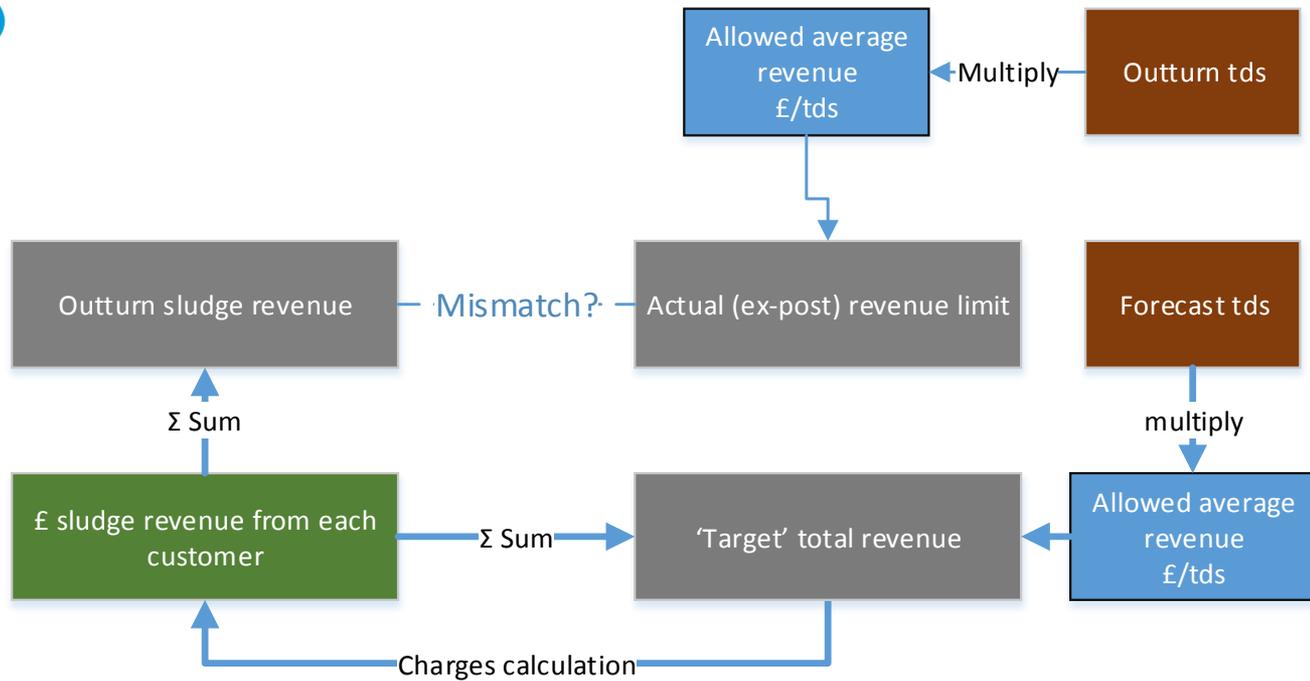
**Step 3: Calculation of charges (internal to company).**  
(Ahead of year 1)



**Step 4: Recover 'sludge revenue'**  
(End of year 1)



**Step 5: Ofwat makes adjustments required to revenue raised (?)**



## Analysis

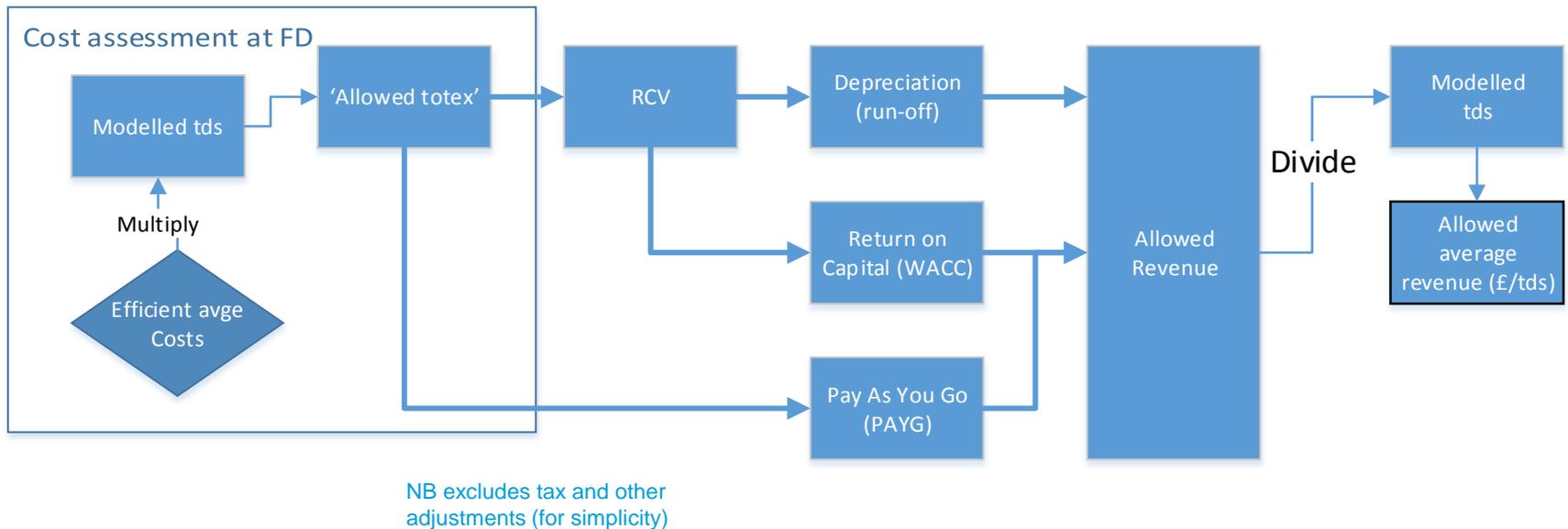
Scenario	Outcome	Incentive and risks
<p>Outturn volumes higher than forecast volumes (e.g. due to less-than-expected wet weather)</p> <p>Outturn volumes lower than forecast (e.g. due to more wet weather)</p>	<p>Company 'under-recovers' against allowed revenue.</p> <p>Company 'over recovers' against allowed revenue.</p>	<p>Possible incentive for company to forecast high volumes – unless there is an adjustment for this.</p> <p>How does this fit with Ofwat intention for companies to bear 'volume risk'?</p>
<p>Forecast volumes = outturn volumes, but sludge 'multipliers' overestimated (e.g. lots of hosepipe use increases recovery from measured customers).</p>	<p>Company 'over-recovers' against allowed revenue.</p>	<p>Possible incentive for company to overestimate sludge multipliers, unless there is an adjustment.</p>

If Ofwat makes adjustment, will that be year-by-year or at next price review?

Step 6: Calculation of control for years 2-5

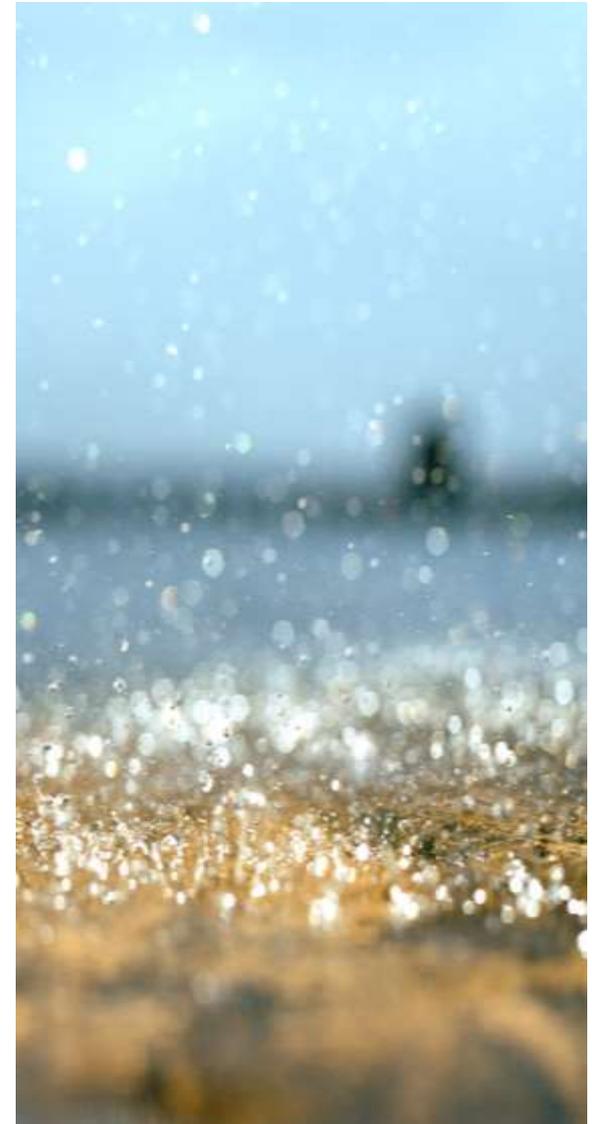
Options

- Same exercise as for year 1, as below (possibly with different average revenue limit for each year).
- 'Hard-wired' to the year 1 control, with an ex-ante (efficiency factor) applied.



## Summary of questions arising

- Will there be a building blocks approach on forward-looking basis, with RCV added to each year?
- Will the control for each year be determined separately, or across the 5 years?
- Will there be ex-post adjustments to close gap between outturn revenue and allowed revenue?
- If so, in what circumstances, and would the adjustment be factored in each year or at end of period?
- What about trading...?



# Sludge price control

Issues for the price control and tariffs



# Introduction

- Three issues have been raised at the sludge working group meeting regarding the price control and tariffs:
  - The requirement for new investment to be at risk
  - Whether there should be one regulated price or a separate regulated price for each year, and the treatment of inflation (i.e questions on the structure of the price control)
  - The impact of a sludge price control on tariffs
- We address these three points in the following slides, which we think can be easily resolved.
- We then raise an additional, substantive point for discussion on the sludge market
  - whether the tariffs framework will incentivise the development of the market.



# Issue 1: The requirement for new investment to be at risk

- New investment not subject to stranding risk during AMP7 (2020-25)
  - except for differences in forecast and actual sludge volumes
- All in-area generated sludge from the Network plus business will be included in the Sludge price control
  - removes need for separate RCV guarantee mechanism in AMP7
- Therefore, no issue with maintaining building block approach to allowed revenues



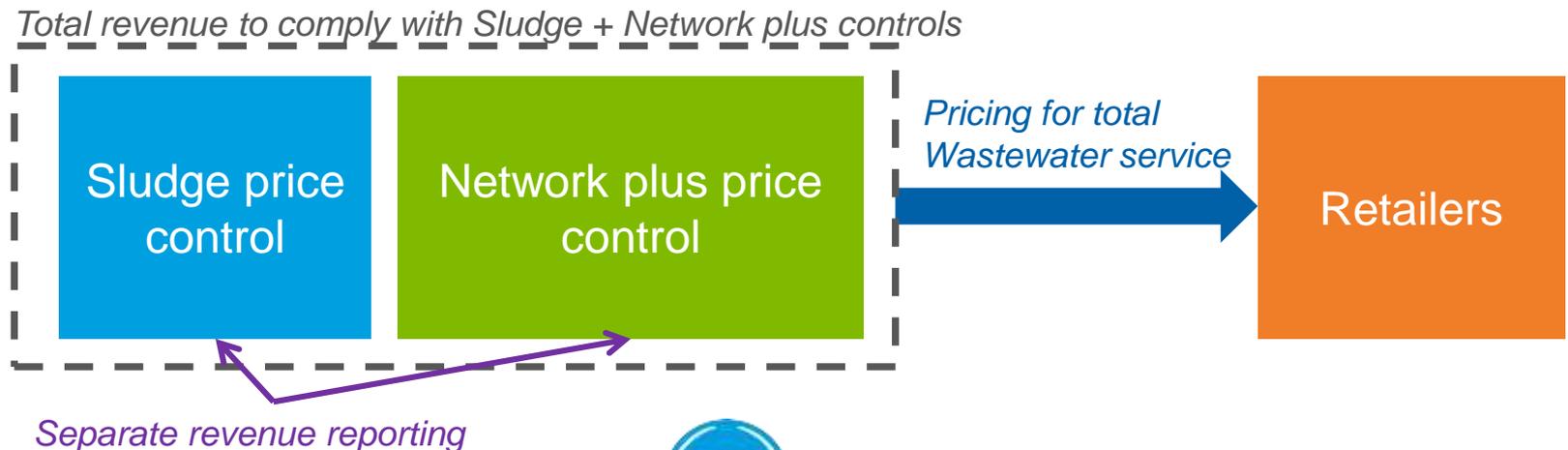
## Issue 2: Structure of the price control

- PR19 allowed £/tds = allowed building blocks revenue / expected sludge generated in-area
- Control can either vary by year or remain flat in NPV terms
- Price control to be indexed by the relevant inflation index
- Actual allowed £/tds = allowed £/tds \* actual sludge generated in-area
- Pricing methodology does not form part of price control



# Issue 3: Impact of the sludge control on tariffs

- Pricing methodology is in independent process to setting price control
- For pricing:
  - Retailers continue to buy wholesale wastewater service, no direct charge for sludge
  - Wholesalers to ensure revenue complies with sum of Network plus and Sludge controls
- Pricing methodology is an issue for companies, encouraging innovation in tariff design
- For reporting, Wholesalers to allocate revenue to Network plus and Sludge controls, in line with Ofwat guidelines



# Additional issue – Will the tariffs framework incentivise the development of the sludge market?

- Differences in operating costs insufficient to incentivise trading where need to recover share of capital charges (illustrated in table)
- Highlights that companies not incentivised to trade when:
  - Traded volumes can be treated by existing assets
  - Traded volumes require new assets that are still required even with trading
- Are there any ways to encourage trading in AMP7 while maintaining the principle of no material asset stranding risk?
- Would it be appropriate for the accounting guidance to make it clear that for sludge trades companies can price at marginal cost plus a margin?

Table 1: Cost structure of two adjacent WASCs (for the same volumes)

£	WASC A	WASC B
Variable operating costs	45	50
Fixed operating costs	15	18
Total operating costs	60	68
Return & depreciation on RCV	72	72
Total costs	132	140
Average costs £/unit	0.33	0.35
Marginal costs £/unit	0.11	0.13

WASC A significantly more efficient in operating costs.

Despite WASC A being more efficient – it would need to charge £0.33/unit to process WASC B's sludge, while WASC B would only save £0.13/unit



# Appendices – Further details on issues



# Issue 1:

## The requirement for new investment to be at risk

- The need for new investment to be at risk does not mean that new investment needs to be at risk during AMP7 (2020-25). Indeed Ofwat have stated that there will be no material stranding risk in AMP7.
- Apart from some forecasting risk on actual sludge volumes, there is no stranding risk in AMP7 as Ofwat have stated that all in-area generated sludge from the Network plus business will be included in the Sludge price control, whether or not it is treated and processed by the incumbent sludge facilities.
- This is the reason that there is no need for an RCV guarantee mechanism in before PR24.
- There is, therefore, no difficulty in maintaining a building block approach to building allowed revenues in PR19 (see next slide). Indeed Ofwat have stated that they will use a building block approach in PR19 (Appendix 2, p21).
- Are there any material issues associated with maintaining a building block approach?



# Issue 2:

## Structure of the price control

- A building block approach should be followed for PR19 using the following categories of revenue:
  - A return on 2020 RCV (net of run-off)
  - Run-off of 2020 RCV
  - Fast money portion of allowed totex
  - A return on new assets net of run-off
  - Run-off of new assets
  - Tax and other adjustments
- The allowed revenue from the above sum, for each year, can then be divided by expected tonnes of dry solids (tds) for each year to derive the allowed £/tds for each year. The expected tds would include all sludge generated in-area, irrespective of who treats the sludge (the incumbent or a third party)
- The allowed average revenue (£/tds) can be profiled, in an NPV neutral manner, to provide a flat £/tds (in real terms) if required, although this is not essential.
- Actual allowed revenue will then be allowed £/tds \* actual reported tds
- Ofwat have committed to all the wholesale controls including sludge being indexed by the relevant inflation index.



# Issue 3:

## Impact of the sludge control on tariffs

- Setting the price control and developing the pricing methodology should be recognised to be independent processes. As a general rule, there is no need for a price control to make any reference to pricing methodology. One sets the size of the cake and the other how it is divided between customers.
- In PR19, retailers do not need to be charged directly for using a regulated sludge service. Instead, retailers can buy a wholesale wastewater service exactly as they do now. Wholesalers will need to ensure their collected income does not exceed the sum of two price controls – network plus & sludge.
- If actual income collected varies from the sum of the two controls – prices will adjusted to reflect this – there is no need to allocate the under/over recovery between the two controls for pricing purposes.
- Companies can allocate the income between the two controls for reporting purposes in any sensible manner that complies with Ofwat’s accounting guidelines.



# Issue 3:

## Impact of the sludge control on tariffs

- The pricing methodology should be for companies to decide. This is consistent with Ofwat’s strategy of being clear on the expectations companies face and leaving it to wholesalers to innovate and design & specify their own wholesale tariffs.
- For example, from Ofwat’s consultation on charging rules (August 2016, page 4):

*“Recognising that there are considerable differences in the structure of charges between wholesalers and that increased standardisation of charging structures could reduce complexity, we are proposing a rule that will require wholesalers wholly or mainly in England and wholesalers wholly or mainly in Wales to consider general charging principles’ when setting their wholesale charges, which we expect will promote some consistency across wholesalers. But, we are not proposing to design and specify wholesalers’ tariffs. **Consistent with our strategy – being clear on the expectations companies face, and enabling and incentivising them to deliver against those in efficient and innovative ways – we will leave it to wholesalers wholly or mainly in England and wholly or mainly in Wales to innovate and, design and specify their own wholesale tariffs.**” [emphasis added]*



# Will the tariffs framework incentivise the development of the sludge market?

- One of Ofwat's aims from introducing a separate sludge control is to increase inter-WASC trading. Differences in operating costs were a key driver for trading.
- Table 1 shows illustrative figures for a potential trade between two WASCs, where WASC A has significantly more efficient operating costs and WASC B wishes to benefit by trading with WASC A.
- However, as set out in the illustrative example, differences in operating costs would not be sufficient, in practice, to incentivise trading, as WASC A would need to charge at average unit costs to recover a share of capital charges\*. WASC B only saves its marginal operating costs.

Table 1: Cost structure of two adjacent WASCs (for the same volumes)

£	WASC A	WASC B
Variable operating costs	45	50
Fixed operating costs	15	18
Total operating costs	60	68
Return & depreciation on RCV	72	72
Total costs	132	140
Average costs £/unit	0.33	0.35
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WASC A significantly more efficient in operating costs.

Despite WASC A being more efficient – it would need to charge £0.33/unit to process WASC B's sludge, while WASC B would only save £0.13/unit



\*Note: a contribution for use of the assets (so that customers get some benefit from use of assets they have funded), in accordance with principles in regulatory accounting guidelines 2 & 5

# When will WASC be incentivised to trade?

- The previous analysis highlights that companies will not be incentivised to trade where:
  - traded volumes can be treated by existing assets; and
  - traded volumes require new assets that are still required even with trading.
- The table below shows the conditions when WASC B would find it efficient to trade with a neighbouring WASC.

Examples	Sludge trading is the least cost solution if ...
Potential trades relating to existing assets	The entrant's gate fee (including operating costs and asset contribution) is less than the avoided short-run marginal cost
Potential trades relating to new assets – new capital costs <i>not</i> avoided	The entrant's gate fee (including operating costs and asset contribution) is less than the additional short-run marginal cost
Potential trades relating to new assets – new capital costs avoided	The entrant's gate fee (including operating costs and asset contribution) is less than the additional long-run marginal costs (including both operating and capital costs)



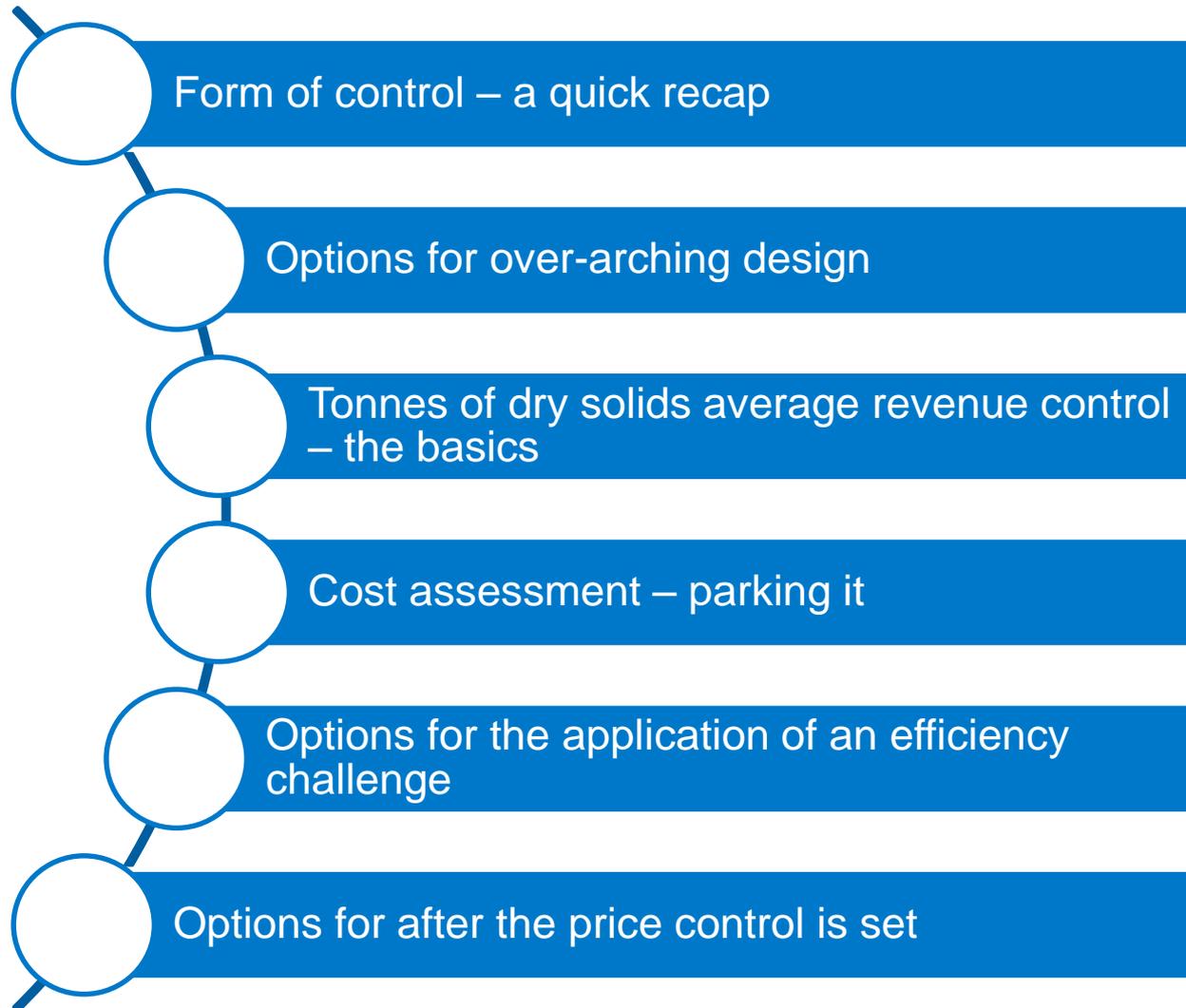
# Sludge tariffs – incentives to trade

- As asset costs are a significant proportion of total costs – it is unlikely that differences in operating costs would be sufficient to outweigh the capital costs, which are significant in the sludge business.
- Ofwat seems to acknowledge this issue (in part) by stating that the costs of a trade will include the return on pre-2020 RCV that is under-utilised due to the trade
- Are there any ways to encourage trading in AMP7 while maintaining the principle of no material asset stranding risk?
- Would it be appropriate for the accounting guidance to make it clear that for sludge trades companies can price at marginal cost plus a margin?



## Form of sludge price controls

Jacob Wood, Principal Economist  
September 2016



What is the “form of control” ?

- The form of control is the way Ofwat defines the money that companies can get for providing sludge services.

Where is the “form of control” set?

- The form of control for each price review is set in the price review methodology statement.
- There is a statutory consultation on the methodology (July 2017).
- The form of control is not set out in the licence.

Why is the “form of control” important?

- Different forms of control result in different balances of risk between companies and their customers.
- They can also provide more or less useful information to other market participants.
- The form of control also creates incentives for companies to act in certain ways.

# Summary of options – over-arching design of price control

Issue	Options 1	Option 2	Option 3	Option 4
What sludge will the price control apply to?	All sludge produced by customers connected to a WASCs network	All sludge treated, transported or disposed by a WASCs sludge business		
What will be the overarching form of the price control?	Average revenue control <b>Decision</b>	Total revenue control with volume adjustment factor	Price cap	
Will there be a building blocks approach to calculating the price control?	Yes – based on PAYG + depreciation + RCV return + Tax	Yes – opex + depreciation + net margin		
What will the units of the average revenue control be?	Tonnes of dry solids	Population equivalent	Tonnes of wet solids	
What risks will companies bear?	No investment at risk	New investment not subject to stranding risk in 2020-25 except for differences in forecast and actual sludge volumes	New investment in 2020-25 at risk	All investment at risk in 2020-25

An average revenue control will be set as:

Average revenue control = allowed revenue per tonne of dry solids produced by company's sewage and trade effluent customers

Outturn revenue will therefore depend on outturn tonnes of dry solids (TDS), while the average revenue control will depend on forecast TDS.

Average revenue control per unit =  $\frac{\text{PAYG} + \text{depreciation} + \text{RCV return} + \text{tax}}{\text{tonnes of dry solids}}$

Tonnes of dry solids is the preferred denominator (over population equivalent) as it links the revenue control more closely to actual volumes (and hence costs) of treated sludge. For more information on consultation respondents views, see appendix.

What about tonnes of wet solids?

To set the control in this way, an assessment of the **efficient costs** of providing sludge services needs to be assessed.

We investigated building cost models for sludge in PR14 and so have a good starting point for this exercise. We now have **new data** to help make these models better. Our cost assessment workstream is developing modelling to assess efficient costs – we are aiming to use a **consistent approach across price controls** where possible.

**We will form a group to develop costs assessment for sludge.** This will consist of cost assessment experts and sludge experts from each WaSC. As this is very techie we do not consider it appropriate for the sludge working group.

# Summary of options – application of efficiency challenge

Issue	Options 1	Option 2	Option 3	Option 4
How could the efficiency challenge be set?	No efficiency challenge	Average industry cost	Upper quartile cost	Frontier company cost
What years of data will be used to set the control?	Historic data (which years)?	Forecast data	Historic and forecast data	
Should efficient costs be considered as “flat” or “variable” in real terms over the 20-25 period?	Flat – an allowance would be set for the first year and inflation indexed for subsequent years	Variable – a “K” factor set for each year that may vary by year		
If efficient costs are flat, should there be a “glide-path” down to efficient costs?	No glide path (achieve efficient costs in year one)	3 year glide path (achieve efficient costs by 2023)	5 year glide path (achieve efficient costs by 2025)	
How should price pressures be taken into account?	Increase real prices by the relevant price index (CPI/H)	<del>Increase real prices by an industry / company specific input price pressure allowance</del>	<del>No increase in prices</del>	
Should special cost factors (as in PR14 wholesale) / adjustments (as in PR14 retail) be taken into account insetting individual company allowances?	No	Depends on what is accounted for by cost models	Yes	

## Summary of options – after the price control is set

Issue	Options 1	Option 2	Option 3	Option 4
What happens if companies over or under recover costs?	No recovery of costs after the fact for companies or customers	One sided recovery of costs – benefits customers and incentivises companies to recover costs correctly	Two sided recovery of costs: Could have: “dead band” “incentive rates”	
When would an adjustment for over or under recovery occur?	No recovery (see above)	Within period (with 2 year delay)	At the end of the price control period	
What happens if totex is reduced compared to allowed revenue during 20-25? For example, if a contract is signed to treat another company’s sludge?	Company gets to keep efficiency savings over 2020-25	Efficiency savings split between company and customer over 2020-25	Company gets to keep efficiency savings for five years from when they are made	Efficiency savings split between company and customer for five years from when they are made
If you treat another company’s sludge, will that affect your allowed revenues?	No	[Not considered]		

Appendix

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# Options we considered for the form of control

Achieving our objectives

Addressing known problems

Practicality

**1 Total revenue control**

Does not promote markets. Would provide guaranteed revenue which would ensure resilience when demand is low, but not when demand is high.

Changes in volumes do not affect revenues.

Can be set on existing data.

**2 Total revenue control with adjustment factor**

More effective at promoting markets than option 1, but less than options 3 and 4. Would not provide signals

Revenue control does reflect changes in revenues, but with a time lag and in an indirect manner.

Can be set on existing data – but would need ongoing additional data for adjustments.

**3 Average revenue control**  
**Decision**

Targeted approach. Would promote markets.

Revenue control affected by changes in volumes, similar to revenues of a competitive firm.

Can be set on existing data, but there may be measurement issues to address.

**4 Price cap – through tariff basket**

Targeted approach. Would promote markets.

Price cap directly relates revenues to volumes, but cap reduces flexibility to adjust prices compared to an average revenue control – important when data on cost drivers for pricing limited.

Could require more specific price information related to chemical composition of sludge.

## 1 Tonnes of dry solids

**Preferred option**

Would subject WaSCs to volume risk from weather and population changes – increases value of information on resilience requirements.

Promotes markets by providing clear price signal for market participants.



A “commodity”-type measure; companies would be paid for what they treat – but it does not reflect full cost of treatment as chemical composition not accounted for.

Creates perverse incentive to increase the tonnes of dry solids artificially eg by reducing screening.

Would encourage further measurement of sludge which would introduce cost, but provide market with information.

Companies already familiar with tonnes of dry solids.

Measurement issues – tonnes of dry solids not measured everywhere or necessarily consistently.

## 2 Population equivalent

Would subject WaSCs to volume risk from population changes only.

Provides more limited market signal.

Population equivalent more closely tied to actual sludge treated than a total revenue control, but not a “commodity” measure.

Population equivalent not easily manipulated, so no perverse incentive created.

Companies already familiar with population equivalent measure.

Can be calculated with no further measurement.



Achieving our objectives

Addressing known problems

Practicality

ANH	WSH	NES	SWT	UU	WSX	YKY	TMS	SRN	SVT
Y but note transport is volumetric	Y but note not very accurately measured	Y but not for transport PE OK for cross check. Must link to cost assesnt	Y but need to understand basis, accuracy of such a key metric. Needs further study	Y but issue about consistency	Y but difficult. PE as cross check is sensible	Y. Measure it at sewage works above a certain size	Y but note that OOW basis is wet tonnes PE is not right.	Y but refer to sludge working group to inform full answer	Y but know it is not perfect therefore risk of over/ under recovery of revenue so care needed



# Basis of PR19 Sludge Average Revenue Control and TDS Questionnaire Responses

August, 2016

Prepared by Yorkshire Water and Ofwat

## General Purpose

- Yield a consistent approach to quantifying sludge production.
- Facilitate understanding of robustness of different measures and derivations.
- Provide comparability of unit costs for improved benchmarking.
- Enable possibility of a more harmonised approach to gate pricing.

TDS Questionnaire designed as stepping stone - understand current status.

1. Provide summary of company responses to TDS Questionnaire
2. Discuss basis of average sludge revenue control for PR19
3. Discuss source(s) of STW specific sludge “production” information for sludge market database
4. Next steps

Intersperse company TDS Q response summary (JD) with discussion of three issues.

Reminder: Two measures for PR19 proposed by Ofwat.

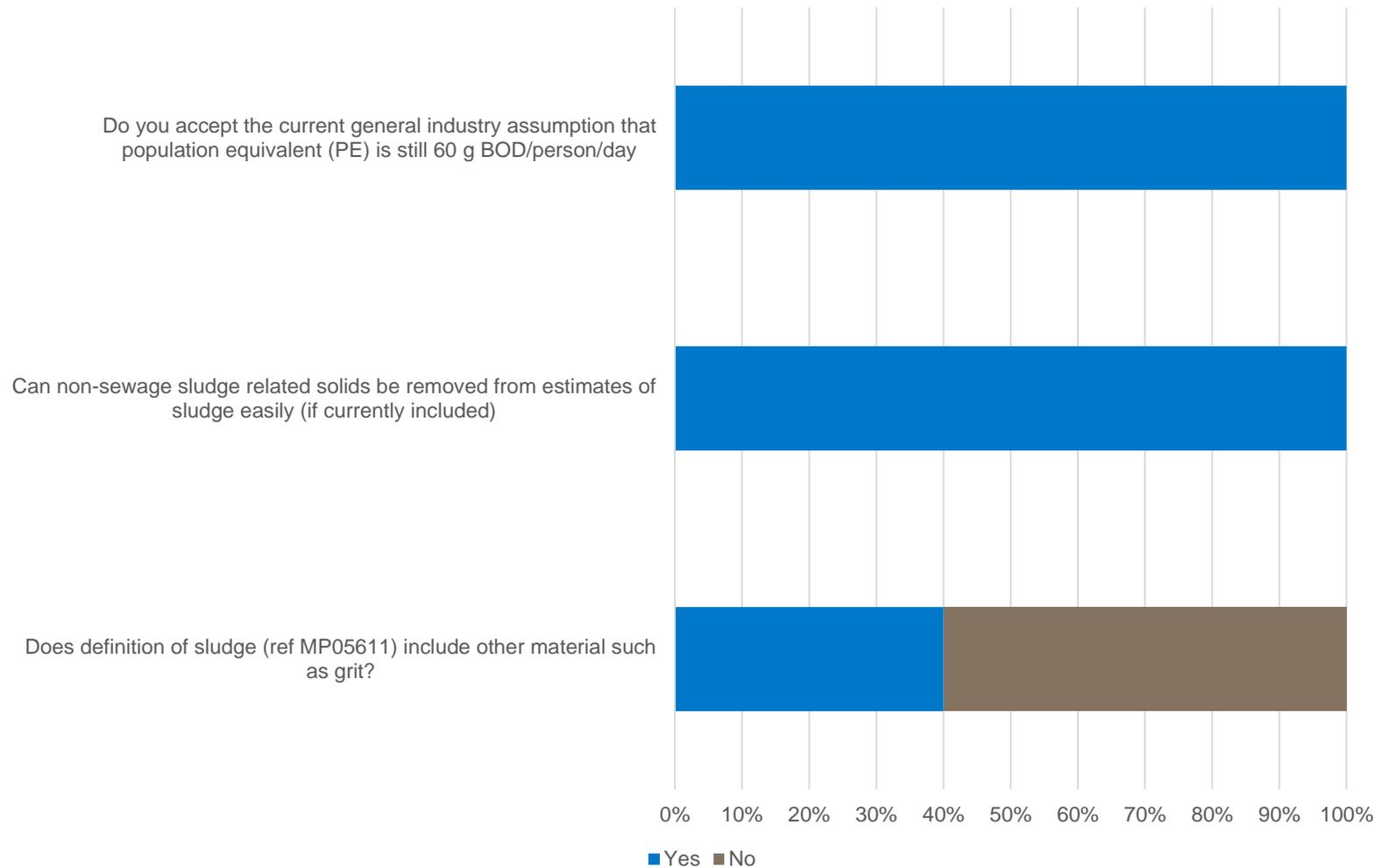
1. Tonnes Dry Solids per year (TDS)/yr – preferred.
2. Population Equivalent, PE, served (60 grams BOD/person.day).

TDS Questionnaire Response Summary:

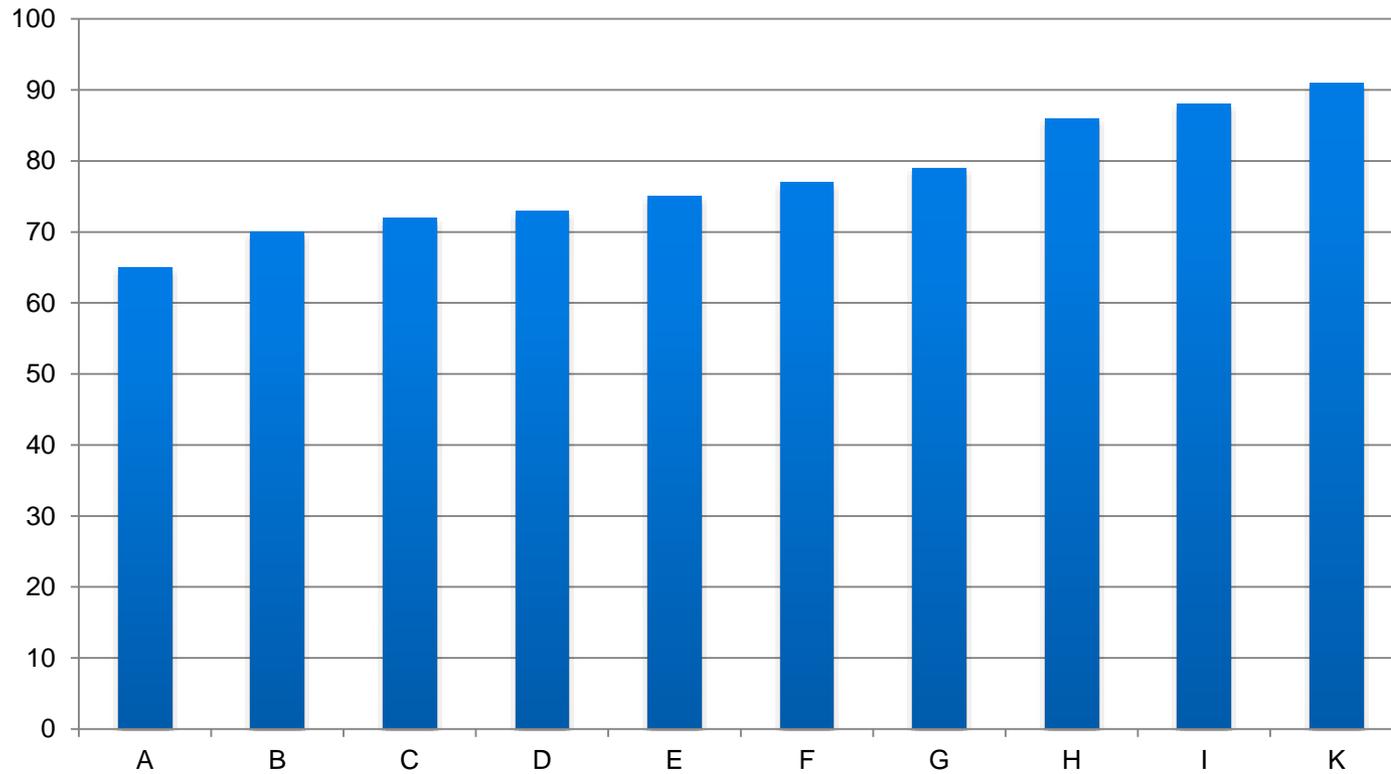
Reporting variations in company methods of estimating “Sludge Production”:

- PE Deemed (4),
- Pre-treat Measured (3),
- Disposal - Post-treat Measured (2),
- Disposal - Back Calculated (1).

Clarification on definitions requested (Q1-Q3).



### Reported Sludge Production 2014-15 (grams DS/population connected. day)



## 1. Basis of Average Revenue Control:

TDS/year – Advantages/Disadvantages

PE – Advantages/Disadvantages

## 2. Source of Individual STW Sludge Production Data:

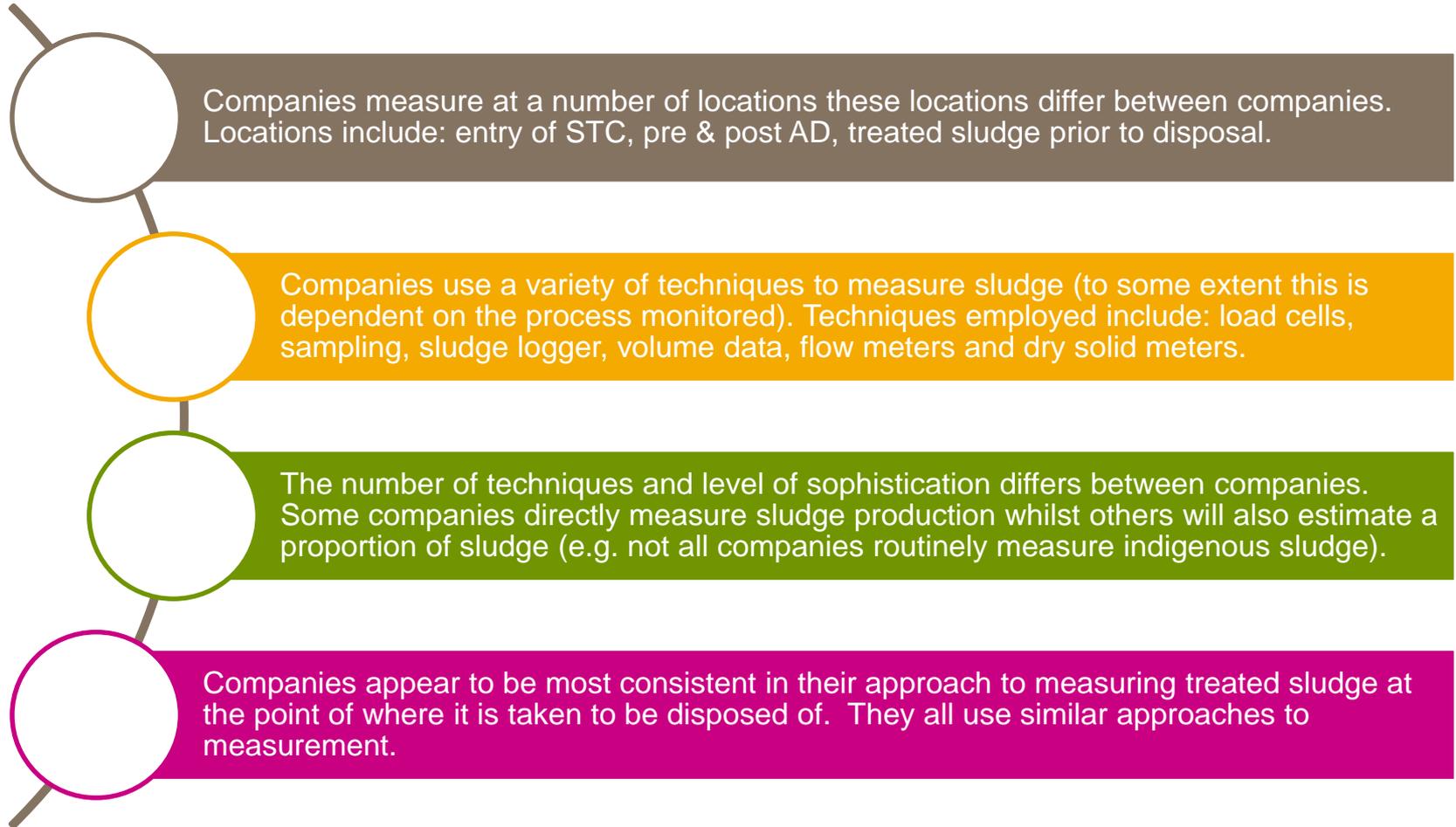
TDS/year – Advantages/Disadvantages

PE – Advantages/Disadvantages

## 3. Any Other Measure Suggestions?

# Current approaches to measuring Sludge production

How do you currently measure/deem sludge production? What methodology/methodologies do you use and from what starting point of direct measurement? Is this approach amenable to providing site-specific sludge measurements/deeming? If so is this for all sites, sites above 2,000 population equivalent or only the larger sites? Approximately what proportions of your sludge production do you measure/deem in the different ways?



If sludge produce and/or BOD loading is measured how regularly do you make these flow/concentration measurements - continuously, hourly, daily, monthly - to inform the annual estimate?

- The level of sampling is depended on the point of measurement (e.g. in-line sludge flow vs weighbridge measurements).
- This, to some extent, reflects the type of technology used and size of site.
- Measurements tend to be either continuous, daily or weekly and in one case monthly.
- A large proportion of companies have some level of continuous monitoring at least at their larger works.

Is there a difference in terms of say size of works, complexity of works etc. where measures are physically made, how they are made (via instruments as opposed to regular sampling and analysis) as opposed to where they are deemed.

- Companies tend to vary the level and accuracy of sampling according to size of the works.
- Larger works tend to be monitored more frequently.
- This allows for a large proportion on their sludge to be monitored closely.
- At least one company only carries out physical measurements at their larger works.

Do companies believe that deeming is appropriate

We received mixed responses from companies. Some considered deeming was appropriate, other considered it should only be used where direct measurements were not possible and some companies were completely opposed to its use.

If so should there be an agreed industry method?

All companies agreed that if deeming was used that there should be an agreed industry method

Who should develop and clarify the required accuracy of these deeming methodologies?

Companies generally considered that this should be developed by industry experts (and in one case led by Ofwat). Through an industry body, such as, Water UK or UKWIR. One company also thought that this should be reviewed by the sludge working group.

Are there any other approaches?

Most companies believe that all options had generally been considered. One company suggested an additional approach could be to use a mixture of deemed PE/sludge production to check against historical and actual sludge tanker movement records along with industry agreed dry solids figures for the type of sludge moved.

# Relative Accuracy Ranking of different methods of stating a raw sludge production figure in TDS/yr

Method - Measured (M) or Deemed (D)	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
M1. Sludge flow meter and sludge density logger	2	1	1	2	1	1	1	1	1	2
M2. Sludge flow meter and regular laboratory samples for Total Solids	3	1	5	4	3	2	2	2	2	1
M3. Sludge volume measure (eg number/size of tankers) and regular laboratory samples for Total Solids	10	2	5	5	5	3	3	4	3	3
M4. Weighed sludge disposal vehicles, regular sludge disposed total solids samples, site specific conversion factors depending on measured process performance (eg Total Solids in and out measured at a digester)	4	3	10	8	3	3	4	3	4	4
M5. Weighed sludge disposal vehicles, regular sludge disposed Total Solids samples, company standard process specific conversion factors (eg - 35% through digestion)	5	7	10	9	7		4	5	5	5
D1. Calculated raw sludge production from measuring BOD/COD load to treatment (measured flow and samples of crude sewage strength) and using measured conversion parameter specific to the individual sewage treatment process technology type.	6	10	10	3	1		4	6	6	6
D2. Calculated raw sludge production from measuring BOD/COD load to treatment and using industry standard average sludge production per tonne of BOD/COD	7	10	10	6	6		5	8	7	7
D3. Calculated raw sludge production from population equivalent figures at each sewage treatment works and company measured conversion parameter (g/person/day) specific to the individual sewage treatment process technology type.	8	2	10	1	7	Don't rely on it because of population fluctuations	6	7	8	8
D4. Calculated raw sludge production from population equivalent figures at each sewage treatment works and industry standard (g/person/day)	9	5	10	7	9	Don't rely on it because of population fluctuations	7	9	9	9
Other – (Sludge flow meter and regular on-site measurement of sludge dry solids (STC sites only) at the point of input to the Advanced Digestion process)	1									

Should all companies follow the same approach to TDS/yr assessment?

Function of added cost (determined by current position) and required accuracy.

Company current positions appears extremely varied (Q4). But.

All? companies directly measure sludge imports and sludge for recycling.

Use weigh bridges and weigh cells for tanker weight or flow meters.

And DS sensors/sampling for liquors or DS sampling for cake.

And most companies (8) measure sludge TDS load prior to treatment at STCs.

Five use flow meters & DS sensors for “continuous” measurement.

Three use flow meters & DS sampling (daily for two, monthly for one).

Two companies use sludge recycling measurements to “estimate” sludge treat.

Deeming (D) sludge production via PE used for design/planning and reporting.

M1 and M2: Most accurate.

Estimates of accuracy vary from +/- 1-10% to +/-20% (sensor issues)

M3: Relatively accurate. Concerns about part loads & sampling.

M4 and M5: Relatively accurate, with 2/4 exceptions. +/- 10-40%?

TDS sampling, weighbridge accuracy, non recycled, conversion factors.

Experience shown not/as accurate (re M1/M2).

But is M4/M5 accuracy sufficient for PR19.

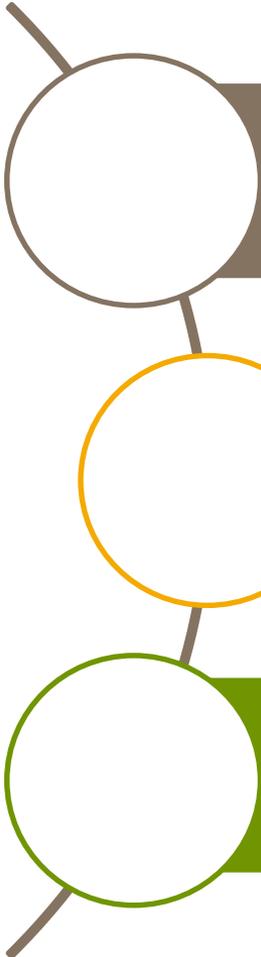
D1 and D2: Relatively inaccurate, with 2 exceptions for D1. +/- 10-40%?

Problems: COD measurement, conversion factors, load variations.

D3 and D4: Most inaccurate, with 2 exceptions for D3. +/- 20-40%?

Problems: Population stats, conversion factors, load variations.

How do you currently measure/deem population equivalent (PE) served. What methodology/methodologies do you use? Is this approach amenable to providing site specific PE measurements/deeming? If you measure PE do you measure BOD or measure COD and apply a suitable conversion, and if so what is that conversion between COD and BOD? Approximately what proportions of your PE treated do you measure/deem in the different ways?



Currently companies appear to use similar approach to estimating PE. Most companies seem to breakdown there PE equivalents into components, including: Domestic, Commercial, Trade, Tankered Waste and Holiday population. One company has a concern about the accuracy of this method and is moving to a new method that will be based on direct measurement. It will use ammonium strength to determine population at each of the works.

**Site specific measurements:** Companies who answered generally considered the approach was amenable to site-specific measurements.

**BOD/COD measures:** Some companies only monitored BOD/COD for environmental regulations purposes (e.g. permits). Where companies provided information on BOD to COD ratios, these tended to be similar between companies, with BOD to COD of 2:1 and Settled BOD to shaken BOD of 1.25.

# Advantages & Disadvantages of a Hybrid Solution described

One possible future solution could be to directly measure sludge production at the proposed PR19 boundary point at the largest STWs (eg >2/10/20,000 pe ?), directly measure all internal imports to STCs (and exports to third parties) and then allocate internal imports/exports to all the smaller STWs by deemed population equivalent (possibly weighted by technology type)? And could such process technology based deeming be used to provide an indication of the source of sludge (primary, secondary, tertiary) at each works, irrespective of whether total sludge production is fully/partly measured? What would be the advantages and disadvantages of these hybrid approaches?

As a whole companies generally disagreed with the use of this approach – they considered that it was not better than current methods and could lead to further inaccuracies

## Advantages:

- There is merit in using a measured for all import facilities, however it is reliant on regular maintenance and calibration of import technology. It does work well for commercial imports currently and could easily be adapted for all imports (internal, commercial or third party). This is the fairest method for all parties.
- There may be some merit to extending our sludge measurement instrumentation to larger STWs that do not currently host an STC. This would improve the day-day accuracy of the sludge market database as sludge production at more individual STWs would be directly measured as opposed to being measured only on export/import.

## Disadvantages:

- It is not better than current approaches.
- It is not clear whether it is intended for measuring sludge production or tonnages entering treatment.
- Gathering this level of detail would be complex due to the high number of sites and is likely to be subject to assumptions, which may affect data robustness.
- Consider that direct measurement should be used for of all transfers by volume and dry solids measurement.
- This would result in numerous grams of sludge/pop/day factors which may still give less accuracy than actual measured sludge data, even more so when you still have to account for trade waste at some works.
- Using just PE deemed for the smaller works is that you are only presenting a theoretical volume/TDS which does need to be checked against what the sites have historically produced through tanker records.

- Which methods should we consider in determining TDS for price control purposes?
- What should we do if improved methods reveal a step change in reported TDS?
- Given companies are in different places do we need a glide path to a common method? If so what time scale/costs are we looking at?
- Should all companies use the same approach at PR19 for consistency (and is this realistic)?
- What issues do we need to be aware of / consider?
- Who should take responsibility for addressing these issues?

# Sludge Information Platform

Ofwat Working Group – September 2016



# Developing the sludge information platform

## Questions

What are the objectives?

(e.g. promoting short-term or long-term trades, inter-WASC trades, encouraging new entrants)

How much standardisation of information and definitions?

What's the right balance between up-front information and providing additional information for specific enquiries?

What period?

e.g. one year, several years, financial or calendar year?

Should it be larger works only, or requirements scaled down for smaller works (if so, how small)?

What information?

e.g. treatment processes, volumes (and estimated or measured), acceptance criteria, greenhouse gases

What assurance is needed?

e.g. review by auditors, use of confidence levels

# The aims of the Information Platform

- The objective is to facilitate market interest in longer-term trading opportunities both from WaSCs outside their regional boundaries and from OOW companies.
- Information should act as a catalyst for market participants to develop business cases and open commercial discussions with sludge producers.
- In order to promote competition, information on the platform should be based on standard definitions and categories – further work is needed on definitions and methodologies.
- This is only for companies to identify potential opportunities (and price is not included). Further information will be available for companies who have an interest in specific sites. Too much information could inhibit use being made of the platform and it could be costly to assemble all the data.

# Data specification issues (1)

## What year?

Should be financial year to align with financial and volume reporting (more important than aligning with environmental reporting)

## What period?

One year may not be typical (e.g. due to operational issues) but a longer period will not reflect changes e.g. due to new consent levels. One year with comments added if it is atypical would be reasonable.

## How many works?

Every waste water treatment works down to the smallest size will produce a very large database, with thousands of works. But in rural areas some private works may have capacity to deal with sludge from very small works. (But is this economically feasible for unmanned works?)

# Data specification issues (2)

## Sludge quality

Screening, grit removal etc at waste water treatment works, and treatment processes at sludge treatment centres, give some guide on quality of sludge. Acceptance criteria for sludge treatment centres is for criteria such as must be digested sludge.

## Volumes

Whether the volume is measured or estimated is significant – estimates may overstate volumes. There needs to be more uniformity of estimation.

## What's missing?

Greenhouse gases associated with the processes – is this something that should be provided case by case, where there is interest in opportunities at specific sites?

Anything else?

# Information for a waste water treatment works (1)

Waste Water Treatment Works Sludge Production Site	
Specification	Input type
WwTW site name	name
WwTW location (grid ref)	grid ref
Data year	Financial year
Treatment process	
Primary	Y/N
Secondary	Y/N
Co-settled sludge	Y/N
WwTW classification	Former JR definition
Volume of raw sludge produced	volume (TDS)
Estimated or Measured volume of sludge	estimated/measured

## Information for a waste water treatment works (2)

Waste Water Treatment Works Sludge Production Site	
Inlet Screened >6mm	Y/N
De-gritting removal	Y/N
Dry Solids %	%
Sludge screened	Y/N
Operating hours of the site	time
Further information (unusual sludge constituents, planning constraints, freshness etc.)	As appropriate
Co-located with a STC	Y/N
Feed rates	
Tanker access	
Other	As appropriate

# Information for a small waste water treatment works

Waste Water Treatment Works Sludge Production Site	
Specification	Input type
WwTW site name	name
WwTW location (grid ref)	grid ref
WwTW classification	Former JR definition

# Information for a sludge treatment centre (1)

Sludge Treatment Centre	
Specification	Input type
Sludge Treatment Centre name	name
STC location (grid ref)	grid ref
Data Year	FY
End product volume	volume (TDS)
Estimated or Measured volume of sludge	estimated/measured
Dry Solids %	%
Sludge screened	Y/N
Sludge treatment available average capacity (per day)	Volume (tds)
Usual operating hours of the site	time
Acceptance criteria for input material	Y/N
Known operational defects that may impact sludge quality	As appropriate

# Information for a sludge treatment centre (2)

Sludge Treatment Centre	
<b>Sludge treatment process at the facility</b>	
Raw sludge liming	Y/N
Conventional anaerobic digestion (with or without liming)	Y/N
Advanced anaerobic digestion (THP)	Y/N
Advanced anaerobic digestion (EH)	Y/N
Incineration of raw sludge	Y/N
Phyto-conditioning/composting	Y/N
Raw sludge thickening hub [dependent on sludge boundary]	Y/N
Thermal drying	Y/N
Other process (please specify)	Y/N
<b>Usual onward sludge recycling/reuse/disposal route</b>	
Recycled to agriculture	Y/N
Landfill (incinerator ash, raw or untreated sludge)	Y/N
Land restoration/reclamation (raw or treated)	Y/N
Incineration of digested sludge	Y/N
Other (please specify)	As appropriate
Further information (planning constraints, etc.)	As appropriate



Actions and setting future working group sessions

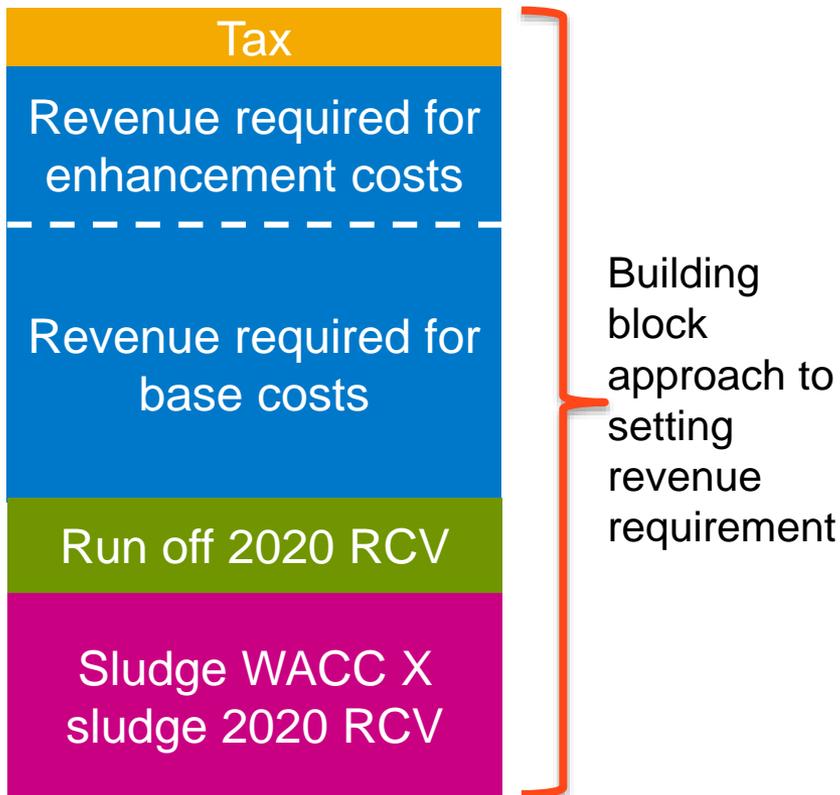
We are looking for help for delegates to contribute in the future area



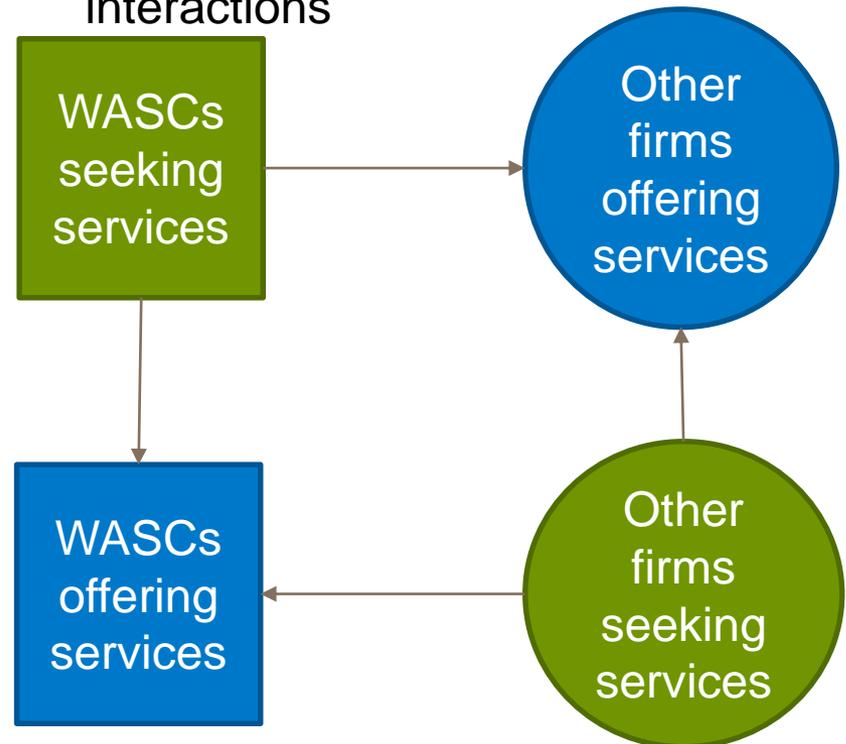
# Look ahead to October: Valuation

## Peter Jordan

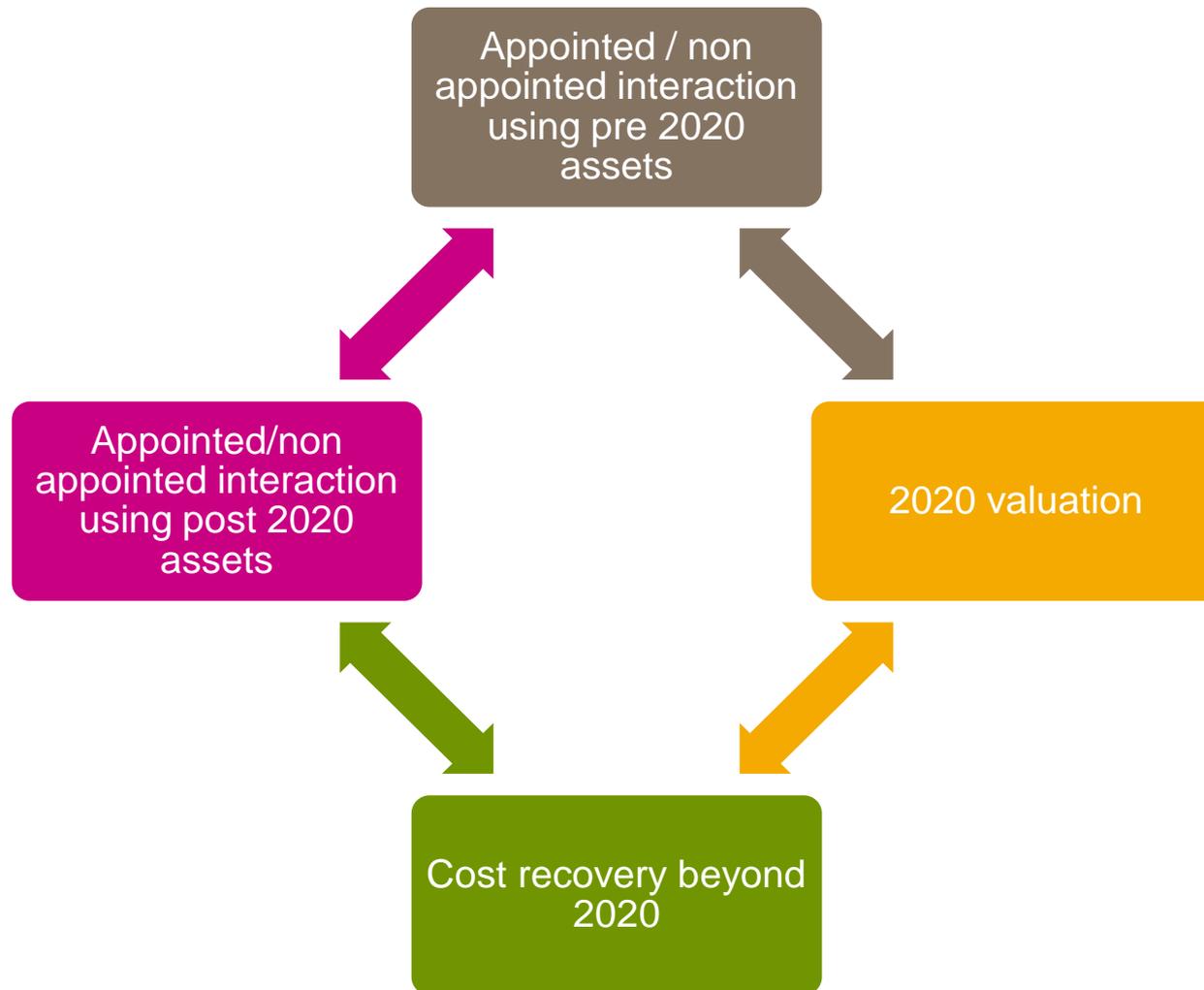
- Valuation needed for building block approach for price control.
- Need to consider impact it may have on both narrow sludge market and wider bioresources market (Companies retain responsibility to satisfy competition requirements)



## Potential sludge market interactions



→ Potential trades



There are a number of important and interrelated issues that could impact sludge markets, but we may not finalise all aspects until final methodology in December 2017.

CEPA found a wide variation in:

- a) valuations (mainly based on PR09 – with some adjustments to update to now)
- b) assumptions

Assumptions:

- **greenfield vs. existing?**: blank canvas or existing configuration, choice of site (telecoms – “scorched node”)
- **economies of scale?**: whether and how should be incorporated;
- **technology?**: MEA (modern equivalent) or replacement of existing assets;
- **individual asset level or process level?**;
- **abandoned, decommissioned or mothballed assets**;
- **net or gross MEA valuations?**; and
- **boundary issues** between sewerage and sludge;
- **Management and General (M&G) assets?**: how are they allocated?

## Spectrum of feasible approaches to understand value

1. Value assets on existing sites, with existing technology taking into account condition. (Could take mothballed sites into account).
2. Replacement value of processes on existing sites, with centrally specified technology.
3. Notional assets based on specified cost/technology/assets to treat given amount of sludge. No specific account taken of intermediate or mothballed sites.
4. PR09 valuation indexed up.
5. Value implied by discounted net cash flows.
6. Net historic cost included in statutory accounts balance sheet.
7. ....Other(?).

## One approach or many?

- Single: Good approach if we are confident objective values will be given within a narrow range and if we are clear how it will impact the sludge market.
- Multiple: If valuations have a large range of plausible values. Multiple values could be used to cross check or could be used in a triangulation approach. Provides more flexibility.
- What is the extra cost to apply multiple scenarios to the same observations?
- What extra benefits could we receive from having a richer picture of value?

## Same approach for land and assets?

- **Discuss**
  - Views
  - Potential offers - explore one approach (including coherent sets of assumptions) to discuss at working group in October.

When	What
8 September	Today
20 October	Working group discussion
Nov - Jan	Consultation on guidance?
Jan - Mar 2017	Finalise initial guidance to complete valuation (do we need to build in potential to update if necessary?)
Feb - Apr 2017	Start Valuation Exercise
July 2017	Further opportunity to consult as part of methodology consultation.
Jul – Sep 2017	Complete Valuation Exercise
Dec 2017	Final decision on valuation in or alongside final methodology statement.

## Update on future workshops

Date	Themes (provisional)
20 <sup>th</sup> October 2016	<ul style="list-style-type: none"><li>• Sludge market: bid information</li><li>• Non-regulated revenue: Charging and transfer pricing</li></ul>
29 <sup>th</sup> November 2016	<ul style="list-style-type: none"><li>• Form of price control (session 3)</li><li>• Price control: cost assessment and 2017-18 Regulatory Accounting Guidelines for sludge</li></ul>
17 <sup>th</sup> January 2016	To be confirmed