

Data Table Commentaries

6 Bioresources

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1. Introduction

These tables collect data on companies' forecast costs and associated drivers over the period 2022-30 for bioresources. There are six data tables related to cost assessment for the bioresources services.

This data is being collected as part of PR24 bioresources cost assessment. The data helps to establish an independent baseline estimate of bioresources costs by using accurate historical and forecast costs and volumes for a range of cost drivers.

Where Confidence Grades are not detailed against line commentary, all forecasts have been produced from historical data with a confidence grade of B3 or better.

Due to the straight-forward methodology followed to forecast PR24 sludge production, an additional report has not been considered necessary.

2. BIO1 Bioresources sludge data

BIO1.1 Total sewage sludge produced, treated by incumbents

Historical data is used to understand ttds/year over time. The current proportion of Total sewage sludge produced to be treated by incumbents is 98.4%. It is assumed that this will continue in the next AMP (2025-2030). 98.4% of Total sewage sludge produced is therefore used to populate each reporting year of the forecast from 2023-2030.

BIO1.2 Total sewage sludge produced, treated by 3rd party sludge service provider

22/23 commentary - Due to Afan degrit, compliance issues and a lack of capacity at AAD due to breakdowns and maintenance, a record volume of sludge has been treated and recycled via 3rd party. This was an anomalous year and we forecast a return to normality in 23/24, hence the drop in the value of this line.

BIO1.3 Total sewage sludge produced

Historical data is used to understand ttds/year over time. The current reporting year 2022-23 is calculated by summing BIO 1.1 & BIO 1.2. A trendline is used to provide an understanding of the average growth for that period. The trendline is then used to forecast ahead to 2030 on the understanding that growth at a similar rate is expected, taking account of population increase and greater solids capture via delivery of Phosphorous Schemes, which are expected to increase ttds at a similar level to what we've seen over the last 5 years.

BIO1.4 Total sewage sludge produced from non-appointed liquid waste treatment

Historical data is used to understand historic ttds/year over time. A trendline is used to provide an understanding of the average growth for that period. The trendline is then used to forecast ahead to 2030 on the understanding that growth at a similar rate is expected, taking account of population increase which is expected to increase ttds at a similar level to what we've seen over the last 5 years.

BIO1.5 Percentage of sludge produced and treated at a site of STW and STC co-location

Historical data is used to understand % over time. Following delivery of AAD strategy in 2020, our strategy of treating and recycling sludge via the 4 AAD sites is now set with no changes planned, therefore a linear forecast is used based on 2022-2023 % value.

BIO1.6 *Total sewage sludge disposed by incumbents*

Line description	Units	DPs	Total	Total	Total	Total	Total	Total	PR24 BP reference
			2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	
Total sewage sludge disposed by incumbents	ttds/year	1	27.47	50.60	39.00	32.70	35.90	32.70	BIO1.6

Growth at a similar rate to what has been seen over the last 5 years is expected, taking account of population increase and greater solids capture via delivery of Phosphorous Schemes, which are expected to increase Total sewage sludge disposed by incumbents at a similar level.

Historical data is used to understand ttds/year over time. By checking the destruction rate relationship between BIO 1.6 and BIO 1.1 for current and previous reporting year (2021-2022 & 2022-2023) an average of these two values is gained to understand the mean destruction rate. This mean destruction rate is then used to forecast future years.

BIO1.7 *Total sewage sludge disposed by 3rd party sludge service provider*

Historical data is used to understand ttds/year over time. By checking the relationship between BIO 1.7 and BIO 1.2 for current and previous reporting years (2019-2020 & 2020-2021 & 2021-2022 & 2022-2023) an average of these four values is gained to understand the mean rate. This mean rate is then used to forecast future years.

BIO1.8 *Total sewage sludge disposed*

Historical data is used to understand ttds/year over time. Total sewage sludge disposed is a combination of Total sewage sludge disposed by incumbents & Total sewage sludge disposed by 3rd party sludge service provider, therefore the sum is totalled.

BIO1.9 *Total measure of intersiting 'work' done by pipeline*

Historical data is used to understand ttds/year over time. Previous years' figures are 3.1, 3.3 and 3.2' so it is not expected that these values will increase significantly enough to report a figure other than 3 in the forecast years.

BIO1.10 *Total measure of intersiting 'work' done by tanker*

Historical data is used to understand ttds*km/year over time. By understanding the relationship between BIO 1.3 and BIO 1.10 for the current reporting year (2022-2023) we are then able to apply this to the forecasting years.

BIO1.11 *Total measure of intersiting 'work' done by truck*

Historical data is used to understand ttds*km/year over time. By understanding the relationship between BIO 1.3 and BIO 1.11 for the current reporting year (2022-2023) we are then able to apply this to the forecasting years.

BIO1.12 *Total measure of intersiting 'work' done (all forms of transportation)*

Historical data is used to understand ttds*km/year over time. Total measure of intersiting 'work' done by pipeline is a combination of Total measure of intersiting 'work' done by pipeline & Total measure of intersiting 'work' done by tanker & Total measure of intersiting 'work' done by truck, therefore the sum is totalled.

BIO1.13 *Total measure of intersiting 'work' done by tanker (by volume transported)*

Historical data is used to understand $m^3 \cdot km/yr$ over time. By understanding the relationship between BIO 1.3 and BIO 1.13 for the current reporting year (2022-2023) we are then able to apply this to the forecasting years.

BIO1.14 *Total measure of 'work' done in sludge disposal operations by pipeline***BIO1.15** *Total measure of 'work' done in sludge disposal operations by tanker*

Line 14 & 15 Historical data is used to understand $ttds \cdot km/year$ over time. DCWW have not done any 'work' linked to Total measure of 'work' done in sludge disposal operations by pipeline & Total measure of 'work' done in sludge disposal operations by tanker in recent years, and there are no future plans to do this type of 'work', therefore zero is entered for each line and all forecast years.

BIO1.16 *Total measure of 'work' done in sludge disposal operations by truck*

Historical data is used to understand $ttds \cdot km/year$ over time. By understanding the relationship between BIO 1.8 and BIO 1.16 for the current reporting year (2022-2023) we are then able to apply this to the forecasting years.

BIO1.17 *Total measure of 'work' done in sludge disposal operations (all forms of transportation)*

Historical data is used to understand $ttds \cdot km/year$ over time. Total measure of 'work' done in sludge disposal operations (all forms of transportation) is a combination of Total measure of 'work' done in sludge disposal operations by pipeline & Total measure of 'work' done in sludge disposal operations by tanker & Total measure of 'work' done in sludge disposal operations by truck, therefore the sum is totalled.

BIO1.18 *Total measure of 'work' done by tanker in sludge disposal operations (by volume transported)*

Historical data is used to understand $m^3 \cdot km/yr$ over time. DCWW have not done any 'work' linked to Total measure of 'work' done by tanker in sludge disposal operations (by volume transported) in recent years, and there are no future plans to do this type of 'work', therefore zero is entered for all forecast years.

BIO1.19 *Chemical P sludge as % of sludge produced at STWs*

Historic data is used to understand historic % over time. The average for historic years is then used for all forecast years as the data is variable but doesn't follow a particular trend.

3. BIO2 Bioresources operating expenditure analysis

Confidence Grade B3 for the whole table

General

All figures in this table and commentary are post frontier shift and real price effects.

Overall, an increase of £6m, £26.317m increasing to £32.366m, in Total operating expenditure (excluding third party) from 2022-23 to the end of AMP8, including enhancement Opex which is allocated to Sludge Treatment type.

Enhancement Opex is the driver for the overall increase from 2022-23 through 2029-30, with an initial £0.677m cost in 2025-26, rising annually throughout AMP8 to a Bioresources total of £7.045m enhancement Opex in 2029-30. Enhancement Opex is allocated to the specific price controls implementing the investment, and the enhancement

Opex recorded in table BIO2 reconciles to the enhancement Opex recorded in table CWW3b Enhancement expenditure - wastewater network+ and bioresources, line CWW3b.194.

Excluding enhancement Opex, Total operating expenditure (excluding third party) rises £4.5m from 2022-23 to 2023-24, driven by an increase in power spend to the end of AMP7. Total operating expenditure (excluding third party) then falls through AMP8 driven by reduced consumption from energy efficiency improvements.

There have been no changes in reporting methods / assumptions that have led to a material change in reported figures. Similarly, there has been no evidence or expectation of material change to cost allocations anticipated.

Sludge transport method

BIO2.1 Power

In Sludge Transport, power increases 145% 2022-23 to 2023-24, and then falls 22% 2024-25 to 2025-26. Similarly, in Sludge Treatment, power increases 86% 2022-23 to 2023-24, increasing again 15% to 2024-25 before falling 10% to 2025-26, falling again 16% from 2026-27 to 2027-28. Rainfall is a driver of energy consumption, there is a 7% forecasted increase in annual rainfall for 2023-24. Followed by a reduction of Power costs during AMP8 through a mixture of energy efficiency investment, and a forecast of lower electricity prices.

BIO2.2 Income treated as negative expenditure

We have no income treated as negative expenditure

BIO2.3 Discharge consents

We have no costs for discharge consents

BIO2.4 Bulk discharge

We have no costs for bulk discharge

Other operating expenditure

BIO2.5 Renewals expensed in year (Infrastructure)

We have no renewals costs

BIO2.6 Renewals expensed in year (Non-Infrastructure)

We have no renewals costs

BIO2.7 Other operating expenditure excluding renewals

In Sludge Transport, other Opex falls 11% 2022-23 to 2023-24, before increasing 16% from 2024-25 to 2025-26. In Sludge Treatment, other Opex increases 12% from 2022-23 to 2023-24 and in Sludge Disposal other Opex falls 40% from 2022-23 to 2023-24. As a Bioresources Total, other Opex has no material year on year movements with exception of 2022-23 to 2023-24, an increase of 11% (£11.26m).

BIO2.8 Total functional expenditure

Calculated cells

BIO2.9 *Local authority and Cumulo rates*

In Sludge Transport, rates fall 60% (£0.004m) 2022-23 to 2023-24 before increasing 200% (£0.006) 2024-25 to 2025-26. In Sludge Disposal, rates fall 57% (£0.003m) 2022-23 to 23-24 before increasing 250% (£0.005m) 2024-25 to 2025-26. The rates charges are calculated in the CWW10 table. Please refer to the commentary on CWW10 for more details on how local authority and Cumulo rates have been calculated. The increase in rates is driven by the reduction of transitional relief (TR), coupled with no announcement by either the Welsh or English Governments regarding the availability of TR at the 2026 revaluation and so we have not factored this into the resultant rates liabilities. No TR has been entered after 2026 as there are no details to confirm whether it will be available.

BIO2.10 *Total operating expenditure (excluding 3rd party)*

Calculated cells

Sludge treatment type**BIO2.11** *Power***BIO2.12** *Income treated as negative expenditure***BIO2.13** *Discharge consents***BIO2.14** *Bulk discharge*

We have no costs associated with bulk discharge

Other operating expenditure**BIO2.15** *Renewals expensed in year (Infrastructure)*

We have no costs associated with renewals

BIO2.16 *Renewals expensed in year (Non-Infrastructure)*

We have no costs associated with renewals

BIO2.17 *Other operating expenditure excluding renewals***BIO2.18** *Total functional expenditure*

Calculated cells

BIO2.19 *Local authority and Cumulo rates*

The rates charges are calculated in the CWW10 table. Please refer to the commentary on CWW10 for more details on how local authority and Cumulo rates have been calculated. The increase in rates is driven by the reduction of transitional relief (TR), coupled with no announcement by either the Welsh or English Governments regarding the availability of TR at the 2026 revaluation and so we have not factored this into the resultant rates liabilities. No TR has been entered after 2026 as there are no details to confirm whether it will be available.

BIO2.20 *Total operating expenditure (excluding 3rd party)*
Calculated cells

We note the Erratum published regarding this row and have followed the specific action required, i.e. we have ignored the error in the calculation.

The correct totals are:

	Line description	Units	DPs	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30
	Sludge treatment type										
	Advanced Anaerobic Digestion										
BIO2.18	Total functional expenditure	£m	3	13.434	19.366	18.160	18.091	17.114	16.534	16.251	15.645
BIO2.19	Local authority and Cumulo rates	£m	3	0.628	0.647	0.680	0.726	0.757	0.788	0.818	0.849
BIO2.20	Total operating expenditure (excluding 3rd party)	£m	3	14.062	20.013	18.840	18.817	17.871	17.322	17.069	16.494
	Other										
BIO2.18	Total functional expenditure	£m	3	-	-	-	0.655	1.477	3.763	6.099	6.682
BIO2.19	Local authority and Cumulo rates	£m	3	-	-	-	0.022	0.065	0.179	0.307	0.363
BIO2.20	Total operating expenditure (excluding 3rd party)	£m	3	-	-	-	0.677	1.542	3.942	6.406	7.045
	Total										
BIO2.18	Total functional expenditure	£m	3	13.434	19.366	18.160	18.746	18.591	20.297	22.350	22.327
BIO2.19	Local authority and Cumulo rates	£m	3	0.628	0.647	0.680	0.748	0.822	0.967	1.125	1.212
BIO2.20	Total operating expenditure (excluding 3rd party)	£m	3	14.062	20.013	18.840	19.494	19.413	21.264	23.475	23.539

Sludge disposal route

BIO2.21 *Power*

BIO2.22 *Income treated as negative expenditure*

We have no income treated as negative expenditure

BIO2.23 *Discharge consents*

We have no costs associated with discharge consents

BIO2.24 *Bulk discharge*

We have no costs associated with bulk discharge

Other operating expenditure

BIO2.25 *Renewals expensed in year (Infrastructure)*

We have no costs associated with renewals

BIO2.26 *Renewals expensed in year (Non-Infrastructure)*

We have no costs associated with renewals

BIO2.27 Other operating expenditure excluding renewals

BIO2.28 Total functional expenditure

Calculated cells

BIO2.29 Local authority and Cumulo rates

BIO2.30 Total operating expenditure (excluding 3rd party)

Calculated cells

4. BIO3a Bioresources energy analysis

Confidence Grades are detailed against each line name

The main areas of uncertainty are variation in generation performance year to year, some estimated data for bioresources and network+ cost splits, and price uncertainty as very little power has been purchased in advance for AMP8.

Energy

BIO3a.1 Energy consumption – bioresources Confidence grade B3

Energy consumption for bioresources is expected to reduce slightly from 125 GWh in 2022/23 to 117 GWh in 2029/30 through energy efficiency measures.

These are higher than the values reported in APR2023 because they did not previously include heat generated and used in bioresources.

BIO3a.2 Energy generated by and used in bioresources control Confidence grade B3

Electricity generation is expected to reduce due to investment in alternative uses of biogas which will increase the generation of biomethane and biohydrogen. Biohydrogen has been included in the biomethane column.

Electricity generated and used in bioresources is forecast to reduce because of a forecast reduction in electricity consumption resulting from efficiency measures. This means that with the same amount of generation, less of it gets used in bioresources.

BIO3a.3 Energy generated by bioresources and used in network plus control Confidence grade B3

BIO3a.4 Energy generated by bioresources and exported to the grid or third party Confidence grade B3

Energy exported to the grid is higher in 2023/24 as this is based on the LBE forecast generation performance whereas the actual generation underperformed in 2022/23.

BIO3a.5 Energy generated by bioresources that is unused Confidence grade B3

BIO3a.6 Energy bought from grid or third party and used in bioresources control Confidence grade B3

BIO3a.7 Energy consumption – bioresources Confidence grade B3

BIO3a.8 Energy generated by and used in bioresources control Confidence grade B3

BIO3a.9 Energy generated by bioresources and used in network plus control Confidence grade B3

BIO3a.10 Energy generated by bioresources and exported to the grid or third party Confidence grade B3

BIO3a.11 Energy bought from grid or third party and used in bioresources control Confidence grade B3

Energy (AMP 7 shadow reported values)

BIO3a.12 Energy consumption – bioresources Confidence grade B3

These are higher than the values reported in APR2023 because they did not previously include heat generated and used in bioresources. Significant variations are explained in the lines that break down this total.

BIO3a.13 Energy generated by and used in bioresources control Confidence grade B3

Lines 12 & 13 show variation most years for electricity

Electricity generated and used in bioresources is forecast to reduce most years because of a forecast reduction in electricity consumption resulting from efficiency measures. This means that with the same amount of generation, less of it gets used in bioresources. There is some increase from electrification of transport and increased electricity use from processing biogas to biomethane and biohydrogen that in some years exceeds the reductions.

BIO3a.14 Energy generated by bioresources and used in network plus control Confidence grade B3

This reduces over AMP8 are because moving away from CHP generation to biohydrogen/biomethane means that instead of electricity being exported to Network+, biomethane/biohydrogen is exported to the grid or 3rd party.

BIO3a.15 Energy generated by bioresources and exported to the grid or third party Confidence grade B3

Electricity exported to the grid is higher in 2023/24 as this is based on the target budget generation performance whereas the actual generation underperformed in 2022/23.

The increases in biomethane over AMP8 are because moving away from CHP generation to biohydrogen/biomethane means that instead of electricity being exported to Network+, biomethane/biohydrogen is exported to the grid or 3rd party.

BIO3a.16 Energy generated by bioresources that is unused Confidence grade B3

BIO3a.17 Energy bought from grid or third party and used in bioresources control Confidence grade B3

BIO3a.18 Energy consumption – bioresources Confidence grade B3

BIO3a.19 *Energy generated by and used in bioresources control Confidence grade B3*

Variations here are driven primarily by changes in the MWh value as explained above, though price also has some impact.

BIO3a.20 *Energy generated by bioresources and used in network plus control Confidence grade B3***BIO3a.21** *Energy generated by bioresources and exported to the grid or third party Confidence grade B3*

Variations here are driven primarily by changes in the MWh value as explained above, though price also has some impact.

BIO3a.22 *Energy bought from grid or third party and used in bioresources control Confidence grade B3*

Variations here are driven primarily by changes in the MWh value as explained above, though price also has some impact, particularly for the step reduction in 2023/24.

5. BIO3b Bioresources; income, liquors and metering analysis

Income from renewable subsidies is not expected to change significantly over the period. Our CHP ROC sites will no longer be eligible for ROCs from 2030, hence the increase in energy subsidies due to expire towards the end of AMP8.

Income from renewable energy subsidies

BIO3b.1 *Income claimed from Renewable Energy Certificates (ROCs)*

Subsidy levels are not expected to be significantly affected by bioresources expenditure and strategy.

BIO3b.2 *Income claimed from Renewable Heat Incentives (RHIs)*

Subsidy levels are not expected to be significantly affected by bioresources expenditure and strategy.

BIO3b.3 *Income claimed from [other renewable energy subsidy (1)]***BIO3b.4** *Income claimed from [other renewable energy subsidy (2)]***BIO3b.5** *Income claimed from [other renewable energy subsidy (3)]*

Line 3b.3 to 3b.5 are left intentionally blank

BIO3b.6 *Total income claimed from renewable energy subsidies*

Calculated cells

BIO3b.7 *% of total number of renewable energy subsidies due to expire in the next 2 financial years***BIO3b.8** *This year's value of renewable energy subsidies due to expire in the next 2 financial years*

Line 7 & 8 A zero indicates that there are no subsidies due to expire in the next two financial years.

Bioresources liquors treated by network plus (shadow reported)

BIO3b.9 BOD load of liquor or partially treated liquor returned from bioresources to network plus

BIO3b.10 Ammonia load of liquor or partially treated liquor returned from bioresources to network plus

Line 9 & 10 Historic data is used to understand historic kg/d & kg Amm-N/d over time. An average of the last two year's data is used for the forecast years as so many variables are in play in terms of sample results and volumes at multiple sites. Trending isn't possible due to the lack of historic data. The step change in 23/24 is due to the method of forecasting the future value.

*BIO3b.11 Recharge to Bioresources by network plus for costs of handling and treating bioresources liquors
Confidence grade B4*

Historic data is used to understand historic kg/d & kg Amm-N/d over time. An industry standard for cost/inflation increase is used to populate forecasting years.

Metering

BIO3b.12 Percentage of bioresources energy consumption that is metered Confidence grade B3

We do not expect the proportion of consumption that is metered to change over the period.

6. BIO4 Bioresources sludge treatment and disposal data**Sludge treatment process**

BIO4.1 % Sludge – untreated

BIO4.2 % Sludge treatment process - raw sludge liming

BIO4.3 % Sludge treatment process - conventional AD

BIO4.4 % Sludge treatment process - advanced AD

BIO4.5 % Sludge treatment process - incineration of raw sludge

BIO4.6 % Sludge treatment process - other (specify)

BIO4.7 % Sludge treatment process - Total

Lines 1 – 7 Historical data is used to understand % over time. DCWW have not processed any sludge via % Sludge – untreated (Line 1) & % Sludge treatment process - incineration of raw sludge (Line 5) & % Sludge treatment process - other (specify) (Line 6), and there is no future plans to process sludge in this way, therefore zero is entered for each line and all forecast years. Both "By incumbent" and "By 3rd party sludge service providers" columns are populated in this way.

The percentage split for "% Sludge treatment process - raw sludge liming" (line 2) & "% Sludge treatment process - advanced AD" (Line 4) is calculated from the data in BIO 1.1, 1.2, 1.3 for the forecasting years.

All DCWW material is treated via AAD and this is going to be the case for the forecasting period, therefore a zero is reported for "% Sludge treatment process - conventional AD" (line 3) for all forecasting years.

% Sludge treatment process - Total is a combination of % Sludge – untreated & % Sludge treatment process - raw sludge liming & % Sludge treatment process - conventional AD & % Sludge treatment process - advanced AD & % Sludge treatment process - incineration of raw sludge & % Sludge treatment process - other (specify), therefore the sum is totalled. Both “By incumbent” and “By 3rd party sludge service providers” columns are summed in this way.

There is a drop in line 2 from 22/23 to 23/24 due to operational challenges in 22/23 - Afan degrid, compliance issues and a lack of capacity at AAD due to breakdowns and maintenance, a record volume of sludge has been treated and recycled via 3rd party liming. This was an anomalous year and we forecast a return to normality in 23/24 onwards.

There is a drop in line 3 from 22/23 to 23/24 due to operational challenges in 22/23 – compliance issues resulted in the decision to recycle a proportion of material as Conventional. This is not typical operational strategy and we forecast that there will be no need to recycle material as Conventional in future years.

There is an increase in line 4 from 22/23 to 23/24 due to operational challenges in 22/23 - Afan degrid, compliance issues and a lack of capacity at AAD due to breakdowns and maintenance, a record volume of sludge has been treated and recycled via 3rd party liming. This was an anomalous year and we forecast a return to normality in 23/24 onwards, hence an increase in % Sludge treatment process – advanced AD.

(Un-incinerated) sludge disposal and recycling route

- BIO4.8* % Sludge disposal route - landfill, raw
- BIO4.9* % Sludge disposal route - landfill, partly treated
- BIO4.10* % Sludge disposal route - land restoration/ reclamation
- BIO4.11* % Sludge disposal route - sludge recycled to farmland
- BIO4.12* % Sludge disposal route - other (specify)
- BIO4.13* % Sludge disposal route - Total

Lines 8 – 13 Historical data is used to understand % over time. DCWW have not disposed of sludge via % Sludge disposal route - landfill, raw (Line 8) & % Sludge disposal route - landfill, partly treated (Line 9) & % Sludge disposal route - land restoration/ reclamation (Line 10) & % Sludge disposal route - other (specify) (line 12), and there is no future plans to use these disposal routes, therefore zero is entered for each line and all forecast years. Both “By incumbent” and “By 3rd party sludge service providers” columns are populated in this way.

The percentage split for % Sludge disposal route - sludge recycled to farmland” (Line 11) is calculated from the data in BIO 1.6, 1.7, 1.8 for the forecasting years.

% Sludge disposal route - Total (Line 13) is a combination of % Sludge disposal route - landfill, raw & % Sludge disposal route - landfill, partly treated & % Sludge disposal route - land restoration/ reclamation & % Sludge disposal route - sludge recycled to farmland & % Sludge disposal route - other (specify), therefore the sum is totalled. Both “By incumbent” and “By 3rd party sludge service providers” columns are summed in this way.

There is a change in line 11 from 22/23 to 23/24 due to operational challenges in 22/23 - Afan degrid, compliance issues and a lack of capacity at AAD due to breakdowns and maintenance, a record volume of sludge has been treated and recycled via 3rd party liming. This was an anomalous year and we forecast a return to normality in 23/24 onwards, hence a decrease in

sludge recycled to farmland by 3rd party service provider and an increase in sludge recycled to farmland by incumbent.

7. BIO5 Bioresources additional treatment and storage data

Bioresources data

BIO5.1 *Tonnes of dry solids treated via main sludge treatment*

BIO5.2 *Tonnes of dry solids undertaking thickening/dewatering*

BIO5.3 *Additional sludge storage - tank volume (pre-thickening/pre-dewatering/untreated sludge)*

BIO5.4 *Additional sludge storage - tank volume (thickened/dewatered/treated sludge)*

Lines 1 – 4 Zero is reported for all forecasting years for all lines as there is no impact from the drivers specified.

BIO5.5 *Additional sludge storage - cake pads/bays area or equivalent (cake)*

We have delivered 3,444m² of “Additional sludge storage - cake pads/bays area or equivalent (cake)” at Magor in 2022-2023, therefore this value is used for the current year reporting. The storage installed in 2022-2023 was delivered to meet the requirements of an AMP7 driver on strategic storage and aligns with the data requested for this line in AMP8.

No further “Additional sludge storage - cake pads/bays area or equivalent (cake)” will be delivered in this current AMP.

A total of 25,127.73m² of “Additional sludge storage - cake pads/bays area or equivalent (cake)” has been submitted in the WINEP plan for approval. This will be delivered over the next AMP and is phased equally over the five-year period to provide a forecast for future reporting years.

BIO5.6 *Total number of sludge treatment schemes providing sludge storage Confidence grade A1*

We have delivered 1 “Additional sludge storage - cake pads/bays area or equivalent (cake)” at Magor in 2022-2023, therefore this value is used for the current year reporting.

No further “Additional sludge storage - cake pads/bays area or equivalent (cake)” will be delivered in this current AMP.

The profile of delivery in AMP8 follows the profile in line 6 above.

BIO5.7 *Total number of sludge treatment schemes providing sludge thickening and dewatering*

Zero is reported for all forecasting years as there is no impact from the drivers specified.

BIO5.8 *Total number of sludge treatment schemes providing main sludge treatment enhancement*

There are no sludge treatment schemes providing main sludge treatment enhancements during 2022-28 & 2029-30. A new and additional digester will become operational in Five Fords AAD 2028-29, increasing capacity and resilience.

BIO5.9 *Volume of sludge processed via thickening or dewatering*

Zero is entered for reporting years 2022-25 as the volume of sludge processed via thickening or dewatering (m³) will not come under the specified driver codes. 9509.913m³ is entered for each

reporting year 2025-2030 – this is based upon the understanding that there will be an increase of 10,936.4 TDS over the course of AMP8 via growth, P Schemes and solids capture by reducing storm spills from CSO's (ref Sludge Strategy – Increase in processing capacity). 10,936.4 TDS is converted to a volume of 47,549.57m³ @ 23% DS (9,509.913 TDS * 5) and is then phased equally over the 5 year AMP period (47,549.57m³ / 5) giving us the value of 9,509.913m³ per year that is used. 23% DS is used as it is the average % DS for all the STC's in reporting year 2022-23.

BIO5.10 *Landbank availability*

We have left 22/23 and 23/24 blank to ensure that there are no issues with Proteus. 2022-2023 is considered to be "<100%" as we have lost some landbank on introduction of 20 new measures to BAS in July 2022. 2023-2024 is also considered to be "<100%" as we will likely lose some landbank if we adopt some of the 20 new measures to BAS in Wales. We have not provided actual figures for 2022-2023 and 2023-2024 because we would need to carry out substantial levels of sampling to gather accurate data in order to understand the precise changes. Sampling might have to be undertaken for both existing landbank and potential future sites. Future forecasting years are an unknown therefore 100 is entered to signify no change to previous year as there is no further legislation changes anticipated over the period.

Sludge management/sludge treatment/ Bioresources cost driver

BIO5.11 *Additional Line 1; Sludge management/sludge treatment/ Bioresources cost driver - Total number of sludge treatment schemes providing sludge storage from increased capacity requirements relating to P/CSO WINEP/NEP drivers*

We have used the additional cost driver lines to capture the effects of increased sludge treatment capacity from non-SUiAR drivers, which are largely driven from other WINEP/NEP drivers such as P removal, CSO harm reduction schemes.

BIO5.11 replicates line BIO5.6 but includes the element of increased activity from other WINEP/NEP schemes (not SUiAR-driven). This represents 10 cake pad schemes phased evenly across AMP8. This represents the number of schemes expected due to chemical P removal and CSO spill reduction. The costs of which are captured in CWW3.137

BIO5.12 *Additional Line 2; Sludge management/sludge treatment/ Bioresources cost driver - Total number of sludge treatment schemes providing sludge thickening and dewatering from increased capacity requirements relating to P/CSO WINEP/NEP drivers*

BIO5.12 replicates line BIO5.7 but includes the element of increased activity from other WINEP/NEP schemes (not SUiAR-driven). This represents 5 regional thickening/dewatering schemes phased evenly across AMP8. This represents the additional number of schemes expected due to chemical P removal and CSO spill reduction. The costs of which are captured in CWW3.131, CWW3.134, CWW3.143

BIO5.13 *Additional Line 3; Sludge management/sludge treatment/ Bioresources cost driver - Total number of sludge treatment schemes providing main sludge treatment enhancement not relating to WINEP/NEP drivers (sludge growth)*

BIO5.13 replicates line BIO5.8 but includes the element of activity from none SUiAR-driven schemes. This represents the additional digester at Five Fords, as part of the North Wales Sludge Strategy. Specifically, phase 2 of the adaptive plan; providing growth/resilience/sludge-trading possibilities, via enhanced capacity. The costs for which are captured in CWW3.162

BIO5.14 *Additional Line 4; Sludge management/sludge treatment/ Bioresources cost driver - Volume of sludge processed via thickening or dewatering from increased capacity requirements relating to P/CSO WINEP/NEP drivers.*

BIO5.14 replicates line BIO5.9 but includes the element of increased activity from other WINEP/NEP schemes (not SUIAR-driven). This represents the additional volume of thickening/dewatering capacity expected due to chemical P removal and CSO spill reduction. The costs of which are captured in CWW3.131, CWW3.134, CWW3.143. This represents an additional 10,936.40TDS/yr, converted to a volume of 47,549.57m³ @ 23% DS (9,509.913 TDS * 5) and is then phased equally over the 5 year AMP period (47,549.57m³ / 5) giving us the value of 9,509.913m³ per year that is used. 23% DS is used as it is the average % DS for all the STC's in reporting year 2022-23.

BIO5.15 *Additional Line 5; Sludge management/sludge treatment/ Bioresources cost driver - Number of Biosolids NEP Investigations*

BIO5.15 we have included these investigations in BIO5 rather than CWW20.62 "Number of WINEP/NEP investigations - survey, monitoring or simple modelling" (where they have been excluded) as they are pilot studies/trials, directly relating to sludge biosolids, rather than traditional investigations. One investigation relates to the total destruction of microplastics via pyrolysis of sludge, one relates to low temperature drying of sludge and one to capturing nutrients from sludge.

The costs are captured in CWW3.149

8. BIO6 Bioresources - NMEAV for capital enhancement schemes

General

All figures in this table are post frontier shift and real price effects.

This table reports the NMEAV for capital enhancement WINEP schemes. The table is split into 7 sections::

- i. Sludge storage -Tanks (pre-thickening, pre-dewatering or untreated); (WINEP/NEP)
- ii. Sludge storage - Tanks (thickened/dewatered or treated); (WINEP/NEP)
- iii. Sludge storage - Cake pads / bays; (WINEP/NEP) bioresources
- iv. Sludge treatment - Thickening and/or dewatering; (WINEP/NEP) bioresources
- v. Sludge treatment - Thickening and/or dewatering; (WINEP/NEP) bioresources
- vi. Sludge treatment - Other; (WINEP/NEP) bioresources
- vii. Sludge investigations and monitoring (WINEP/NEP) bioresources

The additions that are included in the table and the year on year movements are shown below:

Additions (£m) outturn	2025-26	2026-27	2027-28	2028-29	2029-30
Sludge storage -Tanks (pre-thickening, pre-dewatering or untreated);	2.251	4.488	6.752	5.799	3.689
Sludge storage - Tanks (thickened/dewatered or treated); (WINEP/NEP)	1.890	3.768	5.667	4.867	3.096
Sludge storage - Cake pads / bays; (WINEP/NEP) bioresources	3.416	3.405	3.415	3.519	3.731
Sludge treatment - Anaerobic digestion and/or advanced anaerobic digestion; (WINEP/NEP) bioresources	-	-	-	-	-
Sludge treatment - Thickening and/or dewatering; (WINEP/NEP) bioresources	1.825	3.639	5.474	4.701	2.991
Sludge treatment - Other; (WINEP/NEP) bioresources	-	-	-	-	-
Sludge investigations and monitoring (WINEP/NEP) bioresources	0.405	2.404	8.427	3.009	-
	9.786	17.703	29.735	21.895	13.507

Year on Year movements	2025-26	2026-27	2027-28	2028-29	2029-30
Additions (£m) outturn					
Sludge storage -Tanks (pre-thickening, pre-dewatering or untreated);	2.25	2.24	2.26	(0.95)	(2.11)
Sludge storage - Tanks (thickened/dewatered or treated); (WINEP/NEP)	1.89	1.88	1.90	(0.80)	(1.77)
Sludge storage - Cake pads / bays; (WINEP/NEP) bioresources	3.42	(0.01)	0.01	0.10	0.21
Sludge treatment - Anaerobic digestion and/or advanced anaerobic digestion; (WINEP/NEP) bioresources	-	-	-	-	-
Sludge treatment - Thickening and/or dewatering; (WINEP/NEP) bioresources	1.83	1.81	1.84	(0.77)	(1.71)
Sludge treatment - Other; (WINEP/NEP) bioresources	-	-	-	-	-
Sludge investigations and monitoring (WINEP/NEP) bioresources	0.41	2.00	6.02	(5.42)	(3.01)
	9.79	7.92	12.03	(7.84)	(8.39)

Further detail on the additions are included in table CWW3 for lines CWW3.131 to CWW3.152.

The table is at outturn prices and we have used the CPIH values at the end of the year i.e. 31 March to restate to outturn.

Sludge storage -Tanks (pre-thickening, pre-dewatering or untreated); (WINEP/NEP)

BIO6.1 CPIH / CPIH lagged

This reports the inflation adjustment and has been calculated by dividing the CPIH at 31 March for the report year by the equivalent CPIH values in the preceding year. The CPIH values have been taken from PD1.

BIO6.2 NMEAV (Opening)

This is a calculated cell and takes the closing balance in the preceding year and uplifting this by the CPIH/ CPIH lagged index as calculated above. The opening NMEAV for all schemes as at 1 April 2022 is zero as confirmed by Ofwat in their query response.

BIO6.3 Capex

These additions are those that have been reported in lines CWW3.131 to CWW3.152 on a post efficiency basis. The additions in CWW3 are reported in 2022-23 price base and for this table the additions have been adjusted using the 31 March CPIH values for that report year. Commentaries regarding these additions will be included in the commentary for the CWW3 tables.

BIO6.4 CCA Depreciation

This line has been calculated by using the asset lives given by our cost consultants: their asset data base and knowledge of similar schemes were used to derive this information. For sludge treatment: thickening and dewatering and sludge storage: cake pads/ bays the cost have been apportioned in accordance with the nature of the scheme based on a high-level split which have different asset lives. The depreciation has been calculated on a straight-line basis by dividing the fixed asset cost (outturn price base) by the asset lives. Any additions in the year incur 6 months depreciation charge.

BIO6.5 Disposal adjustment

There will be no disposal on these assets up to 2030.

BIO6.6 Other adjustments

There are no other adjustments reported

BIO6.7 NMEAV (Closing)

This is a formula which calculates the following : $NMEAV (Opening) + Capex - CCA \text{ depreciation} - Disposal \text{ adjustment} - Other \text{ adjustment} = NMEAV (Closing)$

Sludge storage - Tanks (thickened/dewatered or treated); (WINEP/NEP)**BIO6.8 CPIH / CPIH lagged**

This reports the inflation adjustment and has been calculated by dividing the CPIH at 31 March for the report year by the equivalent CPIH values in the preceding year. The CPIH values have been taken from PD1.

BIO6.9 NMEAV (Opening)

This is a calculated cell and takes the closing balance in the preceding year and uplifting this by the CPIH/ CPIH lagged index as calculated above. The opening NMEAV for all schemes as at 1 April 2022 is zero as confirmed by Ofwat in their query response.

BIO6.10 Capex

These additions are those that have been reported in lines CWW3.131 to CWW3.152 on a post efficiency basis. The additions in CWW3 are reported in 2022-23 price base and for this table the additions have been adjusted using the 31 March CPIH values for that report year. Commentaries regarding these additions will be included in the commentary for the CWW3 tables.

BIO6.11 CCA Depreciation

This line has been calculated by using the asset lives given by our cost consultants: their asset data base and knowledge of similar schemes were used to derive this information. For sludge treatment: thickening and dewatering and sludge storage: cake pads/ bays the cost have been apportioned in accordance with the nature of the scheme based on a high-level split which have different asset lives. The depreciation has been calculated on a straight-line basis by dividing the fixed asset cost (outturn price base) by the asset lives. Any additions in the year incur 6 months depreciation charge.

BIO6.12 *Disposal adjustment*

There will be no disposal on these assets up to 2030.

BIO6.13 *Other adjustments*

There are no other adjustments reported

BIO6.14 *NMEAV (Closing)*

This is a formula which calculates the following : NMEAV (Opening)+Capex-CCA depreciation-Disposal adjustment – Other adjustment = NMEAV (Closing)

Sludge storage - Cake pads / bays; (WINEP/NEP) bioresources**BIO6.15** *CPIH / CPIH lagged*

This reports the inflation adjustment and has been calculated by dividing the CPIH at 31 March for the report year by the equivalent CPIH values in the preceding year. The CPIH values have been taken from PD1.

BIO6.16 *NMEAV (Opening)*

This is a calculated cell and takes the closing balance in the preceding year and uplifting this by the CPIH/ CPIH lagged index as calculated above. The opening NMEAV for all schemes as at 1 April 2022 is zero as confirmed by Ofwat in their query response.

BIO6.17 *Capex*

These additions are those that have been reported in lines CWW3.131 to CWW3.152 on a post efficiency basis. The additions in CWW3 are reported in 2022-23 price base and for this table the additions have been adjusted using the 31 March CPIH values for that report year. Commentaries regarding these additions will be included in the commentary for the CWW3 tables.

BIO6.18 *CCA Depreciation*

This line has been calculated by using the asset lives given by our cost consultants: their asset data base and knowledge of similar schemes were used to derive this information. For sludge treatment: thickening and dewatering and sludge storage: cake pads/ bays the cost have been apportioned in accordance with the nature of the scheme based on a high-level split which have different asset lives. The depreciation has been calculated on a straight-line basis by dividing the fixed asset cost (outturn price base) by the asset lives. Any additions in the year incur 6 months depreciation charge.

BIO6.19 *Disposal adjustment*

There will be no disposal on these assets up to 2030.

BIO6.20 *Other adjustments*

There are no other adjustments reported

BIO6.21 *NMEAV (Closing)*

This is a formula which calculates the following : NMEAV (Opening)+Capex-CCA depreciation-Disposal adjustment – Other adjustment = NMEAV (Closing)

Sludge treatment - Anaerobic digestion and/or advanced anaerobic digestion; (WINEP/NEP) bioresources**BIO6.22** *CPIH / CPIH lagged*

This reports the inflation adjustment and has been calculated by dividing the CPIH at 31 March for the report year by the equivalent CPIH values in the preceding year. The CPIH values have been taken from PD1.

BIO6.23 *NMEAV (Opening)*

This is a calculated cell and takes the closing balance in the preceding year and uplifting this by the CPIH/ CPIH lagged index as calculated above. The opening NMEAV for all schemes as at 1 April 2022 is zero as confirmed by Ofwat in their query response.

BIO6.24 *Capex*

These additions are those that have been reported in lines CWW3.131 to CWW3.152 on a post efficiency basis. The additions in CWW3 are reported in 2022-23 price base and for this table the additions have been adjusted using the 31 March CPIH values for that report year. Commentaries regarding these additions will be included in the commentary for the CWW3 tables.

BIO6.25 *CCA Depreciation*

This line has been calculated by using the asset lives given by our cost consultants: their asset data base and knowledge of similar schemes were used to derive this information. For sludge treatment: thickening and dewatering and sludge storage: cake pads/ bays the cost have been apportioned in accordance with the nature of the scheme based on a high-level split which have different asset lives. The depreciation has been calculated on a straight-line basis by dividing the fixed asset cost (outturn price base) by the asset lives. Any additions in the year incur 6 months depreciation charge.

BIO6.26 *Disposal adjustment*

There will be no disposal on these assets up to 2030.

BIO6.27 *Other adjustments*

There are no other adjustments reported

BIO6.28 *NMEAV (Closing)*

This is a formula which calculates the following : NMEAV (Opening)+Capex-CCA depreciation-Disposal adjustment – Other adjustment = NMEAV (Closing)

Sludge treatment - Thickening and/or dewatering; (WINEP/NEP) bioresources**BIO6.29** *CPIH / CPIH lagged*

This reports the inflation adjustment and has been calculated by dividing the CPIH at 31 March for the report year by the equivalent CPIH values in the preceding year. The CPIH values have been taken from PD1.

BIO6.30 *NMEAV (Opening)*

This is a calculated cell and takes the closing balance in the preceding year and uplifting this by the CPIH/ CPIH lagged index as calculated above. The opening NMEAV for all schemes as at 1 April 2022 is zero as confirmed by Ofwat in their query response.

BIO6.31 *Capex*

These additions are those that have been reported in lines CWW3.131 to CWW3.152 on a post efficiency basis. The additions in CWW3 are reported in 2022-23 price base and for this table the additions have been adjusted using the 31 March CPIH values for that report year. Commentaries regarding these additions will be included in the commentary for the CWW3 tables.

BIO6.32 *CCA Depreciation*

This line has been calculated by using the asset lives given by our cost consultants: their asset data base and knowledge of similar schemes were used to derive this information. For sludge treatment: thickening and dewatering and sludge storage: cake pads/ bays the cost have been apportioned in accordance with the nature of the scheme based on a high-level split which have different asset lives. The depreciation has been calculated on a straight-line basis by dividing the fixed asset cost (outturn price base) by the asset lives. Any additions in the year incur 6 months depreciation charge.

BIO6.33 *Disposal adjustment*

There will be no disposal on these assets up to 2030.

BIO6.34 *Other adjustments*

There are no other adjustments reported

BIO6.35 *NMEAV (Closing)*

This is a formula which calculates the following : NMEAV (Opening)+Capex-CCA depreciation- Disposal adjustment – Other adjustment = NMEAV (Closing)

Sludge treatment - Other; (WINEP/NEP) bioresources**BIO6.36** *CPIH / CPIH lagged*

This reports the inflation adjustment and has been calculated by dividing the CPIH at 31 March for the report year by the equivalent CPIH values in the preceding year. The CPIH values have been taken from PD1.

BIO6.37 *NMEAV (Opening)*

This is a calculated cell and takes the closing balance in the preceding year and uplifting this by the CPIH/ CPIH lagged index as calculated above. The opening NMEAV for all schemes as at 1 April 2022 is zero as confirmed by Ofwat in their query response.

BIO6.38 *Capex*

These additions are those that have been reported in lines CWW3.131 to CWW3.152 on a post efficiency basis. The additions in CWW3 are reported in 2022-23 price base and for this table the additions have been adjusted using the 31 March CPIH values for that report year. Commentaries regarding these additions will be included in the commentary for the CWW3 tables.

BIO6.39 *CCA Depreciation*

This line has been calculated by using the asset lives given by our cost consultants: their asset data base and knowledge of similar schemes were used to derive this information. For sludge treatment: thickening and dewatering and sludge storage: cake pads/ bays the cost have been apportioned in accordance with the nature of the scheme based on a high-level split which have different asset lives. The depreciation has been calculated on a straight-line basis by dividing the fixed asset cost (outturn price base) by the asset lives. Any additions in the year incur 6 months depreciation charge.

BIO6.40 *Disposal adjustment*

There will be no disposal on these assets up to 2030.

BIO6.41 *Other adjustments*

There are no other adjustments reported

BIO6.42 *NMEAV (Closing)*

This is a formula which calculates the following : $NMEAV (Opening) + Capex - CCA depreciation - Disposal adjustment - Other adjustment = NMEAV (Closing)$

Sludge investigations and monitoring (WINEP/NEP) bioresources**BIO6.43** *CPIH / CPIH lagged*

This reports the inflation adjustment and has been calculated by dividing the CPIH at 31 March for the report year by the equivalent CPIH values in the preceding year. The CPIH values have been taken from PD1.

BIO6.44 *NMEAV (Opening)*

This is a calculated cell and takes the closing balance in the preceding year and uplifting this by the CPIH/ CPIH lagged index as calculated above. The opening NMEAV for all schemes as at 1 April 2022 is zero as confirmed by Ofwat in their query response.

BIO6.45 *Capex*

These additions are those that have been reported in lines CWW3.131 to CWW3.152 on a post efficiency basis. The additions in CWW3 are reported in 2022-23 price base and for this table the additions have been adjusted using the 31 March CPIH values for that report year. Commentaries regarding these additions will be included in the commentary for the CWW3 tables.

BIO6.46 *CCA Depreciation*

This line has been calculated by using the asset lives given by our cost consultants: their asset data base and knowledge of similar schemes were used to derive this information. For sludge treatment: thickening and dewatering and sludge storage: cake pads/ bays the cost have been apportioned in accordance with the nature of the scheme based on a high-level split which have different asset lives. The depreciation has been calculated on a straight-line basis by dividing the fixed asset cost (outturn price base) by the asset lives. Any additions in the year incur 6 months depreciation charge.

BIO6.47 *Disposal adjustment*

There will be no disposal on these assets up to 2030.

BIO6.48 *Other adjustments*

There are no other adjustments reported

BIO6.49 *NMEAV (Closing)*

This is a formula which calculates the following : $NMEAV (Opening) + Capex - CCA depreciation - Disposal adjustment - Other adjustment = NMEAV (Closing)$