

UUW58

# Bioresources business plan

October 2023

Chapter 8 supplementary document

Our low regrets business plan for AMP8 allows us to manage a period of unprecedented change and uncertainty in the bioresources sector, whilst keeping a close watch on the future to enable transformation of our service over the longer-term to deliver better outcomes for customers and the environment.

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# 1. Introduction to our bioresources business plan

## 1.1 Key messages

- **Our largest ever investment in the bioresources price control:** We propose to invest £979 million in AMP8 to start to transform our service, to respond to a period of unprecedented change in the bioresources sector and ensure our service is fit for the future.
- **A transformational investment programme for the future:** We are anticipating a step-change in the bioresources business model, although there is significant uncertainty over the scale and the timing of the change. Our long-term plan for bioresources identifies the need for £1.8 billion of enhancement investment expenditure over the next 25 years to meet new challenges and realise opportunities to deliver better outcomes for customers and the environment.
- **Our stretching botex plan:** Our AMP8 plan sets out to achieve an ambitious performance, without increasing the level of botex (beyond the adjustments for additional scope). We will embrace innovation and new ways of working to unlock greater social, economic and environmental value.
- **Enhanced environmental protection:** We will deliver a substantial WINEP programme to achieve significant enhancements to the natural environment across the North West, improving resilience in our agricultural recycling activities and meeting increasing regulatory controls under the Waste Framework Directive.
- **Generating additional value:** We will reduce our operational greenhouse gas emissions, recover phosphorus for the first time, and generate green energy equivalent to 19 per cent of our total electricity consumption.
- **Embracing markets to realise greater value:** We will continue to take a leadership role in the development of the bioresources market and will create an opportunity for a market solution for up to 20 per cent of our sludge treatment activity to meet rising demand.
- **Managing uncertainty:** Our AMP8 business plan is focussed on low regret interventions, where we have high certainty in the scope and the investment needed to meet new service standards. We propose a Notified item to manage the risk over uncertain future investment requirements and believe this is the right approach to best protect the interest of customers.

## 1.2 Structure

- 1.2.1 This document provides details of our AMP8 business plan for the Bioresources price control and supporting information to Chapter 8 of our business plan.
- 1.2.2 We have divided this document into the following sections:
- (a) **Section 2** provides context on the bioresources market and the transformation of environmental regulation of sludge treatment and disposal. Significant known changes, plus uncertainty over further changes in environmental regulation and the bioresources market, are important to understand as they are driving the overall direction of our AMP8 plan. We make recommendations on how the regulatory framework should adapt to respond the changing circumstances.
  - (b) **Section 3** sets out our long term strategy and ambitions. The bioresources business model will be transformed over the next 25 years. We anticipate that biosolids recycling to agriculture will reduce over time to match the growing environmental ambitions of customers and regulators. Our low regrets business plan for AMP8 is the first step on this journey.
  - (c) **Section 4** summarises our AMP8 delivery plan and the outcomes we are looking to achieve. Although overall costs are increasing we are efficiently managing the costs in our control and have identified stretching cost forecasts to ensure that we deliver a competitive service. We provide details of the efficiencies we are driving to deliver our ambitious botex plan.

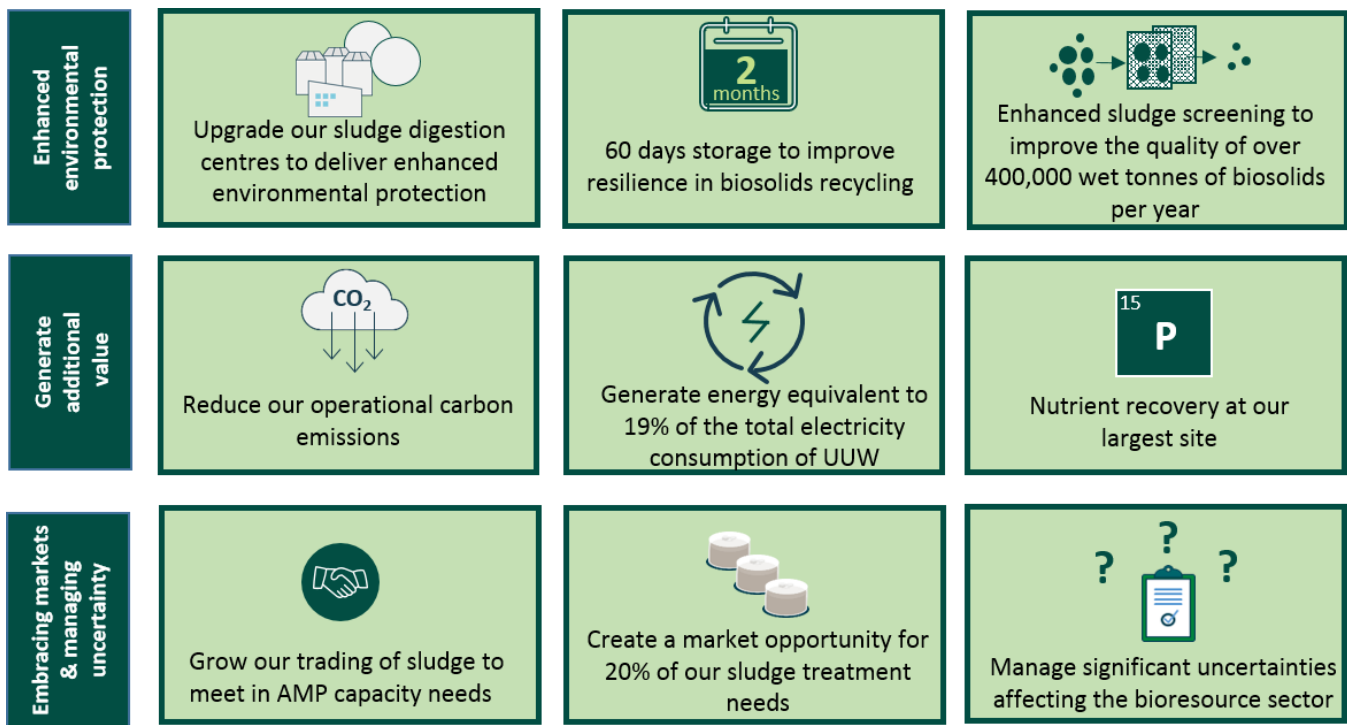
- (d) **Section 5** provides detail of how we will use innovation, markets and partnerships to support our transformation and ensure we deliver value for customers. We will take a leadership role in the development of the bioresources market and create opportunities to utilise markets to meet rising demand.
- (e) Finally, in **Section 6** we explain the risk that significant uncertainty poses to the Bioresources price control. Should confirmation or clarification of requirements occur before 2030, we will require significant additional investment above that determined through the price review process. We propose a Notified item that would trigger an interim determination (iDoK) if risks materialise in-AMP.

## 1.3 Overview

Our low regrets business plan for AMP8 allows us to manage a period of unprecedented change and uncertainty in the bioresources sector, whilst keeping a close watch on the future to enable transformation of our service over the longer-term to deliver better outcomes for customers and the environment.

- 1.3.1 The bioresources sector is experiencing a period of unprecedented change driven by environmental concerns, increased regulatory control and economic drivers. We believe that our bioresources business has reached a critical juncture and it has become apparent that our service needs to transform.
- 1.3.2 During AMP7 there have been significant challenges for our bioresources business. We experienced severe disruption to the bioresources market from the Environment Agency's revised interpretation of Farming Rules for Water, as yet unresolved cost shocks from the implementation of the Industrial Emissions Directive and publication of the Environment Agency Sludge Strategy signalling further change in the sector. These AMP7 challenges have inhibited the development of the bioresources market and are symptomatic of the need to change. It is imperative that our future planning, alongside the regulatory approach at PR24, must be sufficiently resilient and flexible to adapt to changing markets and regulation, as well as accommodating exceptional levels of uncertainty.
- 1.3.3 It is clear from our engagement with customers and stakeholders that the industry must address emergent and growing concerns regarding nutrient management, emissions and emerging contaminants. We have listened and this is driving new investment to ensure we continuously improve our service.
- 1.3.4 We have developed an ambitious and efficient long-term strategy to meet these new challenges and realise opportunities to deliver better outcomes for customers and the environment. It is our aim to ensure that sludge treatment and recycling can support the delivery of national priority outcomes including sustainable agriculture, a circular economy, net zero and efficient costs for customers.
- 1.3.5 AMP8 is the first step in our long-term transformation journey, and is focussed on delivering improvements where there is greatest certainty over the requirements. In AMP8 we will deliver low-regrets actions to ensure regulatory compliance and improve landbank resilience to sustain biosolids recycling to agriculture. Our AMP8 plan also ensures maximum flexibility by keeping multiple strategic pathways open through alignment with our Long Term Delivery Strategy (LTDS).
- 1.3.6 We propose £979 million of totex which will deliver the following outcomes in AMP8:

Figure 1: Our bioresources outcomes for AMP8



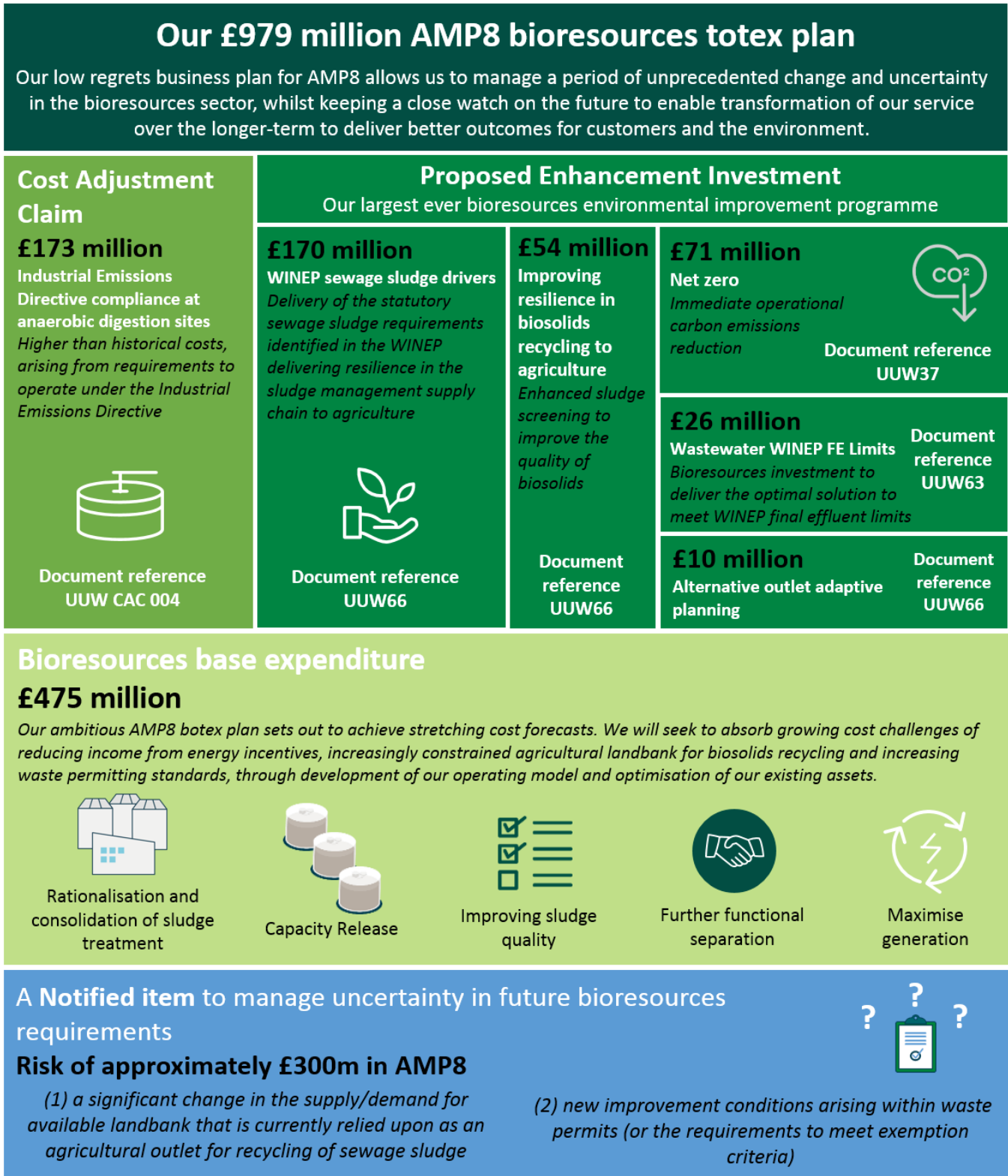
Source: United Utilities, 2023

- 1.3.7 Our AMP8 plan represents the largest ever investment in the Bioresources price control. We propose to deliver a substantial enhancement programme, delivering WINEP outcomes for the natural environment across the North West, investing to increase our service levels to meet ambitious new regulatory expectations, as well as other key priorities supported by customers including net zero ambitions. We have significantly restricted the scope of enhancement expenditure in areas of uncertainty, for instance proposing only £10.394 million preparatory work in relation to moving to alternative outlets for biosolids disposal compared with a potential £1 billion programme of work.
- 1.3.8 Although overall costs are increasing, we are efficiently managing the costs within our control to ensure that we deliver a competitive service. Our AMP8 plan sets out to achieve an ambitious performance, without increasing the level of botex (beyond the adjustments for additional scope). Stretching cost forecasts will absorb growing cost challenges from reducing income from energy incentives, increasingly constrained agricultural landbank for biosolids recycling and increasing waste permit compliance standards.
- 1.3.9 We are driving efficiencies in bioresources through improving sludge quality, rationalisation and consolidation of sludge treatment, and optimising renewable energy generation output. We will continue our journey for further functional separation between Bioresources and Wastewater Network Plus price controls to drive greater management focus to deliver efficiencies.
- 1.3.10 Market forces have the potential to help to create greater economic and environmental value within the bioresources sector. We will take a leadership role in the development of the bioresources market and create an opportunity for a market solution for up to 20 per cent of our sludge treatment activity to meet rising demand.
- 1.3.11 Innovation will be at the heart of our transformation to deliver new technologies that ensure that we embrace and realise the benefits of a more circular economy, generating higher value products that reduce our impact on the environment and deliver significant benefits to society. We have had a strong innovation performance in AMP7 and we have delivered significant value to customers and approximately, for every pound we have invested, we have successfully leveraged a further four pounds of external investment. Through innovation in areas of high uncertainty we will seek to deliver new

technologies to provide alternative treatment and disposal options to mitigate the risk of reducing agricultural outlets.

- 1.3.12 Whilst the need for change is clear, there is considerable uncertainty over the scale and timing of changes for the bioresources sector. In AMP8 we will continue our thought leadership in the sector by coordinating and collaborating with others to determine the optimal biosolids management approach for the future. In contrast to previous AMPs there is a significant risk that there will be insufficient landbank for biosolids recycling in AMP8. We have no clear way to accommodate and plan against such exceptional levels of risk within the PR24 regulatory framework.
- 1.3.13 Our AMP8 plan, underpinned by our proposed cost adjustment claim and enhancement investments, manages the highest certainty risks. However, there remains a great deal of uncertainty and there is a risk that material, additional costs may arise during the course of AMP8. The scale of the investment that would be required if risks manifest as a cost-shock fundamentally threaten the ability of the existing business to deliver the required changes in time. Through our LTDS, we identify that an adverse landbank scenario could materialise in AMP8 and if it does, this may require immediate costs of up to circa £300 million in AMP8 to divert biosolids away from agriculture, alongside commencing and committing to a further £700 million in AMP9 to deliver a resilient and long term alternative outlet for biosolids.
- 1.3.14 To proactively manage the uncertainty we propose that significant bioresources risks are recognised as Notified items that would trigger an interim determination (iDoK) if they materialise in-AMP. Unless we have the appropriate mechanisms in place to fund our current and future statutory obligations, and gain sufficient certainty to be able to invest with confidence, it will be difficult to implement the best value long-term strategy for our bioresources business. If our proposal for an uncertainty mechanism is rejected, we will need to include additional costs in our AMP8 plan.
- 1.3.15 A summary of our plan is presented in Figure 2.

Figure 2: Summary of our AMP8 Bioresources price control plan



Source: United Utilities, 2023



## 2. New challenges and opportunities in the bioresources sector means the future will be very different

- Following two decades of stability, new challenges and opportunities in the bioresources sector means the future will be very different from the past.
- There are a multitude of emerging and increasing factors of uncertain scale and timing outside of company control which are driving the need for change in the bioresources sector, and will lead to an entire step change in the bioresources business model.
- A new bioresources regulatory framework under the Waste Framework Directive coupled with reducing landbank availability will have significant implications for PR24 planning. We are planning whilst trying to manage an unprecedented level of uncertainty. Without changes to the economic regulatory framework there is a systemic risk to the capacity of the sector to provide a resilient sludge management service.
- Investment risks are not being addressed through the PR24 WINEP process and therefore must be addressed through another route at PR24.
- The lack of regulatory certainty is giving rise to significant concerns for PR24. A repeat of the AMP7 IED situation would leave the industry exposed to another material unfunded cost shock. The scale of the investment required could lead to an inability to respond to changes in regulation in sufficient time.
- We make recommendations on how the regulatory framework should adapt to respond to the changing circumstances. If our proposal for an uncertainty mechanism is rejected, we will need to include additional costs in our AMP8 plan.

### 2.1 Development of the current bioresources operating model

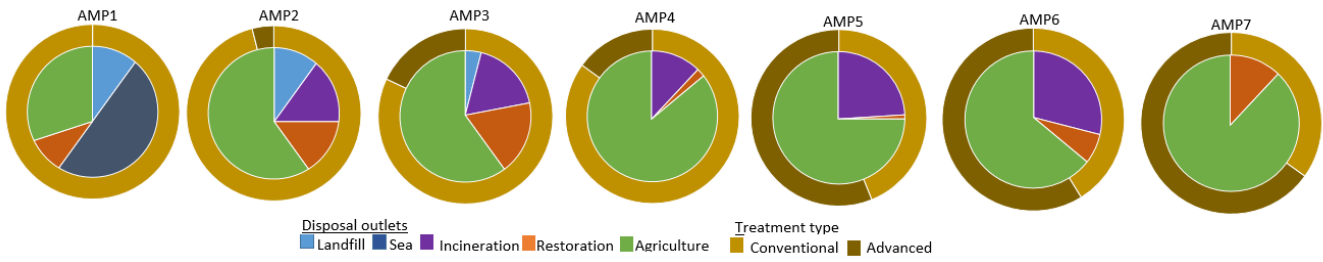
- The sector has experienced more than two decades of stability and minimal regulatory change, enabling gradual change to optimise environmental outcomes and efficiency. Advanced anaerobic digestion and recycling of biosolids to agriculture is recognised as being the best practicable environmental option for sludge management in most circumstances.

- 2.1.1 Over time, attitudes to bioresources management have shifted from being perceived as a waste disposal problem, to a growing recognition of sludge as a commodity, from which there is potential to recover valuable energy and nutrients. The water industry has increasingly invested in advanced anaerobic digestion to recover renewable energy, whilst also producing a higher quality biosolids product to recycle to agriculture. This process has many significant environmental and economic benefits; anaerobic digestion creates the opportunity to generate renewable electricity or green gas; and biosolids applied to land are a valuable source of nitrogen and phosphorus, as well as other plant nutrients and organic matter, which can provide long-term benefits to soil structure and fertility. Moreover, the recycling of biosolids to land is recognised as being the best practicable environmental option by the European Union and UK Government in most circumstances<sup>1</sup>.
- 2.1.2 We present data in Figure 3 to show how our sludge treatment and outlets have developed over time to transition to our current operating model of sludge digestion followed by sludge recycling to land. This is in line with the overall sector approach to sludge management.

<sup>1</sup> <https://assuredbiosolids.co.uk/wp-content/uploads/2019/01/Biosolids-Agric-Good-Practice-Guidance-January-2019.pdf>



Figure 3: AMP by AMP development of sludge treatment and outlets over time



Source: United Utilities, 2023

2.1.3 Development has been enabled by two decades of stability and minimal regulatory change in the bioresources sector, allowing gradual change to optimise environmental outcomes. Bioresources investment has been typically driven by efficiency, capacity or asset health needs, rather than by regulatory change, which has enabled gradual evolution to biosolids recycling to agriculture becoming the industry standard operating model. Even when confronted with the banning of sludge disposal to sea in December 1998, the industry had a clear regulatory objective and timeline that enabled companies to plan and adapt. In addition, there was strong government policy and incentives over sludge recycling to agriculture and energy recovery from anaerobic digestion facilities that provided clear government objectives for bioresources management.

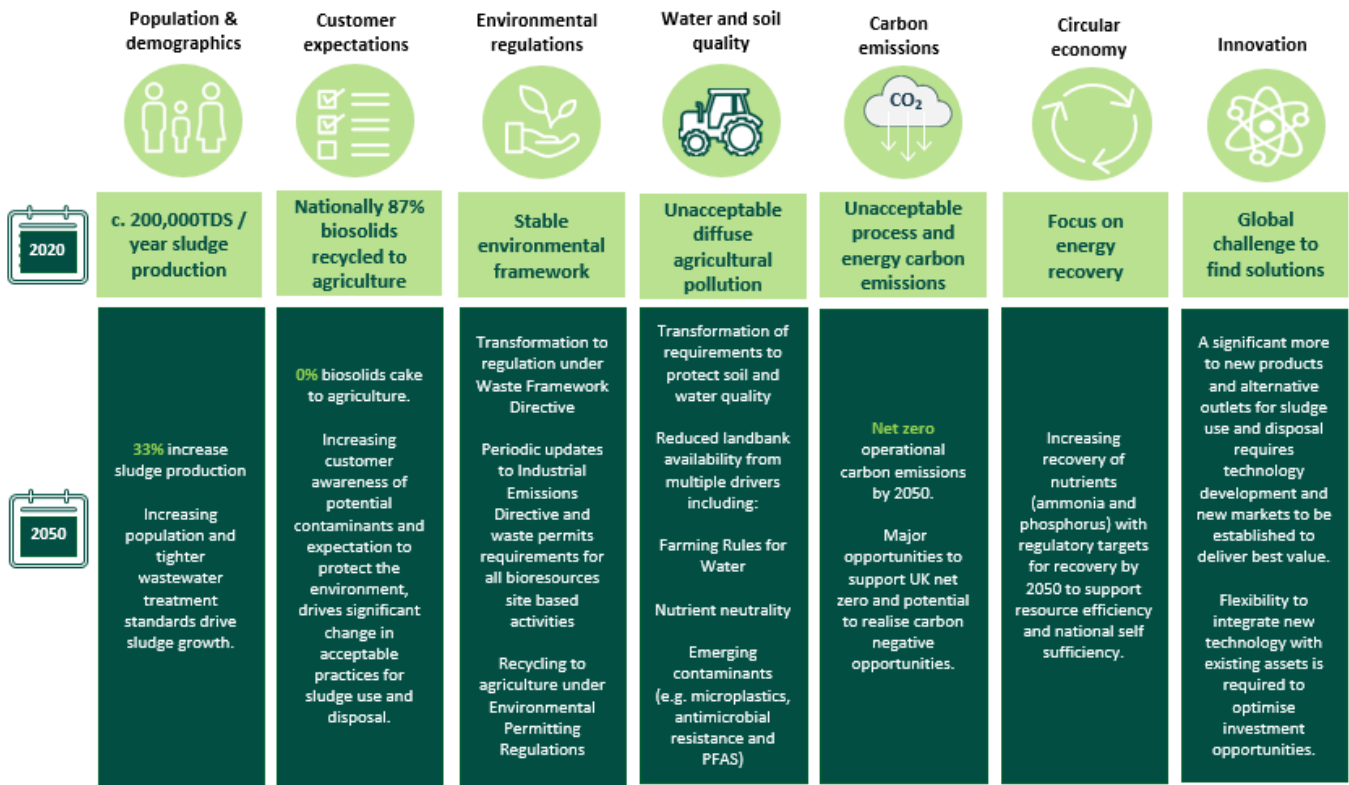
## 2.2 Factors driving the need for change in the bioresources sector

- There are a multitude of emerging and increasing factors of uncertain scale and timing outside of company control which are driving the need for change in the bioresources sector.
- The scale of potential changes represent revolution and not evolution of bioresources management and they will lead to an entire step change in the bioresources business model.

2.2.1 The scale of change and uncertainty facing the bioresources sector is greater than ever before. There are increasing challenges on our operations, outside of company control, from factors including climate change, environmental standards, market competition, sludge production and contamination. The scale of the potential change represents revolution and not evolution of bioresources management and they will lead to an entire step change in the bioresources business model. This transition must be undertaken in a planned and coordinated manner, with efficient resourcing of new regulatory requirements, to ensure delivery of a resilient and efficient sludge management service that delivers optimised environmental outcomes.

2.2.2 The key drivers for change are summarised in Figure 4.

Figure 4: Forecast changes which will impact on bioresources services over the next 25 years



Source: United Utilities, 2023

2.2.3 Taken in isolation the true impact of these drivers is not immediately evident, but when the cumulative impact of all of these changes is considered, and in combination with the ambition to develop a contestable bioresources market, it has become clear that the industry is at a critical juncture. There is now considerable uncertainty over the sustainability of biosolids recycling to agriculture and it is no longer clear if recycling to agriculture, will continue to be viewed by all stakeholders as the best practicable environmental option.

2.2.4 We consider that AMP7 has been a turning point in the evolution of the bioresources sector, as new environmental regulatory expectations on the sector have started to be revealed:

- **Transition towards regulation under the Waste Framework Directive:** Sludge treatment and biosolids recycling to agriculture activities currently benefit from two separate exemptions from the EU Waste Framework Directive. The Environment Agency intend to remove these exemptions and for these activities to be regulated under the Waste Framework Directive (see section 2.3). This is a fundamental shift away from the existing regulatory framework which has provided stability and little by the way of new requirements in 20 years.
- **Landbank availability:** In AMP7 we have seen multiple shocks to the biosolids market culminating in the Environment Agency issuing three Regulatory Position Statements (RPS) to manage disruptions in the sludge supply chain to agriculture. Historically farmer acceptance rates have been relatively consistent, bolstered by voluntary compliance with the Biosolids Assurance Scheme (BAS) and our team of highly qualified agricultural advisors who work hard to maintain good relationships with farmers. Moving forwards, uncertainty in requirements over the regulatory enforcement position of Farming Rules for Water and implementation of government nutrient neutrality ambitions has the ability to drastically and rapidly reduce the demand for our biosolids product or directly prevent biosolids recycling activity (see section 2.4).

2.2.5 These new requirements are driving additional investment requirements at PR24 as we need to improve our resilience and comply with new environmental standards. However, whilst we are starting to gain a clearer picture of some environmental expectations, there is still significant uncertainty, and no clear

regulatory roadmap for change. For instance, although we now understand the requirement for sludge treatment to be regulated under the Industrial Emissions Directive (IED), until we have permits issued, we are unable to fully predict, quantify and address the impact on our business. Other factors, like societal acceptability and increasing concern over emerging contaminants such as microplastics and persistent organic pollutants, including perfluoroalkyl and polyfluoroalkyl substances (PFAS), are even more difficult to predict, leading to significant uncertainty over both the extent of future requirements and the timing of those requirements.

## 2.3 Implications of a new regulatory framework in bioresources

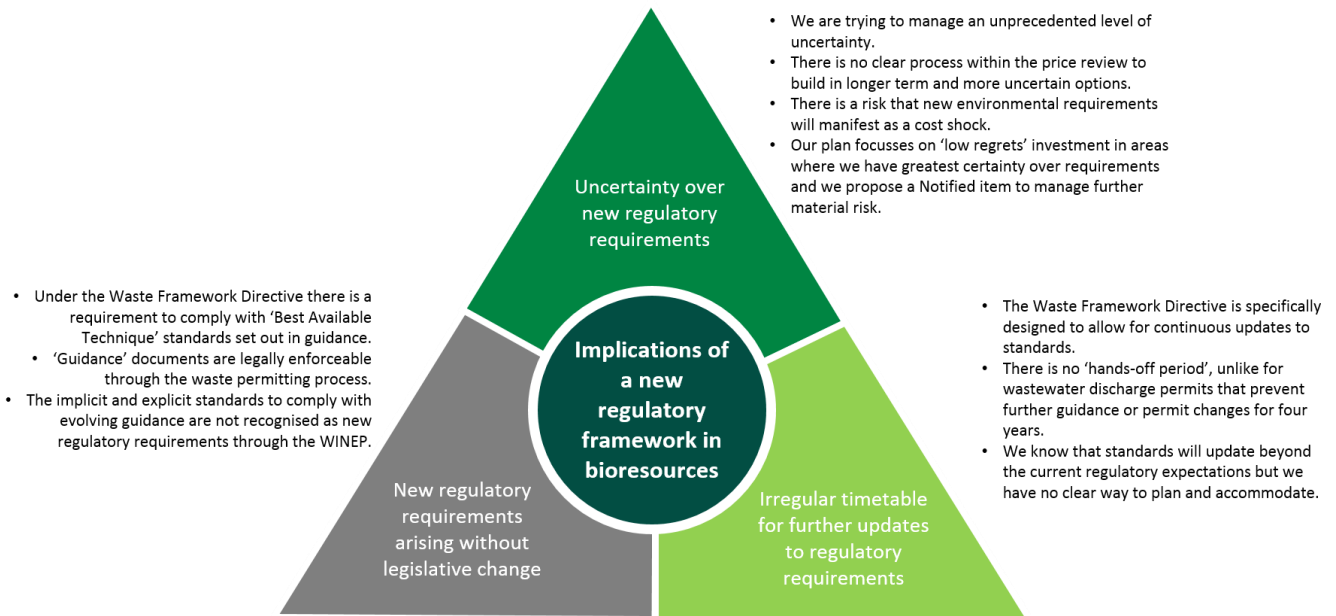
- The regulation of sludge as a waste under the Waste Framework Directive will materially impact how we plan for future price reviews.
- The new regulatory framework is leading to: (i) uncertainty over new regulatory requirements; (ii) new regulatory requirements arising without primary legislative change and (iii) an irregular timetable for further updates to regulatory requirements.
- We are undertaking PR24 planning while trying to manage an unprecedented level of uncertainty. Without changes to the economic regulatory framework there is a systemic risk to the capacity of the sector to provide a resilient sludge management service.

- 2.3.1 Historically, bioresources activities have benefited from two separate exclusions from the EU Waste Framework Directive (WFD) by virtue of:
- Regulation of sewage sludge treatment being already covered by the Urban Wastewater Treatment Directive (UWWTD) 1991.
  - The recovery of biosolids to agricultural land being controlled under the Sewage Sludge Directive as implemented through the Sludge (Use in Agriculture) Regulations (SUiAR) 1989.
- 2.3.2 There have been two recent regulatory changes that seek to withdraw these exemptions and to transition the regulation of bioresources to a waste under the Waste Framework Directive:
- **Implementation of the Industrial Emissions Directive:** In July 2019 the EA wrote to companies<sup>2</sup> to inform us that it was now implementing IED with respect to sewage sludge. This marked the first time that the IED regulations had been applied to the industry's sludge treatment activities. Implementation of IED introduces a requirement for sites to hold IED permits and increase environmental protection to meet Best Available Techniques (BAT) for waste treatment.
  - **Implementation of the EA Sludge Strategy:** The EA published a policy paper "Strategy for safe and sustainable sludge use"<sup>3</sup> (hereafter "EA Sludge Strategy") which notified the industry of their ambition to revoke SUiAR and regulate biosolids recycling within the Environmental Permitting Regulations (EPR) framework. The exact form of the EA Sludge Strategy is uncertain as it is still being developed, but it is very likely to have a significant impact on the administrative process, logistics and operations of our biosolids recycling service, and require thousands of permits each year to enable biosolids recycling.
- 2.3.3 Regulation of bioresources as a waste under the Waste Framework Directive introduces three key aspects that will materially impact how we plan for price reviews, as summarised in Figure 5:
- (i) Uncertainty over new regulatory requirements
  - (ii) New regulatory requirements arising without primary legislative change
  - (iii) Irregular timetable for further updates to regulatory requirements

<sup>2</sup> Letter from EA to water industry, *Industrial Emissions Directive*, 8 July 2019

<sup>3</sup> Environment Agency strategy for safe and sustainable sludge use, July 2020 [gov.uk/government/publications/environment-agency-strategy-for-safe-and-sustainable-sludge-use/environment-agency-strategy-for-safe-and-sustainable-sludge-use](https://www.gov.uk/government/publications/environment-agency-strategy-for-safe-and-sustainable-sludge-use/environment-agency-strategy-for-safe-and-sustainable-sludge-use)

Figure 5: Implications of regulation under the Waste Framework Directive on price review planning



Source: United Utilities, 2023

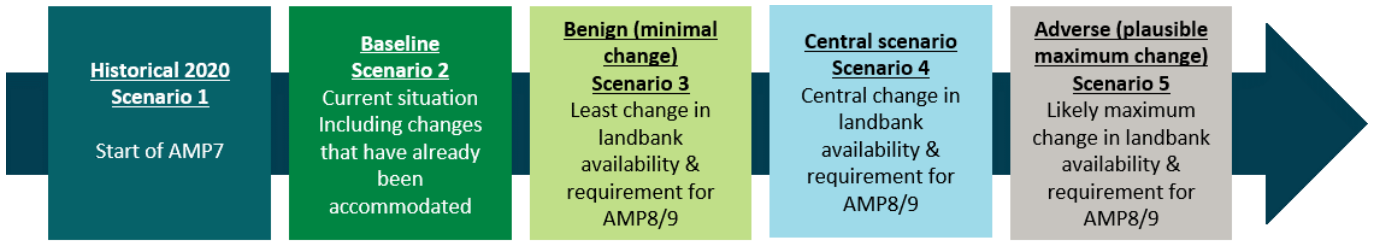
- 2.3.4 The Price Review process needs to reflect that bioresources is now regulated under a different framework to the water and wastewater price controls. It is unclear if a regulatory trigger will be recognised as a Relevant Change in Circumstance (RCC). Recent experience of the EA implementation of the Industrial Emissions Directive and the view that the very material investment required was not an RCC demonstrates the complexity of the challenge facing regulators to align environmental and economic regulatory framework mechanisms to enable the industry to secure the efficient resources to meet statutory obligations.
- 2.3.5 Without changes to the economic regulatory framework, there is a systemic risk to the capability of the industry to deliver. If we are not funded to efficiently comply with our regulatory requirements we may be unable to provide a resilient sludge management service.

## 2.4 Reducing landbank availability in AMP8

- There are very significant challenges facing the future of biosolids recycling to agricultural land in England. National modelling shows that the impact of the most likely environmental restrictions (as discussed with the EA) is insufficient agricultural land to recycle biosolids.
  - Key drivers of reducing landbank are changes in the implementation of Farming Rules for Water regulations, raw sludge growth, nutrient neutrality, and increasing public and stakeholder concerns over emerging contaminants.
- 2.4.1 There are very significant challenges facing the future of biosolids recycling to agricultural land in England, threatening the overall ability of the bioresources operating model to deliver the required changes in time. Biosolids recycling to agriculture is entirely dependent on access to third party landbank and acceptance of our products by farmers and land managers. An increasing number of factors that are outside of company control test the resilience of the supply chain of sewage sludge to agricultural land, such as; exceptional weather events preventing access to agricultural land; disease causing farmers to change their cropping plans; or regulatory or market requirements affecting land managers and the supply and demand of sludge to land.
- 2.4.2 We have undertaken both national and company landbank modelling to quantify the risk of having insufficient agricultural outlets for biosolids disposal. In Figure 6 we summarise the increasingly stringent modelling scenarios. Whilst all modelling scenarios were collaboratively agreed by the EA and

water industry, and tried to capture the full range of variables to generate accurate modelling, several key uncertainties remain that cannot be modelled or forecast, and the impact of uncertainty increases as we project further into the future.

Figure 6: Increasingly stringent modelled landbank scenarios



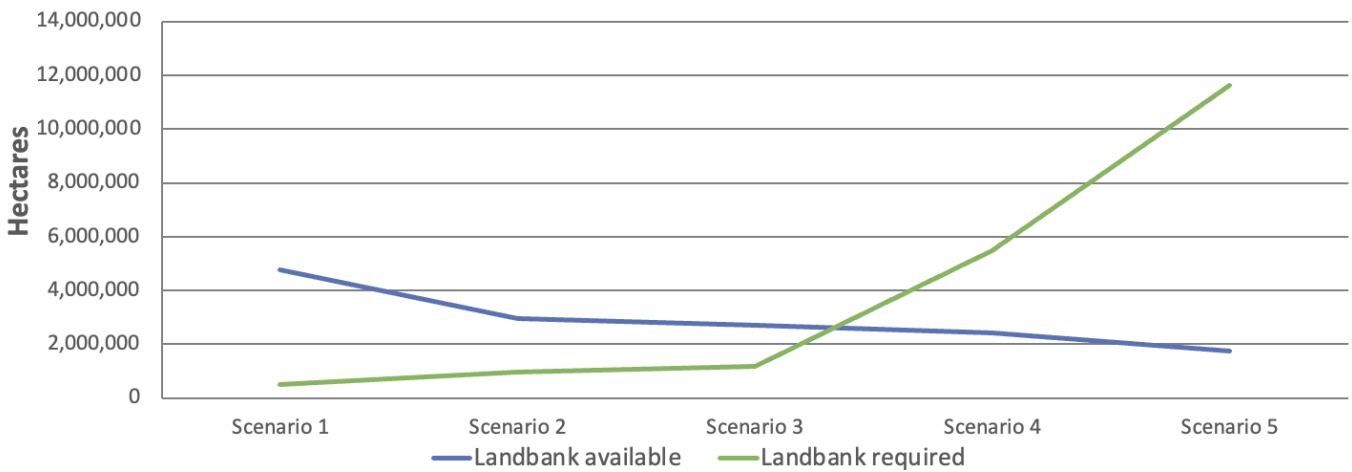
Source: United Utilities, 2023

2.4.3 Landbank availability is a balance between the following two key parameters:

- **Landbank available:** The area of agricultural land available for biosolids recycling once topography, regulatory restrictions (i.e. proximity to water courses) and competition from farmyard manures and other organic wastes is taken into account.
- **Landbank required:** This is a factor of the quantity and quality of biosolids produced, and also accounts for return rates i.e. biosolids cannot be applied to the same field year-on-year. Therefore the landbank required is greater than that area that biosolids will be applied in any one year.

2.4.4 We summarise in Figure 7 the results of the national landbank modelling<sup>4</sup>. Under all scenarios, landbank becomes progressively more difficult to access over time, and we will need to drive increasing distances, increasing our costs, to be able to continue to recycle all biosolids to land. Moreover, as available land becomes more limited, it becomes a shared resource with companies competing for landbank capacity.

Figure 7: Summary of national landbank modelling results



Source: Grieve Strategic in association with RSK ADAS, National Landbank Assessment, 2023

2.4.5 For scenarios one, two and three there is sufficient available agricultural land to recycle all national biosolids. There are ‘hotspots’ of competition (including the North West) where biosolids will have to be transported further, but biosolids recycling under these circumstances is manageable. For scenarios four and five there is a step-change and there is insufficient available agricultural land to recycle all biosolids. Under scenario four, there is only sufficient land available to accommodate the continued recycling of approximately one third of all national biosolids. Alternative treatment and/or disposal outlets will be

<sup>4</sup>Grieve Strategic and ADAS, National Landbank Study.

required for the remaining two thirds of biosolids. The scale of the risk is significant and the costs are estimated to be over £1 billion for UUW alone, and may take decades to fully implement.

### Key risks and uncertainties driving landbank restrictions

- 2.4.6 Landbank modelling shows that the impact of the most likely environmental restrictions (as discussed with the EA) is insufficient agricultural land to recycle biosolids. If the current trajectory of regulation is ultimately confirmed, there is a high likelihood that these combined issues will lead to the industry being unable to sustainably recycle biosolids to agricultural land. The drivers causing the greatest reduction in landbank availability are:
- (a) **Farming Rules for Water (FRfW):** EA enforcement of its revised and more restrictive interpretation of FRfW, rule 4(1)<sup>5</sup> is a hidden crisis facing biosolids recycling. Landbank decline is only staved off by Defra statutory guidance (June 2022<sup>6</sup>) that prevents the EA enforcing their interpretation while it is in place, but it has to be reviewed no later than September 2025. The EA believe the industry is non-compliant with FRfW, specifically that there should be no applications in the autumn (when over 70 per cent of biosolids are recycled) and there should be severe limits on phosphorus additions (on soils where 70 per cent of biosolids are recycled).
  - (b) **Sludge growth:** Raw sludge growth is being driven by population increases and more stringent wastewater final effluent standards to meet Environment Act phosphorus targets<sup>7</sup>. As well as a greater volume of sludge for disposal leading to a greater landbank requirement, we expect that more stringent phosphorus final effluent standards will lead to a doubling of phosphorus loading in biosolids over the same period, lengthening biosolids application return rates.
  - (c) **Nutrient neutrality:** The Government is under significant pressure regarding a perception of their wider inaction to prevent diffuse agricultural pollution in particular around sensitive sites (e.g. Special Protection Areas (SPAs) and Special Area of Conservation (SACs) and sensitive catchments (e.g. the River Wye). New restrictions on biosolids spreading in sensitive sites and catchments to meet government nutrient neutrality ambitions are anticipated. Designations are site specific and further sites to be designated are unknown but the cumulative impact of additional restrictions over multiple catchments could have a significant impact on national landbank availability.
  - (d) **Emerging contaminants:** The increasing public awareness and media attention around biosolids contaminants such as microplastics, antimicrobial resistance or PFAS as urgent environmental issues, increases the risk of a significant reduction in the food supply chain acceptability of biosolids recycled to agriculture. A loss of confidence in the market may be based on a perceived, rather than quantified risk, and accelerate ahead of regulation. Changing market demands are hard to forecast and this may impact with an immediate and catastrophic fall in demand for biosolids products, curtailing the sectors ability to recycle biosolids to agricultural outlets.

## 2.5 Measures to address reducing landbank availability are excluded from the PR24 WINEP

- Reducing landbank availability is not addressed through the PR24 WINEP process.
- The exclusion of the risk and the rejection of proposed actions from the WINEP process does not mean that the investment needs are spurious. Rather, it reflects that these investment actions were not eligible under

<sup>5</sup> The Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018, <https://www.legislation.gov.uk/ukxi/2018/151/made>

<sup>6</sup> Defra statutory guidance, June 2022, <https://www.gov.uk/government/publications/applying-the-farming-rules-for-water/applying-the-farming-rules-for-water>

<sup>7</sup> UK Statutory Instruments, The Environmental Targets (Water) (England) Regulations 2023, No. 93, PART3. Regulation 10: The second target in respect of water is that the load of total phosphorus discharged into freshwaters from relevant discharges is, by 31st December 2038, at least 80% lower than the baseline. Online <https://www.legislation.gov.uk/ukxi/2023/93/regulation/10/made>



the WINEP assessment criteria established by regulators. Investment needs to mitigate the landbank risk must be addressed through another route at PR24.

- The lack of certainty is giving rise to significant concerns for PR24 and a repeat of the AMP7 IED situation, whereby the industry experienced a material unfunded cost shock, although the scale this time is greater. The scale of the investment required could lead to an inability to respond to changes in regulation in time.

2.5.1 The EA has developed two new WINEP sewage sludge drivers for AMP8. The driver guidance states that:

*“A lack of access to alternative outlets or treatment technologies for sludge or ability to store sewage sludge temporarily in a compliant manner during times when agricultural land is not available demonstrates that contingency measures and long-term planning for sludge management require investment”<sup>8</sup>.*

2.5.2 We have taken a leadership role to develop an approach, collaborating with all other WaSCs and the EA, to provide further granularity over the risks and issues that the WINEP drivers are addressing, along with clarification over the scale and the timeframe they will impact. EA assessment of the industry’s proposed WINEP actions resulted in a minority of actions being approved under the sewage sludge drivers. The EA wrote to all WASCs on 22 March 2023<sup>9</sup> to justify the draft outcomes of the options assessment for the sewage sludge drivers. The EA described that the wider remit of the sewage sludge driver guidance, to address landbank accessibility, landbank availability and landbank quality issues, was set aside in favour of a “focussed approach”. The EA stated:

*“We have given an emphasis on effective storage in the sustainable supply and use of sewage sludge. This is seen as the minimum action necessary to deliver improved resilience in the sludge supply chain to agriculture and other relevant use or disposal outlets”.*

2.5.3 Subsequent discussion and follow-up meetings with all WASCs led to the EA issuing a revised, “Storage+ assessment”, in a second draft release of the WINEP. This assessment broadened the scope of actions approved under the Sewage Sludge drivers as follows:

*“It includes both storage and other actions which deliver environmental improvements of sludge quality and handling prior to storage and before supply to agriculture, such as enhanced dewatering and pelletisation. The assessment also supports in principle the options associated with future EPR requirements for the agricultural use of sludge”<sup>10</sup>.*

2.5.4 The focussed approach of the WINEP sewage sludge driver assessment means that significant landbank quality and availability risks and drivers will not be addressed by the AMP8 WINEP. The sewage sludge driver actions are based on the continued reliance of recycling of biosolids to land and there being sufficient available landbank.

2.5.5 To provide an example of the risks not covered by the sewage sludge WINEP drivers, we note that Ofwat’s final methodology specifically identifies compliance with FRfW as one of the risks to be managed through the WINEP sludge drivers. The methodology states:

*“Farming rules for water: PR24 WINEP sewage sludge driver aims at delivering improvements in the resilience of the sludge management chain. This process provides a framework for addressing risks related to the use or disposal of sewerage sludge over the 2025 to 2030 period”<sup>11</sup>.*

2.5.6 While this may have been the intention at the time the methodology was written, the subsequent “focussed assessment” of WINEP actions has meant that investment in several drivers (including FRfW) are considered by regulators to be out of scope. There is no route to support actions to meet wider

<sup>8</sup> Environment Agency, PR24 WINEP driver guidance – Sewage Sludge, V0.3 Issued by email January 2022

<sup>9</sup> Environment Agency Information Letter (EA/09/2023), Water Industry National Environment Programme - Sludge update, 22 March 2023

<sup>10</sup> Environment Agency Information Letter (EA/12/2023), Water Industry National Environment Programme - Sludge (Use in Agriculture) update, 19 May 2023

<sup>11</sup> Ofwat, Creating tomorrow, together: Our final methodology for PR24, Appendix 4: Bioresources control, December 2022 page 13 <https://www.ofwat.gov.uk/wp-content/uploads/2022/07/Appendix-4-Bioresources-control.pdf>



company obligations to mitigate landbank risk or deliver Government requirements set out in the Environment Act or Environmental Audit Committee recommendations.<sup>12</sup>

- 2.5.7 The industry is in an iniquitous position and at risk of being unable to adequately invest and adapt to meet landbank challenges. Should FRfW risks (or any others) materialise once the enforcement position is clarified in AMP8, there must be recognition of these legitimate costs through another route, outside of the WINEP.

### **The implications of FRfW uncertainty and landbank risks on our PR24 planning**

- 2.5.8 The EA currently does not see FRfW as a WINEP issue, but as a market issue (as the FRfW restriction is on the farmers that are receiving the sludge from water companies). Investment needs to meet FRfW are assumed by EA as a “to be assessed by Ofwat” resilience issue. It is important to note that EA rejection of company WINEP claims for bioresources investment is not an indication that the needs raised by companies are spurious, rather that they are not recognised as within the scope of the WINEP drivers.
- 2.5.9 We highlight that implementation of the EA Sludge Strategy will mean that FRfW will more directly apply to water companies (and therefore not just be a “market issue”). Once biosolids recycling to agriculture is required to be permitted under EPR, each and every permit application has the potential to be assessed against the EA’s latest interpretation of FRfW (and any other appropriate guidance) and company permit applications may be directly rejected on that basis. The EA does not yet recognise that this would represent a clear legal change and the industry has no route through PR24 to manage this risk. The lack of certainty with our environmental regulators is giving rise to significant concerns for PR24. A repeat of the AMP7 IED situation, would see the industry experience a material unfunded cost shock, and this current issue is an order of magnitude greater.
- 2.5.10 The risks over landbank availability, while uncertain, are significant and the bioresources sector is facing unprecedented challenges if required to find alternative outlets for up to two-thirds of biosolids nationally. The lowest cost outlet is to recycle biosolids to agricultural land. Should landbank risks materialise, the base expenditure allowance is insufficient to deliver the scale of investment that would be required to move away from biosolids recycling to agriculture (circa £1 billion for UUW alone). The impact is anticipated to be an entire step change in the business model and comprise:
- (i) Additional capital works to build alternative outlets (i.e. sludge incinerators); and
  - (ii) Significant additional operational costs to dispose of sludge to more expensive outlets (i.e. landfill) until the new outlets come in to operation. This is expected to take many years.
- 2.5.11 The PR24 price control for bioresources provides no safety net for overspend and, unlike other price controls, companies are fully exposed to additional expenditure. As landbank becomes more limited, it becomes a shared resource with companies competing for landbank capacity. This creates a first mover disadvantage for any company moving to alternative outlets at a higher cost, as this creates landbank capacity for other market participants. These compounding risks mean that without RCV protection there is no surety that investment will be recovered and this drives additional caution on any investment. That caution alongside the uncertainty of need creates inertia. Inertia could lead to an inability to respond to changes in environmental regulation, or alternatively those companies who invest first will likely lose financially.

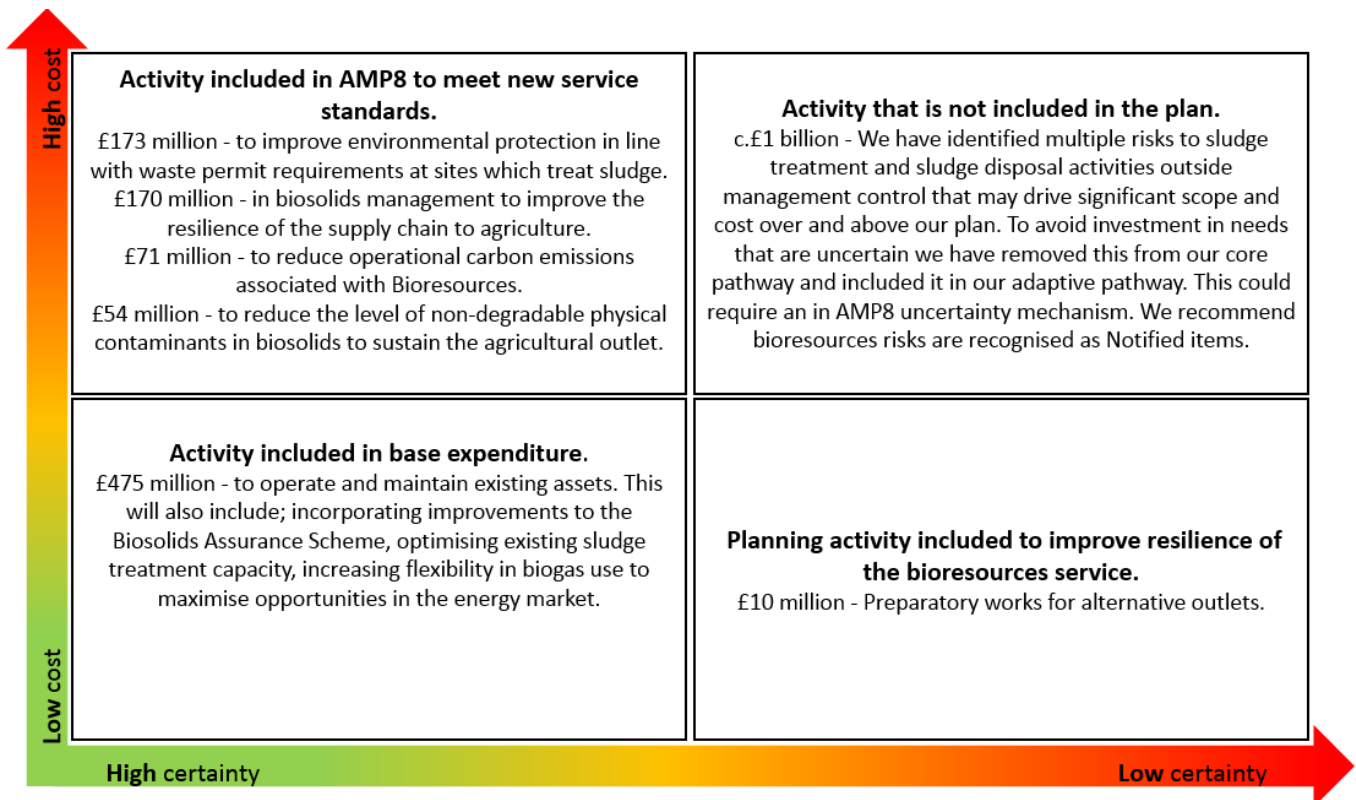
<sup>12</sup> Environmental audit committee <https://committees.parliament.uk/publications/22190/documents/164546/default/>

## 2.6 Our strategy to manage uncertainty through our business plan submission

- Our AMP8 plan is aligned with our bioresources long-term delivery strategy and prioritises low regrets actions where we have high certainty over the requirements. We have deferred low certainty activities and balanced that risk with a small investment to improve the resilience of the bioresources service.
- To invest in low certainty activities risks making investment that may not be completely required and this could be detrimental for customers. We instead seek the use of an uncertainty mechanism (Notified item) if risks materialise mid-AMP. If our proposal for an uncertainty mechanism is rejected, we will need to include additional costs in our AMP8 plan.

- 2.6.1 The scale of change and uncertainty facing the bioresources sector is greater than ever before. In order to respond to the multiple drivers for change impacting on the entirety of the sludge production line it is clear that the bioresources business model will be transformed over the next 25 years, although there remains significant uncertainty over the timing and nature of the changes.
- 2.6.2 A proactive biosolids management strategy is necessary to adapt to drivers for change and ensure that we have taken reasonable precautions and measures to ensure provision of an efficient and sustainable biosolids service. The call for action is increasing and it is imperative that we take swift and proportional action.
- 2.6.3 Figure 8 shows how we are responding to changes in the bioresource sector in our business plan submission. Our costs are increasing in AMP8 as we undertake additional activities, above our base expenditure, to ensure regulatory compliance and improve the resilience of our biosolids recycling to agriculture service. Our plan prioritises low regrets actions where we have high certainty over the requirements.

Figure 8: Managing uncertainty through our business plan submission.



Source: United Utilities, 2023

- 2.6.4 We are at significant risk of unknowable and unscaleable new regulatory requirements for the management of bioresources in AMP8. We have developed an adaptive plan that enables us to navigate through the uncertainty and make significant investment decisions at an appropriate point in time. Our bioresources LTDS is detailed in *UUW12 - Long term delivery strategy* and summarised in section 3.
- 2.6.5 We have identified through our LTDS that insufficient outlet for biosolids disposal is the most significant factor triggering deviation to alternative pathways on our adaptive plan. While there remains significant uncertainty over the scale and timing of potential landbank constraints, we have deferred significant investment to implement actions to move away from biosolids recycling to agriculture in AMP8. There is a risk that this investment may not be completely required and this could be more detrimental for customers. We instead seek use of an uncertainty mechanism (Notified item) if risks materialise mid-AMP (see section 6). If our proposal for an uncertainty mechanism is rejected, we will need to include additional costs in our AMP8 plan.
- 2.6.6 Moreover, these routes are dependent on technological development and innovation and therefore we need to accelerate planning works associated with moving to alternative outlets. Unless we undertake the critical planning activities included in our AMP8 plan, we will lose flexibility within our LTDS to adopt the pathways when required, as the implementation time will be too great if we wait to exceed a trigger to move away from biosolids recycling to land.

## 2.7 Our recommendations to support the bioresources sector

- The scale of change and uncertainty facing the bioresources sector is greater than ever before. Unless we have the appropriate mechanisms in place to fund our current and future statutory obligations, and gain sufficient certainty to be able to invest with confidence, we will struggle to implement a proactive and successful long-term strategy for our bioresources business.
  - We recommend that Ofwat supports the bioresources sector through this exceptional period through (1) development of an in-AMP uncertainty mechanism, (2) national coordination of landbank as it becomes increasingly scarce, (3) alignment of the economic and environmental regulatory boundaries, (4) review the greenhouse gas performance commitment impact on the bioresources market.
- 2.7.1 We are at significant risk of unknowable and unscaleable new regulatory requirements for the management of bioresources in AMP8. These relate in particular to the regulatory management of sludge as a waste under the Waste Framework Directive with wide reaching implications including:
- New and progressively increasingly onerous requirements emerging through permitting of sludge treatment and disposal activities, as these transition to being regulated under the Waste Framework Directive; and,
  - Restrictions on landbank availability which have the potential to lead to a shortfall in landbank for up to two-thirds of biosolids nationally. The potential for AMP8 enforcement of the more restrictive EA interpretation of FRfW, rule 4(1) is a hidden crisis to biosolids recycling. Landbank decline is only staved off by Defra statutory guidance (June 2022) that prevents the EA enforcing their interpretation while it is in place, but it has to be reviewed no later than September 2025.
- 2.7.2 Our AMP8 plan has prioritised low regrets investment where we have high certainty over the requirements. However, this leaves considerable risk that uncertainties will crystallise, or new investment requirements will emerge in AMP8 that manifest as cost-shocks to the bioresources business. The scale of the investment that could be required (for instance circa £1 billion to exit landbank) fundamentally threatens the ability of the bioresources business to respond in time.
- 2.7.3 We note within Ofwat's final methodology that there remains scepticism over the need for the adaptive planning framework to address risks regarding the use or disposal of sludge. However, unless we have the appropriate mechanisms in place to fund our current and future statutory obligations, and gain

sufficient certainty to be able to invest with confidence, the industry will struggle to implement a proactive and successful long-term strategy for the bioresources business.

2.7.4 In Table 1 we detail the following key recommendations to address uncertainty and support the evolution of the bioresources sector in AMP8:

- (i) In-AMP uncertainty mechanism
- (ii) National coordination of landbank
- (iii) Alignment of the economic and environmental regulatory boundaries

2.7.5 We believe these asks are critical to support the development of the Bioresources market, maximise the value recovered from sludge whilst minimising harm, and to ensure efficient investment for customers over the long term.

**Table 1: Our recommendations for the future economic regulation of the bioresources sector**

Recommendation	Justification
In-AMP uncertainty mechanism	In the absence of certainty and planned alignment between the environmental and economic regulatory frameworks we request that uncertainties impacting the bioresources price control are recognised as Notified items that would trigger an interim determination (iDoK) if risks materialise in-AMP. Further details are provided in section 6.
National coordination of Landbank	To date, surplus of landbank enables sustainable biosolids recycling to agriculture as the established bioresources operating model and all companies have been able to find sufficient agricultural landbank within a reasonable distance of sludge treatment centres. As landbank is predicted to become a finite resource we believe there should be a co-ordinated industry approach to the landbank challenge. This could take various forms including a shared and proportionate allocation of landbank per company through to the development of a strategic planning framework and a vehicle for oversight in a similar way to the Regulators' Alliance for Progressing Infrastructure Development (RAPID). The requirement for substantial incineration or advanced thermal treatment technology would be nationally significant infrastructure that requires considered and co-ordinated preparation and planning.
Alignment of the economic and environmental regulatory boundaries	The environmental regulatory boundary for sludge is not aligned to the economic regulatory boundary for bioresources. This leads to some sludge assets being accounted for in wastewater network plus and some in the bioresources price control. The Waste Framework Directive is driving site specific permitting and higher costs for sludge treatment. As the future costs will be significantly greater than historic costs, the significance of the misalignment will increase over time. In order to maintain a level playing field for the bioresources market we consider it important to ensure comparability between company activities and the current position of the boundary will make that very difficult to do.  A review of the price control boundary is recommended to provide greater alignment between the environmental and economic regulatory frameworks. We discuss further in section 4.7 the implications of new investment in the Bioresources price control in AMP8 to meet statutory WINEP obligations in the Wastewater Network Plus price control.
Review of the greenhouse gas performance commitment impact on the bioresources market	We would welcome a review of the greenhouse gas performance commitment with Ofwat in the spirit of effective regulation that supports the most sustainable long term solutions for society. We believe that in the Bioresources price control the greenhouse gas performance commitment is negatively distorting existing energy and carbon markets, and is over valuing greenhouse gas reductions for water companies in the short term against longer term reductions in areas of the economy which are the hardest to decarbonise.

Source: United Utilities, 2023

### 3. Our long-term strategy and ambition

- **A transformational investment programme for the future:** Our long-term plan for bioresources identifies the need for £1.8 billion of enhancement expenditure over the next 25 years. We are anticipating a step-change in the bioresources business model, although there is significant uncertainty over the scale and the timing of the change.
- **Managing significant uncertainty:** The uncertainty over the future availability of landbank for biosolids recycling means an adaptive plan is critical. The scale of change required, if landbank is no longer available, will take multiple AMPs to put in place the solutions to provide guaranteed alternative outlets. We have prioritised low regrets investment where we have high certainty over the requirements. However, if regulators require an immediate (AMP8) move away from recycling biosolids to land (a deviation from our core pathway) this may require immediate costs of up to circa £300 million in AMP8 to divert biosolids away from agriculture, alongside commencing and committing to a further £700 million in AMP9 to deliver a resilient and long term alternative outlet for biosolids.
- **Ensuring a resilient sludge treatment and disposal service:** AMP7 has seen multiple shocks to the biosolids market and we will deliver agreed WINEP investment of £169.965 million in AMP8 to improve the resilience of our biosolids recycling service. The risk of losing the sludge recycling outlet to land is increasing, requiring acceleration of investment aligned with our core pathway.
- **Providing additional sludge treatment capacity:** Population growth and increasing standards of wastewater treatment are leading to increasing raw sludge production, forecasted to be 33 per cent over the next 25 years. We anticipate needing to create 83,000 tonnes additional sludge treatment capacity over this period and we will utilise markets for delivery where they provide best value.
- **Maximise recovery of value from bioresources:** Our long term vision is for our sludge treatment centres to become 'bio-refineries' (resource recovery hubs), where a multitude of products are recovered from sewage sludge across an integrated wastewater and sludge production line. We identify the need to build open collaboration with partners to innovate and accelerate new technologies for deployment and ensure that we unlock the full potential value of bioresources.
- **Protecting the environment through a phased reduction in reliance on the agricultural landbank:** We will improve landbank resilience through a phased transition out of biosolids recycling to agriculture by 2050 to match the growing environmental ambitions of customers and regulators. We seek £10.394 million enhancement investment to undertake preparatory works for uncertain and long term options for biosolids disposal aligned with our LTDS.
- **Customer preferences have informed our long-term strategy and ambitions:** Health and environmental concerns are at the heart of customers' priorities and there was a clear consensus around not waiting for problems to occur. We have prioritised investment for enhanced sludge screening to directly address customers concerns by going over and above industry best practice.

#### 3.1 Our ambition for bioresource services in the North West

- 3.1.1 This section summarises our bioresources LTDS, which is presented in full in *UUW12 - Long term delivery strategy*.
- 3.1.2 We are committed to providing efficient, effective and resilient bioresource services. We are the custodians of over 200,000 tonnes of sludge a year and it is our responsibility to ensure that we continue to develop and maximise the value created through recovery and re-use of this valuable resource.

3.1.3 With the combination of drivers for change discussed in section 2.2 it has now become clear that we need to start to transform our service. Innovation will be at the heart of our transformation to deliver new technologies to ensure that we embrace and realise the benefits of a more circular economy, generating higher value products that reduce our impact on the environment and deliver significant benefits to society.

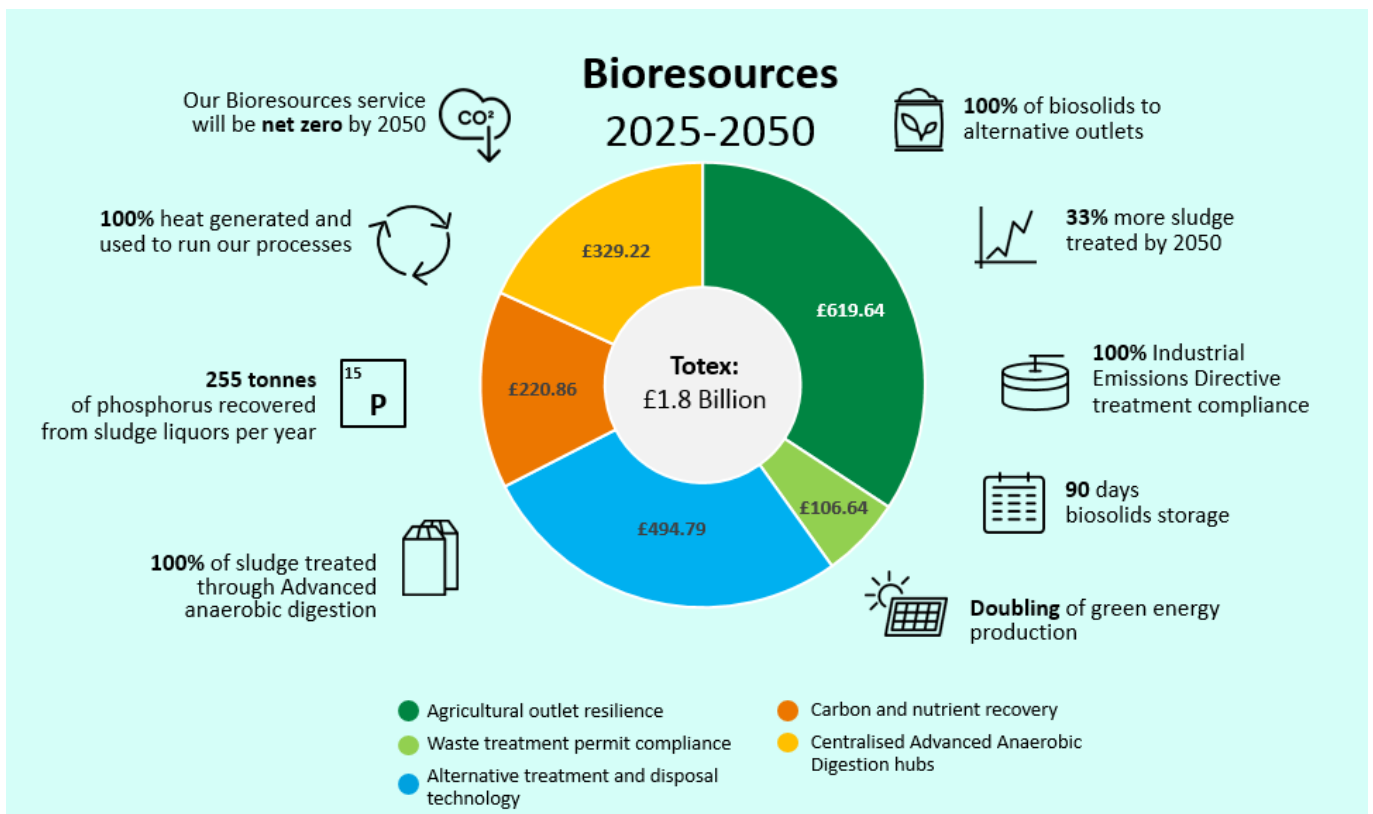
3.1.4 Our bioresources ambitions for 2050 are to:

- **Enhance the resilience of our sludge management service:** We will improve resilience and seek a phased reduction in reliance on landbank by 2050 to match the growing environmental ambitions of customers and regulators.
- **Protect, restore and improve the natural environment of the North West:** We will work with others to understand the potential risks from emerging contaminants such as PFAS and microplastics and play our part to deliver government objectives set out in the Environment Act to ‘manage soils sustainably’ by 2030.
- **Waste nothing and continue to develop and maximise the value recovered from bioresources:** Maximising resource productivity will allow us to support a zero-waste economy and improve the sustainability of our activities, while adding wider value to society.
- **Progressively reduce our greenhouse gas emissions:** Successful management of our bioresources business aims to deliver beyond net zero to create ‘carbon negative’ works, capturing and utilising greenhouse gases in innovative forms and products.

3.1.5 To deliver these ambitions the bioresources operating model will change, enabling sludge treatment centres of the future to become bio-refineries. We envision fewer, but larger scale treatment centres that will generate sufficient economies of scale to recover and capture value at every stage of an integrated wastewater and bioresources production line. We strive to work in partnership with the wider community and industrial and academic partners to develop new products and new markets.

3.1.6 Our ambitious outcomes to be delivered through our LTDS are summarised in Figure 9.

Figure 9: Bioresource 2050 business model

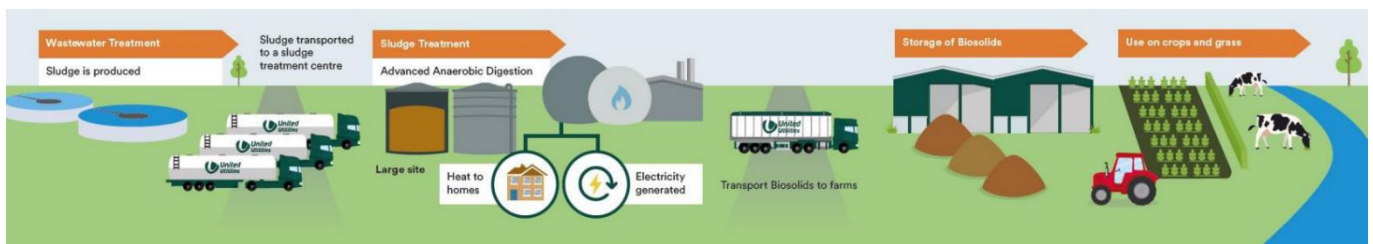




## 3.2 Our core pathway to deliver our bioresources ambition

- 3.2.1 In order to respond to the multiple drivers for change impacting on the entirety of the sludge production line, it is clear that the bioresources business model will be transformed over the next 25 years. We anticipate that biosolids recycling to agriculture will reduce over time to match the growing environmental ambitions of customers and regulators, although there remains significant uncertainty over the timing and scale of the change.
- 3.2.2 The core pathway for bioresources will allow us to deliver a progressive transformation in our capability to maximise the value recovered from sludge. We present the end-to-end sludge treatment and recycling process under the bioresources core pathway in Figure 10. This approach aligns to the best practicable environmental option for biosolids management in the UK, in most circumstances.

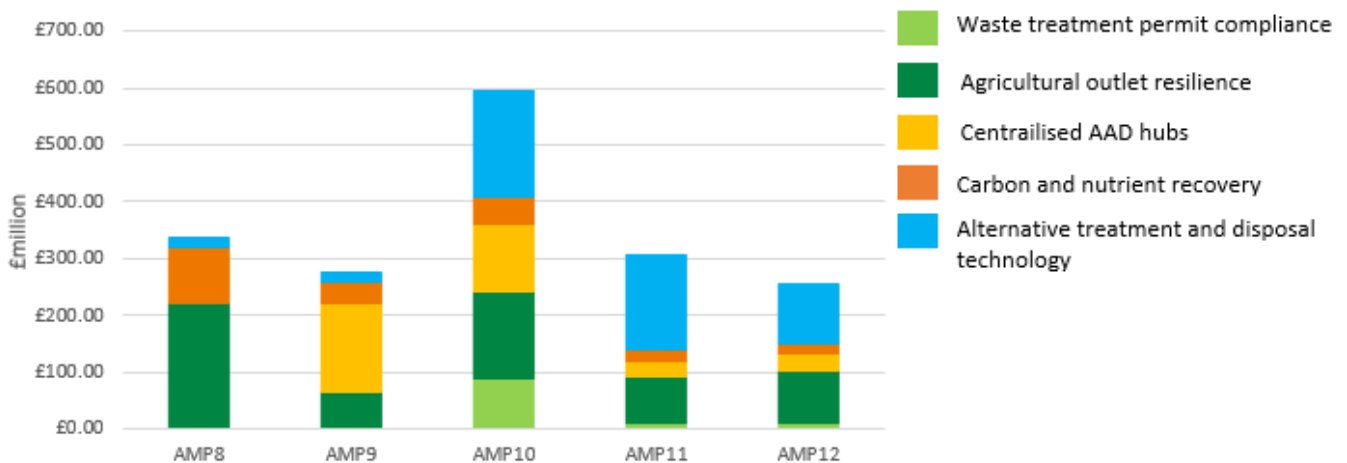
**Figure 10: Representation of the bioresources core pathway**



Source: DJS Research on behalf of United Utilities, Bioresources pathways customer research, October 2022

- 3.2.3 The bioresources core asset pathway, for Advanced Anaerobic Digestion (AAD) and biosolids recycling to agriculture, is a continuation of our approach for AMP7. It has three key overarching principles:
- Centralise sludge treatment into fewer, larger AAD hubs**: In addition to reducing the reliance on landbank, AAD supports the recovery of calorific and nutrient value, allowing renewable energy generation through green gas and producing a fossil free fertiliser alternative, supporting circular economy principles. The centralisation to AAD hubs becomes more important as the economies of scale provided by these large Digestion treatment centres provide the platform to generate greater value from recovering more biogas in the short term and subsequently bolt-on technologies and transition to any plausible adaptive pathway end point.
  - Increase resilience against sludge supply chain disruption**: A series of shocks and disruptions to the biosolids market in AMP7, combined with limited access to alternative outlets for biosolids disposal in the event of disruption, make it clear that we need to provide a greater level of resilience. We plan to provide increased flexibility and agility of the sludge asset base to allow operations to continue during closed periods for agricultural recycling.
  - Phased reduction in reliance on agricultural landbank over the longer-term**: An increasing number of factors that are out of company control threaten the availability of landbank for biosolids recycling. Whilst our core pathway is to continue to recycle biosolids to land we will ensure maximum flexibility by keeping multiple strategic pathways open. We seek a phased reduction in reliance on landbank by 2050 to match the growing environmental ambitions of customers and regulators.
- 3.2.4 We present in Figure 11 a summary of our forecast enhancement expenditure aligned with our core pathway by expenditure type. This marks a step change in our bioresources business, which historically has required limited enhancement expenditure.



**Figure 11: Our core pathway of enhancement investment to 2050, by expenditure type**

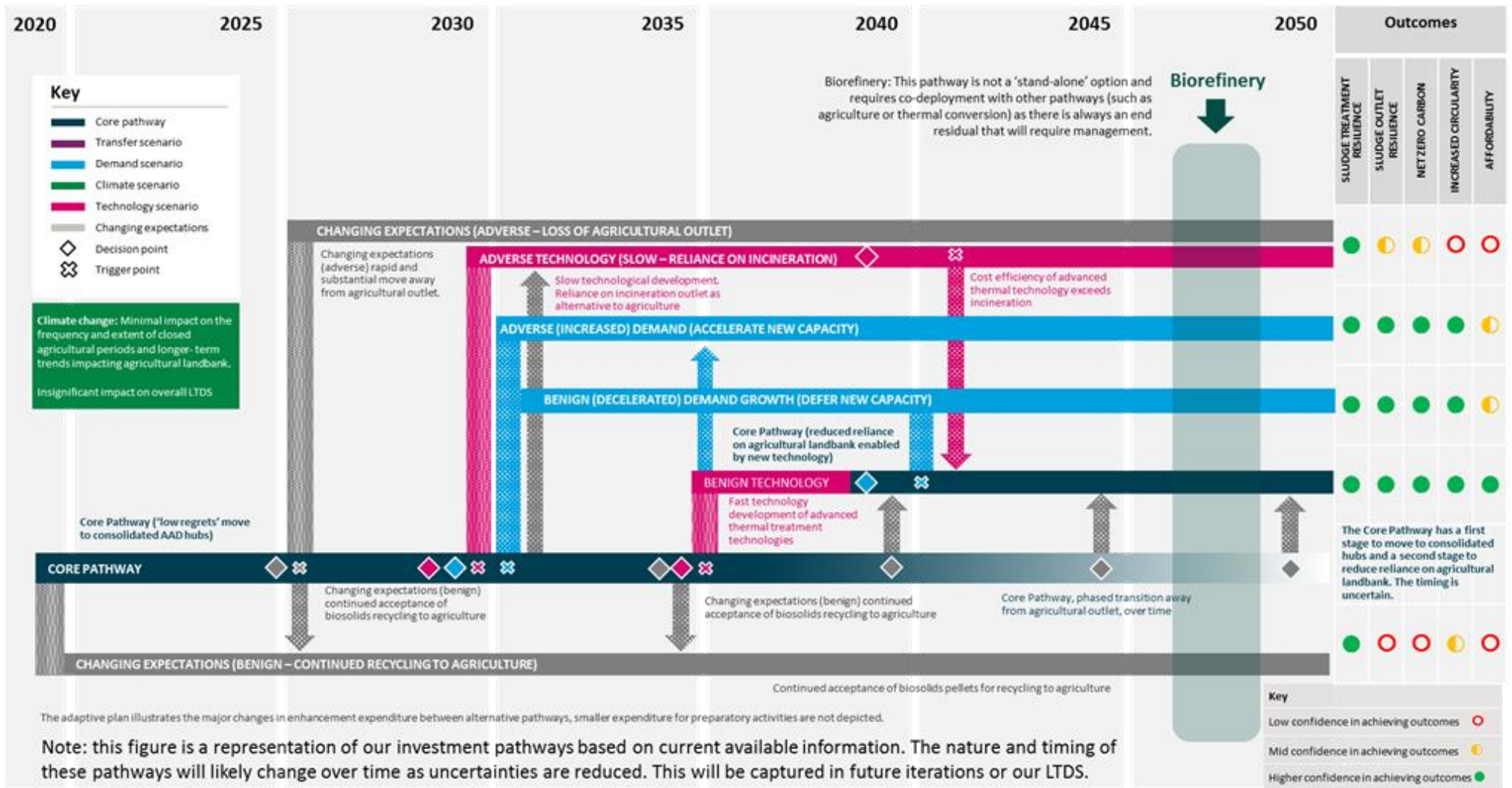
Source: United Utilities, 2023

- 3.2.5 We have developed our regional, integrated package of core pathway enhancement interventions through the use of our strategic planning tool, Regional Integrated Asset Plan (RIAP). Strategic planning capability is central to our asset strategy over the next 25 years and enables us to understand and optimise the carbon footprint, capital and operational costs of planned actions, across the entire bioresources system to ensure optimal outcomes and efficient delivery.
- 3.2.6 Our core pathway was developed by stress testing against the Ofwat Common Reference Scenarios and our bespoke 'Changing Expectations scenario' (to consider the impact of increasing customer and stakeholder expectations for the sustainable treatment and disposal of sewage sludge). We note that Ofwat's methodology does not consider that the LTDS should be used to forecast regulatory change. We consider that significant landbank risks, such as regulatory enforcement of Farming Rules for Water, are significant regulatory issues that should be incorporated through our LTDS. These regulations do not impact directly on water companies but manifest as a market issue, as such the impacts of regulatory change for bioresources are considered within the 'Changing Expectations' scenario.
- 3.2.7 Our core pathway delivers against all benign scenario outcomes, however, the level of enhancement investment does not deliver against more adverse demand, technology or 'Changing Expectations' scenarios. In all these cases, additional enhancement investment would be required, aligned to an alternative pathways on our adaptive plan.
- 3.2.8 We note that the most significant risk driving additional investment on our core pathways is an adverse 'Changing Expectations' scenario. This is also the only scenario that leads to failure of our core pathway in AMP8. Should this scenario materialise we would need a mechanism in-AMP to seek additional investment to adapt to changing circumstances.

### 3.3 Our alternative pathways for bioresources

- 3.3.1 Notwithstanding its suitability under a wide range of scenarios, the bioresources core pathway will not deliver our stretching ambitions in all scenarios. Scenario testing has informed our alternative pathways in our adaptive plan, as shown in Figure 12.
- 3.3.2 The figure shows the core pathway in two phases, the first phase is a move to advanced digestion hubs and the second phase is a reduced reliance on agricultural landbank enabled by new technology. Adverse and benign scenarios for demand, technology and changing expectations are illustrated as movements that branch away from the core pathway.

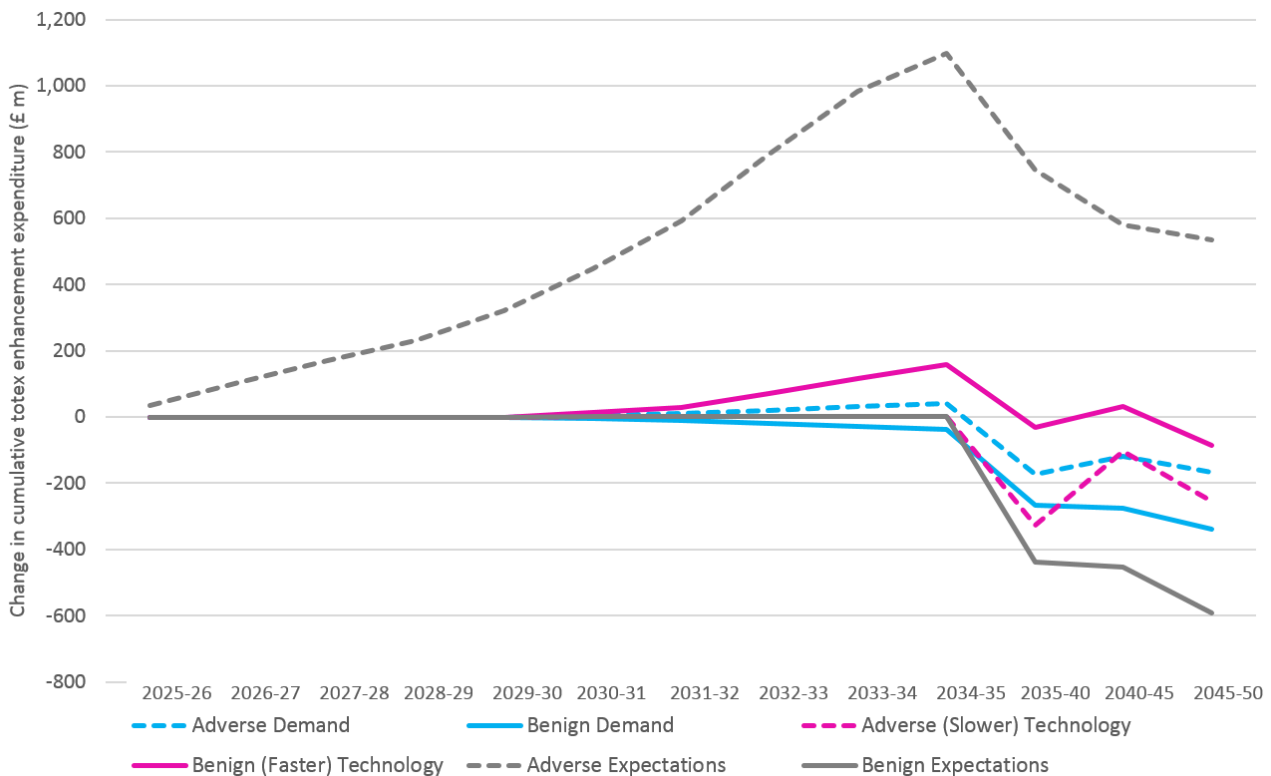
Figure 12: Bioresources adaptive plan



Source: United Utilities, 2023

- 3.3.3 Landbank availability, as considered under the changing expectations alternative pathways, is the most significant factor driving additional investment in the Bioresources LTDS. We have identified three pathways for biosolids disposal (in addition to our core pathway of biosolids recycling to agriculture):
- (i) **AAD and incineration** - Combustion of sewage sludge to remove any requirement for recycling to land. The resulting ash can be recovered in construction or disposal to landfill. The long-term strategy for bioresources in England warns against use of short term, inflexible incineration solutions as an alternative to agricultural outlets as these will not increase the value recovered from bioresources.
  - (ii) **AAD and advanced thermal technologies** – A group of technologies including pyrolysis and gasification to convert sewage sludge feedstocks using high temperatures into outputs such as chars, oils and syngas. Outputs may be disposed of, used for energy generation or recovered and re-used in wider industrial markets. These are novel technologies not deployed at scale in the UK and there is a need for further work to assess feasibility and (if appropriate) accelerate deployment.
  - (iii) **Biorefinery** – A resource recovery hub whereby a multitude of products may be recovered from sewage sludge feedstocks. This pathway is not a ‘standalone’ option and requires co-deployment with other pathways (such as sustaining agriculture or advanced thermal technologies) as there is always an end residual that requires disposal via another route. The pathway is currently limited by technology readiness to deploy and the maturity of markets, specifications, regulations and potentially societal acceptance of outputs / products.
- 3.3.4 All alternative options for biosolids disposal require large-scale investment of circa £1 billion and will take multiple AMPs to deliver. A move to any of these alternative outlets represents an entire step-change in the bioresources business model.
- 3.3.5 The cumulative expenditure to 2050 for all pathways is shown in Figure 13. This is our current best estimate and will change as uncertainties are better understood and choices evolve. This shows that the changing expectations adverse scenario is significantly more expensive than other pathways and that the greatest variance in investment is in AMP8 and AMP9 as we rapidly transition to alternative outlets.

Figure 13: Cumulative changes in expenditure from core pathway



- 3.3.6 Through our core pathway we plan for a gradual transition away from biosolids recycling to agriculture, enabled by technological development. This moves to a bioresources operating model of AAD and advanced thermal technologies. The pathway potentially delivers greater environment benefits than incineration, however, it requires technological development to prove benefits at scale. Therefore, it is more appropriate to deploy over a longer term and phased transition from biosolids recycling to agriculture. Following a period of development, we then expect this pathway to take a minimum of ten years to implement.
- 3.3.7 Under the adverse changing expectations pathway we have insufficient time to adapt to loss of the agricultural outlet. In AMP8 costs will significantly increase to deliver enhancement investment for additional capital works to build alternative outlets (i.e. sludge incinerators) and well as additional operational costs to dispose of sludge to more expensive outlets (i.e. landfill) until the new outlets come in to operation. Given the short timescales for implementation, this pathway utilises conventional incineration technology. This pathway uses established technologies, however, given the scale of transformation required and timescales for moving to an incineration outlet we would expect this to take a minimum of ten years.
- 3.3.8 If we reach a decision point in our plan which puts us onto one of our defined alternative pathways and this requires additional investment, we will discuss the implications of this with regulators. The lowest cost outlet is to recycle biosolids to agricultural land. Should landbank risks materialise mid-AMP, base expenditure is insufficient to deliver the scale of investment that would be required to move away from biosolids recycling to agriculture (circa £1 billion for UUW alone).

## 3.4 Developing the plan with customers

- 3.4.1 It is important that customers' opinions are fed into our decision-making process over how to manage bioresources services in future, and so we have established customer preferences over options set out within the bioresources LTDS. The research has informed both our long-term strategy and our AMP8 plan, which is the first step on this journey.
- 3.4.2 Bioresources Pathways Customer Research was undertaken in September 2022, which conducted five, three-hour deliberative workshops with a total of 60 current household customers and 12 'future bill payers', held at various locations across the North West. The research was structured to build customers' knowledge of the topic area and introduce the sludge treatment process, net zero and the environmental impacts of bioresources. Once this foundation of knowledge had been established, the conversation turned specifically to the future pathways open to UUW. The purpose of this second section was to understand customers' preferences and priorities in relation to these pathways and to establish which pathway(s) are most acceptable to them.
- 3.4.3 Prioritisation was based on high-level considerations, for example the importance of reducing greenhouse gas emissions, in comparison to protecting watercourses, rather than specifics of costs and emissions volumes for each pathway. The workshops were designed to ensure customers were able to provide meaningful feedback on each of the pathways, with visual demonstrations and subject matter experts attending to answer any customer questions.
- 3.4.4 The research concluded that health and environmental concerns are at the heart of customers' priorities. Customer priorities, as summarised in Figure 14, are for a bioresources service that provides reliable sludge treatment in a way that limits its impact on human health, greenhouse gas emissions, and on water quality. For most, these are the non-negotiable responsibility of UU. Tier two priorities are

important but just not as important as human health and pollution. Least important are the Tier three priorities as customers are too distant from these for them to be a priority.

**Figure 14: Priority outcomes for customers regarding bioresources management**

Tier 1 (most important)	Tier 2 (less important)	Tier 3 (not very important)
Harm to human health	Impact on bill	Trucks on the road
Carbon emissions	Quantity of biogas produced	Lack of market for product
Microplastics/heavy metals	Benefit to farmers	Size of site
River pollution	Process energy use	On-farm storage
Food chain contamination	Useable on grass (for cows)	Untested technology

Positive aspects labelled in green, negative aspects in orange

Source: DJS Research on behalf of United Utilities, Bioresources pathways customer research, October 2022

- 3.4.5 Our LTDS has been developed utilising feedback from customers over their preferred routes for biosolids recycling. The foundation of all our pathways on our LTDS, AAD and consolidation to hubs, was seen by customers as the favoured sludge treatment process when compared to AD. AD was viewed as a lesser technology due to its lower gas yield, higher carbon footprint and limited versatility as a product to agriculture. Most customers understood that AAD treatment was needed before any of the alternative pathways to be most efficient.
- 3.4.6 Of all the alternative pathways discussed, the AAD and advanced thermal technologies with heat recovery pathway was customers’ preferred pathway option. This technology choice has been used as the basis for the assumptions for investment on our core pathway. Customers were positive that this pathway presented the most ‘balanced’ option, appealing to customers’ priorities for a pathway that protects farmland and rivers from contamination and makes efficient use of the biogas generated. Customers cited the fact that the technology showed fewer ‘extremes’, making it an ‘optimum’ middle path while simultaneously tapping into their core priorities.
- 3.4.7 In contrast, the alternative pathway, AAD plus incineration had muted support from customers. Customers had significant concerns over greenhouse gas emissions and local air quality and was viewed as “a massive step backwards... from recycling” (Customer, from Trafford Workshop). As such, use of incineration would only be our preferred alternative pathway to sludge recycling to land, in the event of a rapid transition away from landbank, whereby this is the only feasible option to deliver a reliable Bioresources service.
- 3.4.8 There was a clear consensus around not waiting for problems to occur and instead, to plan and invest now in additional capacity and functionality so that if and when problems occur, we are in the best position to deal with those problems. Through our ambitious AMP8 plan we seek to deliver no regrets investment aligned with this philosophy. Moreover we have prioritised investment for enhanced sludge screening to directly address customers concerns by going over and above industry best practice.
- 3.4.9 We have undertaken specific customer research to develop a better understanding of customer’s opinions on our proposed enhanced investment to improve the quality of biosolids recycled to agriculture. The research demonstrated strong support for implementation of enhanced sludge screening technology and furthermore, customers see the maximum predicted bill impact of £1.66 as an acceptable price to pay for the implementation of the technology.



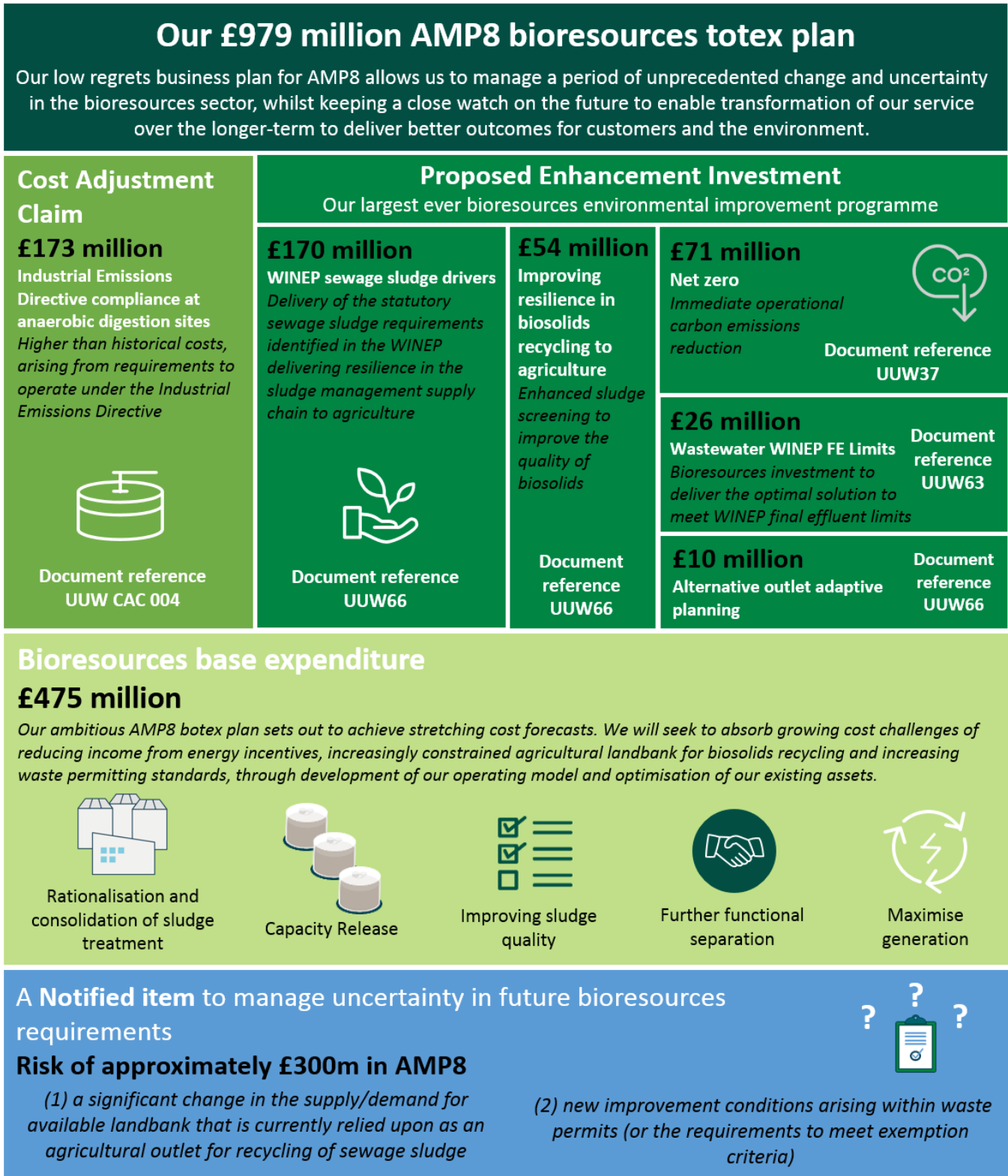
## 4. Our AMP8 delivery plan

- Our proposed £979 million investment plan in the bioresources price control represents the largest ever bioresources plan, delivering a substantial WINEP programme to achieve significant enhancements to the natural environment across the North West, as well as further regulatory obligations and other key priorities supported by customers, including net zero ambitions.
- We have a strong track record in delivering performance for customers and the environment, and our ambitions for AMP8 will see us deliver even more improvements to meet evolving regulatory standards. We will deliver enhanced environmental protection, continue to maximise the value recovered from sludge, and embrace markets to start to transform our business and adapt to change in the sector.
- Our AMP8 plan sets out to achieve an ambitious performance, without increasing the level of botex (beyond the adjustments for additional scope). Stretching cost forecasts will absorb growing cost challenges from reducing income from energy incentives, increasingly constrained agricultural landbank for biosolids recycling and increasing waste permit compliance standards.
- We will manage growing demand and a predicted capacity shortfall, through efficient capacity release investment and short-term use of markets, until a long-term guaranteed sludge treatment solution is developed.
- AMP8 is focussed on low regrets actions, where we have high certainty in the scope and the investment needed to meet new service standards. We have taken a balanced view of the agricultural outlet risk by proposing enhancement investment to improve the resilience of the supply chain to agriculture in order to maintain the agricultural outlet for biosolids recycling. We have identified multiple risks to sludge treatment and sludge disposal activities outside management control that may drive significant scope and costs over and above our plan. To avoid investment needs that are uncertain we propose to manage this risk through an AMP8 uncertainty mechanism (Notified item).

### 4.1 Plan summary

- 4.1.1 Our plan to invest £979 million in the bioresources price control is delivering substantial value for the North West in AMP8.
- 4.1.2 We have developed an ambitious and efficient long-term strategy to meet new challenges and realise opportunities to deliver better outcomes for customers and the environment. It is our aim to ensure that sludge treatment and recycling can continue to support the delivery of national priority outcomes including sustainable agriculture, a circular economy, net zero and efficient costs for customers.
- 4.1.3 Our low regrets business plan for AMP8, summarised in Figure 15, is the first step on this journey. Further details of how we have developed this plan are provided in *Chapter 8 - Delivering at efficient cost*.
- 4.1.4 Our bioresources plan totex is higher than AMP7, largely driven by increasing regulatory expectations. Where costs are within our control, our plan sets out to achieve an ambitious performance, absorbing growing cost challenges without increasing the level of botex (beyond the adjustments for additional scope).
- 4.1.5 Our cost adjustment claim for £172.594 million will ensure compliance with the Industrial Emissions Directive at anaerobic digestion sites. Proposed efficient enhancement totex of £234 million relates to actions required to comply with our obligations under the WINEP, increasing resilience in our recycling biosolids to agriculture and a further £71 million focussed on reducing greenhouse gas emissions.

Figure 15: Our AMP8 Bioresources price control plan summary



## 4.2 The value created through our plan

### Full regulatory compliance

4.2.1 We have a strong track record in delivering performance for customers and the environment, and our ambitions for AMP8 will see us deliver even more improvements to meet evolving regulatory standards.



4.2.2 Through delivery of our AMP8 plan we aim to be 100 per cent compliant with our statutory obligations. The EA ensures that the environment is protected in regard to sludge treatment and disposal and will monitor performance through the industry Environmental Performance Assessment (EPA) metrics for:

- Satisfactory Sludge Use/Disposal.
- Waste permit compliance: This is a proposed new EPA measure in AMP8 and reflects the increased regulatory scrutiny and increasing regulatory expectations for our waste treatment activities.

4.2.3 In addition, the company voluntarily complies with the Biosolids Assurance Scheme (BAS) and is audited annually to demonstrate best practice in our biosolids to agriculture recycling operations. Standards are evolving to improve levels of environmental protection afforded under the BAS scheme, we are committed to continuing to comply with the draft enhanced measures at no extra cost to customers.

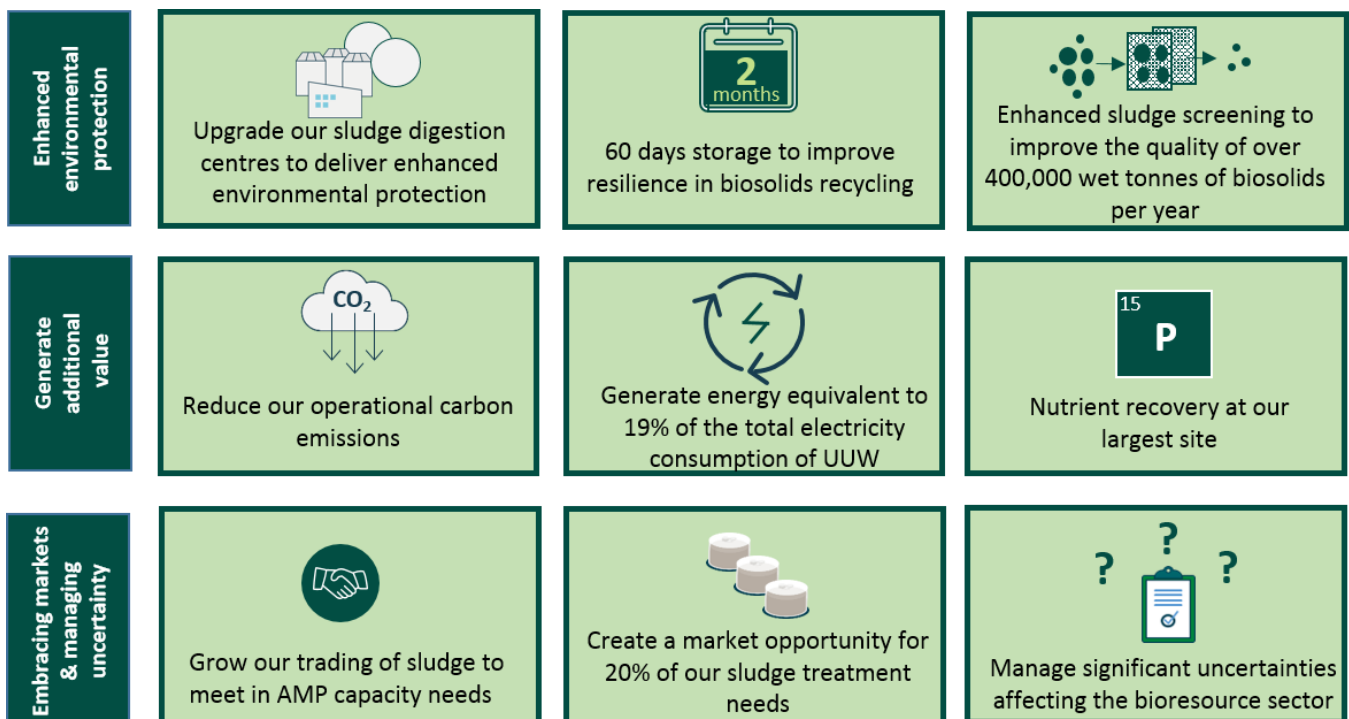
**AMP8 outcomes**

4.2.4 There are no bioresources specific Performance Commitments in AMP8 but bioresources investment will contribute to the delivery of the Operational greenhouse gases (wastewater) (tonnes of CO<sub>2</sub>e) Performance Commitment. We further discuss the relationship between our bioresources plan and this Performance Commitment in section 4.8.

4.2.5 As we summarise in Figure 16, the AMP8 bioresources plan proposes to deliver outcomes in three key areas:

- Enhanced environmental protection
- Generating additional value
- Embracing markets and managing uncertainty

*Figure 16: Our bioresources outcomes for AMP8*



**(1) Enhanced environmental protection**

4.2.6 Building on our excellent operational performance and compliance track record in AMP7 we propose to invest to increase our service levels to meet increased regulatory expectations. The plan should deliver compliance with the Industrial Emissions Directive, standards specified under the Appropriate Measures for the Biological Treatment of Waste guidance and the Environment Agency Sludge Strategy.

- 4.2.7 Through our sewage sludge WINEP actions we propose to increase the resilience of our sludge to land operations by providing 60 days storage to provide resilience against closed periods in the agricultural calendar. We also propose to double our production of enhanced quality biosolids to enable access to greater and more diverse areas of landbank, increasing the flexibility and resilience of our operations.
- 4.2.8 We have strong customer support for our proposals to deploy fine screening of all our sludges, going beyond current best practice, seeking to minimise microplastics and other non-degradable physical contaminants in biosolids recycled to land. Improving product quality will support market acceptance of higher quality products, further improving resilience in biosolids recycling to agriculture.

### **(2) Generate additional value**

- 4.2.9 Our approach to managing sewage sludge is based on the circular economy principle of keeping materials in use, at their highest value and our plans support the minimisation of waste to landfill or incineration. Each year our biosolids supply nutrients, minerals and valuable organic matter to almost 20,000 hectares of agricultural land in the North West and beyond, with a direct economic value of almost £8.5 million each year.
- 4.2.10 Our proposed AMP8 net zero enhancement programme is critical to our goals for net zero and delivers immediate operational greenhouse gas emissions reduction and includes reducing fossil fuel use in our bioresources treatment operations and switching our bioresources HGV fleet to green fuel. The renewable energy we generate from sewage sludge also plays a key role in our ambitions for net zero. We currently recover over 500 GWh of green gas per year, and generate energy equivalent to 19 per cent of the total electricity consumption of UUW, and in AMP8 we will optimise our sludge processing to further increase energy recovery. This renewable energy also helps our own energy security as a company and as a nation by providing clean and home grown energy for our use or sent to the national grid.
- 4.2.11 At our largest wastewater treatment works we propose to install a full-scale plant to recover up to 255kg of phosphorus per year. This is an innovative approach, led by circular economy principles, to recover phosphorus from sludge liquors, rather than simply binding it inorganically within sewage sludge or returning it to the treatment works and cycling back to the river system. This will support a more sustainable sludge recycling service whereby we are ensuring that valuable nutrients are supplied where they are needed most and are not over applied to agricultural land through the supply of our biosolids.

### **(3) Embracing markets and managing uncertainty**

- 4.2.12 We believe that in the right conditions market forces could help to create greater economic and environmental value within the bioresources sector. In AMP8, we will take a leadership role in the development of the bioresources market and seek a market solution, where it delivers best value, to deliver 45,000TDS of sludge treatment capacity to meet rising demand. This is equivalent to approximately 20 per cent of our annual sludge production.
- 4.2.13 We will continue our thought leadership in the sector by coordinating and collaborating with others to determine the optimal biosolids management approach for the future. Through innovation in areas of high uncertainty we will seek to deliver new technologies to provide alternative treatment and disposal options to mitigate the risk of reducing agricultural outlets. We will deliver preparatory work in AMP8 for uncertain and long-term options for alternative biosolids disposal outlets.
- 4.2.14 In contrast to previous AMPs, there is a significant risk that there will be insufficient landbank for biosolids recycling in AMP8. Our AMP8 base expenditure, cost adjustment and enhancement claims for bioresources address the highest certainty risks, but there remains a great deal of uncertainty and potential additional material costs may arise during the course of AMP8. To proactively manage the uncertainty we propose that significant bioresources risks be recognised as Notified items that would trigger an interim determination (iDoK) if risks materialise in-AMP. We discuss this further in section 6.

## 4.3 Maximising value in AMP8 through base expenditure

### Our AMP8 botex plan

- 4.3.1 Our AMP8 botex plan will enable us to achieve an ambitious performance, without increasing the level of botex (beyond the adjustments for additional scope). To do this we have sought and embedded numerous efficiency assumptions into our plan, as detailed in Section 5.
- 4.3.2 Ensuring that we can meet our stretching costs forecasts will present a considerable challenge in AMP8 as we will need to absorb growing cost challenges from reducing income from energy incentives, increasingly constrained agricultural landbank for biosolids recycling and increasing waste permitting standards.
- 4.3.3 The challenges of delivery in AMP8 come on the back of a challenging AMP7 for our bioresources business. We consider that AMP7 has been a turning point in the evolution of the bioresources sector, as new environmental regulatory expectations on the sector have started to be revealed. During AMP7 we have had to re-baseline our plan, adjusting to cost shocks and disruption in the bioresources market from the Environment Agency's revised interpretation of Farming Rules for Water, and implementation of the Industrial Emissions Directive.
- 4.3.4 Our AMP8 plan was developed and optimised through the use of our strategic planning tool, Regional Integrated Asset Plan (RIAP). Strategic planning capability is central to our asset strategy over the next 25 years and enables us to understand and optimise the carbon footprint, capital and operational costs of planned base and enhancement actions across the entire, regionally integrated bioresources system.
- 4.3.5 AMP8 forms the first five years of our long-term delivery strategy. By building our plan for the next AMP in the context of the longer term, we have been able to understand the top priorities that require investment now, identify areas where preparatory work is essential to mitigate future risks, and find opportunities to phase investment until the requirement is more certain.

### Managing bioresources' key operational risks

- 4.3.6 Central to the development of our plan is ensuring that we are adequately managing bioresources' largest operational risks. Bioresources risks are managed along with all other risks in our corporate risk process set out in *Chapter 7 - Resilience and asset health*.
- 4.3.7 We present in Figure 17 a summary of the highest scoring operational risks impacting the bioresources business, along with a brief description of how we use our resilience strategy to help to manage the risk. Our targeted AMP8 investment will ensure that risks are minimised to an acceptable level.

Figure 17: Key bioresources risks managed through our corporate risk management process

<p><b>Failure to treat sludge</b> </p> <p><b>Risk exposure:</b> We continuously produce sewage sludge and must ensure provision of sufficient sludge treatment capacity and asset availability to meet demand. Demand is growing from a combination of population growth and increasing wastewater treatment standards increasing the quantity of sludge produced. Sludge digestion activities are now regulated under the Industrial Emissions Directive (IED) increasing the regulatory standards at these sites and driving the need for investment.</p> <p><b>Control / mitigation:</b> We manage our capacity via a Throughput, Reliability, Availability and Maintainability (T-RAM) approach. We also undertake a digester and tank cleaning programme, regular testing and analysis of sludge and balance capacity and demand through the Bioresources production planning team. We are proactively accelerating rationalisation of sites enables us to avoid wasteful investment in meeting IED standards at sites that would ultimately have been closed in the medium term as we implement our long-term delivery strategy. We are seeking to use markets to support provision of additional capacity for resilience purposes.</p>	<p><b>Recycling of biosolids to agriculture</b> </p> <p><b>Risk exposure:</b> This represents a multitude of risks including in-year landbank accessibility risks from operational failures bad weather or agricultural epidemics; and landbank availability risks resulting from market demand from biosolids, competition from other organic wastes and (total or partial) regulatory restrictions on recycling. Through the EA sludge strategy the EA intend to exert greater control over biosolids recycling, and on-going uncertainty over the implementation of Farming Rules for Water Rule 4(1) present considerable risks to future landbank availability.</p> <p><b>Control/mitigation:</b> Full compliance with the voluntary Biosolids Assurance Scheme provides quality assurance to our agricultural customers. We work closely with farmers, land owners and contractors fostering good relations to ensure market demand for our product. Our field staff are fertiliser advisors certification and training (FACTS) qualified and we offer free agronomy and nutrient planning advice to support them in using our biosolids compliantly and with minimum risk of harm to the environment.</p>	<p><b>MVSP</b> </p> <p><b>Risk Exposure:</b> We own and operate a 85km digested sludge main across the south of our region. The pipeline is buried and crosses watercourses, rail lines and roads, including the M60. There is potential for bursts of this pipeline due to over pressurisation, third party damage, ground movement or asset failure, leading to a serious pollution incident.</p> <p><b>Control/mitigation:</b> In AMP7 we have undertaken an extensive digitisation exercise to better understand asset condition, and likely failure points. We are moving to a proactive maintenance and monitoring strategy to reduce the likelihood of bursts. Booster stations are closely monitored in our Integrated Control Centre to warn of pipeline health issues.</p>
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### Growing and emerging cost challenges in AMP8

- 4.3.8 We are expecting significant cost challenges that will need to be absorbed through our AMP8 plan in order to meet our ambitious performance targets:
- **Reducing income from government energy incentives**
- 4.3.9 We currently benefit from government incentives for electricity generation at our anaerobic digestion sites. In AMP8 we will be absorbing the loss of around £16.5 million of income from Renewable Obligation Certificates (ROCs) from 2028, as the scheme comes to an end. New replacement government schemes for biomethane explicitly exclude the conversion of existing engines, making our sites ineligible for incentives. Moreover, as discussed in section 4.8, the AMP8 operational greenhouse gases (wastewater) (tonnes of CO<sub>2</sub>e) performance commitment dis-incentivises further biomethane generation, and as a result, expansion of our biomethane production capacity has been removed from our plan. Our plan is focussed on continuing to optimise our sludge processing to continue to increase energy recovery year on year at existing facilities.
- **Reducing landbank availability for biosolids recycling**
- 4.3.10 There are very significant challenges facing biosolids recycling to agricultural land in England. An increasing number of factors that are outside of company control threaten the resilience of the supply chain of sewage sludge to agricultural land, such as; exceptional weather events preventing access to agricultural land; disease causing farmers to change their cropping plans; or regulatory or market requirements affecting land managers and the supply and demand of sludge to land.
- 4.3.11 To find adequate landbank we already have a greater distance to travel to recycle than any other company, driving higher sludge recycling costs. Grieve Strategic, National Landbank Modelling (2022) demonstrates that under current regulatory conditions the average maximum haulage distance we are required to travel to recycle biosolids to land is 71km, compared to an industry average maximum distance of 46km<sup>13</sup>.
- 4.3.12 We forecast that we will need to travel even further to landbank in AMP8, increasing our costs, as a result of changing market demand for biosolids and more constrained landbank availability. This is

<sup>13</sup> Grieve Strategic and ADAS, National Landbank Study.

discussed in Section 2.4. We anticipate that landbank available for biosolids recycling in the North West will have almost halved between 2020 and 2030, largely due to new regulatory restrictions. These changes have a disproportionately large impact on the phosphorus-rich, grassland landbank of the North West.

4.3.13 As well as increasing distances to travel, measures for recycling are becoming more stringent. Updates to the BAS standard are proposed to support the EA's implementation of Farming Rules for Water. We are voluntarily working to the draft measures and we do not seek additional cost recovery for these activities.

- **New waste permitting requirements**

4.3.14 New and evolving waste permit requirements have the potential to drive significant additional cost in AMP8. By the end of AMP7 we anticipate we will have absorbed £66.030 million of unfunded IED costs. We seek cost recovery for a further £172.594 million of AMP8 IED costs to comply with Appropriate Measures standards, through our cost adjustment claim discussed in Section 4.6.4. The costs set out within the cost adjustment claim are the capital costs (and future ongoing opex resulting from this investment) to comply with Appropriate Measures guidance.

4.3.15 There is significant uncertainty over further waste permit compliance costs that could be incurred in AMP8, beyond the scope of our cost adjustment claim. IED compliance requirements are site specific and the exact requirements will not be known in full until we progress each individual permit variation. Furthermore, implementation of IED introduces a requirement for sites to meet BAT standards for waste treatment. The review of permitting requirements every four years is out of alignment with five year price review cycles. We propose to manage significant additional scope via a Notified item as discussed in Section 6. There is a risk that other new requirements, which may be below the threshold to trigger a Notified item may provide a further cost challenge in AMP8.

4.3.16 In AMP8 we will also incur new waste permit obligations at physico-chemical sludge treatment sites that import more than 100,000m<sup>3</sup> of sludge per annum. Two sites will require bespoke waste permits and a review to ensure compliance with Appropriate Measures standards. Costs are estimated to be in the order of £21 million. These costs were previously identified in our withdrawn cost adjustment claim, UUW\_CAC\_005 submitted on 9 June 2023.

### **Cost efficiency opportunities in our AMP8 plan**

4.3.17 To ensure that we can absorb the cost challenges set out above and meet our stretching botex plan for AMP8, we have sought and embedded numerous efficiency assumptions into our plan. Our strategic approach and planned investments through our base expenditure to drive efficiency in AMP8 are set out below. Further information on how we are using markets, innovation and partnerships in AMP8 to drive further efficiencies are described in section 5.

- **Rationalisation and consolidation of sludge treatment**

4.3.18 In AMP8 we will continue our proactive rationalisation of small, aging anaerobic digestion sites and consolidation to larger AAD sites. AAD supports the recovery of calorific and nutrient value, allowing renewable energy generation through green gas and producing a fossil free fertiliser alternative, supporting circular economy principles. The centralisation to AAD hubs aligns with our LTDS and provides economies of scale, supports low emissions treatment and maximises energy recovery.

4.3.19 IED implementation has directly led to the accelerated rationalisation of several of our small, aging AD sites, and in AMP7 our sites with digestion activities reduced from 16 to 11, as we have sought to implement IED as efficiently as possible. In AMP8 we anticipate further rationalisation of sludge treatment to nine sites, ceasing our sludge liming activities and closing aging digestion capacity.



- **Capacity release**

4.3.20 We conducted a review with a consultant to identify a range of opportunities to optimise existing capacity. We will make targeted tactical investment through botex to deliver efficient capacity release at our two largest sludge treatment centres. This provides the lowest cost option to offset the reduction in sludge treatment capacity resulting from the accelerated rationalisation of sites due to IED implementation. At Liverpool we will improve sludge import facilities to allow an additional circa 2,500 TDS of sludge throughput per annum and at Manchester Bioresource Centre (MBC) targeted investment will allow the site to run above average design capacity and achieve an additional 9,000 TDS throughput per annum.

- **Improving sludge quality**

4.3.21 We have set ambitious operational targets in AMP8 to improve sludge thickening and dewatering efficiency. By increasing the dry solids content of sludge from satellite sludge production centres to an average of four per cent dry solids we will reduce sludge tanker transport miles and we anticipate savings of up to £2 million per year. Benefits are expected to be delivered through targeted investment, increased operational focus and sludge quality monitoring. Our regional sludge production planning tool helps to further optimise sludge logistics and ensure delivery of benefits.

- **Further functional separation**

4.3.22 During AMP7 we introduced service level agreements (SLAs) between our Wastewater Network Plus sludge production centres and bioresources sludge treatment centres. These SLAs will continue in AMP8 to drive efficiencies and ensure clear accountabilities and management focus.

4.3.23 In AMP8 we seek to implement further functional separation between bioresources and Wastewater Network Plus. This will support our on-going efforts to ensure costs are correctly and appropriately allocated between price controls. Moreover, the implementation of a new, dedicated bioresources operations and maintenance team will allow greater focus on bioresources key performance metrics to drive operational efficiencies, and develop personnel with a greater knowledge and skill set dedicated to bioresources assets. As well as delivering efficiency benefits, we expect multiple benefits including process safety and waste permit compliance.

- **Maximise generation**

4.3.24 We will continue to grow our renewable energy generation, maximising green energy recovery from our sludge. Our AMP8 plan is focussed on continuing to optimise our sludge processing to continue to increase energy recovery year on year at existing facilities. We are proposing to deliver a programme of CHP engine replacements as assets reach end of life, which has the co-benefit of continuing to lower harmful NOx emissions from our activities.

## 4.4 AMP8 sludge forecast

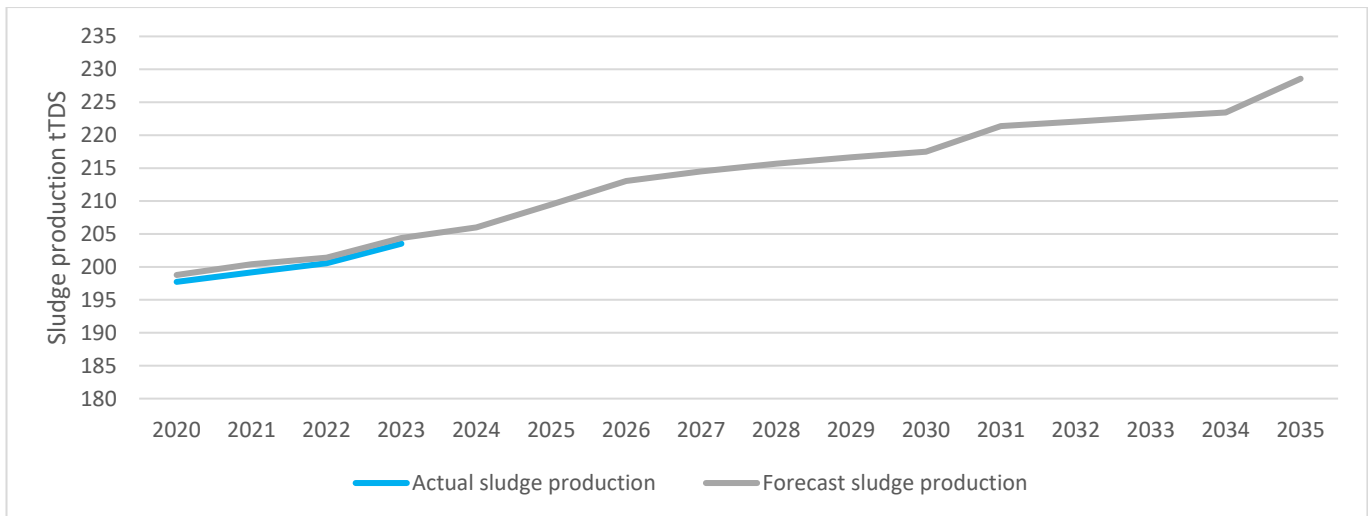
4.4.1 The bioresources price control is an average revenue control based on the quantity of sludge treated and disposed. It is therefore critical that we have an accurate and reliable sludge production forecast.

4.4.2 By 2050 we expect a significant 33 per cent increase in sludge production, from a 2020 baseline. Sludge growth is driven by a combination of rising population (aligned to our wastewater DWMP projections) and tighter wastewater treatment standards. Tighter wastewater effluent discharge consents to meet phosphorus targets under the Environment Act will lead to significant sludge growth by 2038. In addition, chemicals such as nonylphenol and cypermethrin are of increasing concern with monitoring and investigations forming part of the WINEP. Removing these chemicals from wastewater is often achieved by dosing iron salts (e.g. ferric chloride) and could have a significant uplift if new final effluent controls are imposed more extensively beyond AMP8.

4.4.3 Our sludge forecast is presented in Figure 18. By 2030, the annual total quantity of sewage sludge produced in the North West is forecast to increase by around 11,500 TDS per annum from current

levels. The rate of sludge growth is consistent with that seen in AMP7. Due to the phasing of the wastewater WINEP programme the full impact of sludge growth from AMP8 wastewater treatment investment is only expected in AMP9.

**Figure 18: Sludge production forecast**



Source: United Utilities, 2023

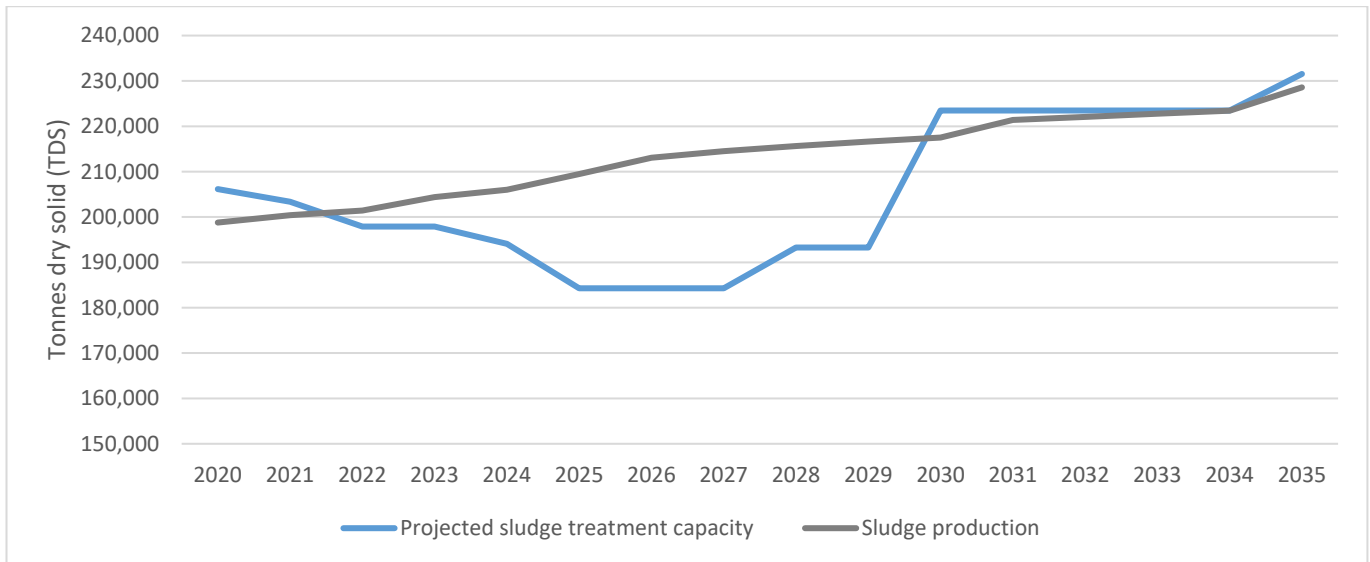
- 4.4.4 We have a high level of confidence and certainty in our sludge production forecast. Our sludge forecasts at PR19 were reliable and outturn sludge production rates have an accuracy within one per cent. We have continued to use our AMP7 methodology for forecasting sludge production.
- 4.4.5 We note that there is the potential for changes to our sludge forecasts which are outside of management control. A substantial change in wastewater WINEP requirements or implementation dates may mean that we are required to adjust our sludge forecast.
- 4.4.6 In future, not only the quantity of sludge produced will increase but the quality of sludge is forecast to change. Currently, approximately one third of sludge produced is chemical P sludge (produced by chemically aided settlement to remove phosphorus from wastewater) but by 2030 we expect that this will be almost half of sludge production. The changing quality of sludge has implications for wider sludge treatment and disposal, for instance chemical P sludge has a lower calorific value than primary sludge, reducing the value we are able to recover per tonne of dry solid. In addition, more stringent phosphorus final effluent standards are expected to lead to a doubling of phosphorus loading in sludge. Phosphorus is a limiting factor in determining biosolids application return rates for agricultural recycling and greater concentrations will increase the biosolids application return rate, creating a significantly greater landbank requirement. Moving forwards sludge quality, as well as sludge quantity will need to be considered in pricing sludge treatment and disposal in the developing bioresources market.

## 4.5 Ensuring resilient sludge treatment capacity

- 4.5.1 At PR19 we were forecasting more sludge treatment capacity than the volume of sludge to be produced. We did not predict a treatment capacity shortfall until circa 2034. However, during AMP7 we have had to adapt our plan in response to changing regulatory drivers. IED implementation has directly led to the accelerated rationalisation of several of our small, aging AD sites reducing our digestion activities from 16 to 11 sites as we have sought to implement IED as efficiently as possible.
- 4.5.2 The consequence of this accelerated rationalisation means that we are now predicting a shortfall in incumbent sludge treatment capacity in AMP8. In Figure 19 we present the relationship between our forecast sludge production and sludge treatment capacity. Due to accelerated site rationalisation our sludge treatment capacity has reduced from 198,000 TDS to 181,000 TDS. Unmitigated, the shortfall in sludge treatment capacity would be 36,000 TDS by 2030.



Figure 19: Forecast sludge production versus incumbent sludge treatment capacity



Source: United Utilities, 2023

- 4.5.3 We forecast that as markets grow over time, we will need to have less reliance on our own treatment capacity and can make use of third parties and other water companies to treat sludge. However, there are currently significant barriers to the use of markets: A misalignment has developed between the environmental and economic regulatory frameworks, with uncertainty over new future environmental regulatory requirements, and investment risk is amplified by the lack of RCV protection in bioresources, creating uncertainty around cost recovery. This is actively inhibiting our use of markets in many areas as uncertainty is priced at too high a cost.
- 4.5.4 Our plan will manage the forecast shortfall in sludge treatment capacity in the most efficient way using a multifaceted approach. During AMP8 we will regularly review the capacity that will be required and engage the market to deliver the most cost beneficial solutions. In AMP8 we will:
- Release capacity through continuous operational improvement and targeted asset investment: Targeted interventions at our two largest sludge treatment sites are anticipated to release 11,500 TDS capacity throughput in AMP8, substantially offsetting the predicted shortfall in capacity.
  - Deploy innovation to maximise the use of existing assets: We are undertaking innovation trials in AMP7 using technologies such as Ephyra that aim to optimise sludge treatment and create additional capacity within existing assets and systems. If on-going trials in AMP7 have favourable results this has the potential to further offset the AMP8 shortfall in digestion capacity.
  - Engage with markets to provide short-term sludge treatment and disposal capacity. We expect that short-term trading with third parties and other water companies has the potential to offset the remainder of our forecast sludge treatment capacity shortfall. This outlet is not guaranteed and our cost forecasts have assumed the use of market restoration capacity for sludge disposal. We will continue to engage the market to ensure delivery of best value solutions.
  - In AMP8 we will take a leadership role in the development of the bioresources market and seek a market solution, where it delivers best value, to deliver 45,000 TDS of new sludge treatment capacity to meet rising demand. We discuss in Section 5.2 more about how we have engaged with markets to test the viability for market delivery.

## 4.6 Additional investment requirements in AMP8 to deliver enhanced service standards

4.6.1 We are proposing to deliver a substantial investment above base expenditure to achieve significant benefits to the natural environment across the North West, meet our regulatory obligations and deliver other key priorities supported by customers, including net zero ambitions.

4.6.2 The bioresources regulatory framework has been stable for the last 20 years, with little by the way of new requirements. Now it is operating as a waste business under the Waste Framework Directive and this change brings new investment requirements in AMP8. It is clear from our engagement with customers and stakeholders that the industry must address increasing and emerging concerns regarding nutrient management, emissions and emerging contaminants. We have listened and this is driving new investment to ensure we continuously improve our service.

4.6.3 Our AMP8 investment is focussed on delivering low-regrets improvements where there is greatest certainty over the requirements.

### Bioresources cost adjustment claims

4.6.4 Costs to comply with the IED at anaerobic digestion sites are not adequately reflected in the cost models and we have therefore submitted a cost adjustment claim for £172.594 million to reflect the higher than historical sludge treatment costs:

- Industrial Emissions Directive (IED) compliance at anaerobic digestion (AD) sites cost adjustment claim

4.6.5 More information can be found in the supplementary document *UUW44 – Cost adjustment claims, section 22 to 27*.

### Bioresources enhancement claims

4.6.6 Our enhancement programme represents the largest ever bioresources environmental improvement programme. The programme will deliver a substantial WINEP programme to achieve significant enhancements to the natural environment across the North West and deliver further enhancements to improve the resilience of our biosolids recycling to agriculture service, as supported by customers.

4.6.7 More information about our bioresources enhancement cases can be found in the supplementary document, *UUW66*, and as summarised below:

- **Bioresources WINEP – sewage sludge drivers:** We are proposing to invest £169.965 million to deliver the statutory requirements identified in the WINEP to meet the new and more onerous requirements for sewage sludge drivers, which are focussed on actions to ensure the sustainable management of sewage sludge.
- **Improving resilience in biosolids recycling to agriculture:** We are proposing to invest £54.133 million to deliver enhanced sludge screening at our sludge treatment centres. We have strong customer support to implement fine screening for all our sludge and across all our sites, going beyond current best practice, to minimise as far as possible microplastics and other non-degradable material in biosolids recycled to land. The scheme has multiple, overlapping benefits to:
  - Address increasing public awareness, media attention, and government calls for action around microplastics as an urgent environmental issue;
  - Follow the precautionary principle to minimise the risk of environmental harm from our activities;
  - Mitigate the risk of a loss of market demand for our biosolids product due to contamination concerns; and,

- Ensure regulatory compliance with Environmental Permitting Regulations by seeking to continuously improve quality standards to align with best available techniques.
- **Alternative outlet adaptive planning:** We are proposing to invest £10.394 million to deliver preparatory works for uncertain and long-term options for alternative pathways in our bioresources LTDS. A lack of access to alternative outlets or treatment technologies for sludge means that unless we act now and start to plan and accelerate deployment of alternative uncertain and long term options, we face a risk of being unable to provide a resilient sludge management service, and ultimately having no disposal outlet for sludge. These advanced works will inform PR29 planning for landbank resilience needs.

4.6.8 Further bioresources investment is associated with wider business plan enhancement cases, as summarised below:

- **Net zero enhancement (UUW67)** £71 million: Our net zero enhancement programme includes a suite of projects which all have a primary driver of emissions reduction. Customers support bold action in AMP8 to align to the national legal requirements in the Climate Act 2008 to achieve net zero by 2050. Proposed investment includes measures in bioresources for immediate operational greenhouse gas emissions reduction and includes reducing fossil fuel use in our bioresources treatment operations and switching our bioresources HGV fleet to biofuel.
- **WINEP Final effluent limits WINEP Optimisation – Davyhulme (UUW63)** £27 million: An integrated approach to meet wastewater final effluent limits will necessarily drive investment in the bioresources price control to deliver the optimal solution to meet WINEP outcomes. Investment has been identified at our co-located sludge treatment centre (MBC) at Davyhulme wastewater treatment works to introduce a digested liquor treatment plant to maintain performance of existing secondary treatment processes through improved ammonia management. The implications of this consequential investment on the bioresources price control are discussed further in Section 4.7.
- **WINEP Investigations (UUW63):** The investigations included in this programme area are all required under the WINEP to support the robust identification of future needs for investment and include:
  - The Chemical Investigations Programme (WFD\_INV\_CHEM) which will undertake analysis of samples from various in areas including chemicals in sludge and biosolids applied to land in field trials.
  - Microplastics investigation (WFD\_INV\_MP) which will quantify microplastics generated within the wastewater treatment process and investigate sludge treatment technologies and their impact on microplastics.

### Protecting customer investment

- 4.6.9 The robust and quantified evidence we have gathered to support our enhancement cases, including landbank modelling and storage capacity assessment, ensures that the proposed interventions are necessary, we only do what we need to do, and the value to both business and customers is clear. We have undertaken a significant options assessment to identify the most effective way of delivering a robust and sustainable sludge recycling to agriculture service. A detailed unconstrained to constrained options assessment has been completed. All options were considered based around the Generic High Level Solution preference hierarchy, including monitoring and control, access to alternative outlets for biosolids disposal, and over 80 potential intervention types were screened.
- 4.6.10 Our approach to delivering best value for customers is robust and consistent across our enhancement cases and uses a rich mix of metrics to help us drive value and efficiency in developing our plan. Our enhancement and cost adjustment claim investments are the best value and least cost options. Where appropriate, we discuss discounted alternate options in our enhancement cases.
- 4.6.11 Where we are proposing to make significant investment over and above base totex we will protect customer investment through Price Control Deliverables. For Bioresources, where Ofwat is proposing to

move away from reliance on the traditional RCV building block approach at future price controls, it is important that PCDs should not compensate customers for non-delivery by more than Ofwat is committing that companies would have been able to recover from customers in future price controls. Given Ofwat’s long-term strategy for the Bioresources price control, we do not believe it would be appropriate for PCDs to protect customers by more than the value that would be recovered from customers in AMP8 alone (and therefore not the full assumed cost of the related investment). The detail of the Price Control Deliverables is set out within individual enhancement cases (UUW66).

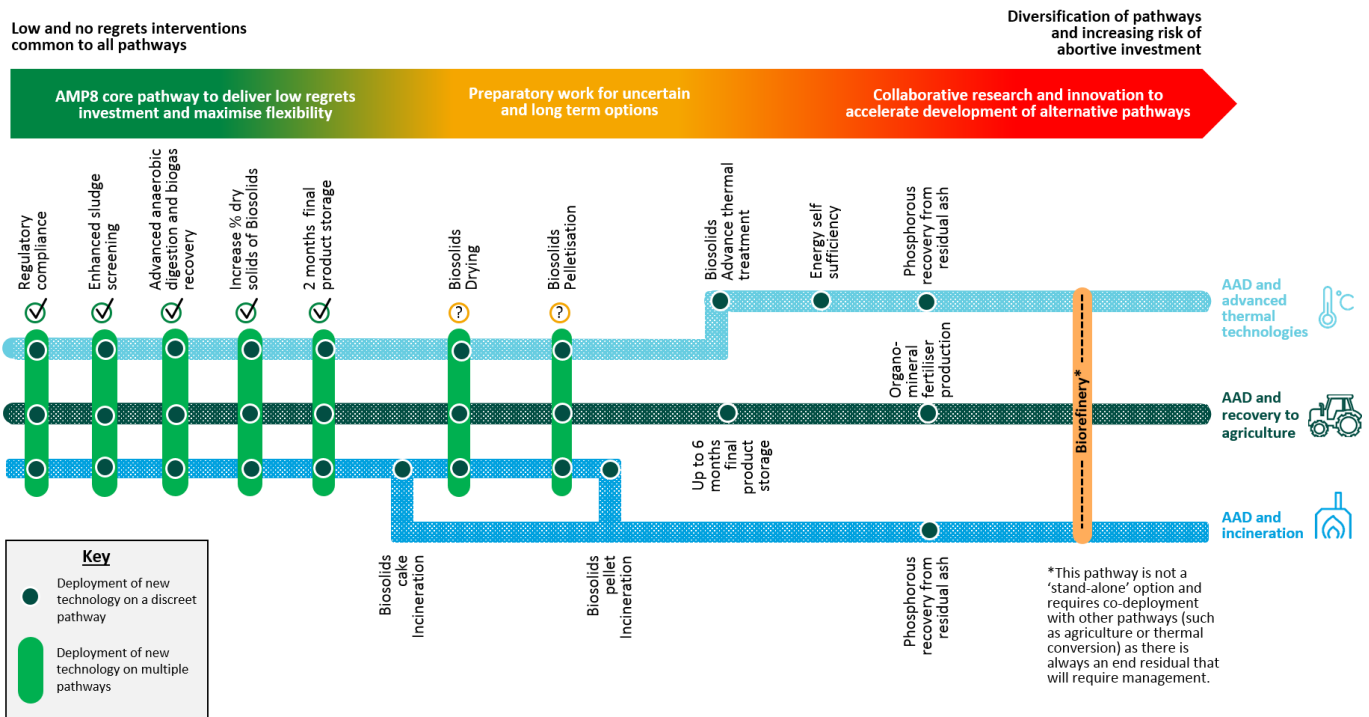
4.6.12 The EA will ensure that the environment is protected in this area on behalf of customers through the AMP8 Environmental Performance Assessment (EPA) metrics. Moreover, non-delivery of the regulatory outputs will likely incur prosecution and fines by the EA. If non-compliance is through deliberate actions by the company this is likely to influence the scale of any fines issued.

**Our enhancement investment aligns with our LTDS**

4.6.13 AMP8 forms the first five years of our long-term plan. By building our plan for the next 5 years in the context of the longer term, we have been able to understand the top priorities that require investment now, identify areas where preparatory work is essential to mitigate future risks, and find opportunities to phase investment until the requirement is more certain.

4.6.14 In AMP8 our investment strategy will ensure maximum flexibility by keeping multiple strategic pathways open and we have prioritised low regrets investment where we have certainty over the requirements. We demonstrate in Figure 20 that no regrets actions are common interventions that are beneficial across all potential pathways for biosolids disposal. Delivery of no regrets actions in AMP8 ensures environmental outcomes can be delivered and the risk of inefficient investment is minimised.

**Figure 20: Indicative illustration of low and no regrets actions on our bioresources LTDS**



4.6.15 We have used our Regional Integrated Asset Plan (RIAP) to optimise the scale and timing of solutions within our existing asset base. Moving to an alternative disposal outlet is not considered as part of the core pathway in AMP8, as these actions may be considered as abortive investment in the longer term, as there remains uncertainty over both timescales for change and the preferred alternative outlet for sludge disposal. These pathways will only be followed under more adverse landbank scenarios, and the additional activities may be described as 'higher-regret', relative to investments included in the core pathway. We have therefore deferred significant investment (an additional circa £1 billion) to implement actions to move away from biosolids recycling to agriculture.

## 4.7 Aligning our bioresources plan with Wastewater Network Plus

- 4.7.1 Bioresources management is inextricably linked to wastewater treatment sites, which control the location, quality and quantity of sludge produced. An integrated planning approach has been adopted between Wastewater Network Plus and Bioresources price controls to ensure optimal sludge management, and provision of sufficient capacity to treat return liquors from sludge treatment.
- 4.7.2 Further details of the Wastewater Network Plus price control plan are provided in supplementary document *UUW56 – Wastewater network plus business plan*.
- 4.7.3 Sludge management requirements have been built into the DWMP and sludge production forecasts for bioresource services are based on population forecasts from the DWMP. Our approach to the DWMP and the integration of long-term sludge treatment and disposal requirements is unique across the industry.
- 4.7.4 In developing our company LTDS we have further integrated wastewater and sludge needs, recognising that joint planning is essential to best utilise land at increasingly constrained sites, phase construction activities and ensure the best possible outcomes for energy resilience and greenhouse gas emissions.
- 4.7.5 This approach is most apparent in our WINEP options development which has taken a holistic approach across the integrated wastewater and bioresources production line in order to identify the lowest cost and best value solution in AMP8. This integrated approach will necessarily drive £26 million investment in the bioresources price control to deliver the optimal solution to meet WINEP outcomes. Investment is required to deliver a digested liquor treatment plant to maintain performance of existing secondary treatment processes through improved ammonia management.
- 4.7.6 A consequence of the division of activity between Bioresources and Wastewater Network Plus price controls is that the bioresources control fails to account for this additional activity being undertaken. Historically, the costs of meeting a new obligation have been accounted for within the price control that the costs are incurred i.e. where the asset is built. Now some investment is being delivered within a different price control than the point of compliance. The consequence of this change is that there is no route to recover efficiently incurred costs in the bioresources price control. We are potentially penalised for undertaking the most efficient investment route to achieve statutory compliance, compared to investing only in Wastewater Network Plus where cost recovery would be guaranteed. In addition, the changing form of the bioresources control creates additional risks associated with overspend, as opposed to expenditure within the Wastewater Network Plus price control which has a customer cost sharing mechanism.
- 4.7.7 We would like to work with Ofwat to look at options to update Regulatory Accounting Guidelines to reflect this and similar activity and ensure that companies are able to recover efficient costs for delivery of their statutory obligations. An alternative solution would be to identify obligations to specific controls and therefore the associated costs with meeting those obligations would also be identified to the particular control.
- 4.7.8 This issue has the potential to create a distortion in the bioresources market as it will be difficult to compare controls where expenditure sits in different controls. Inclusion of additional bioresources activity resulting from obligations in the Wastewater Network Plus price control is not a fair comparison of the efficiency of bioresources assets. Moreover, this additional obligation being assigned to bioresources will impact the potential for competition as it places an obligation on bioresources for which a comparable third party provider would be expected to be paid.

## 4.8 Our plan to deliver value as we strive for net zero

- 4.8.1 Bioresources is a significant contributor to our company carbon footprint and in 2020 bioresources activities accounted for approximately 40 per cent of operational greenhouse gas emissions. To deliver our net zero ambitions emissions reductions from bioresources is essential, but successful management of our bioresources business aims to deliver beyond net zero to create ‘carbon negative’ works, capturing and utilising greenhouse gases in innovative forms and products.
- 4.8.2 For more information about our ambitions and methodologies for greenhouse gas (GHG) emissions reduction in AMP8 and in the long term see supplementary document *UUW37 – Net Zero 2050 Plan*.
- 4.8.3 To achieve the required levels of GHG emissions reduction will require substantial focus, collaboration and investment over the short and long term to achieve the inherent transformational systemic change. To make bold progress in AMP8 and prepare for longer term action, we have developed a programme of net zero enhancement investments where GHG emissions reduction is a primary driver. As shown in Table 2, we are proposing to invest £71 million to deliver a benefit of around 94,000 tCO<sub>2e</sub> in AMP8.

**Table 2: Summary of our bioresources net zero enhancement proposals**

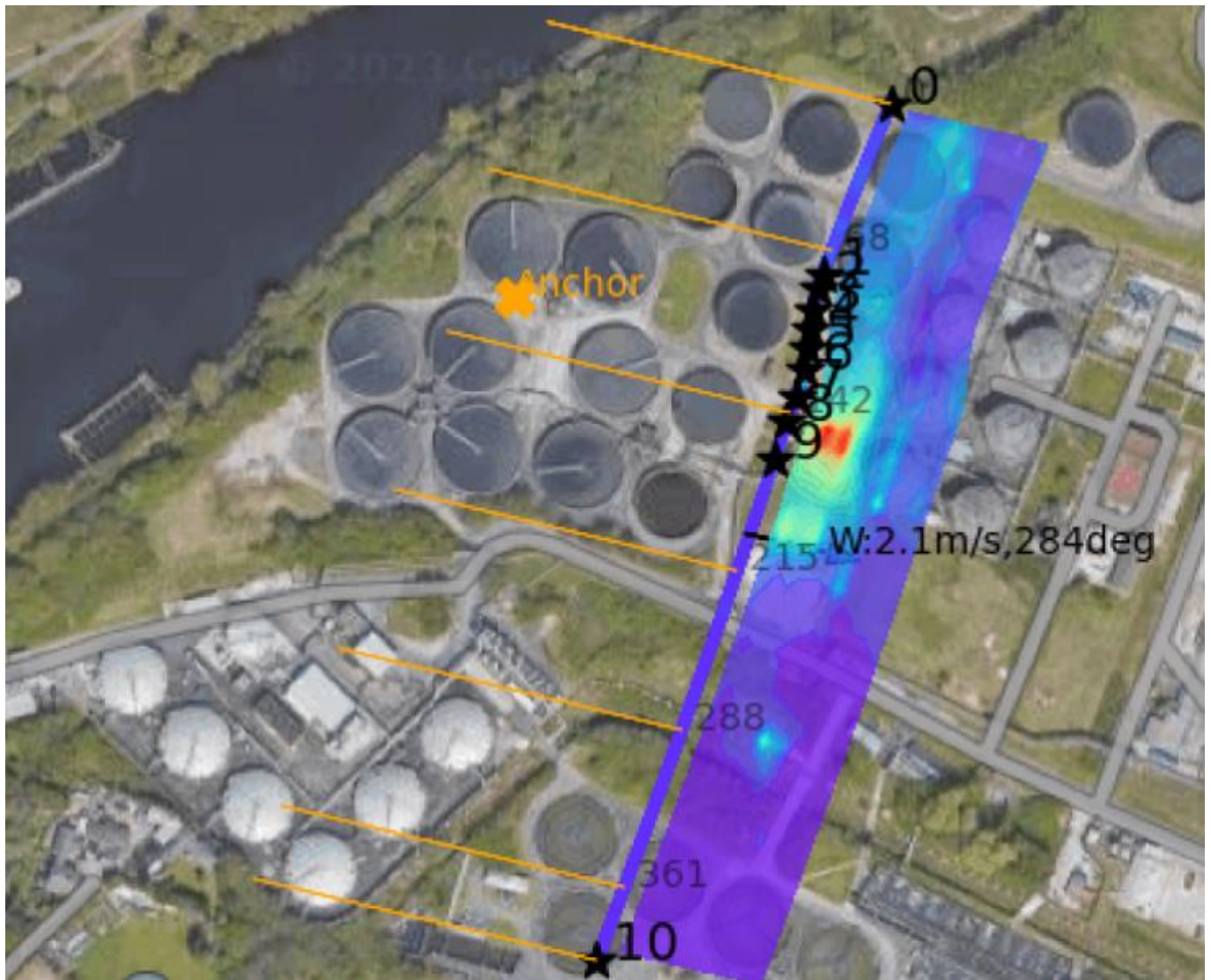
Action	Description	Cost (£m)	AMP8 Carbon Benefit tCO <sub>2e</sub>
Transport fossil fuel reductions/Green fleet biomethane HGVs	Convert 20% of bioresources HGV fleet to run on biomethane	£1.202	3,866
Transport fossil fuel reductions/ Green fleet electric or other clean alternatives phase 1&2	Convert 20% of bioresources LCV fleet to run on biomethane	£8.718	8,439
Stationary fossil fuel reductions	Biogas used in boilers to replace fossil fuels	£12.622	35,277
Process emissions (Bioresource)	Vacuum degassing of digestate	£13.595	20,077
Property emissions reductions	Allocation from business wide action plan	£1.197	2,041
Phase2- further low regrets emission reductions in AMP8	Potential further carbon reduction actions dependent on the outcome of activities above	£33.248	22,300

Source: *United Utilities, 2023*

- 4.8.4 Our proposed enhancement programme is shaped and complemented by on-going innovation trials and research. In AMP7 we successfully secured funding from Department for Energy Security and Net Zero (DESNZ) to develop a road map for our largest sludge treatment centre to achieve net zero. The works confirmed that our current approach, utilising advanced anaerobic digestion and biomethane to grid, provides the most favourable emissions outcome from currently available technologies for the treatment of sewage sludge. Through our LTDS core pathway we plan to continue to move to this operational model, supporting the long term reduction in greenhouse gas emissions.
- 4.8.5 The work excluded consideration of the impact of process emissions, but we recognise that process emissions make up 70 per cent of our reported direct emissions across wastewater and bioresources. For bioresources, the key GHG emitted is methane which is produced during anaerobic sludge digestion and released during sludge processing activities. Across AMP8 and beyond we are committed to continuing to identify ways in which to minimise our bioresources process emissions.
- 4.8.6 We have engaged in innovative drone technology analysis in order to identify hotspots of methane emissions. By measuring the gas concentrations, wind speed, wind direction, and area downwind from a target source, we can quantify the drifting plumes and estimate total emission rates. We present an example output of the drone imagery in Figure 21.



Figure 21: Example drone imagery to quantify process emissions



Source: Explicit ApS, 2023<sup>14</sup>

4.8.7 The example imagery in Figure 21 shows a ‘hotspot’ downwind of tanks storing digestate material. Better quantification of the sources of GHG emissions has informed our investment activities to ensure that we can maximise the benefits of any investment made. The technology can be used to identify potential leaks from the gas system and pipework on site to minimise losses. Also, the drone monitoring undertaken across wastewater and bioresources has identified the most significant process emissions reduction opportunity which forms part of our net zero enhancement submission. We propose to deploy innovative vacuum degassing technology which will extract methane from biosolids that would otherwise be lost to atmosphere. The extracted methane will be recovered to our biogas system and support the production of biomethane.

**Contributing to the common operational GHG emissions performance commitments**

4.8.8 In AMP8 Ofwat is introducing common operational GHG emissions performance commitments (PCs). In bioresources, the PC creates an additional economic incentive which, in our analysis, is not aligned with the government strategies and policies for biomethane.

4.8.9 The UK Government’s Net Zero Strategy and subsequent Biomass Strategy (August 2023) are supportive of biomethane production, stating:

<sup>14</sup> Explicit AgS, Drone Flux Measurement (DFM) Method: Quantifying and visualizing total methane and nitrous oxide emissions from United Utilities wastewater and sludge treatment plants, July 2023)

“Biomethane will continue to play an important role in optimising the path to net zero and increasing energy security; it can support decarbonising a number of sectors such as heat, transport and power, and the anaerobic digestion (AD) process is recognised as a recycling activity, creating a more circular economy.”<sup>15</sup>

- 4.8.10 The incentives provided by the PC promote the retention of CHP engines (in preference to new biomethane to grid capacity) as this maintains our company carbon footprint at its current level and promotes the generation of more renewable electricity, if more biogas is available. Over the lifetime of the assets the overall emissions benefit is expected to be considerably lower, and almost half that of investing in a biomethane to grid plant.
- 4.8.11 The PC has similar disincentives for other innovative opportunities that we expect to be deployable at scale in future, for example, transitioning to biomethane to grid with carbon capture and storage alongside utilisation of green hydrogen. These opportunities also have the potential to add significant value to the local economy and wider UK decarbonisation targets. We believe that maximum value can be delivered by looking to wider opportunities, rather than simply looking to reduce or maintain our own company carbon footprint in line with the performance commitment.
- 4.8.12 We have not included biomethane to grid projects in our AMP8 plan due to the financial penalty the GHG PC creates.
- 4.8.13 We would welcome a review of the GHG PC with Ofwat in the spirit of effective regulation that supports the most sustainable long term solutions for society. We believe that in the Bioresources price control the GHG PC is negatively distorting existing energy and carbon markets, and is over valuing greenhouse gas reductions for water companies in the short term against longer term reductions in areas of the economy which are the hardest to decarbonise.

## 5. Embracing new ways of working to unlock greater social, economic and environmental value

- Our plan identifies stretching efficiencies to ensure that we can meet our ambitious botex plan for AMP8. Delivery will be reliant on embracing new ways of working in AMP8 and beyond to unlock greater social, economic and environmental value.
- Innovation will be at the heart of our transformation to deliver new technologies that ensure that we embrace and realise the benefits of a more circular economy, generating higher value products that reduce our impact on the environment and deliver significant benefits to society. Our AMP7 innovation programme has delivered significant value to customers and approximately, for every pound we have invested we have successfully leveraged a further four pounds of external investment. Capitalising on this work we will deploy innovative technologies to drive efficiency, create treatment capacity and improve sludge quality in AMP8.
- We are working to address barriers to market development as we believe market forces have the potential to drive value in the sector. We have undertaken significant work to understand the market in AMP7, which we will inform our procurement strategy to secure long term guaranteed capacity for 20 per cent of our sludge treatment needs.
- Collaboration and partnership is essential for defining the future of the sector and our business. We need to build open collaboration to tackle this challenge. We have led the water industry in considerable efforts to work collaboratively with regulators to clarify uncertainties and resolve challenges over the future of the bioresources sector. Our call for a National Bioresources Strategy was the impetus for developing the Long Term Strategy for Bioresources in England.

<sup>15</sup> Department for Energy Security and Net Zero, *Biomass Strategy* August 2023  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1178897/biomass-strategy-2023.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1178897/biomass-strategy-2023.pdf)

## 5.1 Deploying innovation

- 5.1.1 Innovation is at the heart of our transformation to deliver new technologies and ways of working that ensure that we deliver improvements in the performance and service and realise the benefits of a more circular economy, generating higher value products that reduce our impact on the environment and deliver significant benefits to society. For more detail on our innovation strategy please see supplementary document *UUW49 - Innovation and framework strategy*.
- 5.1.2 Our innovation activity is fully aligned with our LTDS. We are seeking to deploy multiple innovative technologies across our end to end sludge treatment process, the combined impact of which will be an entire step change in the bioresources model, enabling sludge treatment centres of the future to become bio-refineries. We envision fewer, but large-scale treatment centres that will generate sufficient economies of scale to recover and capture value at every stage of an integrated wastewater and bioresources production line.
- 5.1.3 Our innovation strategy has two key aspects:
- (i) **Innovative technologies that deliver benefits in AMP8:** We have incorporated new ideas in our AMP8 plan to improve our performance across our existing asset base. We are investing in low regrets, market-ready solutions. These address key risks, enable us to achieve new service standards and complement our move towards advanced digestion hubs, whilst retaining flexibility in our asset base to move to alternative strategic pathways.
  - (ii) **Researching and developing opportunities to enable long term ambitions:** We recognise that there is a need to accelerate deployment of innovative sludge treatment and disposal technologies to allow a move away in the long-term from biosolids recycling to agriculture. We are keen to collaborate with others to innovate and lead on aspects that are key to keeping alternative pathways open on our LTDS. We are aligned to the findings of the Long Term Strategy for Bioresources in England which has set out innovation recommendations in areas of high uncertainty, nurturing new industrial and technological landscapes.
- 5.1.4 In Figure 22 we illustrate the key technology innovation activities that we are progressing across our production line to help deliver benefits in AMP8 and develop opportunities to enable our long-term ambition.

*Figure 22: Key innovative technology opportunities we are progressing in bioresources*



*Source: United Utilities, 2023*

### Innovative technologies that deliver benefits in AMP8

5.1.5 We have identified and led several key innovation opportunities in the sector and conducted multiple trials in AMP7. We have delivered significant value to customers through successfully leveraging partnership funding of over £16 million, and approximately, for every pound we have invested we have successfully unlocked a further four pounds of external investment.

Our AMP8 plan incorporates stretching efficiency targets, which will partially be delivered through realising innovation opportunities trialled in AMP7. In Table 3 we set out the clear alignment between innovation action in AMP7 and how it has led to investment in our plan.

**Table 3: Innovation opportunities that have shaped our AMP8 totex plan**

Focus	Innovation activity in AMP7	Impact on AMP8 plan
Improving biosolids quality	We conducted a trial of fine screening technology, ten times smaller than existing screens, to understand the efficacy of removal of non-degradable physical contaminants such as microplastics.	The trial provided sufficient evidence to support our proposed £54.133 million regional deployment of the technology across our sites in AMP8. Details of which is set out in enhancement case: UUW66 Improving resilience in the recycling of biosolids to agriculture.
Improving digestion efficiency	Digestion is the backbone of existing sludge treatment and there are many innovative solutions to improve performance: <ul style="list-style-type: none"> <li>• Through our innovation lab we trialled [X]nutrient additive to aid conventional digestion to boost biogas yield.</li> <li>• We are trialling Ephyra plug flow digestion technology as a low cost approach to releasing sludge treatment capacity. It enables digestion at a very short sludge retention time of just six to eight days potentially allowing greater throughput.</li> </ul>	<ul style="list-style-type: none"> <li>• We are rolling out the [X] technology where short term trials demonstrate a cost effective improvement in performance.</li> <li>• In partnership with Royal HaskoningDHV we secured 40% funding through the Carbon Trust's Industrial Energy Efficiency Accelerator fund. We are aiming for £1.25 million savings in AMP8 and more if we can scale up at other sites.</li> </ul>
Improving sludge quality through increased dry solids	Volute low energy dewatering, as an alternative to centrifuges has demonstrated 84% electricity efficiency in AMP7.	This technology will be considered as an option as existing centrifuges reach end of life and need replacement and as a technology to deliver our WINEP action of enhanced dewatering.
Drying, pelletisation and advanced thermal treatment of biosolids	Drying is a key enabler of efficient transition to other treatment and disposal technologies such as advanced thermal treatment, incineration, or pelletisation. We led an Ofwat Innovation Fund bid "Bioresources Energy Recovery System" to understand how drying can be deployed and best utilised in different end applications. Our submission received wide support from across the Sector. This bid was rejected and we are considering resubmitting a proposal.	Our core pathway set out in our LTDS identifies a reduction in reliance on the agricultural outlet. The scale and timing is uncertain but the consequence is too significant not to be addressed at PR24. Details of our AMP8 preparatory works to move to alternative outlets, including use of the Bioresources Energy Recovery System are set out in enhancement case: Biosolids preparatory works for alternative outlets UUW66
Reducing process emissions to move towards net zero	We have engaged in innovative drone technology analysis in order to identify hotspots of methane emissions with Explicit ApS. Better quantification of the sources of GHG emissions has informed our AMP8 investment activities.	Drone monitoring has identified a significant process emissions reduction opportunity and we are proposing to invest in vacuum degassing technology to recover more methane from digested sludge. Details are set out in enhancement case: <i>Net zero UUW37</i>

Source: United Utilities, 2023



### Researching and developing opportunities to enable long term ambitions

- 5.1.6 We understand and value the role of innovation in solving long-term problems. We have a strong track record of working collaboratively across companies, the supply chain, academia and organisations outside the water sector. Our innovation activity in AMP8 will continue to align with this approach.
- 5.1.7 We will move towards a low emissions and increasingly circular economy business and therefore AMP8 research and innovation will align to these themes with an expectation that wider investment in deployment will occur in AMP9 or beyond.
- 5.1.8 The Long-term strategy for bioresources in England sets out the role that research and innovation must play to enable the development of future opportunities in the bioresources sector. The project identified research needs prioritised based on the development and flexibility between different strategic pathways. This includes; investigations into the fate of contaminants such as PFAS and microplastics, assessment of regulatory regimes for contaminants, prioritisation of recoverable resources and end of waste regulatory requirements, as well as identifying any remaining gaps and delivering an innovation programme to inform PR29.
- 5.1.9 We have already proposed a project (supported by all other companies) into the prioritisation of recoverable resources to be delivered through UK Water Industry Research (UKWIR). Through the remainder of AMP7 and into AMP8 we will continue to lead and collaborate on the next steps in the development of the Long-term strategy for bioresources in England.
- 5.1.10 We are leading a £7 million Ofwat Innovation Fund project “Biopolymers in the circular economy”. This will look at developing biopolymers from sludge and wastewater to replace chemical polymers currently used to aid dewatering. If successful, this could create a sustainable internal market for biopolymers.
- 5.1.11 Key to decarbonising our energy use is enabling the use of hydrogen as a fuel to replace natural gas or biogas in our boilers. We are supporting the development of the hydrogen economy locally through a partnership with a third party which is seeking to generate and supply hydrogen to our largest sludge treatment centre. This may be a fore runner to wider adoption of hydrogen use and also create opportunities for us to produce and sell hydrogen into a local network.
- 5.1.12 Key to the success of the circular economy is the development of new products from waste streams. We are working to trial a technology that will process biogas into hydrogen and lock in the carbon fraction by producing graphene. Graphene is a carbon based material that was discovered in Manchester and it has many beneficial properties. It is lightweight, strong, conductive and malleable which offers multiple potential uses and markets.

## 5.2 Utilising markets

- 5.2.1 Participation and support of markets is one of the strategic principles we have embraced to deliver our overarching vision of a competitive, agile and resilient Bioresource service. Our plan combines the following elements which aligns with our bioresources LTDS:
- (i) Driving value from mature service offerings e.g. transport
  - (ii) Engaging with the market to identify and develop effective sludge treatment services, including the provision of new sludge treatment capacity
- 5.2.2 Lastly, markets have the potential to meet new and emerging service needs, e.g. alternative outlets for biosolids. The bioresources services market of the future will need to evolve to comply with regulatory change. For example the challenges facing the sector on continuing to recycle biosolids to land will require new solutions. We see this as a future opportunity for markets to deliver these new services.

### Driving value from mature service offerings

- 5.2.3 Existing procurement activities enable us to drive value from our supply chain where the market is mature and this enables us to secure competitively priced goods and services which underpin the



efficient delivery of our bioresources service. Examples of this includes chemical supplies such as polymers to thicken sludge, HGV transport contracts, as well as specialist maintenance services and restoration outlets.

### **Engaging with the market to identify and develop effective sludge treatment services, including the provision of new sludge treatment capacity**

- 5.2.4 We forecast that overtime, as markets grow, we will need to have less reliance on our own treatment capacity and can make use of third parties and other water companies to treat sludge. However, there are currently significant barriers to the use of markets: A misalignment has developed between the environmental and economic regulatory frameworks, with uncertainty over new future environmental regulatory requirements, and investment risk is amplified by the lack of RCV protection in bioresources, creating uncertainty around cost recovery. This is actively inhibiting our use of markets in many areas as uncertainty is priced at too high a cost.
- 5.2.5 Our sludge forecast is showing a year on year increase in sludge produced over the long term. This is primarily due to wastewater quality requirements, particularly phosphorus removal, and population growth which is increasing sludge volumes. By the end of AMP7 we will have a sludge treatment capacity deficit that will need to be addressed.
- 5.2.6 Bioresources is not eligible for DPC and instead we are exploring the potential to drive efficiencies through competitive markets by tendering for new capacity for sludge treatment in excess of our current processing capability.
- 5.2.7 Our plan to address the capacity deficit, which will grow over time, is as follows:
- **Secure short-term market treatment capacity or outlets for sludge in AMP8.** We are planning to undertake procurements to secure short-term market outlets for sludge. This could be through sludge trading to sludge treatment centres and/or land restoration outlets. This short-term market solution will provide capacity until long-term sludge treatment capacity can be secured. We expect that short-term market solutions will offset our forecast sludge treatment capacity shortfall.
  - **Secure long-term guaranteed market treatment capacity.** Our plan is to launch a procurement in AMP7 to secure guaranteed sludge treatment capacity by the end of AMP8. Our early market engagement in AMP7 has demonstrated that sufficient capacity does not already exist in the market and must be built by whomever will provide the service. We have issued a Prior Information Notice (PIN) and will conduct a procurement process to obtain tenders to design, build, own, finance and operate new treatment capacity for around 20 per cent of our total sludge volume. At present, there is limited market capacity and capability which creates uncertainty around the competitiveness of any bids that we may receive. We will perform a value test against our own estimated cost to deliver before committing to appointing a third party to ensure best value in order to protect customers.

### **Our experience of short-term trading opportunities in North West**

- 5.2.8 We issued a PIN in March 2023 to find a market solution to our forecast shortfall in sludge treatment capacity. We did not receive responses for trading opportunities to digestion facilities, and the only option with the potential to provide significant capacity was using land restoration. Our discussions, supported by Atkins assessment of sludge treatment capacity across all WASCs (WINEP treatment capacity, 2023), concluded that there is limited potential for sludge trading without new capacity being specifically built.
- 5.2.9 We have also engaged with our neighbouring Wastewater Companies and found that even when market information identifies potential tradable capacity, significant operational caveats undermine the potential usefulness and value of that capacity, and for some the capacity does not appear to be available. The caveats include:
- Restrictions over the quality of traded sludge, limited to cake and excluding sludge from biological phosphorus removal due to its different handling characteristics and reduced energy value.

- Companies are unwilling to release headroom capacity for their own resilience purposes, retaining capacity to meet variations in annual sludge production and planned and unplanned outages.
- 5.2.10 We continue to bilaterally trade relatively small volumes of sludge but these activities are restricted to times when there are operational challenges and these opportunities are short-term and transient in nature.
- 5.2.11 For the purposes of our cost forecasts we have assumed the use of market restoration capacity to meet our capacity deficit as this is currently considered a competitively priced and more guaranteed outlet. We will continue to engage the market to ensure delivery of best value solutions to meet our capacity shortfall in AMP8.

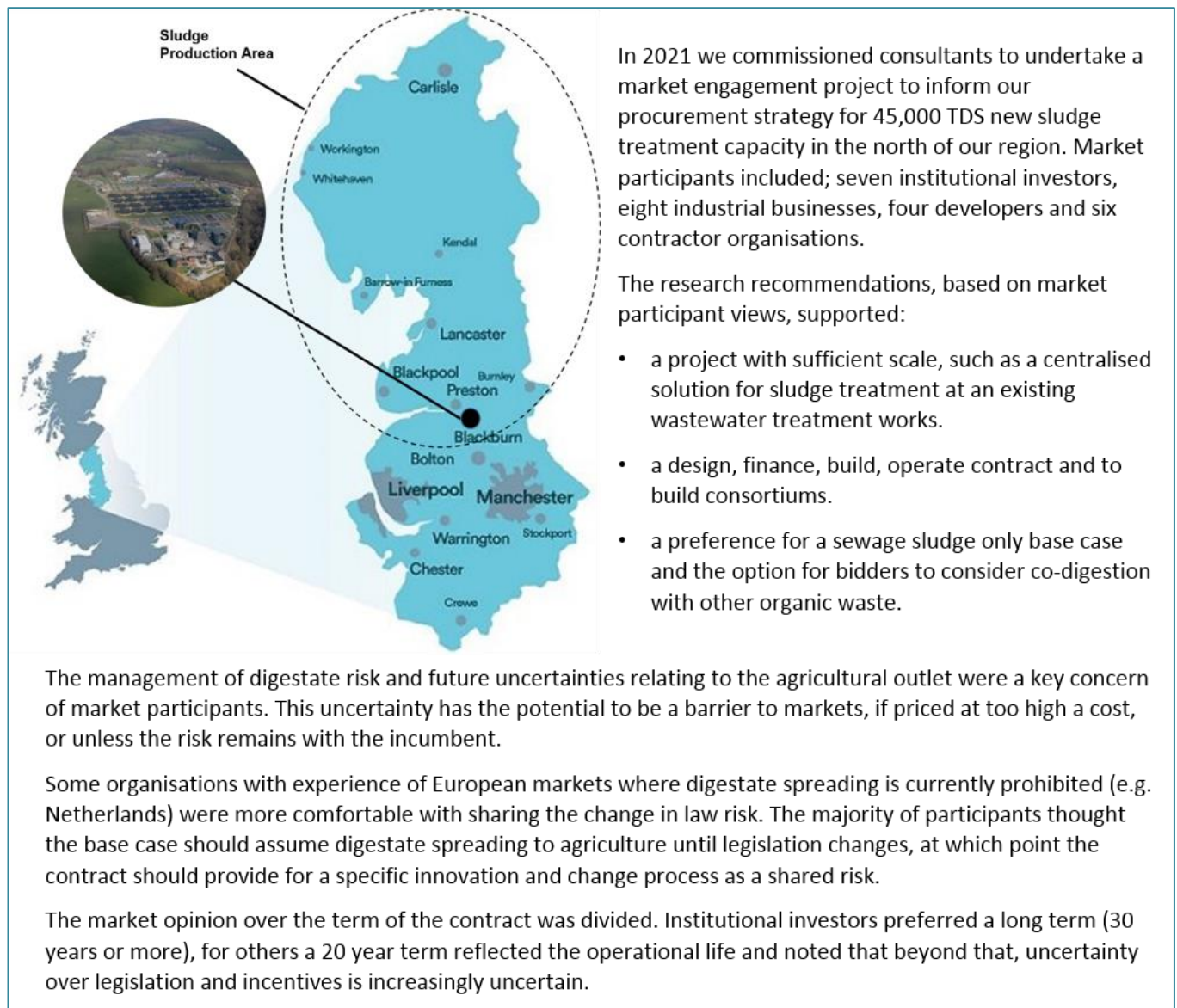
#### **Use of the bioresources Bid Assessment Framework**

- 5.2.12 Our bioresources Bid Assessment Framework (BAF) went live on 29 September 2022. The purpose of the BAF is to engage potential third party providers to support us to meet the requirements for our appointed bioresources activity. More information about development of the BAF is provided in supplementary document *UUW51 – Bid Assessment Framework*.
- 5.2.13 Four bids in relation to Bioresources Services have been received. These bids have yet to reach the outcome stage of the BAF process. Given that these bids are currently being progressed limited information can be provided at this time. Nevertheless one of the bids is showing some potential and it is hoped that this bid will to be able to be progressed at pace.

#### **Stimulating the bioresources market for new capacity**

- 5.2.14 Our experience of existing market opportunities and levels of engagement in the North West has led us to focus our activities on leading the development of markets to create new capacity. Developing effective markets for sludge treatment is a cornerstone of our future plan and we have already completed a range of activities to engage and stimulate the market.
- 5.2.15 We have undertaken extensive engagement with market participants to develop a procurement model for delivery of new long-term treatment capacity, and identify the preferences and requirements of service providers that will enable them to provide effective and competitive services. We issued a PIN and followed up with multiple rounds of one-to-one engagement with the service providers that responded. Progress has been challenging due to regulatory uncertainty, particularly the future availability of landbank for biosolids recycling. Our conclusion based on this engagement is that there are capable and interested suppliers in the market which has encouraged us to look to procure this new sludge treatment capacity from the market, rather than using an insource or traditional design and build contractual model. Further information is provided in Figure 23.
- 5.2.16 We have taken a comprehensive and varied approach to the opportunities to participate and support a new and existing bioresources market, the culmination of which is the intent to undertake an innovative procurement to create an opportunity for new sludge trading capability for 20 per cent of our sludge treatment capacity in AMP8.
- 5.2.17 We have ensured we have aligned the effective development of markets for sludge treatment services with our LTDS which is critical to avoid abortive market led service delivery.

**Figure 23: AMP7 activity to inform our procurement strategy for new market capacity**



## 5.3 Leading the sector in collaboration and partnership

- 5.3.1 There is no long-term future regulatory roadmap set out for bioresources and the overall vision for the sector is unclear. The strategic challenge to optimise biosolids management requires multiple partners to collaborate (private, public, third sector and academia). To tackle this, we aim to build open collaboration across several sectors.
- 5.3.2 While we know that the future will not be ‘business as usual’, there is significant uncertainty of the scale and timing of this change. There are two core challenges which have significant implications for the way we go about our business in AMP8, making collaboration and partnership essential for defining the future of our business:
- **Clear objectives** – there is no clear policy direction on how the multiple risks and benefits associated with the management of sewage sludge should be balanced and prioritised to deliver the optimal overall outcomes in the national interest.
  - **Scale of the change** – the challenge is so significant no single company can absorb the first-mover disadvantage by moving out of landbank and developing and deploying new technologies in isolation.

- 5.3.3 Our work is focussed on helping the industry and regulators better understand the issues, highlight risks, and promote appropriate management of the risks. This work has been across various bioresources issues including FRfW enforcement, the EA Sludge Strategy and the WINEP sewage sludge drivers.
- 5.3.4 We are a thought leader in the sector calling for national collaboration. Our paper, “Unlocking greater value through a national bioresources strategy”, published in November 2021<sup>16</sup> was the first call for the development of such an approach and was the impetus for developing the Long-term strategy for bioresources in England.
- 5.3.5 The National Bioresources Strategy for England was published in 2023. The strategy identified that there are multi-faceted options available for the English water sector to deploy and consider, alongside regulatory, technological and market constraints. There are many beneficial environmental outcomes that are achievable through effective, circular bioresources management, but, there are also several environmental and health impacts that must be carefully mitigated.
- 5.3.6 In AMP8 we advocate continuing to develop the national strategy and setting out a roadmap for change. Transformational change for the sector must be endorsed by stakeholders and enabled through collaborative planning between environmental and economic regulators and companies.
- 5.3.7 As well as our work to support the industry and regulators to understand and resolve changes over the future of the sector, we have identified multiple opportunities where we will work in partnership to unlock greater value through our activities. The key collaborative opportunities we aim to continue or develop in AMP8 are:
- **Agricultural partnerships with the farming community of the North West:** Access to agricultural landbank is reliant on biosolids acceptance by third party land managers and it is therefore essential that we work in partnership with our farmers, fostering good relations and delivering a high quality product. Our field staff are Fertiliser Advisers Certification and Training (FACTS) qualified and we offer free agronomy and nutrient planning advice to our farmers to support them in using our biosolids compliantly and with minimum risk of harm to the environment. Each year our biosolids supply nutrients, minerals and valuable organic matter to almost 20,000 hectares of agricultural land, delivering a financial value of almost £9 million.
  - **Collaboration in electric HGV trials with other sectors:** We have been successful in securing almost £1 million funding from the Zero Emission Road Freight (ZERFD) demonstration programme run by the Department for Transport, in partnership with Innovate UK. As part of a consortium, we are collaboratively working towards the development of national HGV charging infrastructure which aims to accelerate and inform the rapid decarbonisation of the UK’s long haul HGV sector.
  - **Phosphorus recovery:** At our largest wastewater treatment works, we will install a phosphorus recovery plant to recover 255kg of phosphorus per year from sludge liquors. We aim to work in partnership with inorganic fertiliser manufacturers to provide a feedstock for sustainable and low emissions products.
  - **Supporting the hydrogen economy in the North West:** We are progressing a partnership with Carlton Power to enable the development of a Green hydrogen energy hub, adjacent to our largest sludge treatment centre. We are supporting development of the hub, which will produce green hydrogen fuel for industry, transport and heating. We are developing a solution to provide a guaranteed offtake of hydrogen to support the early development of the project, and use the fuel to displace fossil fuel use in our boilers, and help us to reduce our greenhouse gas emissions.

<sup>16</sup> [unitedutilities.com/globalassets/documents/pdf/unlocking-greater-value-through-a-national-bioresources-strategy.pdf](https://unitedutilities.com/globalassets/documents/pdf/unlocking-greater-value-through-a-national-bioresources-strategy.pdf)

## 6. A Notified item to manage uncertainty in future bioresources requirements

- Our AMP8 business plan is focussed on low regret interventions, where we have high certainty in the scope and the investment needed to meet new service standards. This approach includes the necessity of a Notified item as a means of managing the residual investment risk over uncertain future investment requirements. We believe this is the right approach to best protect the interest of customers.
- We are seeking a Notified item to manage uncertainty over both:
  - (1) the immediate costs and future investment requirements arising from a significant change in the supply/demand for available landbank that is currently relied upon as an agricultural outlet for recycling of sewage sludge; and
  - (2) the costs required to meet new improvement conditions arising within permits (or the requirements to meet exemption criteria). This could be either as a variation to an existing permit (or exemption), or from the creation of a new permit.

- 6.1.1 The bioresources sector is undergoing significant and unpredictable change, including evolving (and tightening) regulation to meet Waste Framework Directive requirements (which also encapsulates IED regulations) and multiple regulatory and market drivers that constrain the use of the agricultural outlet for biosolids recycling – either by reducing the landbank available, or placing restrictions on the use of land (such as requiring reduced rates of spreading) such that more land would be required. This could drive a significant change (and likely a deficit) in the supply/demand balance in the agricultural landbank required for sludge recycling.
- 6.1.2 These changes have the potential to drive very significant new investment requirements. In contrast, changes in the past have been relatively small, when compared with the potential scale of investment required in future price control periods.
- 6.1.3 Our AMP8 business plan is focussed on low regret interventions, where we have high certainty in the scope and the investment needed to meet new service standards. We have taken a balanced view of the agricultural outlet risk by proposing enhancement investment to improve the resilience of the supply chain to agriculture in order to maintain the agricultural outlet for biosolids recycling.
- 6.1.4 However, despite industry efforts, the regulator has not provided a clear and consistent planning assumption for the future use of biosolids in agriculture. National landbank modelling, designed in collaboration with the EA, revealed the possibility of future changes leading to a significant deficit in the landbank available (in some scenarios).
- 6.1.5 A reduction and/or deficit in the agricultural landbank could arise as a result of multiple external factors including; implementation of known regulations where requirements have not been confirmed, such as Farming Rules for Water (whereby the full impact of those regulations has not impacted on water companies, due to other factors such as the intervention by Defra through statutory guidance to curtail EA enforcement of regulation); the introduction of new regulations, such as the EA Sludge Strategy moving recycling to agriculture into Environmental Permitting Regulations; the response of third party land owners to changing regulatory requirements, or to an adverse public perception of using biosolids in agriculture and the subsequent negative impact that would have on the demand for biosolids. It is unclear which of the numerous potential triggers will be activated between now and 2030. It is also unclear as to the extent of the compounding effect that multiple changes may have.
- 6.1.6 Scenario testing of our core pathway evaluates the impact that an adverse agricultural outlet scenario would have if it materialises in AMP8. If it does, this may require immediate costs (for UUW alone) of circa £300 million in AMP8 to divert biosolids away from agriculture alongside commencing and



committing to a further £700 million of investment in AMP9 to deliver a resilient and long term alternative outlet for biosolids.

- 6.1.7 These risks have not been addressable through the WINEP process. The industry presented to Ofwat, EA and Defra a view of scale of the risk and the investment needed to meet WINEP bioresources drivers, including a scenario where two thirds of the biosolids could not be recycled to agriculture. Most of this was rejected by the EA due to incompatibility with its interpretation of its WINEP drivers. However, it is important to clarify that this rejection by the EA was not a rejection of the potential investment need, but a rejection of its classification under that WINEP driver. Regardless of the WINEP outcome, if some of the more extensive outcomes arise (such that there is a significant deficit in available landbank), then significant investment will be required, regardless of whether or not the WINEP drivers align with those needs.
- 6.1.8 The timing of a significant change is also currently unclear, and unlikely to be clarified prior to PR24 final determinations. Industry discussions on defining the requirements for the implementation of Farming Rules for Water with the EA is continuing with no set date for a conclusion. The published EA sludge strategy has recently been updated specifically to remove a date of implementation. The published Defra statutory guidance on farming rules for water (which currently enables water companies to continue use of agricultural outlets, without risk of prosecution under FRfW) must be reviewed at the latest by September 2025. The outcome of that review cannot be known at present but it could be the trigger for a significant change to the agricultural outlet for biosolids recycling early in AMP8.
- 6.1.9 It is not acceptable for companies to carry the full risk of a significant reduction in the agricultural outlet. This concern is particularly acute for bioresources, given that there is no customer sharing mechanism for the bioresources costs. This leaves companies exposed to the full cost of the investment required to meet new service standards with no mechanism for recovering the efficient resources to meet these statutory obligations.
- 6.1.10 For the reasons set out above, we have set out business plan that:
- (a) includes high certainty requirements that provide a clear scope and cost with low regrets investments (including our enhancement cases to improve biosolids quality and supply chain resilience to help maintain this outlet), and
  - (b) includes the necessity of an uncertainty mechanism (this Notified item) as a means of managing the uncertainty in future investment requirements.
- 6.1.11 We believe this is the right approach to best protect the interest of customers – better than seeking to recover significant additional amounts up front from customers and then refund them in the event that those investments are not required.
- 6.1.12 We believe that the agricultural outlet risk should be recognised as a Notified item, as defined under condition B of our instrument of appointment. We consider that it is sufficiently unclear as to whether any future change would qualify as a Relevant Change in Circumstance, given that:
- (a) the precise route to the loss of landbank is currently unclear, and
  - (b) whether or not the loss would arise directly as a change in legislation to water companies, or indirectly via restrictions placed onto the agricultural sector.
- 6.1.13 What is clear is that it is the loss in available landbank itself that is the trigger to required investment, not the specific route (legislative or otherwise) by which that occurs. Therefore, a Notified item is warranted in this case.
- 6.1.14 Furthermore, the precise investment needs will depend on the extent of the landbank restrictions and how this is best co-ordinated around the industry to manage it. It is important to recognise that a deficit in available landbank would be an industry-wide issue, not just a regional issue for UUW. Therefore co-ordination will be required (which we have already raised with Ofwat, to seek its support) to ensure that



investment requirements across the sector are efficient. The IDoK process is best placed to give appropriate consideration to the specific investment needs identified.

- 6.1.15 We are aware that other companies have also identified the agricultural outlet as a risk and will likely be seeking similar or alternative forms of uncertainty mechanism. What is essential is:
- (a) that Ofwat accepts the need for some form of uncertainty mechanism in AMP8 to manage the risk to landbank availability, and
  - (b) that it is recognised that it is an industry issue, and therefore applies a common and co-ordinated approach.
- 6.1.16 In addition to the landbank risk, the Bioresources sector is also facing further uncertainty in future changes to site base permits (or exemptions) under waste permitting regulations. For example, this would include a future change in IED guidance published by EA that leads to an IED permit variation, which specifies the improvement conditions (i.e. the additional investment we need to make) to meet those requirements. It is the conditions set out in the permit that establish the required new investment. During recent correspondence between UUW, EA and Ofwat, it has been stated that such permit changes may not qualify as a relevant change in circumstance under condition B. If that is the case, then a further Notified item is required to manage changes under waste permitting regulations that were not reflected within PR24 determinations. If Ofwat agrees that such permit variations are a relevant change in circumstance, then we would agree that this component of our proposed Notified Item would not be required.
- 6.1.17 The Notified item that we are seeking is for both:
- the immediate costs and future investment requirements arising from a significant change in the supply/demand for available landbank that is currently relied upon as an agricultural outlet for recycling of sewage sludge; and,
  - the costs required to meet new improvement conditions arising within permits (or the requirements to meet exemption criteria). This could be either as a variation to an existing permit (or exemption), or from the creation of a new permit.

**United Utilities Water Limited**  
Haweswater House  
Lingley Mere Business Park  
Lingley Green Avenue  
Great Sankey  
Warrington  
WA5 3LP  
[unitedutilities.com](http://unitedutilities.com)



**Water for the North West**