

# Research report

## Bioresources research



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# Background, objectives & methodology

# Background

United Utilities (UU) transports, treats and disposes of around 200,000 tonnes of sewage sludge, known as “Bioresources” each year.

The business aims to provide an efficient service at the lowest cost and needs to make decisions as to how best to manage its sludge services in the future. It is important that customers’ opinions are fed into this decision-making process, and so United Utilities would like to establish customer preferences in relation to our Bioresources long term adaptive planning pathways.

It is important that United Utilities gains an understanding of customer preferences regarding what it invests in, regardless of bill impact, as it is likely to have an affect either way.

United Utilities wants to understand customer preferences for the environmental outcomes alternative technologies can deliver.

## More specifically, UU wants to explore the following areas:

1. Overall customer preferences regarding the Bioresource long term adaptive plan.
2. The trade-offs customers are willing to make in regards to treatment and use of biosolids.
3. The different priorities of customers regarding the long term plan, including environmental/climate factors and bill implications.
4. The combination of Bioresource pathway and billing combination that is most attractive to UU customers.

# Methodology: qualitative

We conducted 5 x 3 hour deliberative workshops with a total of 60 current customers and 12 'future bill payers'. All respondents were screened based on being a United Utilities customer and sole/joint bill payer, except for the future bill payer session.

- # 1 (pilot), Trafford, n=16 participants
- # 2: Preston, n=15 participants
- # 3: Warrington, n=15 participants
- # 4: Carlisle, n=14 participants
- # 5\*: Manchester, n= 12 participants

Across the sessions, to ensure that we speak to a variety of people, a mix of SEG, age, metered status, life-stage, vulnerability and proximity to sewage processing plant were recruited. We also recruited to each session a minimum of two people who had experienced an issue with their local sewage processing plant in the last 5 years as well as a range of views towards the environment.

Two digitally disenfranchised participants also attended each workshop (excl. the future bill payer session).

\*We conducted 1 session with future bill payers who were recruited via our panel and social media. These participants were aged between 16-29 and not currently paying a water bill. This session was also attended by YourVoice.

Post-pilot, we asked all participants to review some stimulus provided by United Utilities prior to attending the sessions. This helped to bring them up to speed on some of the day to day activities of the company and what we'd be discussing during the evening.



Fieldwork was carried out in August and September 2022.



# Methodology: deliberative

How we structured the deliberative workshops was important and they tended to take the shape of a funnel.

What this meant was that we started off very open ended (and uninformed) before becoming increasingly deliberative as the discussions progressed, introducing specific parameters and drip-feeding information (i.e. different bioresources pathways etc), but being careful not to lead participants or prime them with answers.

This was done with the support of UU experts, who attended each session to ensure that the discussion was lead by the available facts and evidence, and that any specific or technical questions posed by participants were answered.

Throughout the discussions participants were provided with multiple ways through which they could engage with the subject matter. This included subject matter experts (from UU) attending all sessions, large size and engaging virtual stimulus and hard copy boards showing each of the pathways.

Together, this was designed to enhance the experience into one that was as stimulating to the senses as possible.

The full pathway diagrams and descriptions are detailed in the appendix to this report.



Tactile formats including boards and samples of fertiliser, ash and pellets.



Large, engaging stimulus



Engaging presenting

# Methodology: iterative by design

This research was covering a highly complex topic area which ran the risk of confusing participants if an iterative approach wasn't adopted from the outset. To help ensure that the materials and discussions were as understandable as possible, a multi-phased approach to refinement was taken. This is summarised below:

## Initial pilot with future bill payers

As our materials were being designed they were piloted with DJS in-house future bill payers to gauge initial levels of comprehension.

This led to small tweaks being made prior to the first workshop taking place. For example:

- Resizing of certain imagery to be more prominent
- Simplification of language to enhance comprehension

United Utilities' customer challenge group, YourVoice group was consulted to provide an overall critique of the research and research tools, with the purpose of improving the design of the research.

## Post-pilot workshop revisions

Following the pilot workshop, areas for further refinement were identified in order to enhance the ease and relevance of the research, in line with [CCW's recommendations on better customer engagement](#). For example:

- Relatable analogies were incorporated (referring to "160k Olympic sized swimming pools" and "If we put all the sludge on the Old Trafford football pitch it would be 56m deep!" *as opposed to only* "200k tonnes of sludge")
- Portions of discussion reduced/streamlined
- Portions of additional discussion inserted to help add context (i.e. pre-reading sent to participants, scene setting introduction, general priorities when planning future investment)

## Subsequent refinements

Whilst the post-pilot discussion represented the basic form of the subsequent discussions, further refinements were iteratively made after each session to enhance the experience further. For example:

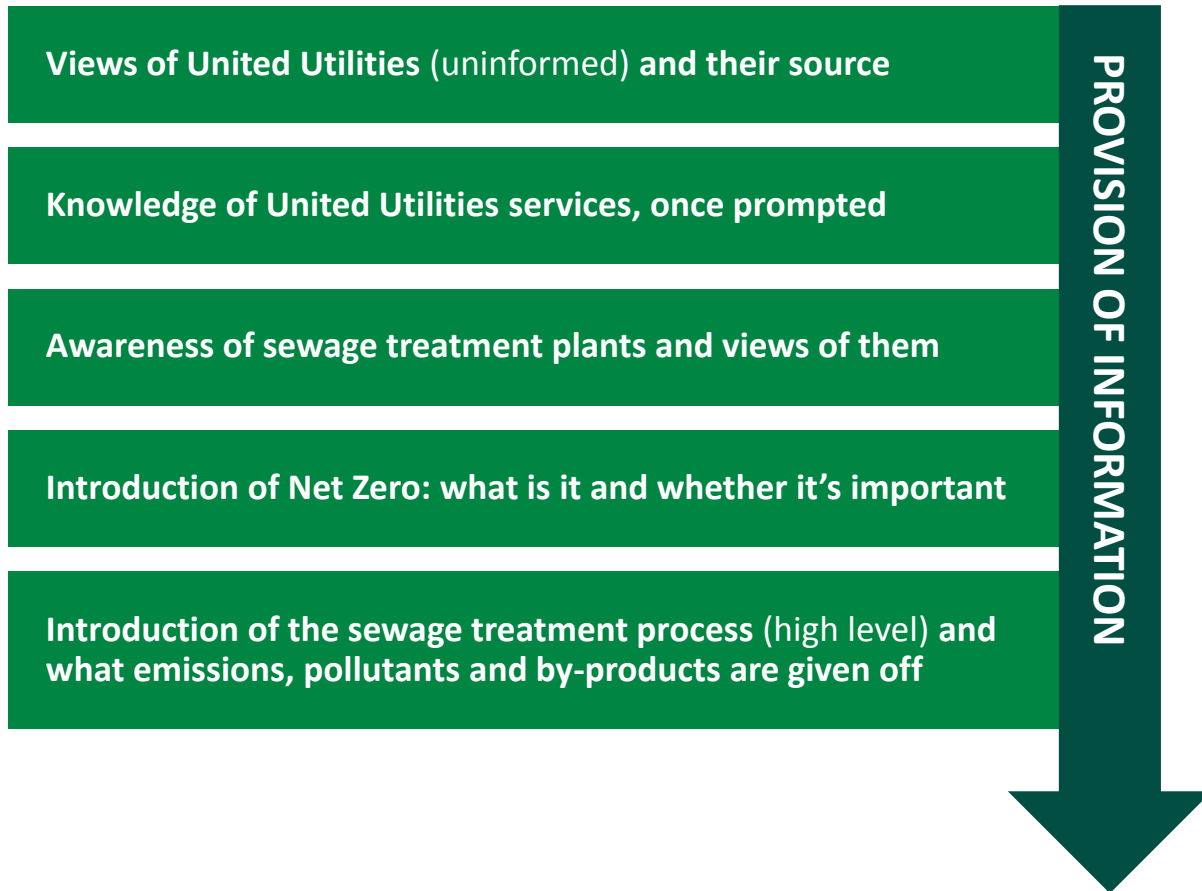
- Location specific additions, such as Cumbria's "liming" process
- Materials being updated (i.e. new symbols being included to aid comprehension)

# Participants' views: The contextual backdrop



# The sections of the deliberative funnel

In this section, we provide amalgamated feedback using a 'deliberative funnel':



This process provides the knowledgebase upon which participants were able to provide their views on the pathways.

The first half of each workshop was used to build a knowledge of the topic and enable participants become comfortable with the necessary subject matter.

# Views of United Utilities are dictated by different sources, predominantly experience (or lack thereof) and the media...

## When discussing perceptions of United Utilities, a range of views were heard.

Those who've had no dealings with UU tend to trust that they are acting in customers' best interests generally, and in relation to the environment.

*'I trust them. I turn my tap on water comes out, flush my toilet, it goes away. I wouldn't say they're efficient, but I do trust them.'*

Warrington, ABC1

\*This research was taking place at a time when a lot of media stories around sewer overflows and leakage were in the national media.

However, those who have had bad experiences or who have been exposed to media stories\* hold more negative views.

"I have gone by my own personal experience...a few years ago the water was contaminated in Preston, with faeces. I was heavily pregnant at the time and they were giving you advice not to even sit in water, drink water or bathe your kids.

There wasn't really a full explanation as to how that got infected, so I felt like that was really badly managed and put a risk to a lot of vulnerable people."

Preston, ABC1

"You see things on the news where sludge gets put into the rivers...Those are the things you hear about quite a lot and that is why I scored it slightly lower. [When it comes to leakage...] it seems to be a bit like a bank losing money now and again and asking us to accept it!"

Preston, ABC1

# Customers understand what United Utilities does at a general level, albeit their knowledge of the specifics when it comes to the sewage treatment process is (mostly) lacking

When prompted with a list of UU services, most participants generally felt this was inline with what they thought to be the case.

However, when the discussion moved onto the sewage treatment process, the majority of customers were (pleasantly) surprised that recycling of poo occurs.

“It is a bit disgusting but it is a good thing if there is no better use for it...”

**Preston, ABC1**

That said, at this *initial* level of understanding, concerns are apparent for some. This is largely due to concerns around whether the recycled waste can retain some ‘nasties’ that could then make it through to crops...

Concern was particularly pronounced amongst those who have a keen recreational interest in the environment (i.e. wild swimmers) who were particularly vocal on this. Future bill payers were particularly concerned about river health.

“I think it’s great because things aren’t going to incineration or landfill, it’s positive for the environment.”

**Trafford, C2DE**

“They are recycling the waste which I don't like the sound of, only because of all the chemicals in it and people’s medication...”

**Warrington, ABC1**

## As the discussions unfolded, it was apparent that most were aware of the sludge treatment plants near them...often due to the odour

Customers are often aware of the sites, with a few even having visited them and others wanting to.

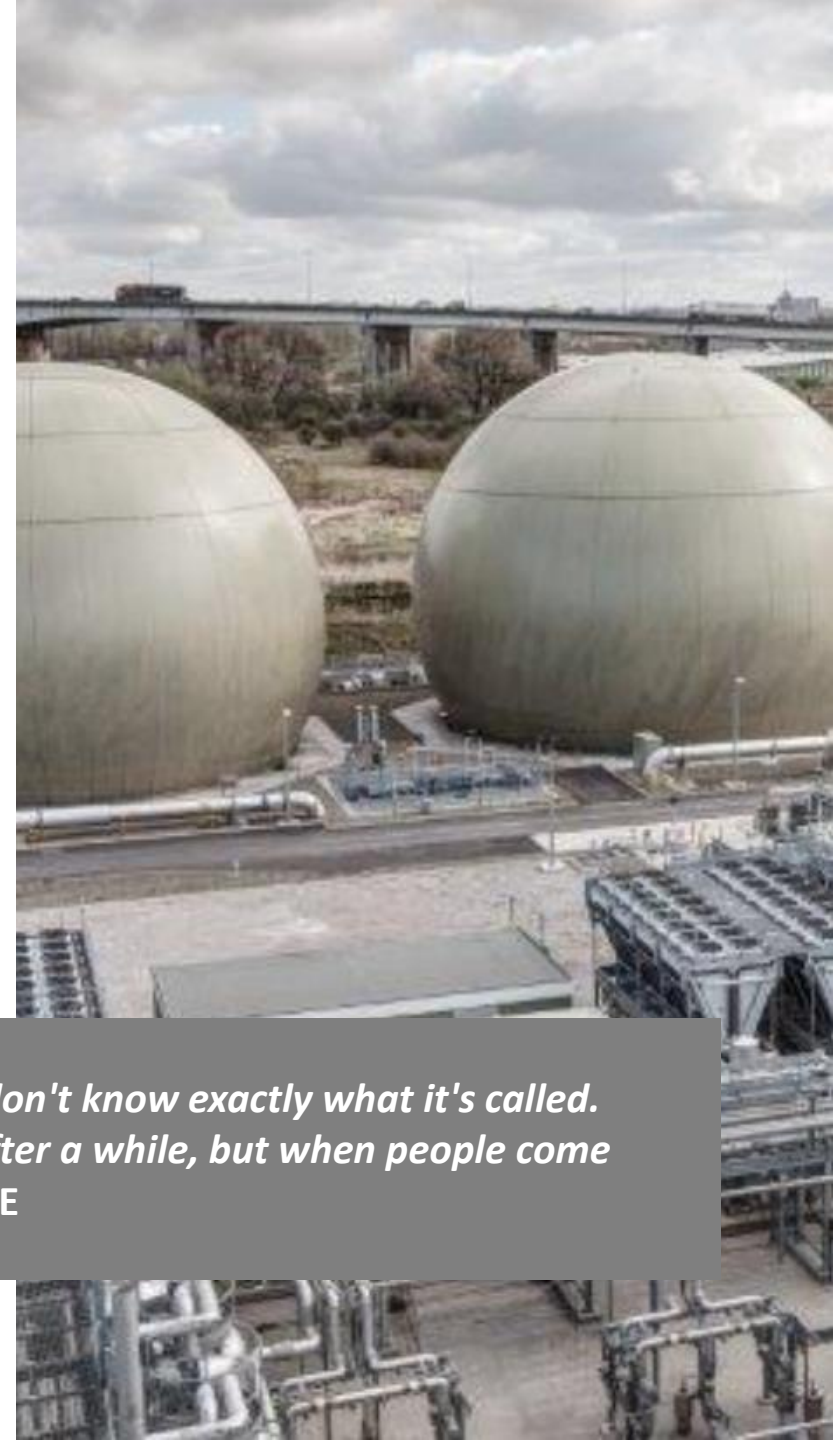
“I see the big waggons coming out of the plant. I don't know if they're going in with something or coming out with something... I've always wanted to have a look around actually...”

**Trafford, ABC1**

Those impacted by the periodic smell tend to say that you just get used to it (and that it has improved considerably over the years)...even though that doesn't make it any more welcome at the time and can lead to concerns about house prices and the desirability of an area.

It can also lead to some embarrassing moments if you are to have any badly timed visitors.

*“I live near one. It's close to where I live. It's about two miles away in Warrington, I don't know exactly what it's called. But you can smell it when the winds blow in the wrong direction. You get used to it after a while, but when people come to visit, they do make comments.” Warrington, C2DE*



# As the discussions developed and were placed in the context of Net Zero, it was clear that whilst the term is familiar, its precise meaning isn't understood by all...

The majority of customers are familiar with the term Net Zero, largely due to its presence in the media. That said, there is a degree of vagueness that exists when it comes to its precise meaning.

Many associate the term with the environment and doing things that are good for the environment.

"It is to with cars and transport and the affects to the environment when you move things around...you are causing problems to the environment."

**Preston, C2DE**

Whilst a smaller proportion correctly recognise the term as referring to the achievement of **a balance** between input and output of emissions.

"Is it to do with the carbon footprint, where you balance out the amount of carbon you use with the amount you take out. That's why a lot of companies grow trees, to help balance it out?"

**Carlisle, ABC1**

Future bill payers showed similar levels of understanding of Net Zero to customers

Once explained, in terms of Net Zero's importance, the vast majority feel action should be being taken to work towards achieving it. However, there was some feeling that, to a large extent, achieving Net Zero is very much out of individual people's control.

In addition, working towards Net Zero at present is taking place against a backdrop of **rising bills** and participants admitted that priorities might shift as their financial positions do.

"I think it's important. Definitely, definitely important but very much out of our control as well. Yeah, it's difficult to ask these questions because it is important, but then there are other things that are important, for example, keeping bills manageable. Very [important] in fact, particularly as bills are going up, up and up!"

**Warrington, ABC1**



# The sludge cycle

Specifics were provided on exactly what emissions, pollutants and by-products are given off by the sewage treatment process to further build participants' knowledge.

These were separated into things United Utilities could use, such as:

- ✓ Methane
- ✓ Sludge
- ✓ Waste water
- ✓ Nutrients (Nitrogen & Phosphorus)

And things that United Utilities need to get rid of, such as:

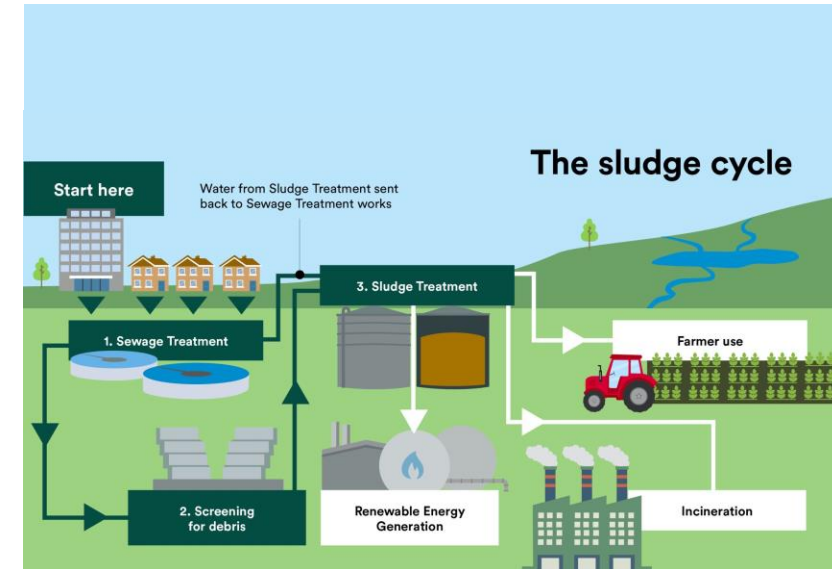
- ✗ Microplastics
- ✗ Bacteria

Participants were further told that the screening process takes out much of this unusable material and that 95% of sludge is ultimately recycled...

What's interesting here is that whilst participants knew little about this process prior to attending the sessions, they all had preconceived notions of what would constitute an expected level of recycled sludge. The reality of the situation, therefore, was positively received as this was much higher than most anticipated.

"Yeah, I wouldn't have expected it to be that. I know. I was shocked actually. Pleasantly shocked."

**Warrington, ABC1**



"5% is quite high, [given] the amount of sludge they are treating, I think they should be doing more to get that down to about 1%."

**Future bill payer**

There were no clear indicators of what drives expected levels of sludge recycling, but views were generally very positive about this statistic. That said, a minority, especially within the future bill payer group, mentioned that 5% is still a large amount of material to go to landfill.

# A note on microplastics

**Whilst not unanimously understood, for those that were aware of what they are, microplastics were of real concern. In fact, for a minority it was *the* reason why some had agreed to attend the session.**

Whilst sympathetic to United Utilities in terms of them not being the cause of microplastics floating around, their presence is a cause for alarm for many:

“We're all ingesting microplastics. Which we shouldn't be, we need to stop it.”

**Preston, C2DE**

The presence of microplastics leads to altered behaviour for some who believe that using Britta filters removed microplastics from their water, which is otherwise believed to be present in tap water.

The negatives of microplastics, as we'll see, were ever present in people's thinking and considerations of the pathways encountered later in the discussions.



***“Just news stories that you see. And documentaries, you see on Netflix. I think it causes cancer and things like that.”***

**Warrington, C2DE**

# Reaction to pathways

# Testing the pathways: structure of the conversations

At the end of the first, educational section of the session, participants were given a short break to digest the information they had received. After this break, the conversation turned specifically to the future pathways open to United Utilities. 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.

## Establishing participants' priorities

Before introducing the pathways themselves, participants were asked to identify their more general priorities against a list of United Utilities key considerations.

Once this was complete, participants were also invited to express a preference for upfront or incremental investment strategy, and for investment in new, innovative technologies vs. tried and tested ones.

The purpose of this stage was to identify the strongest moral and emotional drivers for use as context to their evaluation of the pathways themselves.

**See appendix for details of each pathway.**

## Working through pathways

Once customers overall priorities had been gathered, the moderator worked through each of the pathways one-by-one.

This involved:

- Giving a brief presentation of the pathway, accompanied by the display of a large poster diagram that was then on display for the remainder of the session
- Mocked up "samples" of pathway products
- Taking customers' initial reactions to the pathway and gathering spontaneous suggestions of pros and cons
- Revealing an 'official' account of United Utilities suggested pros and cons for discussion

## Measuring popularity

At the end of this spontaneous and then prompted feedback session, customers were engaged in an activity designed to gauge their enthusiasm and acceptance of each one.

This simple exercise asked them to allocate 100 'points' across each of the six pathways, representing the extent to which participants would like to see United Utilities invest in each.

After the first of these exercises, customers were given a comparative ranking for each pathway across seven different measures (carbon footprint, trucks on the road, storage, contaminants, farmer use, established technology, and impact on bill).

Once these rankings had been revealed, the points allocation exercise was run once more to identify the impact of this new information.

## Without specific details, participants struggled to make clear trade-offs between aspects of the different pathways.

Typically, participants believed that the lack of specific detail prevented them from making clear trade-off decisions about different aspects of each pathway.

“It sounds good, but we don’t have the comparative figures to know how incineration compares to the others. Unless we know the figures, we really don’t know...”

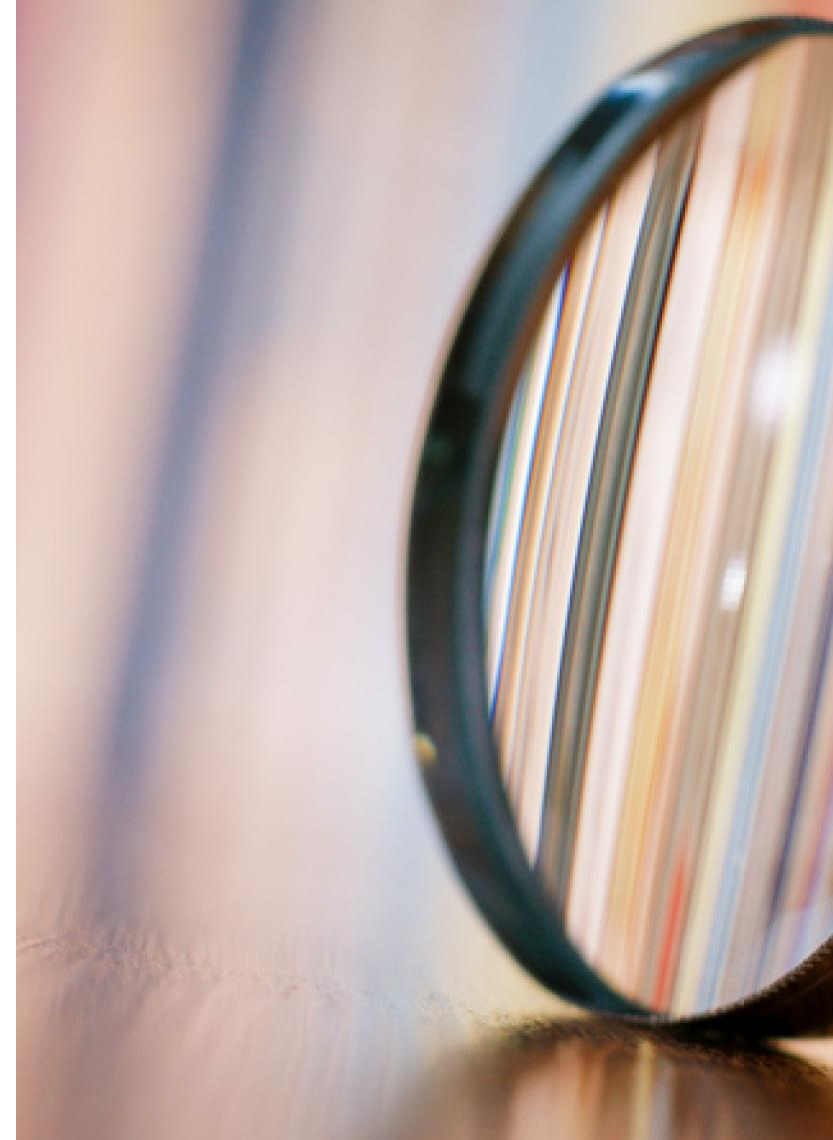
**Trafford, C2DE**

In particular, participants felt that, in order to assess the pathways fully, they would need to know:

- The pounds and pence impact on bills
- Greenhouse emission volumes
- Relative environmental impact of carbon emissions and river run-off




The consistency of some attributes across the pathways (e.g, biogas production volumes) meant that some aspects of the pathways were difficult for participants to compare.

Because of this, the conversations focussed on the prioritisation of high level considerations (e.g. the importance of reducing carbon emissions in comparison to protecting waterways) and a more general assessment of which pathways best address these priorities.





# First and foremost, customers want United Utilities' approach to guarantee their health is protected, but also to prioritise reducing emissions and pollution...

Priorities for customers regarding United Utilities' processes	Top priorities
Ensuring that human health is protected	
Minimising greenhouse emissions and air pollution	
Avoiding pollution to the ground and to waterways	

While the research left the definition of 'human health' deliberately open, for customers it was typically interpreted in terms of the safety of drinking water, the avoidance of raw sewage spillage and the health and safety of UU staff.

"Human health – for customers and for staff – that's the number one priority really."  
**Carlisle, ABC1**

A full account of how participants prioritised these and other considerations is on slide 48.

Health and environmental concerns are at the heart of customers' priorities, even more so than their bills.

However, the importance of cost varies by customer as a shifting situation at present, as almost all are seeing other bills rise. Many see a minor bill increase as an acceptable price to pay for a cleaner environment, but some already feel too squeezed (see slides 43-46 for further details regarding bills).

## ✘ Reducing traffic volumes

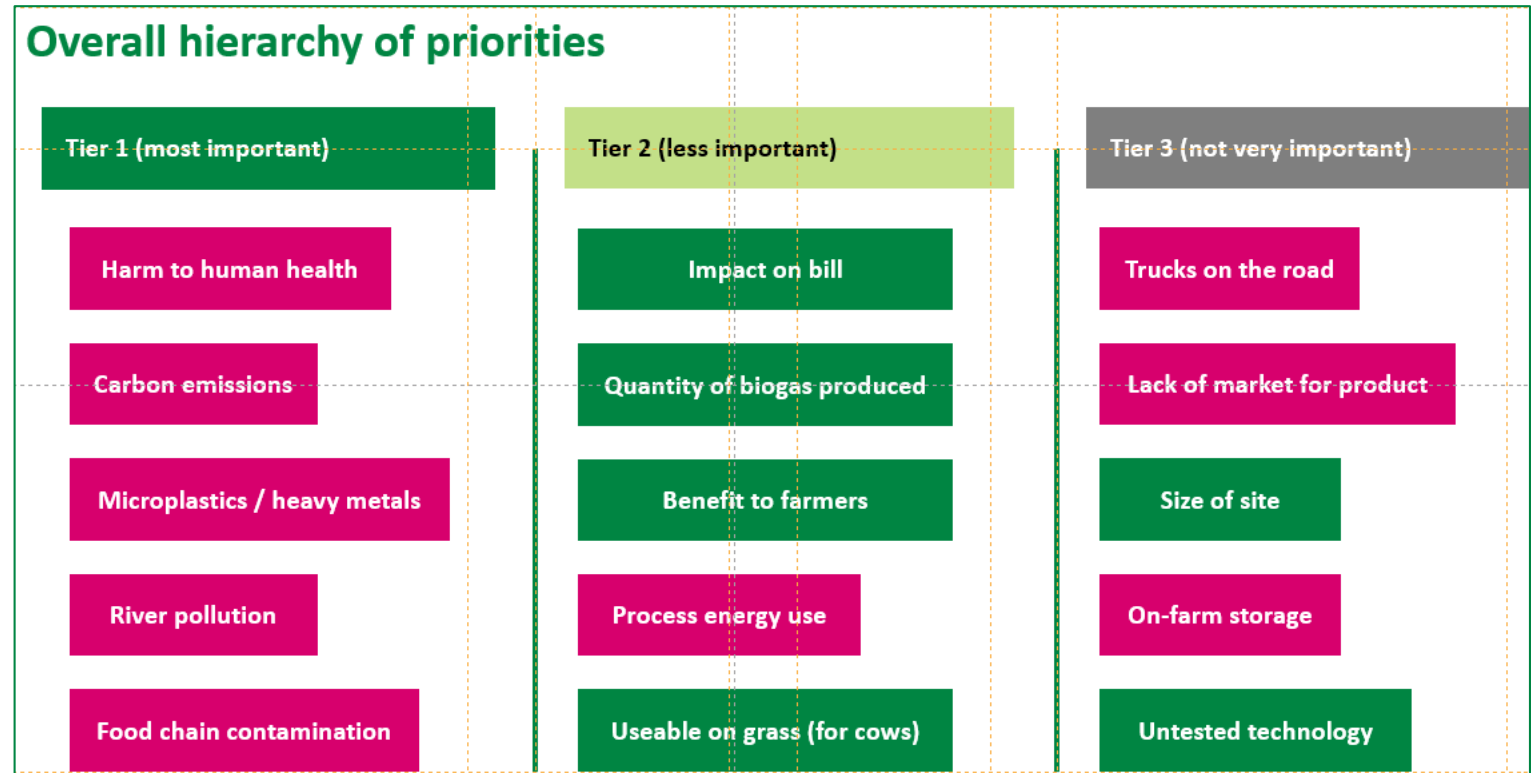
Increased traffic volumes was the least concerning aspect of United Utilities' processes, as it lacked an immediate public health impact, and was helped via the move to electric vehicles.

Many customers showed concern for the deal farmers receive, not least because our food supply depends on them

# These concerns are reflected once customers see the different pathways...

Concerns mainly centre around harm to human health (be it air pollution, microplastics or food chain contamination) and harm to wildlife (river pollution and microplastics)

Tier 2 priorities are important but just not as important as human health and pollution; so, people are concerned about their finances primarily, the quantity of biogas produced (which impacts on energy costs and pollution levels) and farmers, but for most, they don't compare to health.



Positive aspects labelled in green, negative aspects in red

**Least important are the Tier 3 priorities. Customers are just too distant from these for them to be a priority.**

# In ensuring these more general priorities are met (see previous slide), participants agree that a blended approach to investment is best to ensure that one eye is kept firmly on the future

There is 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, United Utilities is in the best position it can be to deal with those problems.

“If the Victorians hadn’t done what they did with the sewers, we’d be in a right mess now. They were forward thinking. We need to be forward thinking. There’s no point panicking once the horse has bolted.”

Preston, C2DE

Focusing on the tried and tested technologies should provide a bedrock on which a foundation of improvement can be built. Yes, the tried and tested (by virtue of the fact that United Utilities knows it works) should be more heavily relied upon. However, more innovative options should be explored *in tandem* with the tried and tested because this is how improvements in any field are seen to be made.

“You’re screwed if something happens five years from now [and you haven’t invested]. At least if you’re investing now and something goes wrong, you’ve got the infrastructure to deal with it.”

“Fail to prepare, prepare to fail.”

Warrington, C2DE

***“You’ve got to do a bit of both. Things are invented and changing all the time and getting better all the time so maybe you invest more money in what’s tried and tested but you have to put a bit in [the more innovative side] to make these things happen. We can’t stay the same. You’ve got to do a bit of both.”***

Warrington, C2DE

# A note on comprehension of/engagement with pathways

Customers and future bill payers spoken to were largely an engaged and knowledge-thirsty cohort. They were full of questions and queries that at times we had to admit to not having the answers to (due to the newness of some of the technologies), however this speaks to the level of engagement that participants were bringing to the sessions.

## Comprehension

By and large, participants 'got' the general gist of each pathway, which was the aim. There were still elements of complexity that the subject matter experts had to explain at each workshop, but this translated into a more fruitful discussion and level of understanding.

## Interest

Participants were interested in the topic area, keenly evidenced by the comments as people were leaving about how much they'd enjoyed their time discussing the topics.

What was also apparent was the level of deep thought that many of the participants engaged in, which often led to the desire for levels of detail that were beyond the scope of the research.

## Questions

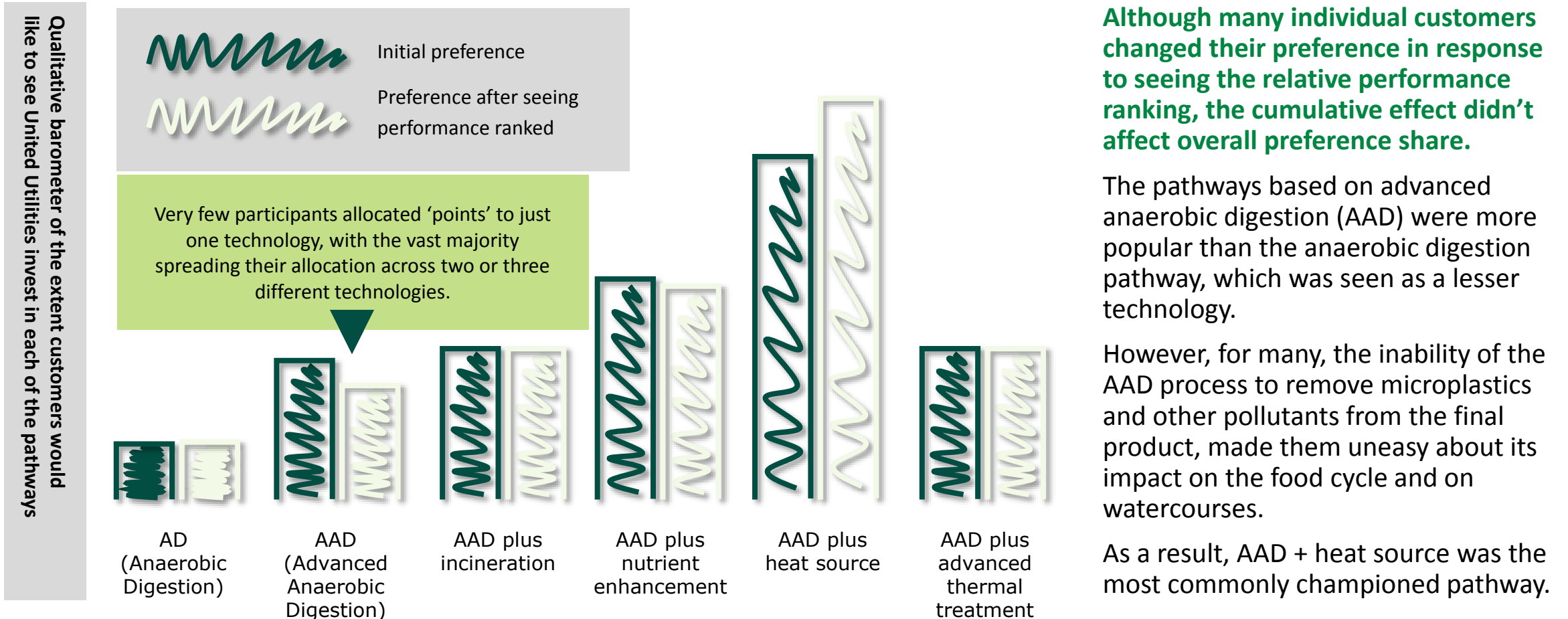
Linked to the point around interest, our participants were full of questions and queries throughout the sessions.

At times this led to questions around where some of the technologies could be taken, evolved and adapted.

For instance:

- Could the ash from incineration be taken and used for bricks?
- Could the pellets be used as horse bedding?
- Do farmers get the fertiliser for free or do they have to pay?

# THE VERDICT: AAD plus heat source is customers' preferred pathway, both before details of its relative performance are revealed and afterwards



Although many individual customers changed their preference in response to seeing the relative performance ranking, the cumulative effect didn't affect overall preference share.

The pathways based on advanced anaerobic digestion (AAD) were more popular than the anaerobic digestion pathway, which was seen as a lesser technology.

However, for many, the inability of the AAD process to remove microplastics and other pollutants from the final product, made them uneasy about its impact on the food cycle and on watercourses.

As a result, AAD + heat source was the most commonly championed pathway.

Based on 72 responses. Results are qualitative and should be treated as indicative rather than robust.



**Most customers were happy to see a blended approach to implementing pathways, and typically assigned their 'points' across a number of options**

*'I think there's a need for both. You've got that much [waste] to get rid of somewhere. It needs to be used as much as it can be. United Utilities don't have the facilities to do just one or another at the moment...'*

**Trafford, C2DE**



# The best performing pathway: AAD + heat source

# AAD plus heat source appeals to two of United Utilities customers' most valued priorities: protecting human health and minimising run-off

Fear of river and land contamination, fuelled by recent news stories of sewage discharge into watercourses, makes many nervous about applying bioresources to farmland.

## Attraction to AAD plus heat source:

- ✓ Limited potential for microplastics and other pollutant run-off to end up on farmland and in watercourses
- ✓ Not reliant on external fuel: cheaper and lower emissions
- ✓ Based on an existing and known technology
- ✓ Self-contained solution
- ✓ More useful than incineration

“This is more sustainable. It’s giving something back. There’s a product at the end that’s used up whereas the incineration and landfill can only go on so long; they seem like a waste.”

**Trafford, C2DE**



# AAD plus heat source: while not perfect, this pathway appeals to customers' core priorities and has few areas of very poor performance

AAD plus heat source appealed as the most 'balanced' option out of the six presented, appealing to customers' priorities for a pathway that protects farmland and rivers from contamination and makes efficient use of the biogas generated.

Interestingly, once participants were able to see the pathways' comparative strengths and weaknesses, support for AAD plus heat source grew. Customers cited the fact that the technology showed fewer 'extremes', making it an 'optimum' middle path whilst simultaneously tapping into their core priorities.

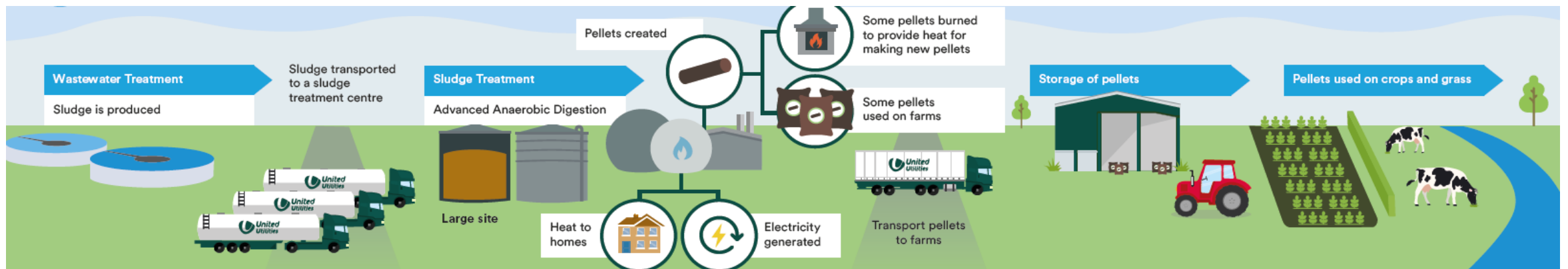
*"As best as we can get in the situation."*

Preston, ABC1

Productive use of burning bioresources

Not reliant on external gas for operation

Much reduced threat of microplastics/run-off



## AAD plus heat source: in customers' own words

### Productive use of burning bioresources

"It's a win, win! You end up with less pellets *and* you're using the pellets as a source of the heat so you're going to save on fuel costs!"

**Trafford, ABC1**

"I initially liked the nutrient pellets, and the [useful] impact that could have, but if it tips it from going over to under in terms of your carbon emissions then I would chose this."

**Warrington, ABC1**

### Much reduced threat of microplastics/run-off

"There's just not as much run-off."

**Preston, ABC1**

### Not reliant on external gas for operation

"You're not having to import the gas, so that saves on that aspect... and it's a lower carbon footprint doing it this way as well!"

**Warrington, ABC1**



# Review of other pathways

# Anaerobic digestion: shorter transit distances not enough to allay concerns around soil/river pollution and low gas yield

Compared to advanced anaerobic digestion, standard anaerobic digestion struggles to convince most customers of its benefits.

With lower gas yield, a less versatile product, and greater risk of polluting run-off, the majority of customers see AD as a lesser, outdated technology. Shorter journeys to local processing plants is not something customers clearly recognise as preferable to longer journeys based around centralised hubs. In reality, customers' key concern here is more often the overall carbon output from logistics, which they struggle to compare between pathways.

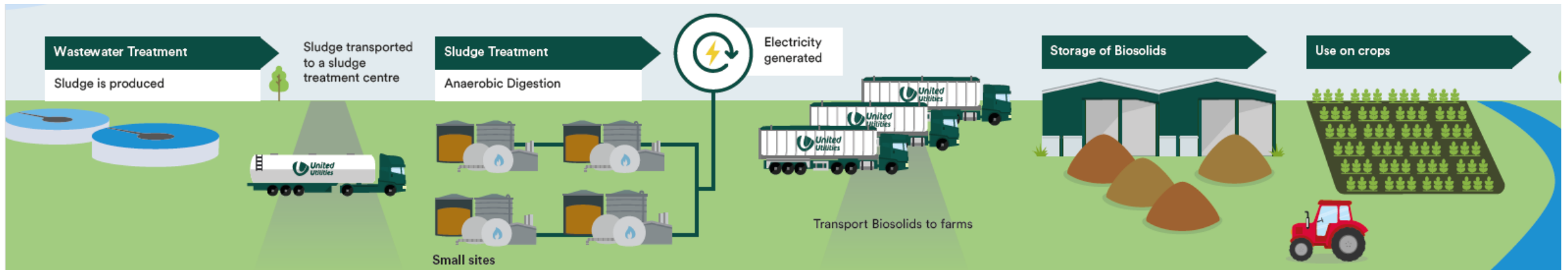
*"We eat the food off that land... it might have microplastics in it."*

Preston, ABC1

Low gas yield

Unable to use on grass

Microplastic pollution of farmland and waterways



## Anaerobic digestion: in customers' own words

**Low gas  
yield**

“There’s less gas produced.”

**Preston, ABC1**

**Unable to use  
on grass**

“You can see that it has fewer  
benefits than [AAD]”

**Future Bill Payer**

**Microplastic pollution of  
farmland and waterways**

“It’s not as safe as [AAD] for the  
environment, the rivers and the  
grass.”

**Preston, ABC1**

# Advanced anaerobic digestion: a clearly more efficient and versatile technology than AD, but worries about pollutants still exist

Compared to standard anaerobic digestion, customers view AAD as a noticeably more efficient and versatile process.

Customers are primarily drawn to AAD's increased efficiency of biogas production, albeit with a degree of cynicism as

selling this gas to the grid would actually return lower bills to customers. While customers are reassured that the biosolids were deemed suitable for grazing, they were still concerned about run-off into waterways and the presence of microplastics.

*“There’s more gas going into people’s homes.”*

Preston, C2DE

In particular, this pathway was popular with Future Bill Payers, due to its carbon footprint, tested technology, and lower bill impact.

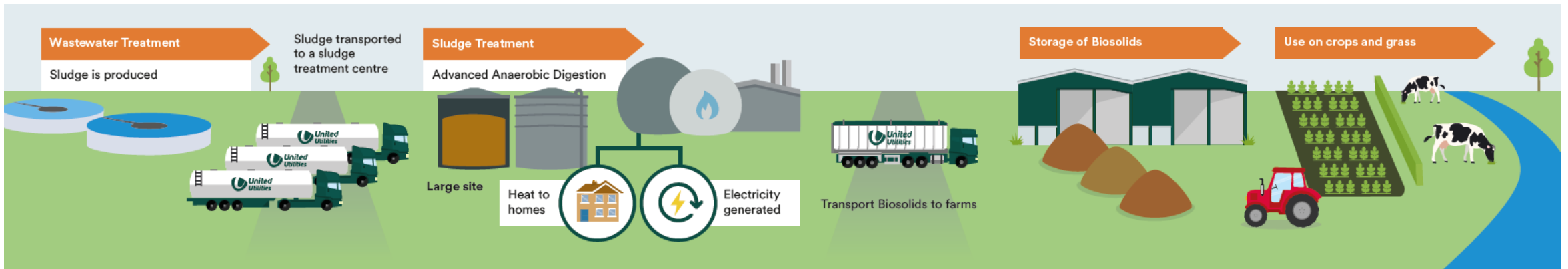
Energy use during production

Higher gas yield

More versatile biosolids

Micro-plastics

Potential for run-off



## Advanced anaerobic digestion: in customers' own words

### Energy use during production

“Being pre-heated, how much energy is that going to use? Is it going to use as much as it is creating in order to heat it?”

**Preston, ABC1**

“When you're heating it, is it fossil fuels you're using?”

**Warrington, ABC1**

### Higher gas yield

“There's more gas going into people's homes.”

**Preston, C2DE**

### More versatile biosolids

“It's better. You've got less pathogens in it and more uses out of it.”

**Carlisle, C2DE**

## Advanced anaerobic digestion: in customers' own words

### Microplastics

“But if [the microplastics] are likely to get on the land, then they’re going to get into the cows!”

**Carlisle, ABC1**

“What about the microplastics, [the cows] will still eat that?”

**Warrington, ABC1**

### Potential for run-off

“And those [contaminants] will go into the water with the fish as well...”

**Carlisle, C2DE**

“If you’re a meat eater, and you eat the cow or drink its milk [is that dangerous]?”

**Warrington, ABC1**



# AAD plus incineration: a muted reaction to this pathway, mainly due to concerns about carbon emissions and local air quality

**Incineration is a familiar concept for most customers, with an association of being an old technology tied to greenhouse gas emissions and poor air quality, particularly in the area close to the plant.**

For those most concerned about sewage waste contaminating the soil and waterways, incineration offers reassurance that most microplastics and other pollutants are destroyed.

However, many feel unqualified to judge whether the environmental impact of incineration's emissions and reduced air quality are, in fact, balanced by the reduction of contaminants in the land and waterways.

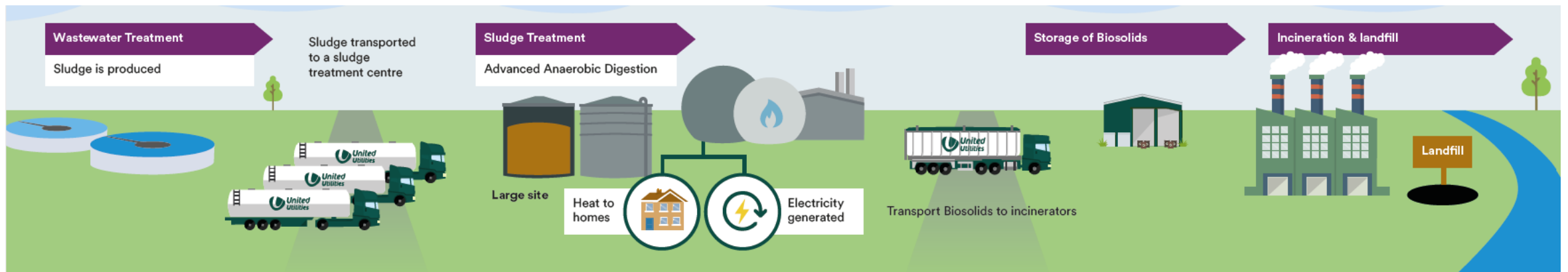
*“You wouldn't want your house near this, would you?”*

Preston, ABC1

Replacing water pollution with carbon emissions

Poorer air quality

No materials left to contaminate the land/water



# AAD plus incineration: in customers' own words

## Replacing water pollution with carbon emissions

"You can't go carbon zero by such a date if you're going to start building [incinerators]... it doesn't make sense."

**Warrington, ABC1**

"Just defeats the purpose of everything else before causing more waste and more carbon dioxide in the air."

**Future Bill Payer**

## Poorer air quality

"This would be a massive backstep, going from recycling more due to the new regulations coming and going back to burning the stuff so if going to carbon neutral...it's not really."

**Trafford, C2DE**

## No materials left to contaminate the land/water

"We burn lots of stuff anyway. But actually if you kill the rivers then that's going to really impact everything. I know it sounds awful burning stuff but really damaging the rivers would be considerably worse."

**Trafford, C2DE**

"Turning it to ash means there's less chance of it going into the water and rivers."

**Future Bill Payer**

# AAD plus nutrient enhancement: there is strong support for any measures that benefit farmers, but microplastic pollution remains a concern

Most groups contained people who advocated for supporting farmers and, of each of the pathways, AAD plus nutrient enhancement performed strongest in this regard.

The pathway also appealed to a sense that re-using bio-resources in creative and productive ways was better than simply burning or dumping it (especially compared to incineration). However, for many, the presence of microplastics and other pollutants in the product left it open to the same criticisms as standard AAD.

*“Why can’t they give them to farmers, rather than being sold?”*

Preston, ABC1

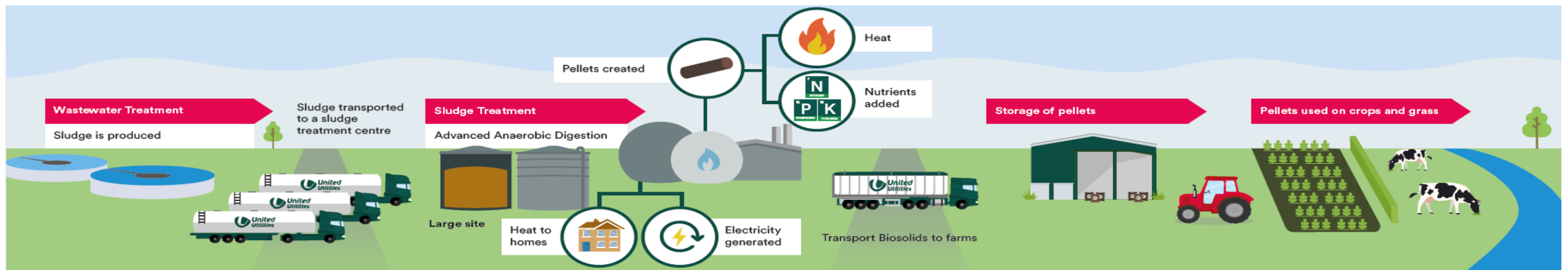
Energy use of process

Lack of market/ need for pellets

Strong support for benefitting farmers

Presence of microplastics

Lower potential for run-off



# AAD plus nutrient enhancement: in customers' own words

## Energy use of process

"They're using a lot more energy to produce them, how is that going to affect our bills? It sounds expensive."

**Carlisle, C2DE**

"This is a lot of energy being used. The carbon footprint seems to have gone up."

**Warrington, ABC1**

## Lack of market/ need for pellets

"How much more of that are you going to produce for it to go to farmers? I mean, surely, you're not just going to keep producing just to keep storing, storing, and storing it, so you've got too much."

**Future Bill Payer**

"Do the farmers even want it from them? Are they, like, give us it quick?!"

**Carlisle, ABC1**

## Strong support for benefitting farmers

"It's positive that they are tailoring the nutrients for different crops, so whatever crops the farmers are growing it's benefitting them as well."

**Warrington ABC1**

"The end product can be used, whereas [with incineration] it's just ash."

**Preston ABC1**

## AAD plus nutrient enhancement: in customers' own words

### Microplastics

“There’s just still that danger of microplastics, isn’t there...”

**Carlisle, ABC1**

“Microplastics is one of those things you can’t get rid of... unless you stop using them altogether.”

**Preston C2DE**

### Lower potential for run-off

“What happens if you scatter them on the fields and the pellets don’t dissolve?”

**Preston C2DE**

# AAD plus advanced thermal treatment: for many customers this pathway suffers from the same drawbacks as standard incineration

As unpopular as incineration, AAD plus advanced thermal treatment suffers from a similar perception: carbon emissions and air pollution.

Customers are unconvinced that the heavy metal residue should be any less concerning than the microplastics the process removes.

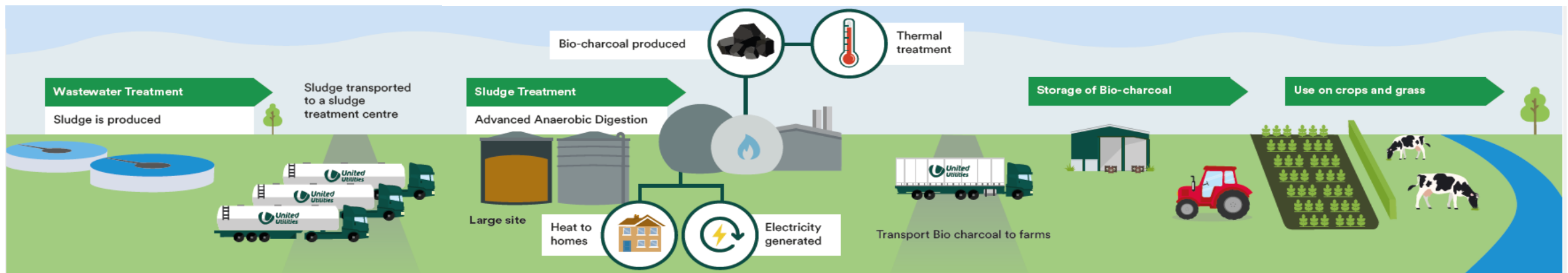
*“Are you changing one problem for another?”*

Preston, ABC1

Emissions and poor air quality

Removal of microplastics

Heavy metals





# AAD plus advanced thermal treatment: in customers' own words

## Emissions and poor air quality

“Gives off emissions, doesn't it? And, we're trying to get to the point where we're not doing that anymore.”

**Warrington ABC1**

## Removal of microplastics

“It's burning and is the only thing that gets rid of microplastics. That seems to be the thing [we] are most concerned about. All of the other options still have microplastics in the end.”

**Warrington ABC1**

## Heavy metals

“You're basically just swapping the microplastics for heavy metals, which will probably be worse.”

**Carlisle, ABC1**

“Will the heavy metals be carcinogenic?”

**Carlisle, C2DE**

# Impact of cost

**Currently, cost isn't the primary concern for most customers when considering how United Utilities invests in future bioresource pathways. However, as the cost of living crisis deepens, more will start to prioritise it.**

**While most customers wanted United Utilities to prioritise public health and core environmental concerns (e.g. carbon emissions and waterway health) over small bill increases when planning future bioresource investment, they did want to feel that their bills were being used thoughtfully and responsibly.**

As the cost of living continues to bite, and customers become more intent in making savings to their monthly out-goings, it is possible that the cost of this investment, as reflected in their bills will start to challenge some of the more universally prioritised areas.

For most, the acceptability of any cost increase is a matter of scale (i.e. pounds and pence impact of each pathway) – something that was not possible to present to them at this stage of pathway development. This left many feeling unable to make precise judgements regarding their prioritisation of cost over all and in regard to each specific pathway.

It should be noted, therefore, that once the precise bill impact is clear and, if relatively substantial, customers may revise their priorities.



# Unlike human health and environmental issues, willingness to accept higher bills divides customers

**Prior to knowing which pathways were likely to have the most significant impact on their bills, customers had already shown a range of attitudes to cost.**

This research was conducted at a time where not only were energy bills, and other household expenses, rising, but that future increases seemed unpredictable. Because of this, participants appeared more sensitive to their water bill cost than would otherwise be the case.

However, it was still rare for respondents to completely prioritise cost over environmental impact, although some rated it as high a concern. At the other end of the spectrum, a number of customers were happy to pay more to ensure the best for the environment.

“What are they more bothered about, paying that extra bit of money or [your child’s] health and the environment?”

**Warrington, ABC1**

“We would pay more if we weren’t in such a fix as we are now.”

**Preston C2DE**

“It’s tricky... You would like to think that they would pass this on to customers, but as we know [this doesn’t happen].”

**Warrington ABC1**

Many felt that commercial profits from selling bio-resources products such as fertiliser, or cost savings made by United Utilities through adopting more energy efficient pathways, should go towards reducing household bills. However, there was a degree of cynicism that this would, in fact, happen.

# Cost was also the final piece of the jigsaw to be considered by participants

After full consideration of the technologies, their technical detail, and their pros and cons, and ranked performance, participants were informed of the relative cost of each pathway (see far right).

As part of the final review exercise, participants were asked to consider the likely relative impact on bills before making their final points allocation.

Carbon footprint 	Trucks on the road 	Storage 	Contaminants in river & land 	Farmer use 	Technology 	Impact on bill
1st (lowest) AAD + heat source pellets <b>E</b>	1st (least) AAD + incineration <b>C</b>	1st (best) AAD + incineration <b>C</b>	1st (lowest) AAD + incineration <b>C</b>	1st (easiest) AAD + nutrient pellets <b>D</b>	1st (established) Anaerobic digestion (AD) <b>A</b>	1st (least) Anaerobic digestion (AD) <b>A</b>
2nd Advanced anaerobic digestion (AAD) <b>B</b>	2nd AAD + bio-charcoal <b>F</b>	2nd AAD + bio-charcoal <b>F</b>	2nd AAD + bio-charcoal <b>F</b>	2nd AAD + heat source pellets <b>E</b>	2nd Advanced anaerobic digestion (AAD) <b>B</b>	2nd Advanced anaerobic digestion (AAD) <b>B</b>
3rd Anaerobic digestion (AD) <b>A</b>	3rd AAD + heat source pellets <b>E</b>	3rd AAD + heat source pellets <b>E</b>	3rd AAD + heat source pellets <b>E</b>	3rd Advanced anaerobic digestion (AAD) <b>B</b>	3rd AAD + incineration <b>C</b>	3rd AAD + heat source pellets <b>E</b>
4th AAD + nutrient pellets <b>D</b>	4th AAD + nutrient pellets <b>D</b>	4th AAD + nutrient pellets <b>D</b>	4th AAD + nutrient pellets <b>D</b>	4th Anaerobic digestion (AD) <b>A</b>	4th AAD + heat source pellets <b>E</b>	4th AAD + nutrient pellets <b>D</b>
5th AAD + bio-charcoal <b>F</b>	5th Advanced anaerobic digestion (AAD) <b>B</b>	5th Advanced anaerobic digestion (AAD) <b>B</b>	5th Advanced anaerobic digestion (AAD) <b>B</b>	5th AAD + bio-charcoal <b>F</b>	5th AAD + nutrient pellets <b>D</b>	5th AAD + bio-charcoal <b>F</b>
6th (highest) AAD + incineration <b>C</b>	6th (most) Anaerobic digestion (AD) <b>A</b>	6th (worst) Anaerobic digestion (AD) <b>A</b>	6th (highest) Anaerobic digestion (AD) <b>A</b>	6th (hardest) AAD + incineration <b>C</b>	6th (unknown) AAD + bio-charcoal <b>F</b>	6th (most) AAD + incineration <b>C</b>

The above information sheet was presented to participants towards the end of the session. The sheet ranks each of the pathways from 1<sup>st</sup> to 6<sup>th</sup> according to their relative performance across seven areas, the last of which being 'impact on bills'. Each pathway was colour coded and lettered A-F, for ease of use. Please note, no precise figures were attached to these rankings.



# Once revealed, the impact on bills was not typically the deciding factor when it came to allocating ‘points’ to a pathway

**However, that does not mean that customers are indifferent to their bills or the way in which United Utilities uses the money it raises.**

There are a number of ways in which customers raised concerns about how their bills were used:

- Having to paying extra for their water bill, while knowing that their supplier is making large profits
- Not passing on savings or commercial benefits (see slide 39)
- Not providing the quality of service expected (e.g. leaks), despite bills remaining the same

Despite not being a deciding factor for most, costs can, however, provide customers with a tangible measuring stick with which to differentiate between pathways.

This isn’t always possible with more abstract comparisons such as damage to waterways vs carbon emissions.

“Just to be on the soapbox... I'd be happy with [an] increase in my bill, [if] United Utilities would decrease its operating profit. It made £6 million in profit. We shouldn't have to have our bills go up that much if they make that much money.”

**Warrington, ABC1**

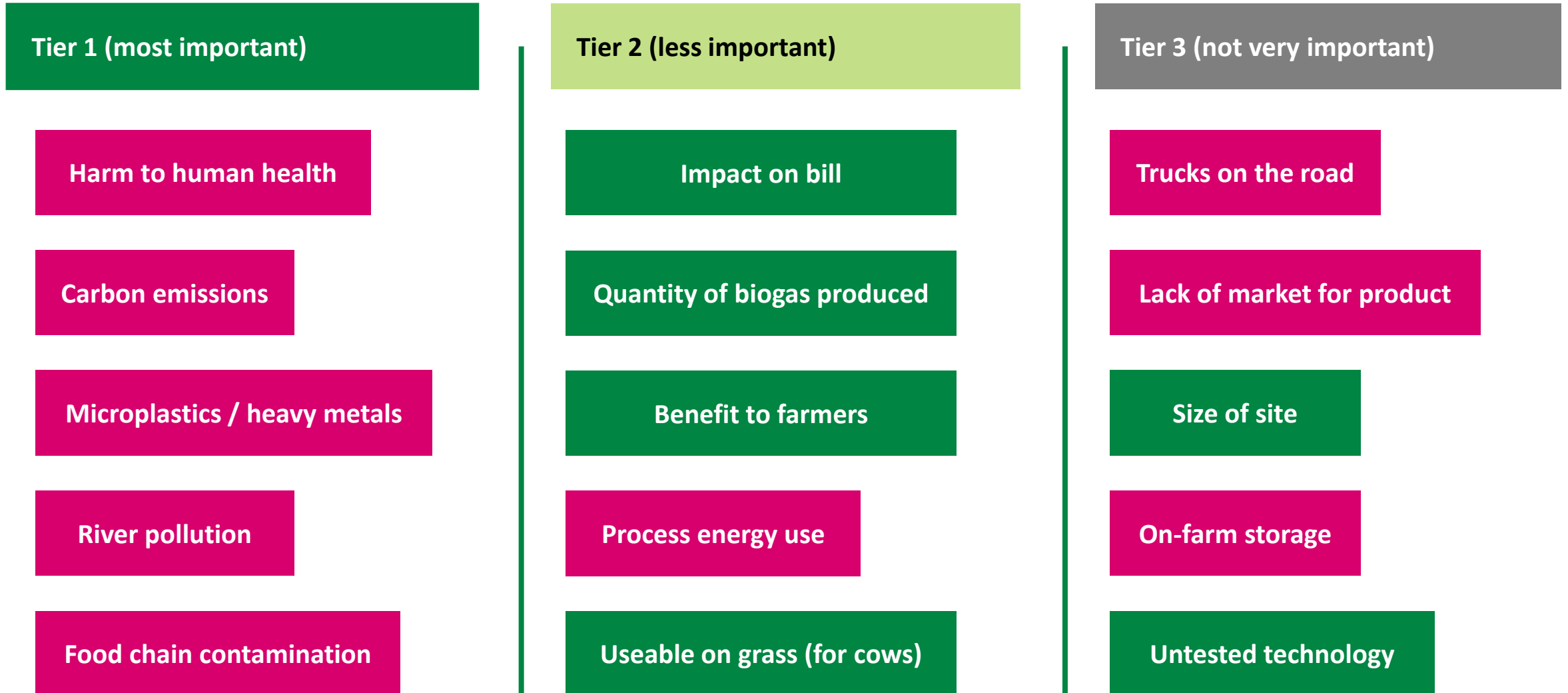
“Even if I had the figures for how much carbon was going up in the air and how many fish are dying in the rivers, I wouldn’t know how to compare that as well. Costs and bills are probably the things I can compare and general recycling principles possibly.”

**Trafford, C2DE**



# Overall hierarchy of priorities

# Overall hierarchy of priorities



Positive aspects labelled in green, negative aspects in red

# Summary & conclusions

# Summary & conclusions

This study has provided strong evidence on the views of household customer and future bill payer preferences regarding the Bioresource long term adaptive plan. For the reasons and trade-offs discussed in this report, AAD + heat source is the pathway that both cohorts would prefer United Utilities to pursue, whilst maintaining enough capacity in the tried and tested technologies that are currently in place; albeit AAD is seen as superior to AD.

Customers appear to have a good understanding of UU's role and responsibility, but when probed further there are gaps in knowledge re. the specifics of sewage treatment.

The public are interested in the topic of bioresource use and they want to see United Utilities maximise the use and benefits that bioresources can offer.

UU's customers give it the green light to explore new and innovative technologies, so long as they are implemented in a way that provides maximum environmental and efficiency benefits to the customer.

Customers' long-term priorities are for a bioresource solution that provides reliable sludge waste removal in a way that limits its impact on human health, greenhouse emissions, and on waterways. For most, these are the non-negotiable responsibility of United Utilities.

While customers are pleased to hear of sludge waste being put to a useful purpose, it is not seen as an essential role for United Utilities and they are less unanimous or emphatic about what that use should be (e.g. fertiliser or heat source pellets).

This provides United Utilities, in conjunction with the farming and scientific communities, with a degree of flexibility to choose a desired pathway that best fits the needs of all parties, so long as the public's concerns regarding environmental protections are taken seriously.

# Summary & conclusions

AAD plus heat source succeeds with customers because it walks the line between minimising ground and water pollution and reducing carbon emissions.

It should be noted however that participants admitted that their views of today might not be their views of tomorrow, as the current context within which people are living is extremely fluid (i.e. cost of living crisis).

Water companies have a degraded reputation in the wake of news stories about sewage discharge into the country's waterways.

This leaves some customers suspicious of how well water companies can be trusted to provide bioresources that risk soil pollution through microplastics or run-off into waterways.

# Ofwat standards for high-quality research

Ofwat have set out requirements for High Quality Research in their [Customer Engagement Policy](#). All water company research and engagement should follow best practice and lead to a meaningful understanding of what is important to customers and wider stakeholders.

## Useful and contextualised

This research was conducted in order to test United Utilities' Bioresources potential adaptive pathways with customers and future bill payers. This research will feed into long term planning and shape future Bioresources strategy, with the preferences and priorities of customers considered in future investment decisions.

## Fit for purpose

This research was designed with accessibility and engagement front of mind, using deliberative discussions and visual stimulus to ensure customer understanding. Cognitive testing was undertaken during the design phase of this research to ensure the complex subject matter was presented in a way which was as understandable and engaging as possible for respondents. Due to the complicated nature of the subject matter, a United Utilities representative was available to answer questions at every session.

## Ethical

This research was conducted by DJS Research who are a member of the Market Research Society. Participants were regularly reminded that they could be open and honest in their views due to non-identifiable reporting, as well as gaining consent at each individual group for recording for analytical purposes.

## Shared in full with others

The full final report and research materials will be shared on the United Utilities' research library webpage.

## Neutrally designed

Every effort has been made to ensure that the research is neutral and free from bias. Where there is the potential for bias, this has been acknowledged in the report. Participants were encouraged to give their open and honest views and reassurances were given throughout the research that United Utilities were open to hearing their honest opinions and experiences.

## Inclusive

The focus groups were face to face, ensuring that a variety of customers could attend, including those digitally vulnerable. The discussion and stimulus were designed to be accessible as possible, using visual aids and allowing enough time in the discussion guide to absorb the information and ask questions. Quotas were set based on the known profile of United Utilities' customers.

## Continual

The outputs of the research will feed into the Bioresources long term strategy, with the insight being used across multiple business plans.

## Independently assured

All research was conducted by DJS, an independent market research agency. United Utilities collaborated with Your Voice, the Independent Challenge Group, who reviewed all research materials and provided a check and challenge approach on the method and findings

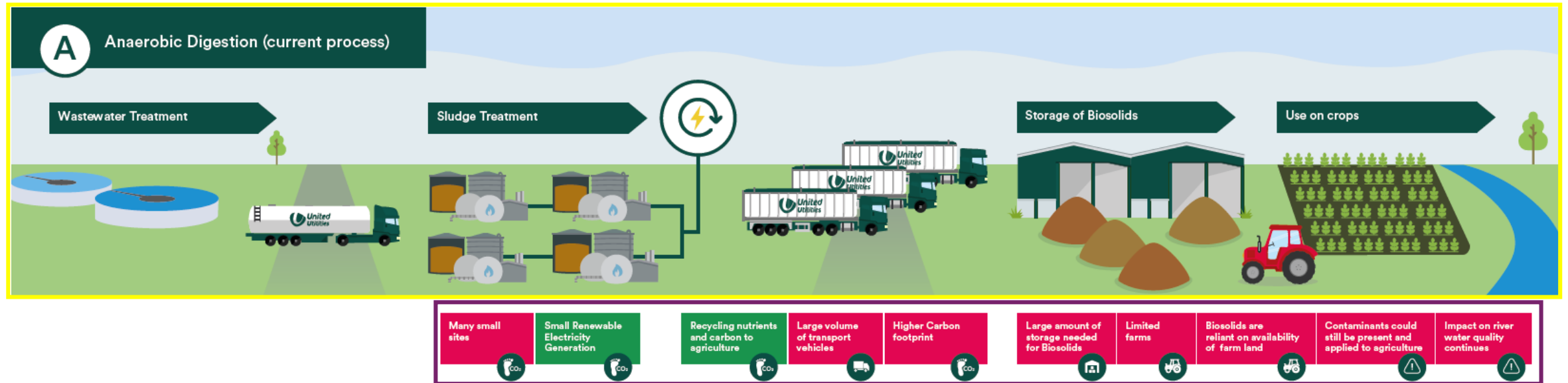


# Appendix: Pathways

# Pathway A: anaerobic digestion

## Pathway summary

Participants were presented with a visual summary of pathway (in yellow box), with United Utilities' assessment of the pros and cons for the pathway (in purple box) added to the visual summary after spontaneous reactions had been gathered.



# Pathway A: anaerobic digestion

## Pathway overview text

*“Here, we start with the sludge. This is typically a liquid that gets transported, by road in big tankers, from around 500 sewage works where the sludge is produced to sludge treatment centres for processing. These tend to be quite small treatment centres with many dotted around the North West. In fact, each one does about 3% of the region’s sludge treatment.*

*In the digestors, about a third of the sludge turns into gas, which can be used to provide more heat to run the plant and keep the digestors warm and generate green electricity to run the site. The other two-thirds of the sludge ends up as a material that goes off to farmers which, along with the next process you’ll be shown, is transported to over 1,000 farms via around 20,000 vehicle movements each year. They can use it as fertiliser to plough into their fields ready for them to grow their crops in. Trucks are used to deliver the material to farmers’ fields where it sits in the corner of a field until the farmer is ready to use it for their crops.*

*Something to note though is that whilst this is great for crops, it isn’t something you’d want put on grass because there are some pathogens that survive which aren’t suitable for cows to be eating as they’re grazing.*

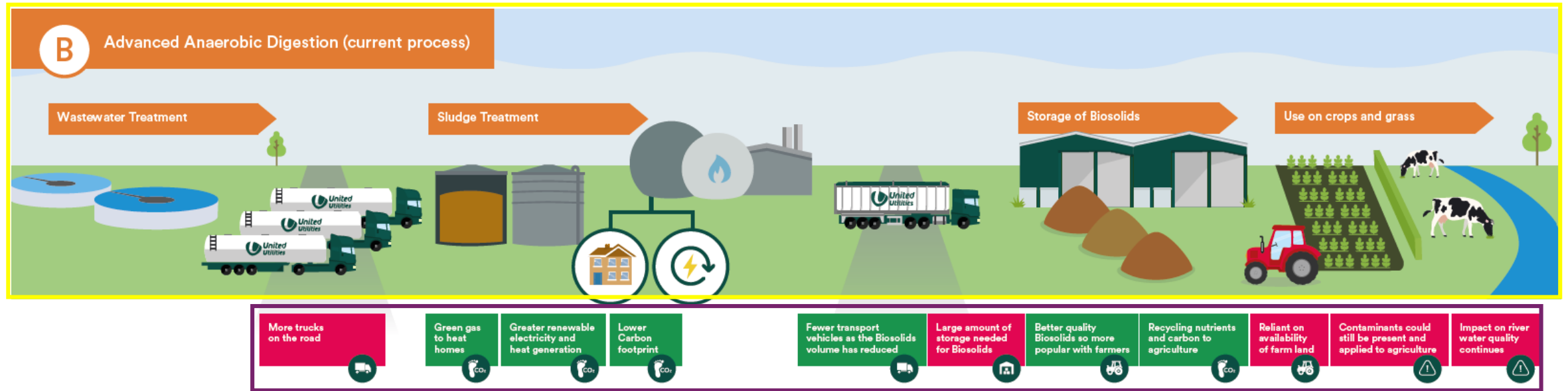
*This is a low carbon alternative to inorganic fertiliser and benefits soil health by recycling carbon back to the soils. That said, there could be small amounts of contaminants that remain in the topsoil such as microplastics which might then end up in the land.*

*And finally, you can get some run-off when it rains, for instance, whereby this material could be washed off fields and into local rivers, which isn’t good for river health.”*

# Pathway B: advanced anaerobic digestion

## Pathway summary

Participants were presented with a visual summary of pathway (in yellow box), with United Utilities' assessment of the pros and cons for the pathway (in purple box) added to the visual summary after spontaneous reactions had been gathered.



# Pathway B: advanced anaerobic digestion

## Pathway overview text

*“With AAD, again, the sludge is again transported from a sewage works but now, it arrives at a much smaller number of larger digestion facilities (remember, in AD we were using a lot of smaller digestion facilities). What’s more, a pre-digestion stage is added whereby the sludge that arrives for treatment gets pre-heated which significantly enhances the breakdown of the sludge before it goes into the digestors.*

*Because the sludge was pre-treated, more gas is produced compared to AD and now, 50% of the sludge turns into gas (instead of only a third with AD). This additional gas is now produced in sufficient quantity to allow it to be piped into the national grid and pumped off to homes for a renewable energy source.*

*Of course, there is now less material then to both transport out for farmers to use and less storage needed to store the reduced volume of material. Also, because of the additional treatment step added, more pathogens are killed off meaning this material can be used on crops and grass which expands the amount of land that this material can be used on.*

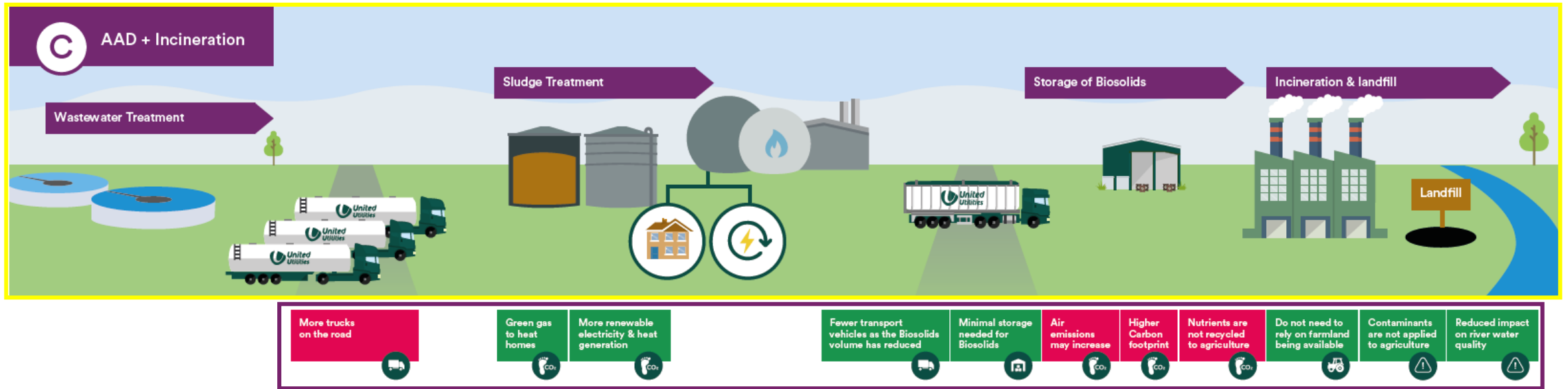
*This is a low carbon alternative to inorganic fertiliser and benefits soil health by recycling carbon back to the soils. That said, there could be small amounts of contaminants that remain in the topsoil such as microplastics which might then end up in the land.*

*You can still get some run-off when it rains though whereby this material could be washed off fields and into local rivers, which still isn’t good for river health.”*

# Pathway C: AAD plus incineration

## Pathway summary

Participants were presented with a visual summary of pathway (in yellow box), with United Utilities' assessment of the pros and cons for the pathway (in purple box) added to the visual summary after spontaneous reactions had been gathered.



# Pathway C: AAD plus incineration

## Pathway overview text

*“After AAD has taken place and half of the sludge has been turned into usable gas, there is the option to burn the remaining solid in an incinerator rather than send it to farms.*

*AAD would be conducted before incineration, rather than burning the raw sludge, as it halves the quantity of material that needs to be burnt. This in turn halves the number of incinerators required. The biosolids created as a result of the AAD process would be transported an incinerator to be burnt.*

*Once the fire is started, the biosolids would be able to burn itself, without having to buy and burn gas to do so – in the same way that a wood burning fire in your house doesn’t require any more firelighters to continue burning, once it’s lit.*

*Currently, United Utilities has one incinerator site that would be suitable for burning this material. However, it is not currently in use and would require investment to get it up and running.*

*This incinerator would be able to process around a quarter of the material produced in the North West. Because of this, if United Utilities wished to incinerate more than a quarter of the material, it would need to build new incinerators.*

*Incineration removes the risk of run-off from farmland into rivers. However, it does increase the emissions released into the air as the solid matter is burnt. Incineration can also generate a small amount of electricity as it burns.*

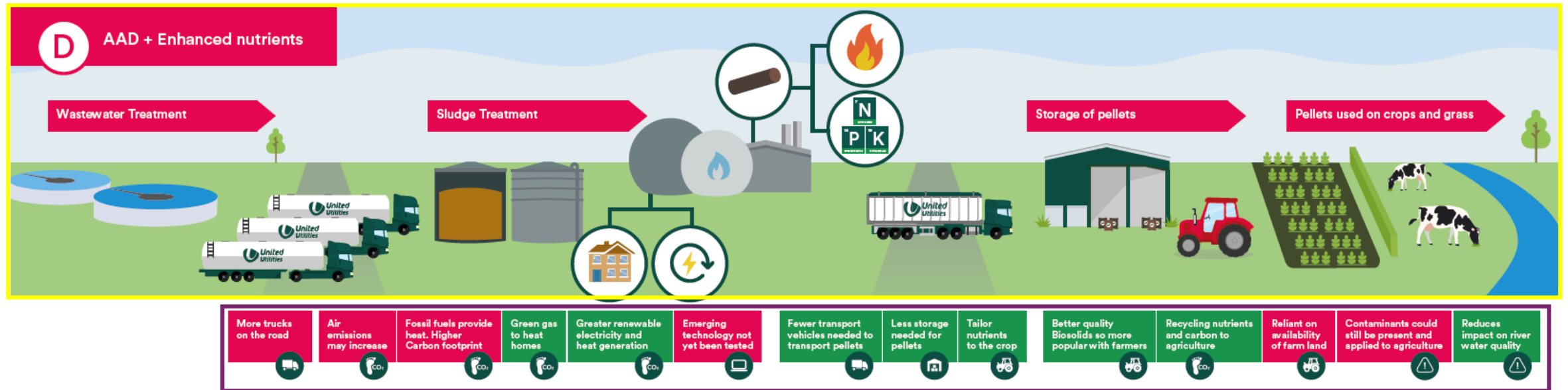
*‘Clean up’ technology can be applied to the chimney stacks to make sure that the emissions from the plant are as clean as possible.”*



# Pathway D: AAD plus enhanced nutrients

## Pathway summary

Participants were presented with a visual summary of pathway (in yellow box), with United Utilities' assessment of the pros and cons for the pathway (in purple box) added to the visual summary after spontaneous reactions had been gathered.



# Pathway D: AAD plus enhanced nutrients

## Pathway overview text

*“After the AAD process has occurred, something that could happen is to turn the material that farmers could use for their fields into pellets, instead of the topsoil type of material they would have received from the AD and ADD processes.*

*To create pellets, a lot more heat is needed because the sludge has to be dried out which, whilst massively reducing the amount of material you end up with, does also mean that gas from elsewhere would have to be brought in to create the heat to make the pellets. Because of this there is a higher carbon footprint with this step.*

*Once created though, the pellets will take up to 70% less space than the topsoil material produced through AD or ADD, less storage space is required by farmers and fewer trucks are needed to transport the pellets to their destinations (for instance, instead of a big truck turning up and tipping a truck’s worth of topsoil out per farmer, multiple farmers could be visited who’d receive much smaller bags of pellets instead).*

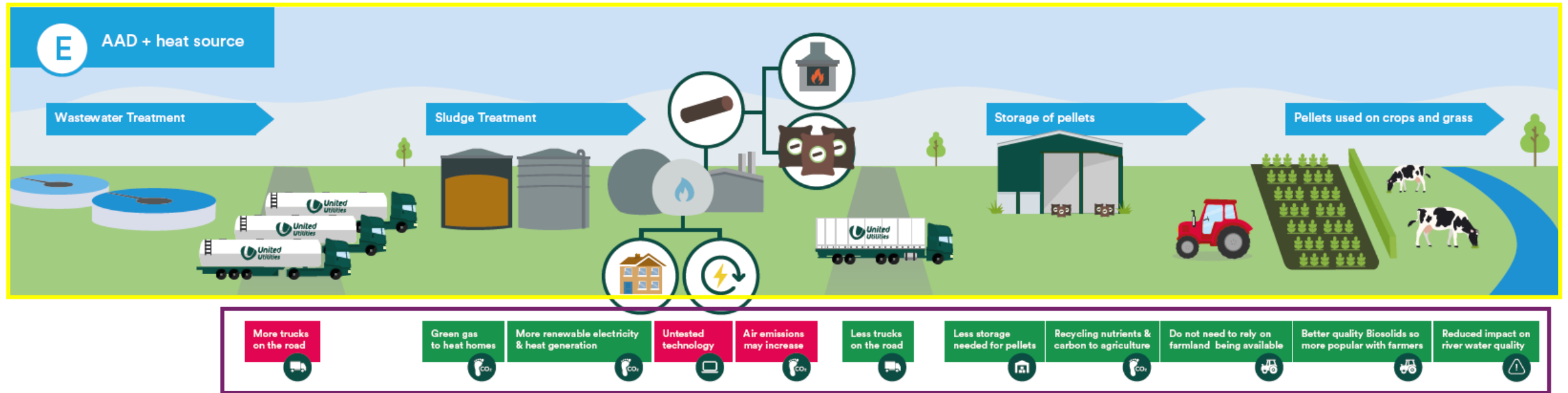
*Because they are dried, the pellets would not be able to be stored in the fields before use. They need to be stored in a barn with adequate fire safety precautions. What’s more, these pellets can have nutrients added to them that can be tailored to the crops that farmers are trying to grow. Farmers scatter these pellets across their fields for crops and grass land, which are then worked into the soil.*

*This allows farmers to make more efficient use of the fertiliser by preventing the soil from receiving too much of one nutrient and reduces the amount of risk of run off into rivers. That said, there could be small amounts of contaminants that remain in the pellets such as microplastics which might then end up in the land.”*

# Pathway E: AAD plus heat source

## Pathway summary

Participants were presented with a visual summary of pathway (in yellow box), with United Utilities' assessment of the pros and cons for the pathway (in purple box) added to the visual summary after spontaneous reactions had been gathered.



# Pathway E: AAD plus heat source

## Pathway overview text

*“With this pathway, the AAD process occurs and the material is dried to turn into pellets however, instead of relying on gas to dry the biosolids some of the pellets themselves are burned to create the heat needed for drying. The pellets are burned at a much lower temperature than an incinerator similar to a domestic boiler.*

*This is a lower carbon emission option than the previous pathway when we were relying on using gas for the heating process.*

*Any pellets not required for heating to dry Biosolids can go to be used on farm as a fertiliser.*

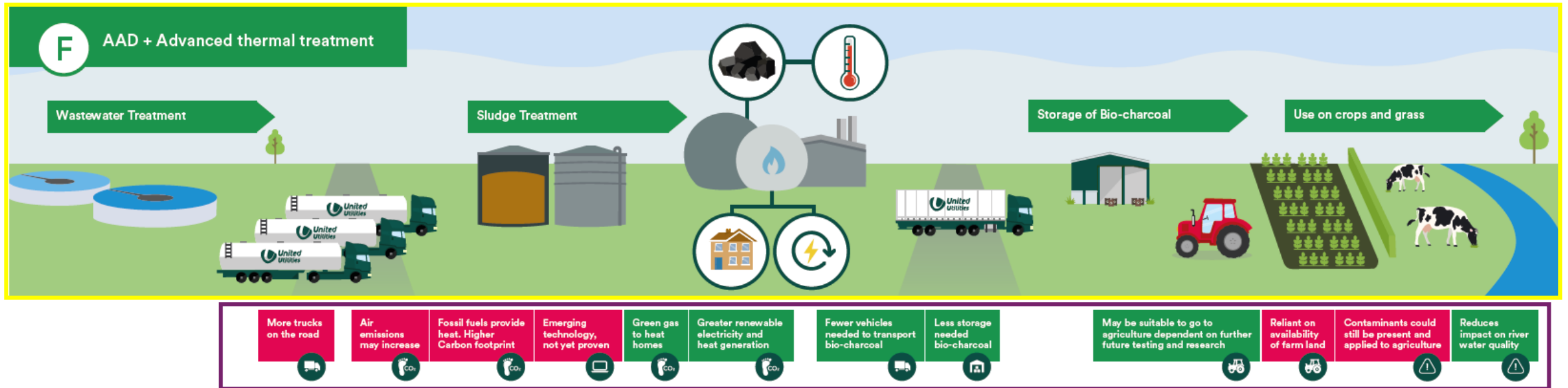
*These pellets are not the type that have enhanced nutrients added either, so their nutrient content will not be tailored to various crops. However, because Biosolids are in pellet form farmers can still ensure soil does not receive too much of one nutrient and reduces the amount of risk of run off into rivers*

*As with the Enhanced Nutrient Recycling Pathway, there could be small amounts of contaminants that remain in the pellets such as microplastics which might then end up in the land. The amount of pellets reaching farmland is less, because many are burned in the creation process, so this may be less of an issue.”*

# Pathway F: AAD plus advanced thermal treatment

## Pathway summary

Participants were presented with a visual summary of pathway (in yellow box), with United Utilities' assessment of the pros and cons for the pathway (in purple box) added to the visual summary after spontaneous reactions had been gathered.



# Pathway F: AAD plus advanced thermal treatment

## Pathway overview text

*"This final pathway is similar to the incineration pathway we've previously seen. However, it seeks to recover some use from the of the material after it has been burnt.*

*Following the AAD process, the sludge can be burnt at different specific temperatures to create different materials. One of these is called bio charcoal. In the future this may be used as a fertiliser for farms. However, in addition to some good nutrients for crops, what's left over could also have high concentrations of heavy metals in it, which farmers might not want to put on their fields. Additionally, there may be less microplastics because they will be destroyed in the burning process.*

*Advanced Thermal Treatment has the potential to generate more electricity as it burns the Biosolids than incineration. Like incineration there is a large carbon footprint because we are burning the sludge.*

*'Clean up' technology can be applied to the chimney stacks to make sure that the emissions from the plant are as clean as possible. Ultimately, less material is going to end up going to farmers, but the process is untested as it's such a new technology."*