

Organics Recycling & Biogas

Autumn 2023 Issue 52

- ▶ **UNLEASHING OUR POTENTIAL**
Skills gap in the sector
- ▶ **MANAGING THE RISK OF BIOAEROSOLS**
Limiting the impact of exposure
- ▶ **COLD AND HIGH-ALTITUDE ANAEROBIC DIGESTION**
Overcoming unique challenges

The magazine from REA Organics and Green Gas



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Welcome

Jenny Grant, Head of Organics and Natural Capital
Sara Bartle, Green Gas and Hydrogen Policy Lead



Welcome to this edition of our magazine. As we write, the long-awaited Government response to the collection consistency consultation has still not been published, and there is uncertainty on dates for when the mandatory food and garden waste collections must be in place. The recently announced delays to the packaging reforms will impact the start dates and we continue to highlight to Government how important the reforms are to ensure we are maximising the potential of the organics recycling industry and recycling organics back to the soil.

Recently, we've been involved in a Defra regulation co-design group to tackle pollution from slurry, including digestates. There are likely to be consultations coming on requirements for low emission spreading equipment, covers for stores and rapid incorporation of solid manures on bare soils. We will circulate further details to members in due course.

Thank you to members for feedback on the Green Gas Support Scheme mid-scheme review, it was invaluable to inform our response. We have had some useful discussions with DESNZ on this and expect feed back later in the year. Work continues on the revision of the Compost and Anaerobic Digestate Quality Protocols with a hazard analysis completed to inform the risk assessment. Next on the QP agenda is discussion on plastics limits and manure and slurry derived digestates.

We hope you enjoy the range of articles in this issue. Please get in touch if you have any feedback or if we can help with any issues you are facing. Hopefully we will see you at some of our events this year – keep an eye on our website for details.

Jenny and Sara.

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European Commission announces Green Deal

The European Commission has introduced a Green Deal package focused on achieving a more sustainable use of plant and soil natural resources.

The package includes several directives and regulations addressing soil monitoring, genomic techniques for plants, food waste, textiles, seeds, and other plant and forest reproductive material.

The primary objective is to improve the health of the EU's soils as, currently, 70 per cent of them are considered 'unhealthy'. The proposed soil law aims to have all soils in a healthy condition by 2050, aligning with the EU zero pollution ambition.

It seeks to achieve this by defining soil health harmoniously, implementing a comprehensive monitoring framework and establishing rules for sustainable soil management, remediation of contaminated sites and a voluntary certification scheme for soil health. This scheme will have strong links to carbon farming and payments for ecosystem services.

Furthermore, the proposals include solutions to replace harmful chemical pesticides, requirements for plant reproductive material, and specific targets to reduce food waste by 10 per cent in processing and manufacturing and 30 per cent in retail, restaurant, food services and households by 2030.

The proposed laws have, however, faced criticism. Critics argue that while the proposals include targets, measurement frameworks, and voluntary measures, much of the issue's current state is already known and therefore the proposed changes lack ambition.

The proposed laws will undergo discussions in the European Parliament and Council through the ordinary legislative procedure. Public consultations on the Soil Monitoring Law and the Food Waste Reduction Targets are also being held to gather feedback from stakeholders.



Defra policy paper sets out Government's food waste reforms

The waste prevention programme for England: 'Maximising Resources, Minimising Waste', published 28 July, sets out Government's plans, including commitment to halving food waste by 2030.

The cross-sector policy paper sets out the steps that Government has taken to deliver the Resources and Waste Strategy, whilst setting out further implementation plans.

Defra highlights the role played by voluntary agreements with food businesses and consumer campaigns, including the Courtauld Commitment 2030 to unite organisations across the supply chain, aligning with Sustainable Development Goal 12.3 to reduce food waste. Currently, the Hospitality Sector Council collaborates with the industry on solutions to minimise food waste, single-use items, and promote water-saving in breweries.

To support waste reduction, Defra provided a £15 million pilot fund in 2019-2020 through the Resource Action Fund – facilitating the redistribution of surplus food from retailers and manufacturers.

In addition, it plans to allocate over £1 million in funding from 2023/24 for campaigns targeting household food waste, potentially saving families £60 per month.

The policy paper reiterates the ongoing Government commitment to WRAP campaigns 'Love Food Hate Waste' and 'Food Waste Action Week', which empower consumers to cut food waste, save money, and benefit the environment.

The Government says it will continue its focus on working with the hospitality industry through the Hospitality Sector Council and the Guardians of Grub campaigns to tackle waste during food preparation and serving.

Carbon capture deal reached in Scottish AD plants

Carbon Capture Scotland (CCSL) and Iona Capital have formed a partnership to capture and repurpose CO2 from Iona's biomethane anaerobic digestion (AD) plants.

The CO2 generated at Iona's Crofthead plant in Dumfries will be reused as dry ice in various industries, including food, cold logistics, and pharmaceuticals, via the nearby CCSL site.

The agreement aims to extend to any future AD plants developed by Iona in the UK, Europe, and North America.

This collaboration is seen as a step towards a sustainable low-carbon future and a circular economy. CCSL's director, Richard Nimmons, expressed that this partnership will drive business growth in Scotland and beyond, while also contributing to the removal of one million tonnes of CO2 from the atmosphere annually.



Keenan Recycling gears up for Welsh expansion

The UK's largest commercial food waste collection firm is investing £1m into additional services in South Wales, ahead of new regulations taking effect.

Part of a wider £2 million growth plan, the investment will strengthen Keenan's presence in Wales and create up to ten jobs, including drivers and sales roles, before the end of the year.

As part of the expansion, ten state-of-the-art trucks powered by compressed natural gas have been ordered, with half allocated for South Wales, strengthening the company's aspirations to decarbonise the fleet by 2030.

The incoming regulatory changes, set for April 2024, will mandate the recycling of food waste by establishments

generating over five kilograms per week.

Managing Director, Grant Keenan said: "This expansion in Wales is an exciting step forward for Keenan Recycling as we continue our mission to provide easy and affordable food waste management to organisations of all shapes and sizes."

Annually, Keenan Recycling processes over 100,000 tonnes of food waste into green energy, as biofuel; a key element of its plan to become a zero-carbon firm by 2030.

Grant added: "Food waste is a global challenge, and our commitment to closing the loop and creating a simple and circular process through anaerobic digestion is key to the process.

www.keenanrecycling.co.uk

UK mandates climate adaptation planning for permitted organisations

The UK government has mandated new climate change risk planning for organisations operating under an Environmental Permit. Those permitted from 1 April 2023 must integrate a climate adaptation plan into management systems. Organisations permitted earlier need to complete a climate risk assessment by 1 April 2024.

The regulations come as climate projections show more extreme weathershow more extreme weather - higher temperatures, increased heatwaves, rising sea levels, altered rainfall patterns and more storms. Organisations must consider how these climate impacts could affect operations and regulatory compliance.

Adaptation plans should address

negative climate impacts on current and future net zero transitions, including risks to communities and the environment. Planning for concurrent events like supply chain disruption and extreme weather is also stipulated. Operations should be resilient to at least 2°C of warming by 2050, with assessments of requirements for 4°C by 2100, via regular climate reviews.

To minimise risks, organisations need to regularly test climate actions, policies, procedures and assessments, revising as new information emerges.

WRM can provide technical guidance on how to successfully implement these measures aligned to the ISO 14090:2019 and ISO 14091:2021 standards.

www.wrm-ltd.co.uk

Brewing a sustainable future with Envar

With the UK drinking around 95 million cups of coffee each day, it's more important than ever to find a sustainable use for waste coffee grounds produced as a by-product of our consumption.

Envar is now working to tackle coffee waste in a more eco-friendly manner and can divert coffee grounds from waste streams that may otherwise end up in landfill, transforming them into a sustainable bio-product.

By recycling coffee waste, coffee lovers and businesses can significantly reduce their carbon footprint and the greenhouse gas emissions associated with landfill disposal. Embracing coffee waste recycling also promotes the principles of a circular economy. Rather than viewing coffee grounds as waste, we should embrace their potential as a valuable resource, creating a closed-loop solution that maximises sustainability.

But what can we do with used coffee grounds? Envar is working in partnership with big brand names to develop a range of sustainable bio-products, from biofuels and natural fertilisers, to compost and bio-based plastics.

www.envar.co.uk



Industry vision for packaging collection and producer responsibility system

Emily Nichols,
Technical Manager,
Organics and
Natural Capital



The REA is amongst stakeholders who participated in Defra-organised sprint group sessions on the industry's vision for longer-term packaging system reform (pEPR). REA focussed on a vision for Organically Recyclable Packaging (ORP); products put on the UK market so far have been those independently certified as industrially compostable, home compostable or as both. A summary of our points:

- ORP should be used in targeted product formats and contexts that support efficient organic recycling of food wastes and good quality digestates and composts;
- There are system-level issues to tackle to ensure that ORP product use is well-targeted and that, after disposal, they are organically recycled on a more geographically widespread basis in the UK;
- Considering infrastructure, this would be aided by: increasing the

percentage of existing composting facilities that organically recycle ORP; adapting existing food waste-fed AD to recycle ORP where feasible, and identifying and – where needed – putting in place drivers for new organic recycling facility models that aid net zero and bioresource circularity goals, including the capability to biodegrade ORP.

- EPR-driven labelling requirements applicable to ORP need to be more appropriate (until the infrastructure and evidence base can be improved, Defra plans to require ORP to be labelled 'Do not recycle') and requirements must be rapidly-changeable in response to new or evolved labelling that evidences successful ORP disposal into food waste bins, at least where local contractual arrangements result in the ORP being organically recycled.

In April and May, Defra's plans were to continue involving value chain stakeholders in EPR transition planning, to define how government and value chain stakeholders could be co-designed into EPR system governance and to confirm the next steps for

a Transition Plan Steering Group. However, in July Defra announced that 'following extensive engagement with industry, and in light of the pressure facing consumers and businesses in the current economic context, new [UK-wide] rules to ensure packaging producers pay for the cost of recycling their packaging will be deferred a year from October 2024 to 2025'.

'Government will use the additional year to continue to discuss the scheme's design with industry and reduce the costs of implementation wherever possible.'



Update on the Green Gas Support Scheme

Sara Bartle,
Green Gas and
Hydrogen Policy
Lead



The Green Gas Support Scheme (GGSS) provides tariff-based support for biomethane produced using AD plants and injected into the gas grid, as a direct replacement for natural gas. The scheme first opened for applications in November 2021 and is set to run until 30 November 2025.

In March 2023, the Department for Energy Security and Net Zero (DESNZ) opened a consultation on the mid-scheme review. It considers the effectiveness of the scheme and reviews potential amendments which are due for implementation during the

2023-2024 financial year.

REA submitted a response in May 2023 which raised concerns about the challenges facing project developers in timeframes with supply chain disruption a key part. Delays in the introduction of food waste collections have had a significant impact and uncertainties remain on the impact both nationally and locally. The planning system was recognised as the greatest barrier to project development in terms of lengthy determinations as well as increasing unpredictability. This, coupled with the time to obtain a permit via the Environment Agency, has further impeded progress.

For these reasons, the REA suggested an extension to the current scheme of at least four months, as this would provide a meaningful buffer for project

planning. It was also suggested that to act on the decisions still pending on food waste collections, a longer extension to March 2027 or even March 2028 might be useful. This would allow flexibility for further recommendations to reduce or remove the waste feedstock limits and allow extensions of existing plant.

It is important that they communicate clearly to industry and ensure there is no gap between the closing of the GGSS and introduction of a successor policy. REA has had recent discussions with DESNZ, who are keen to engage with members proposals on the policy that could succeed. An REA green gas working group was set up in June to formulate possible options and I look forward to helping develop proposals with members.

Circular Economy Scotland

Jenny Grant,
Head of Organics
and Natural
Capital



On 13th June, the Scottish Government published the Circular Economy (Scotland) Bill. The Bill has been introduced to make steps towards creating a circular economy in Scotland and sets out the legislative framework for Scotland as well as the requirements for Ministers to introduce measures, including:

- Placing a duty on Scottish Ministers to publish or refresh a circular economy strategy at least every five years.
- Developing statutory circular economy targets.
- Restricting the disposal of unsold consumer goods.
- Creating a power to set a minimum charge for certain single-use items.
- Making it a criminal offence for a householder to breach their existing duties of care under the Environmental Protection Act 1990, in relation to the transfer of waste, and creating a new fixed penalty regime to enforce these duties.
- Requiring local authorities to comply with a code of practice on collection and recycling of household waste and giving local authorities a package of new responsibilities and powers, including powers for the Scottish Ministers to set recycling targets for local authorities.



- Establishing a new civil penalty regime that will make the keeper of a vehicle liable to pay a civil penalty charge in respect of a littering offence committed from that vehicle.
- Improving enforcement against fly-tipping and other waste crime through a power allowing SEPA and local authorities to seize vehicles involved in specified waste crime.
- Obtaining information about where waste is occurring through a power to require public reporting of waste and surplus by businesses (the intention is for this initially to be applied to information about food).

The Bill was consulted on between May and August 2022, as well as on proposals for general legislation for Scotland's circular economy in 2019.

Compost and AD Quality Protocols revision

Jenny Grant

Work to revise the Quality Protocols continues. Following industry workshops earlier in the year, the Appendix B lists of acceptable feedstocks have been revised to remove some of the '99' waste codes, to streamline with standard rule permits, and to remove some of the riskier inputs. These revised lists have been

used to inform a hazard analysis and scope of the risk assessment work. Comparator work is ongoing.

We are now moving on to look at some of the other issues, such as: the plastics limits for compost and digestate; using digestate in the horticultural market; manure and slurry derived digestate; and, digestate derived products. Please feel free to contact Jenny@r-e-a.net if you require any further information on the revision.

Elimination of biodegradable waste from landfill

Jenny Grant

Defra issued a Call for Evidence on the near elimination of biodegradable waste disposal in landfill from 2028. They were seeking views, data and evidence relating to a number of issues around the landfilling of biodegradable waste. This was to help their understanding of the scale of existing elimination policies across the sector, drivers for the continued landfilling of biodegradable waste and the barriers to alternative treatment, as well as interactions with and effectiveness of other waste reform policies in achieving their commitment.

Following consultation with members, REA responded to the call for evidence. There was overall support for the proposals and REA called for:

- Prioritisation of high-performing separate collections supported by an effective education and communication campaign.
- Measures to improve contamination to enable materials to be treated as high up the waste hierarchy as possible.
- Continuation of the landfill tax escalator to incentivise alternative treatment in advance of a ban.
- Consideration of other policies (e.g. the waste consistency in collections reforms, the biomass strategy and UK ETS proposals) to ensure policy changes interact appropriately.



Events Round Up

Jenny Grant, Head of Organics and Natural Capital at REA, talks through some of the in-person events that are coming up in the calendar.

Green Gas Day

11 October, National Motorcycle Museum, Solihull

Now in its 11th year, REA and CNG Services have been running the Green Gas Day since 2012. It is the largest industry gathering in the UK focused on green gases, including hydrogen, with over 300 people attending all previous years.

Green gases such as biomethane and clean hydrogen are key to reducing our dependency on fossil fuels and our reliance on imported gas from Russia, as well as to deliver an energy future which is independent, secure, and stable.

Policy to support clean hydrogen is also developing at a fast pace in the UK. Innovation is necessary to facilitate the safe and sound deployment of hydrogen production, to successfully integrate with the gas network and to explore different hydrogen applications.

This year's Green Gas Day will look at recent and future policy developments to aid green gases, as well as the latest changes that will impact the green gas market.

UK Green Gas Day 2023 will also highlight the latest technical developments and showcase the industry's latest innovation with green gas production, connection to the grid, blending, process optimisation, adding value and green gas trading.

This event provides the perfect opportunity to meet project developers and operators, financiers, feedstock providers, waste hauliers, technology providers and government officials. There are also exhibition stands from many of the major suppliers to the green gas industry.

If you are involved in or interested in Green Gas, this is an event you can't afford to miss – it's THE event for the UK industry! For details and booking, go to the REA website.



Study Tour

9 – 11 October, Austria and Germany

There is a fantastic opportunity to visit five plants in Austria and Germany to see how they treat biowaste and produce biogas, digestates and composts. Cré, in partnership with REA and Informa Consultants, has organised a study tour to visit dry anaerobic digestion plants of biowaste and garden waste, and wet anaerobic digestion plant of food waste.

This is the fifth study tour abroad that Cré has organised and will provide a unique opportunity to visit experienced plants to learn from. You will have the opportunity to understand how the plants run, gain invaluable insights and engage with the operators.

Highlights include:

- Dry anaerobic digestion of biowaste – two plants, one with a 17,000tonnes per annum (tpa) capacity and the other with capacity for 46,000tpa.
- Wet anaerobic digestion of food waste – one plant with 50,000tpa capacity.
- Dry anaerobic digestion of garden waste – one plant with 16,000tpa capacity; the only dry garden waste compost dry digestion plant in Germany.
- Combined compost and dry digestion plant – one plant with 18,000 tpa capacity.

The tour includes two nights B&B accommodation, evening meals, lunches and internal travel within Austria and Germany.

Delegates will have to book their own flights to and from Munich.

We previously held a study tour to Italy in 2019, where we visited multiple compost and AD sites and viewed different systems. Past delegates have found it especially beneficial, asking questions and sharing best practice with the operators.

One of our delegates on a previous tour, Justin Dampney of Eco Sustainable Solutions said:

“For someone who has been involved with organics recycling, on a domestic level for most of my life, it was refreshing to see an alternative approach... I took an immense amount of value from the trip, and would implore any operators or wider stakeholders to attend any future trips. Huge thanks go to Cré and all involved for organising such an invigorating (and very enjoyable) event.”

For further details and to book, please visit the REA website.

There are limited places available so we recommend that you book early to avoid disappointment.

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CARBON FARMING

Nurturing the seeds of change



Thomas Gent, founder of Gentle Farming, delves into carbon farming and the role it could play in mitigating climate change, as well as the challenges presented by way of transition.

I am Thomas Gent, I am the fourth generation on my family's arable farm in South Lincolnshire. We farm around 800 hectares and have been doing so in a regenerative way for around 15 years now. For the past three years I have been working on carbon farming.

Carbon farming is an emerging practice that has gained significant attention as a promising solution to mitigate climate change while enhancing agricultural sustainability.

By sequestering carbon dioxide from the atmosphere and storing it in the soil and plants, carbon farming holds the potential to support the agricultural industry and beyond in our transition to net zero. This article aims to delve into the concept of carbon farming, explore the economic benefits it offers farmers, analyze the tools and processes necessary for its success, assess the current progress, and discuss the future horizon for this transformative practice.

What is carbon farming?

Carbon farming encompasses a range of agricultural practices aimed at increasing carbon sequestration in soil as well as reducing GHG emissions. These practices include minimising tillage, cover cropping and effective residue management among others. By implementing these techniques, farmers can also enhance the organic matter content in the soil, improve soil health, increase water retention, and reduce erosion. Moreover, carbon farming can be used to offset greenhouse gas emissions.

Less tillage, cover cropping, and residue management are three key practices in agriculture that contribute to the sequestration of carbon in soils and play a vital role in mitigating climate change.

Less tillage: Traditional tillage involves the mechanical disruption of the soil, which releases carbon stored in the form of organic matter

and exposes it to the atmosphere, contributing to greenhouse gas emissions. By practicing reduced or no-till farming, where soil disturbance is minimized or eliminated, carbon sequestration can be enhanced. When the soil is left undisturbed, organic matter decomposes at a slower rate, allowing it to accumulate over time.

Farmers can participate in carbon markets by entering into contracts with organisations that invest in carbon farming projects to compensate for their emissions.

The undisturbed soil structure also promotes the formation of stable aggregates, providing spaces for organic matter to be stored and protected from decomposition. As a result, minimising tillage helps to increase the amount of carbon stored in the soil and reduce carbon losses to the atmosphere.

Cover cropping: Cover cropping involves planting crops specifically for the purpose of covering the soil during periods when the main cash crops are not actively growing. Cover crops, such as legumes, grasses, or brassicas, help protect the soil from erosion, improve water infiltration, and increase organic matter content. When cover crops are grown, they capture carbon dioxide from the atmosphere and convert it into organic carbon through the process of photosynthesis. This organic carbon is subsequently incorporated into the soil when the cover crops decompose. By increasing the content of organic matter in the soil, cover cropping enhances carbon sequestration and promotes soil health and fertility.

Residue management: Residue management refers to the practice of leaving crop residues – such as stalks, leaves, and stems – on the soil surface after harvest instead of removing or burning them. Crop residues contain significant amounts of carbon that can be sequestered in the soil when properly managed. When crop residues decompose, the carbon



they contain becomes incorporated into the soil organic matter. By retaining crop residues on the soil surface, the decomposition process is slowed down, allowing more carbon to be stored in the soil over time. As well as sequestering carbon, residue management also improves soil moisture retention, reduces erosion, and enhances nutrient cycling.

In combination, less tillage, cover cropping, and residue management practices work synergistically to enhance carbon sequestration in agricultural soils. By minimising soil disturbance, maintaining continuous plant cover through cover cropping, and retaining crop residues, these practices promote the accumulation of organic matter, increase soil carbon stocks, and contribute to the long-term storage of atmospheric carbon dioxide. Implementing these practices not only mitigates climate change by reducing greenhouse gas emissions, but also improves soil health, water retention, and overall agricultural sustainability.

A carbon farming marketplace

The economic incentives associated with carbon farming are one of its most attractive features. Farmers can generate revenue by participating in carbon markets or by entering into contracts with companies and organisations that are willing to pay for carbon offsets – and invest in carbon farming projects – to compensate for their emissions and reduce their carbon

footprint. Through these financial arrangements, farmers can diversify their income streams and enhance their overall profitability. On my farm, I have been carbon farming with a company called Agreeena for three years now. Each year I yield a certain number of certificates depending on the practices that I have carried out. I then have a choice of how to use the certificates. I can either sell them, keep them, or look to offer them with my produce through the supply chain. Up to now, I have been selling them to help me finance more of my transition, such as planting more cover crops.

Private markets like that of carbon farming are going to play a key role in allowing farmers to both stay in business and deliver for the planet.

For carbon farming to take off at scale, several tools and processes are essential. Accurate measurement and monitoring of carbon sequestration are crucial. Satellite imagery, remote sensing technologies, and soil sampling techniques play a vital role in quantifying carbon stocks in agricultural landscapes. Additionally, the development of robust protocols for carbon accounting, verification, and certification ensures transparency and trust in the carbon market. These

tools and processes provide the necessary infrastructure for farmers to participate confidently in carbon farming initiatives.

Although carbon farming shows tremendous promise, it is still an emerging industry with various challenges to overcome. Progress has been made in terms of developing measurement tools, creating legislation and regulation frameworks, and establishing compliance bodies. However, further awareness and engagement among farmers are necessary to drive widespread adoption. Education, training, and financial support are crucial to enable farmers to transition to carbon farming practices. Collaboration between researchers, policymakers, and agricultural stakeholders is essential to address barriers and ensure the long-term success of carbon farming.

Transitioning to carbon farming

There are a few key factors involved in transitioning to regenerative agriculture and carbon farming: the financial and practical aspects as well as the need to ensure collaboration and navigate government influences.

Financial considerations:

Transitioning to regenerative farming often involves an initial investment. Farmers need to assess and plan for potential expenses, such as equipment upgrades, soil testing, and training programs. Financial support, grants, and loans offered by government agencies and agricultural organisations can aid farmers in covering these costs. But often these on their own do not cover the expense or mitigate the potential risk of transition. Private schemes such as carbon farming can support farmers in this transition. Adopting regenerative practices can, however, lead to reduced input costs over time – by minimising reliance on synthetic fertilizers and pesticides, farmers can save money on expensive agrochemicals, and improve their profitability in the long run.

Practical aspects: Transitioning to regenerative farming requires a shift in mindset and the implementation of new practices. Farmers need to acquire knowledge about regenerative





techniques such as cover cropping, crop rotation and minimising tillage. Training programs, workshops, and partnerships with experienced regenerative farmers can provide valuable guidance during this transition. Adapting to regenerative practices may also involve changes in farm infrastructure and equipment to accommodate new approaches.

Collaboration: Transitioning to regenerative farming involves a learning process and collaboration among farmers, researchers, and agricultural organisations is crucial. Knowledge sharing platforms, farmer networks, and local cooperatives facilitate the exchange of experiences and best practices. I am part of the UK regenerative organisation called BASE UK; a brilliant organisation looking to help farmers share their knowledge with other farmers on the transition.

Government influences: As a result of leaving the EU, farmers are losing their BPS (basic payment scheme) income. This is being replaced with public money for public goods – for example, the ELMS (Environmental Land Management Scheme) and the SFI (Sustainable Farming Incentive). It is becoming more clear how these payments will be awarded to farmers for delivering certain activities. What is also very clear, however, is that all of the activities that are being rewarded cost money to manage and implement. The age of getting subsidies to own land in the UK is over. Private markets like that of carbon farming are going

to play a key role in allowing farmers to both stay in business and deliver for the planet. The government has been clear that they wish to encourage a private market but details of how they plan to work alongside it are few and clarification is needed.

Benefits of carbon farming

Whilst the transition to carbon farming is not for the faint of heart, the rewards are considerable. As mentioned already, private markets – such as a carbon farming marketplace – will be pivotal in keeping farmers in business, but there are other benefits to be reaped:

Transitioning to regenerative farming requires a shift in mindset and the implementation of new practices.

Market opportunities: Transitioning to regenerative farming aligns with the growing consumer demand for sustainable and ethically produced food. Farmers practicing regenerative techniques often find opportunities to access premium markets. Such products can command higher prices, enhance brand reputation, and also attract environmentally conscious consumers. Additionally, regenerative farming practices can reduce supply chain risks by improving resilience to climate change as well as extreme weather events.

Environmental impact: One of the primary motivations for transitioning to regenerative farming is the positive impact it has on the environment. Regenerative practices promote soil health, enhance water retention and reduce erosion, leading to improved resilience against droughts and floods. By increasing organic matter in the soil, regenerative farming sequesters carbon dioxide from the atmosphere, mitigating climate change. The diversified cropping systems and habitat restoration associated with regenerative practices also foster biodiversity, promoting beneficial insects, birds, and other wildlife on the farm.

In conclusion, carbon farming represents a transformative opportunity for both the world and for farmers. By sequestering carbon and enhancing agricultural sustainability, carbon farming holds the potential to mitigate climate change and improve farm revenues. However, attention must be placed on key areas to maximise this opportunity. Increasing awareness and engagement among farmers, providing adequate support and incentives, and fostering collaboration across sectors are essential steps. With continued progress in measurement tools, legislation, and farmer participation, the horizon for carbon farming appears promising. By unlocking its potential, we can move closer to a more sustainable and resilient future for agriculture and the planet as a whole.



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Unleashing our potential

Katie Cockburn (Professional Services Director, CIWM), Dr Adam Read (Chief External Affairs and Sustainability Officer, SUEZ Recycling & Recovery UK) and Sarahjane Widdowson (Director, Intelisos) assess the pressing need for job creation and skill development within our sector.

The organics and biogas sector is critical to delivering a sustainable future and already plays a significant role in helping the UK deliver on its net zero targets. However, without attracting new talent, addressing policy barriers and upskilling the existing workforce, we won't reach our potential and there is the very real risk that progress could stall.

The Chartered Institution of Wastes Management (CIWM) recognised the urgent need for a roadmap to future jobs and skills development back in 2020 (identified by the then-incoming President as a topic of significance) and – following a period of research and engagement – published a report on this issue. The findings of the 'Skills for the Future' report kickstarted an active programme of work through the CIWM including the development of new training materials and courses to support its members and the formation of a Skills for the Future Working Group, a group of CIWM sector professionals focussed specifically on jobs and skills.

A new report (Beyond Waste – essential skills for a greener tomorrow) was published in March 2023, with the aim of providing an evidence base to support CIWM (through Dr Adam Read) to advocate for the wider resources to the UK Government's Green Jobs Delivery Group and to further support the industry as it ramped up activities to prepare for the challenges ahead.

So how do the findings relate to the organics and biogas sector?

The organics recycling and biogas industries are rightly acknowledged by the Green Jobs Delivery Group as critical in the transition towards a sustainable and circular economy. With an increasing emphasis on renewable energy generation, organic waste management handling, and environmental stewardship to drive down carbon emissions, these sectors offer significant opportunities for job creation and new skill development. However, the organics recycling sector faces specific challenges, including a current skills shortage (technical expertise, including professionals who understand the intricacies of operating and maintaining biogas plants, optimizing process efficiency, and ensuring the quality and safety of the output, data management, regulatory knowledge, analytical and data management skills) amplified by an ageing workforce, the negative perception of the industry as a 'waste' sector, and the need for specific new skills requirements (reflecting the evolving nature of the sector as it embraces technological advancements, circular economy principles, and renewable energy integration), and these issues are discussed in more detail below.

Reframing the industry to attract new talent

One significant challenge in the organics recycling sector is the perception of the industry as a downstream 'waste' sector. Many young professionals may not initially consider the sector as an attractive career choice due to this perception. However, reframing the industry as an innovative, technology-driven sector that contributes to sustainable development, decarbonisation and effective resource management should help overcome this.

Promoting the industry's ties to engineering, agriculture, soil management and innovation could highlight the diverse and exciting career opportunities available. Emphasising the sector's role in mitigating climate change and promoting sustainable farming practices, as well as the

One significant challenge in the organics recycling sector is the perception of the industry as a downstream 'waste' sector.

development of cutting-edge waste-to-energy solutions can help rebrand the industry as an exciting and impactful place to work, one where long-term careers will be fulfilling and secure. As part of the CIWM research, a group of ~150 Masters level environmental students fed back that although a career in 'waste' wasn't particularly attractive, a career in the circular economy and renewable energy was – framing is everything when it comes to selling the opportunities in our sector!

Collaborations with educational institutions, industry associations, and professional bodies can play a crucial role in promoting career paths. Creating internship programs, utilising apprenticeships, developing mentorship opportunities (like the CIWM mentoring





platform - Connect) as well as industry-academia partnerships and joint research programmes, can all help to bridge the gap between theoretical knowledge and practical application, fostering a skilled workforce for the future, and ensuring the skills are available when needed.

According to the “Biomethane: The Pathway to 2030” report, the biogas sector alone has the potential to create over 30,000 direct new jobs in the UK by 2030. This showcases the immense employment prospects available in the industry, further highlighting the need to attract and retain talented individuals in the immediate months and years.

However, staff retention is also a tough challenge. The sector is grappling with an ageing workforce, with many experienced professionals approaching retirement age. This demographic shift will create a large skills gap that needs to be addressed to ensure the continuity and growth of the industry. As older workers retire, there is a pressing need to attract and train new talent to fill the emerging vacancies as well as capture legacy knowledge, perhaps through mentoring programmes and platforms, but we need the professional and trade bodies to step in and create these opportunities before the skills are lost from the sector.

Policy: overcoming barriers to investment in new talent

Delayed policies and regulatory frameworks are already hindering the growth and investment potential of specific sub-sectors within the organics and biogas industries. In some

regions, delays in the implementation of supportive policies, such as feed-in tariffs, subsidies, a carbon tax and market incentives, can make it challenging for companies to plan long-term and attract new talent. A survey conducted by CIWM as part of the research found that 45 per cent of the respondents’ organisations were conducting workforce planning (often connected with forthcoming policy changes). However, worryingly, 61 per cent were struggling to recruit to existing posts – a trend that we’re seeing across the industry right now.

To enable the industry’s growth, policymakers should prioritise the development and timely implementation of specific policies that provide a stable and supportive environment for investment. The ABDA report highlights that the UK biomethane sector could generate £2-£3 billion of capital investment by 2030, but this is contingent on the implementation of supportive policies. The waste sector has £10 billion to invest in meeting known policy reforms and targets. We know that even when the industry is firmly behind developments, getting policies across the line can be painfully slow. With current government concerns relating to the cost of living crisis – and specifically costs to business – advocating the benefits of job creation can provide additional leverage.

Within the CIWM report of the 230,000 predicted new roles by 2040, around 20,000 are related directly to food waste policy changes – rolling out additional collections from households and businesses stimulating investment in new technologies and using the new products appropriately.

Skills: apprenticeships, training, and the Green Skills Fund

To maximise the potential of the organics and biogas sectors, investments in apprenticeships, training programs, and skill development initiatives are essential.

One of the recommendations of the CIWM report was that the current moratorium on funding for skills provision should be lifted by Government and that a Green Skills Fund should be established.

The fund could be supported by public-private partnerships and could play a vital role in providing financial resources for training and upskilling programs tailored to the needs of specific sectors. The fund could support apprenticeships, vocational training, and certification programs that focus on areas such as anaerobic digestion, waste management, renewable energy systems, and sustainable agriculture, alongside other circular economy-based courses and qualifications.

Apprenticeships can offer valuable hands-on experience and practical knowledge for aspiring professionals, enabling them to develop technical expertise. Collaborations between industry stakeholders and educational institutions can facilitate apprenticeship programs and ensure that the curriculum aligns with the evolving demands of the sector. This type of initiative can also lead to regional technical centres focusing on local needs; for example, a centre of excellence focussing on organics may be suited to a more rural area such as East Anglia, where several strong markets and demands already exist.

Additionally, continuous professional development and training opportunities for existing professionals can help them stay updated with the latest technologies, regulations, and best practices. The Green Skills Fund could support workshops, seminars, and certifications that enhance the skills of the workforce, ensuring that the organics recycling and biogas industries remain at the forefront of innovation.

Seize the opportunity

There’s immense potential for job creation and skill development within our sector. By reframing the industry to attract new talent, addressing policy barriers, and investing in apprenticeships and training programs through initiatives like a Green Skills Fund, we can foster a skilled workforce capable of driving innovation, sustainability, and growth in these vital sectors. As the global focus on renewable energy and waste management intensifies, it is crucial to seize these opportunities and drive forward the green industrial revolution.

The time to act is now!

What are the opportunities and challenges of the peat ban?

Catherine Dawson,
Senior Associate
and Technical Lead,
Melcourt Industries



Supplying peat-free media for over three decades, Melcourt has been at the sharp end of the peat debate for a long time. The recent announcement that most professional growers will have to be peat-free by 2026 has caused a stir – principally amongst those reluctant to observe the very obvious direction of travel from Defra and the conservation NGOs.

Let's not overlook that the peat issue initially raised its head in the late 1980s and that the first government peat-reduction target was published nearly two decades ago in 1995.

Further missed targets culminated in Defra announcing the peat bans in 2021. For the retail market, where the ban comes into force at the end of next year (subject to parliamentary process), the effect was almost immediate. An

apparent opportunity seized, a host of new peat-free composts, some of questionable quality, appeared on the market. Poor performance has the potential to drag down the whole sector and is a challenge for specialists such as Melcourt who have spent decades researching and developing peat-free products that perform as well as peat.

Green compost has been a controversial input for many years. In our view it is a very useful resource if sourced and deployed carefully.

However, recent figures indicate that volumes of green compost in growing media have been falling year on year, to represent under five per cent of the UK growing media volume. This perhaps reflects some of the challenges this ingredient can face but we believe there is a place for well-produced, consistent, contaminant-free supply.

So, the opportunities presented by the peat ban are immense but long-term success will only truly exist for those prepared to apply R&D and QA rigour.

Simon Blackhurst,
Director, SJB Quality
Consulting



It has now been over a year since I last wrote about the implications of the proposed peat ban in horticulture, unfortunately many of the concerns remain the same. Cost, quality and consistency, efficacy.

We still don't have a formal position from government, however the debate remains ongoing and calls for evidence and information from industry have been sought.

Retail bagged peat-containing growing media is to be banned, and both retailers and manufacturers have embraced the move, most offering a full range of peat free media.

For professional growers, it's a different story. Some have moved to peat free, some are at trial stages and others are reluctant or don't know where to start. Many growers have had negative and varied experiences when trialling, and so quality and consistency of the formulations are high on the agenda.

Industry believes there are enough raw materials to go around, but peat free formulations are technically complex and many different blends may be required depending on the plant species being grown.

The UK is leading the way and could become a centre of excellence for growing peat free at scale, reducing reliance on imports and supporting a growing horticulture industry.

The organics industry can help by supplying high quality, stable composted materials as the horticulture industry seeks to remove peat completely.

Households can also help, making sure they use the right materials in their gardens; soil improvers for raising beds and borders, not multi-purpose, for example. Or avoiding putting non-compostables in their organic waste bins, as this is the biggest issue for commercial composters and anaerobic digesters.

Steve Harper,
CEO,
Southern Trident



Opportunistically, the UK ban on the use of peat as a growing media is a plus for environmental conservation and for climate change mitigation. Peatlands are valuable ecosystems that provide habitat for unique plant and animal species and store vast amounts of carbon that is released into the atmosphere on extraction.

The ban will undoubtedly encourage the use of alternative growing media, such as composted bark, coir, PAS100 composted green waste or wood fibre, which the Responsible Sourcing Scheme for Growing Media shows have a lower environmental impact.

There is also a huge opportunity for growers. If Dutch growers and the like will not – as expected – move away from peat quickly, UK growers have the chance to grow their business at the expense of importers.

There are, of course, a number of significant challenges. The UK horticultural sector has relied heavily on peat-based growing media due to its excellent water retention and nutrient properties. Transitioning away will require changes to production techniques, supply chains, and consumer preferences.

We need to ensure there is an adequate supply of sustainable alternatives to peat. Companies like Southern Trident could double or treble their output of coir to begin to plug the gap and a number of large substrate companies are preparing for the loss of peat. We now only need to replace c.900,000m³ of peat.

Finally, we need to educate professional growers and consumers about the importance of reducing peat use and the benefits of alternative growing media, which may require targeted awareness campaigns and support from industry organizations and the government.

AD & compostable packaging

A high-energy feedstock following thermal hydrolysis

Conventional AD de-packaging technology cannot differentiate between compostable packaging materials and conventional plastics. In response, Jones Celtic Bioenergy and Aerothermal have developed a thermo-pressure hydrolysis (TPH) technology, providing a unique solution. The process treats bio-waste in a steam environment at 150-160°C for 40 minutes.

Compostable Coalition UK commissioned tests on individual compostable packaging types, and on packaging mixtures, at the TPH pilot plant. These results have been confirmed based on observations at the full-scale demonstration facility.

The process chemically solubilised the organics, resulting in an increase in biomethane productivity and a decreased digestion time. Other features of processing compostable packaging include:

- Most lignocellulosic packaging materials are readily hydrolysed, e.g. cardboard, paper, bagasse.
- Bioplastics such as PLA (polylactic acid) are readily hydrolysed.
- Wooden packaging is less readily hydrolysed.
- High-temperature bioplastics are generally resistant.
- Petroleum plastics can be effectively separated from compostables by screening.
- The digestate meets the PAS 110 standard.

In particular, two detailed tests of a 15kg mixture of Vegware's compostable packaging processed a mixture of cardboard, bagasse, PLA and wood to assess the rate of recovery following 10mm screening. These tests yielded 81.8 per cent and 90.4 per cent of the packaging as a pumpable <10mm floc respectively.

The biomethane yields were extraordinary, with consistently 314 - 317 m³ CH₄/tonne of packaging (fresh weight). The highest yield for an individual component was for PLA-based coffee pods with a yield of 337 m³ CH₄/tonne which included a contribution from the coffee grounds.

These very high yields, while largely related to the high dry matter of the input materials, are around triple typical food waste (100 - 125 m³ CH₄/tonne) or maize silage yields (105 - 120 m³ CH₄/tonne).

Therefore, for example, if seven per cent of a 50,000tpa facility's inputs were compostable packaging currently being disposed of, TPH pretreatment could bring a potential gain of >10,000 MWh per annum of biomethane.

It is therefore considered that TPH treatment, now demonstrated at full scale, represents an important technology for the efficient recovery of compostable packaging.

RWM:

Hear Dr Andrew Walsh discuss TPH trials: day 2, 1:15pm, Materials Village.

Visit Vegware & the Compostable Coalition UK by the Keynote Theatre.

14-tonne compostable packaging IVC trial sample passes PAS100

EnVar Composting Ltd reports the completed trial of this compostable packaging:

- 7.3 million tea bags (67kg from Ekaterra's PG Tips and Pukka, 589kg of Biome Bioplastics material)
- Over 23,000 coffee pods by Blue Goose Coffee and The Green Ring
- Six tonnes of used Vegware containers, cups and cutlery, from Recorra's waste collections at offices in London
- 25,000 caddy liners made from Novamont's Mater-Bi
- Nine pallets of compostable bags by Tipa for Le Col
- Nine million sweet wrappers, aka 2.4 tonnes of NatureFlex cellulose film made by Futamura
- Punnets & lids for Riverford; 1,000 tea sachets by Parkside Flexibles

The compostable packaging materials were included in EnVar's normal in-vessel composting process, and the resulting sample passed PAS100. The trial report, written by EnVar and reviewed by REA, will be published this autumn.

No microplastics detected from compostable materials trialled

A sample of the compost resulting from the EnVar trial was analysed by Socotec's lab, using FTIR, Fourier Transform Infrared Spectroscopy. This concluded: "Analysis of the microplastics recovered from the compost sample showed no detectable evidence of any biodegradable polymers."



Compostable Coalition UK is a UKRI-funded project between REA, EnVar Composting Ltd, Recoup, Recorra, University of Sheffield, Hubbub, Vegware, Tipa, Biome Bioplastics, Futamura. Its aim: ensuring compostable packaging is effectively collected and organically recycled via existing UK bio-waste infrastructure.

www.CompostableUK.info

Managing the risk of bioaerosols

The impact of exposure to bioaerosols can be severe and is a commonplace concern at composting sites. How might one manage the risk? Professor of Environmental Health at The Open University, Toni Gladding, explains.

If you have been in the composting industry for any length of time, you will have heard of bioaerosols. You may have heard of them in a regulatory fashion, particularly with the requirements of M9 (Environmental monitoring of bioaerosols at regulated facilities) from the Environment Agency, or maybe the Health and Safety Executive has asked you if you are controlling them adequately. But what are they and why are they important?

Whilst it is important to know what bioaerosols are and how to assess their associated risks, it is also important to note that 'airborne microorganisms' (bioaerosols) are commonly produced by many natural and human activities and are always in the air around us. Activities such as grass cutting or harvesting can generate significant airborne concentrations, but high concentrations are released from biological waste treatment processes.

What are bioaerosols?

Bioaerosols are airborne solid or liquid particles of biological origin, ranging in size from 0.5 to 100+ microns – in other words, they can penetrate the deepest part of the lungs. Microorganisms can be airborne as clumps, aggregates or as single cells, all of which may or may not be attached to particles of other material – e.g. dusts – and can include various components such as whole cells of live bacterial and fungal spores. High concentrations of live airborne microorganisms have been linked to various health outcomes, but pathogens (species of microorganism which are infectious and can produce disease) can also cause issues at much lower concentrations. There are also components that are present that do not rely on live microorganisms, such as endotoxin. Endotoxin is a component of gram-negative bacteria cell walls and of particular interest as it is released upon microorganism death and is a known respiratory sensitiser. Other components could include viruses, yeasts, and – potentially – secondary metabolites including mycotoxins, all of which have their own potential health outcomes.

The risk of exposure to bioaerosols is an ongoing research area within many industries, including waste

management. Bioaerosols may cause infection (via pathogens such as *Aspergillus fumigatus*), or allergic reactions (total load of perhaps fungi as in Farmer's Lung) in people who are exposed, particularly if they already have other health issues. However, endotoxin is the only component of bioaerosols with a 'dose-response' relationship, e.g., higher concentrations have been definitively linked to health outcomes, such as inflammation in the airways, or systemic effects such as 'flu-like symptoms' (fever, shivering, etc.)

People who work at waste management facilities may be exposed to, and inhale, large quantities of bioaerosols.

The importance of measurement

Measurement of bioaerosols is currently most often carried out by monitoring for the presence of viable or 'live' microorganisms (bacteria and fungi), which are quantified as colony-forming units based on their ability to grow in the laboratory (expressed as cfu/m³). This is due to the fact that it is an inexpensive and relatively easy way to identify exposure. Indeed, the M9 protocol for measuring downwind exposure to bioaerosols from open composting facilities relies on a viable culturing method for all bacterial species and, separately, *Aspergillus fumigatus* in an environmental context. It is recognised that this is a limited way to measure exposure – not least as components such as endotoxin are missed. We also have many exciting new technologies being developed such as real-time measurement devices with the ability to identify to species-level, but these are still relatively expensive. For now, this low-cost/low-tech approach is likely to continue. However, a competent consultant with a strong track record is an absolute must – a poor sampling regime will not inform the risk assessment process, and how results are interpreted could lead to expensive remediation, which might not be required!

Occupational health risks from waste management operations

People who work at waste management facilities may be exposed to, and inhale, large quantities of bioaerosols, especially during work activities where microorganisms become forcibly airborne, such as compost turning, shredding, and screening. However, there are other activities that must not be forgotten such as tipping, driving, picking, or sorting, sweeping, and maintaining waste treatment equipment – particularly where they occur indoors. High-pressure washing and compressed air cleaning can also be significant sources.

There are many ways of dealing with these risks – for example, designing practices to minimise releases or protecting those working at the plant by zoning or restricting access in areas where high concentrations may be present. Other measures include good ventilation or filtered vehicle cabs or respirators in accordance with recognised health and safety practice (bearing in mind personal protective equipment is considered a last resort). Strict hygiene measures for working in facilities are also recommended, as it is common to find a high incidence of stomach issues on such sites. Good practice would include site and task-specific assessments identifying areas of risk and measures taken, to cover contractors and visitors. The Waste Industry Safety and Health (WISH) forum has produced a wide range of guidance and information notes on health surveillance around hazardous substances and green waste, which can all be found at wishforum.org.uk, and there is a new bioaerosol information note due out later this year.

It is important to note there are no workplace exposure limits for 'bioaerosols' within the UK or Europe because methods of measurement are not standardised, and dose-response data is not available. However, risk-based benchmark concentrations over 105cfu/m³ (colony-forming units, e.g., culturable) have been considered elevated in some studies. Pathogens such as *Aspergillus fumigatus* could be considered elevated at lower concentrations. For endotoxin, the

story is slightly different and in The Netherlands there is a suggested limit (90 EU/mg3). Research has measured endotoxin more than this in UK facilities, but work is still ongoing to link health outcomes related to these concentrations. Bioaerosols research is still in its infancy, and we do not really know if there are any long-term health effects to prolonged exposure. Hence a precautionary approach is advised with appropriate health surveillance.

Environmental spread from waste management operations

Research funded by Defra and the Health and Safety Executive has identified that those living more than 250m from an open windrow composting site are not usually exposed to levels above background concentrations and are not regarded as at elevated health risk. With enclosed facilities, this distance may be much smaller. Due to this research in England and Wales, there is a general presumption to not grant a new facility within 250m of homes and businesses.

However, any planning for a site will have probably required the site to have conducted a site-specific risk

assessment to demonstrate where they have identified risk pathways and minimised any risk to sensitive receptors (homes, offices etc.). Most will require a period of sustained monitoring (quarterly for a year or more) to establish their emission profile. It is likely monitoring can be

Although there may be the assumption that a detectable odour from composting activities is synonymous with exposure to bioaerosols, this is not necessarily the case.

reduced after a year if results are within guidelines (currently 1000 cfu/m³ for bacteria and 500 cfu/m³ for *Aspergillus fumigatus* as measured by the M9 protocol). It is important these trigger limits are not used in an occupational context, as they are designed to highlight concentrations above background and to consider the general population including sensitive receptors, which might include the elderly and children.

Finally, dispersal of odour is likely the issue that results in concerns regarding health and bioaerosols. Whilst the chief

cause of odours from composting is when anaerobic microbial activity takes place, causing the release of mainly sulphurous compounds, the two are not necessarily linked. It should be noted that the dispersion behaviour of odorous compounds is different from bioaerosols (mainly as one is gaseous and the other particulate in origin), and although there may be the assumption that a detectable odour from composting activities is synonymous with exposure to bioaerosols, this is not necessarily the case.

Bioaerosols are an inherent part of the waste management industry and require active control to ameliorate environmental and occupational exposure. Training employees to recognise bioaerosols as a potential risk is key.

There are documented cases of occupational issues and illness linked to exposure in the UK, hence it is important to carry out appropriate assessments to understand their sources and the likely risk. It is also recommended that health surveillance of the workforce is carried out. WISH is a reliable source of information, with a new bioaerosols information note due out imminently to assist the industry in evaluating this risk.

Cold and high

Anaerobic digestion in cold and high-altitude environments



By **Robin Szmidt** (Founder of Target Renewables Ltd, a UK-based AD consultancy), **Embrey Bronstad** (a wastewater engineer at Washington State University), and **Jaime Marti-Herrero** (an AD specialist at Universidad Regional Amazónica Ikiam).

Cold & High Anaerobic Digestion (CHAD) is a group of AD specialists and researchers in various interlinked disciplines: coming together to address unique AD challenges. The group initially focused on Alaskan tribal communities where off-grid villages have major health, hygiene and environmental challenges. The CHAD team is designing solutions for organic-waste treatment using innovative AD systems which can be applied worldwide in other cold, high-altitude and latitude situations.

The AD sector mostly focuses on one of three categories: European-style AD using industrial-scale stirred tanks for farm, food and garden waste; farm-village-scale warm climate digestion, particularly in Asia, and then the general background of waste-water treatment. Of course, communities don't always fit neatly into such groups.

In mid-2020, as part of their tribal trust responsibility to help Alaskan Native Villages with sanitation, the US Environmental Protection Agency (EPA) began to look at the potential for the use of AD in remote communities for both waste treatment and biogas generation. The EPA, in concert with Washington State University (WSU), spearheaded a think-tank on aspects of AD specific to extreme cold and high latitude or altitude environments. At a key time in the COVID-pandemic, this was by virtual discussion: creating a virtual team of 25 international stakeholders and AD specialists concerned worldwide with rural Arctic and sub-Arctic communities, which currently lack sufficient sanitation and waste management.

The scale and complexity of the issues around cold-community AD quickly became obvious: linking science, environment, society, geography and economics. This is a good reflection of all research & development needs for fragile environments and locations.

These interactions have since been encapsulated in the Arctic Research Plan 2022–2026.

The group, now known as CHAD, is web-hosted by the Interagency Arctic Research Policy Committee (IARPC) and brings together stakeholders from federal, state, academic, NGO, industry, indigenous and international organisations. The broader international aspects easily relate to all of arctic North America and the North Atlantic, northern Europe, high-altitude regions of South America, and so on.

In cold regions, permafrost may make landfill of human waste impossible: with little or no natural degradation or risk-reduction.

The challenge

Even today in the 21st century, it may come as a surprise how many isolated communities are off-grid with little or no sanitation. Human waste may be collected in so-called 'honey buckets', that are manually dumped, usually

with no treatment available and no easy or hygienic disposal method to rivers or ponds. More than 3,000 rural Alaskan households have to rely on honey buckets for human waste disposal in societies where energy costs are approximately 50 per cent of the average household income. In cold regions, permafrost may make landfill of such material impossible: with little or no natural degradation or risk reduction. In arctic and sub-arctic conditions this also means an increased risk of water pollution, which is very difficult to avoid: all this in communities which often depend on near-surface fresh water and fishing. This situation is common in the whole arctic region.

At high altitude, at first glance, the situation might appear less important. Isolated habitations tend to be scattered over large areas, with trekkers and tourists seasonal. However, in places such as Mount Everest hundreds of annual expedition climbers can have a huge impact on fragile ecosystems. After decades of continued use, Everest Base Camp and the upper camps have become scarred by human impact. By 2019, human waste dumped in Gorak Shep, nestled in



Image: J. Marti-Herrero

The key objectives of CHAD are to:

- Design and construct a digester adapted to cold climate conditions using resources that are portable, simple, and readily available;
- Minimise ancillary equipment associated with the digester to maximise simplicity and accessibility, and to minimise operation and maintenance requirements;
- Design an appropriate enclosure, insulation, and heating system that utilises existing infrastructure, natural or local materials, and renewable energy;
- Assess energy inputs relative to energy generated under mesophilic (30–40°C) or psychrophilic conditions (0–20°C);
- Monitor pathogen reduction, volatile solids reduction, and other waste stabilisation characteristics of the digester
- Test the resilience of the digester microbiology to freezing.



Image: J. Martí-Herrero

Mount Everest Sagarmāthā National Park, a UNESCO World Heritage Site, had grown to about 13 tons annually, causing ever-increasing environmental damage and posing severe risks to clean water sources. The Mount Everest Biogas project is developing local solutions for high-altitude organic waste management and is just one example of a project that can benefit from links to CHAD. Overall, about 10 thousand houses at an altitude of more than 3,000m could potentially benefit from micro-AD in the rural Kathmandu region alone. Similarly in Bolivia, both tubular digesters and tank digesters have been successfully trialled above 4,000m, and even 5,000m, by members of CHAD.

Appropriate technology

Due to the darkness of winter, passive solar heating is a huge challenge. One option is to digest waste only in the warmest part of the year, stockpiling wastes in deep-freeze conditions and processing in start-stop digesters, which needs research. The basic designs of tubular and tank digesters are both being considered; tanks are more common worldwide but limited by cost per effective volume. By contrast,

tubular, or plug flow, designs need water addition, not so readily available in arctic regions. Insulation and mechanical parts need to be effective, simple and easily maintained in remote locations. Of particular concern is the establishment of a productive biology in the AD system capable of functioning under extreme and variable conditions. The CHAD group includes leading scientists researching

Due to the darkness of winter, solar passive heating is a huge challenge.

psychrophilic microbial populations capable of usefully generating biogas at temperatures lower than 10°C. Researching the effect of post-AD digestate on fragile environments and ecosystems then becomes an essential part of the development project.

It makes no sense to try and 'parachute-in' technical solutions using an urban, European-style, AD system. This approach to project development has always led to project failure in the past and increasing resistance to new technology by communities. The early concerns expressed in focus groups

were Cost, Complexity and Uncertainty (of technology). Alongside the technical search, CHAD is committed to action on the ground, with community group training and education, and project 'champions' identified from the outset.

Current status

There have been virtual meetings for two years, talking with different stakeholders, organisations that work in-field with current solutions for wastewater, and relevant actors to understand the real situation and challenges that need to be faced.

In 2023, the first technical developments have been realised, such as commencing work on a demonstration facility at Fairbanks, Alaska; modelling thermal simulations of psychrophilic AD, and sharing experiences and research results on cold climate wastewater treatment, and social concerns related to the topic.

The group will meet together face-to-face for the first time in 2024 for workshop sessions; to review progress on the actual developments on the ground in the AD project at the US National Renewable Energy Laboratory, Fairbanks.

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CCS & BCS



Emma Laws, Research and Communications Assistant, and Georgia Phetmanh, Schemes Manager at REAL, provide the latest on the Compost and Biofertiliser Schemes and the REAL Research Hub.



COMPOST AND BIOFERTILISER CERTIFICATION SCHEMES

Forums and TAC

We held the biannual meetings of the CCS Producers' Forum and the BCS Operators' Forum in May.

CCS Forum: The key topics for discussion at the CCS Forum included an update on the Compost Quality Protocol (CQP) revision, and a short session on compostables, during which producers shared further views on what would be useful for identifying compostable materials in feedstocks. Additionally, there was an update from the Research Hub and a discussion about feedstock contamination and permit requirements.

BCS Forum: At the BCS Forum, similar updates were provided on the Anaerobic Digestate Quality Protocol (ADQP) revision and the Research Hub, on which operators queried how research projects taken forward this year to inform the ADQP revision might fit in with the revision timelines. There was also a query raised surrounding the changing of screens and why this is viewed as a significant change to the process.

CCS/BCS TAC Meeting: An update from the forums was then presented at the June CCS/BCS TAC meeting by the operator/producer representatives. There were further comments raised regarding allowable contamination levels in local authority contracts and the challenges this creates, and the queries from the BCS Forum on changing screens were raised with the Certification Bodies. A BCS position on this technical issue is now being drafted. This meeting also included an update on the investigation into the relationship between Volatile Fatty Acid (VFA) and Residual Biogas Potential (RBP) results, the outcomes of which will be shared at the next BCS Forum in October.

Plant Response Test Technical Working Group

The Plant Response Test Technical Working Group (PRT TWG) met twice in June to provide comments that will aid in developing a project specification for the PRT Research Hub project.

The PRT Hub project had been put out to tender in two different forms and did not receive any bids each time. Following this, REAL decided to take forward the project outside of the usual Hub procedures, as REAL views it as valuable to CCS. As such, REAL has been working on a plan to take the project forward internally, including meeting with the PRT TWG for their advice.

REAL hope to deliver a further update on this project soon.

THE RESEARCH HUB

Ongoing projects

Residual Biogas Potential Test Improvements and Alternatives: This project aims to provide a comprehensive technical evaluation of the Residual Biogas Potential (RBP) test; the only digestate stability testing regime recognised under PAS110. Aqua Enviro was contracted for this work in early 2022, and the project is in its final stages, with the final report being reviewed. The final outputs of this work will be available in the coming months.

Carbon Accounting for Compost and Digestate: This project will evaluate the carbon accounting benefits associated with producing and applying compost and digestate to land. It also aims to develop guidance to account for these benefits under the Greenhouse Gas Protocol. AECOM has been contracted to complete this work and start-up meetings have been held. This work is due to be completed in November 2023.

Plastic Contamination Method Assessment: This project aims to investigate the sensitivity and robustness of current methods for determining physical contaminants and to explore the use of alternative plastic assessment methods to inform future developments to PAS100 and PAS110. Solidsense has been contracted to complete this work and start-up meetings have been held. This work is due to be completed in April 2024.

Future projects

The evaluation process is currently ongoing to select the next project to be taken forward from the 2023 Call for Proposals. The proposals include topics such as the risk assessment for the QP revision, exploring an alternative to peat control growing medium for the plant response test, and monitoring contamination in feedstocks. The full list of proposals can be found on the Research Hub website. REAL will announce the project selected for 2023 in due course.



A focus on quality and connections

Bryony Morten-Short, Operations Manager at Shorts Group explains how they achieve their high-quality compost, and the value of connecting with local schools, farmers and domestic customers.

Our composting facility, which opened in the early 2000s, has been operating as an open windrow composting facility. With the investment of a local authority, we built the yard to process much of the local kerbside and council generated green waste. Our composting division sits with Shorts Agricultural Services Ltd, which was primarily an agricultural contracting business set up in 1985 by Gary Short, and is the sister company to Shorts Group Ltd, which offers waste management, demolition and plant hire services, among others.

In the early days of the facility, we operated a tub grinder to grind the incoming green waste, but we have since moved onto using a high-speed shredder for green waste and a slow speed for roots and oversized. For us, this combination proves to be the most effective. We recently invested in a Willibald Shark Shredder supplied by Doyle Machinery, which is proving to be very effective and efficient at processing the incoming green waste.

Top-quality product

As a business, our aim has always been to produce a top-quality product that will be a soil improver, and to be a champion of organic and peat free recycled produce. This is something we are confident and proud to say we achieve, which was proven at our most recent PAS100 Audit where the auditor gave the best score to the quality of our compost as they found no contamination and even commented that it was the best they had seen in their time of

auditing. This was a great high point and a true credit to the very skilled and experienced team we have working in the yard. Our yard supervisor has been around since the beginning, alongside one of our machine operatives and they are very passionate about maintaining our high standards, which shows through the final product.

We achieve the quality of our final product through our extremely thorough decontamination stage at the reception of the greenwaste. We put a lot of time and effort into cleaning the feedstock as we know that once it has gone through the shredder and started its journey through our yard it is extremely hard to get rid of any unwanted material. Our feedstock supply comes from a mixture of local landscapers, council contractors and kerbside collections.

The quality of the feedstock will always be our biggest challenge – especially with kerbside collections – and we are big advocates of educating the waste producers into what can and cannot be put into their green waste bin.

Local engagement

We try to do as much as we can with local schools by offering and hosting tours around our facility and donating produce for community projects, which is always very well received. From the children to the teachers, we show the step-by-step process – from the green waste arriving to the end product. It is always an engaging experience where we feel we can get across the importance of source-segregating waste, which is relevant in all aspects

of waste management and recycling. The visits always end with the children taking home a little bag of compost and we regularly receive photos from them showing us what they have used it for.

In the early days, our main customers were local farmers who took our 0-20mm product to spread on the fields. We have an agricultural contracting division within our business, so on many occasions, we were contracted to supply and spread compost back to the fields which is a great service that we can offer. Our additional 0-10mm grade has always been a favourite with local landscapers who will collect a load when dropping off their green waste. More recently, we have seen many more domestic customers taking our product as it is viewed as the more sustainable option, and off the back of this we have started to offer a bagged material delivery service giving customers the option to buy on our online portal. The uptake on this has been great and we are now looking at additional products we can offer.

Going forward, we will continue to do what we can to educate and share the benefits of using organic and peat-free composts and we are always looking at additional products we can create and offer. We will always strive to produce the best quality products and are always open to conversations with colleagues within the industry. If anyone would like to have a look around our site or discuss processes please do reach out. We were lucky enough to have hosted a tour after the REA Organics conference last year and it was a really worthwhile visit all around.



Green Gas Steering Group

As the industry sees big changes, regulators and policymakers need to commit to action to capitalise on innovation and investment opportunities. By **Thomas Minter**.

Thomas Minter,
Managing Director,
Malaby Biogas



Big changes over the last year. War and inflation feed commodity and energy prices, and political and investment interest grows. Nature Energy and Archaea Energy show that Big Oil values AD's future beyond existing support schemes. The EU's swift geopolitical response in 2022 was RePower EU signalling long-term investment opportunities for AD. Ditto Biden's IRA. Are we in a price bubble as the UK benefits from the investment interest but sees domestic political turmoil? Regulatory and policy inaction risks 'the wall of capital' going elsewhere. Political dithering could risk investment opportunities.

Technical opportunities exist to optimise current biogas infrastructure with scalable and modular kit. With the GGSS mid-term review about to be confirmed (thus far it has focused solely on new, large-scale facilities), overlooking the potential for expansion and optimisation misses the vision. The Resources and Waste Strategy (Action Plan) delivery is delayed, leading to feedstock uncertainty.

Biogas's inherent flexibility has led to biomethane variants – on and off-grid, CNG & LNG, and bio-CO₂. Transport and food and beverage sectors are set to benefit but the end of waste and quality specifications require resolution of the Environment Agency's long overdue Quality Protocol review to deliver clarity for the future: permit delays and nutrient regulation uncertainty risk undermining ambition and investment. The food vs fuel debate remains stuck in the past while

RePower EU sees sequential cropping as supporting homegrown energy without sacrificing food-productive land. Regulatory support for R&D beyond the lab and pre-commercialisation is outdated, slow and inflexible. Industry and academia are keen to innovate but regulators and policy-makers need to act to support growth.

The sector is poised to grow. Technical capacity, investment and expertise are there. The challenge is opening up opportunities and resolving the barriers. This is happening in the EU and USA with state-scale support. Along with the wider industry and trade bodies, The Green Gas Steering Group and the REA's policy teams are providing essential linkages between industry and Whitehall. With a general election looming, policy delivery is stagnating. Investors will vote with their feet and innovation will follow the path of least resistance.

REA Green Gas steering group members



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Organics Steering Group

Tony Breton takes a look at how the organics recycling industry might need to evolve following recent policy announcements, in order to compete for biowaste feedstocks.

Tony Breton,
Market Specialist –
UK & Ireland,
Novamont



The recent government announcement that, from 2028, carbon emissions from incineration will be included in the UK Emissions Trading Scheme (ETS) should be welcome news for the organics recycling industry. Subject to further consultation and development, from 2028, the quantified fossil carbon emissions from incineration may be required to pay a tax upwards of £80/T. Theoretically, this would at least double the cost of incineration and drive waste up the hierarchy. Furthermore, in 2028, Defra is looking to ban biodegradable waste from landfill. Again, one could presume that organics recyclers will be the winners.

However, all is not simple. Unlike the devolved nations, England does not, nor will it have, statutory recycling targets. Yes, the Environment Act requires the delivery of separate collection services across society but it doesn't say they have to be any good. With Pay-As-You-Throw currently off the agenda, the only real driver for improving services – other than local pride – appears to be coming from EPR, if it ever arrives.

Also demanding value will be the shareholders of the big waste management companies. Within a few years, today's operational incineration capacity will grow from ~17MT to 23MT. Given the reaction to the latest policy announcements and despite all the rhetoric around #socialvalue and #ecologicaltransition, it is clear that they foresee a fruitful future. Looking at their planned and installed food waste capacity, they are not banking

on organics recycling. For sure, their eyes will be on the biowaste in residual. The exclusion of biogenic carbon from the ETS combined with the huge uplift anticipated from the landfill ban and their domination of the collection market means they are perfectly positioned. This is before any gains should their dream of incineration-BECCS ever come to reality.

Future competition for biowaste feedstocks will also come from Advanced Conversion Technologies and bio-economy platforms. For the organics recycling industry to survive, it must first be able to compete through natural 'CCS' i.e. soil organic carbon, but also through market-driven value-led demand for the consequential economic, social and environmental benefits of healthy soils. We must seek to act on these now before all our feedstocks are tied up in smoke.

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