Organics Recycling & Biogas

Spring 2023 Issue 51

The magazine from REA Organics and Green Gas

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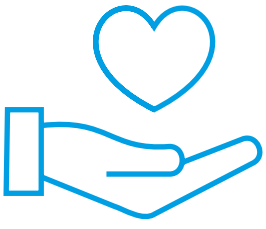

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Welcome

Jenny Grant, Head of Organics and Natural Capital
Paul Thompson, Interim Policy Lead on Biogas

Welcome to this edition of our magazine. As we write this we are still waiting with baited breath for the Government response to the collection consistency consultation alongside further details on dates and funding for when the mandatory food and garden waste collections must be in place.

We know members are keen to get more information on the TEEP requirements, what the requirements for liners for food waste collections will be, and what will be covered in the statutory guidance. Hopefully, by the time you are reading this, we will have some clarity.

We look forward to hearing your feedback and working to ensure the industry is able to realise the potential for recycling organics back to the soil.

This year is shaping up to be a busy one on the policy side. We are expecting further consultation on some of the Clean Air Strategy requirements for digestate storage and spreading, the landspreading permits revision and a consultation on revision of the UK fertiliser regulations.

It's likely the Green Gas Support Scheme mid scheme review will be underway by the time this goes to print, and we are also expecting the outcome of the Sewage Sludge Strategy. The revision of the Compost and Anaerobic Digestate Quality Protocols is slowly progressing and we anticipate the Biomethane Quality Protocol will also be revised.

Hopefully we will see members in person at some of our events this year. We really appreciate feedback and engagement and are happy to discuss any issues that you are facing. We hope you enjoy reading this issue.

Jenny and Paul

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Organics Recycling & Biogas is the magazine of REA Organics and REA Green Gas member forums

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New research paper on plastic contamination instils consumer confidence

REAL has this week released new research on the level of plastic contamination in end-of-waste compost and digestate products in England.

The research used a recent dataset from samples tested within the Biofertiliser and Compost Certification Schemes to show that the level of plastics in compost and digestate samples is considerably lower than the limits required by the PAS 100 and PAS 110 standards.

The analysis in the paper shows 98.5 per cent of compost samples and 98.1 per cent of digestate samples tested were within the limits for physical contaminants. In the majority of compost samples, the level of plastic contamination fell below 0.02 per cent mass/mass. In the majority of digestate samples, the level of total physical contaminants (including plastics) fell below 0.039 kg/t.

The research aims to boost consumer confidence in the quality of independently certified compost and digestate applied to land or, in the case of compost only, used for horticultural purposes.

Virginia Graham, Chief Executive of REAL, said: "I congratulate my colleagues on carrying out this statistical analysis and on preparing this report. Consumers can take confidence that certified compost and digestate consistently meets, and in many cases exceeds, strict limits for plastic content, and that the overall failure rate in England is very low.

"I hope this report will prove useful for Environment Agency in its ongoing process of revising the Quality Protocols for compost and digestate, a process REAL is pleased to support."

Jenny Grant, Head of Organics and Natural Capital at the REA, added: "Plastics [conventional plastics] are not wanted in food or garden waste collections. Our [REA] members put considerable effort into removing any plastics that do arrive and appropriately managing compostable plastics."

REA warmly welcomes the net zero review

The REA warmly welcomed the publication of the Net Zero review on 13 January and reiterates that it is as much an economic opportunity as an environmental imperative and that action must be accelerated.

The association strongly supports a transition that acknowledges how growth in renewables and clean technology provides opportunities for a cleaner, stronger, and fairer economy. The review reflects the REA's longstanding concerns for the sector.

The REA reiterates that cross-government work is absolutely crucial, and welcomes the proposed Net Zero office to coordinate this. The review highlights that policy uncertainty, planning delays and lack of route to market must be addressed.

The review was led by the Rt Hon Chris Skidmore MP and takes on board recommendations from fifty-two evidence roundtable sessions and 1800+ organisations and individuals who submitted to the official Call for Evidence – this includes roundtable meetings with REA Policy Board, Patrons, and many of our members.

Dr Nina Skorupska CBE FEI, Chief Executive of the Association for Renewable Energy and Clean Technology (REA) said: "The Net Zero Review, above all else, makes it clear that the energy transition is as much an economic opportunity as an environmental imperative and that action must be accelerated."

Defra considering transitional rollout of food waste collections

Defra is considering a 'transitional' rollout of UK food waste collections, meaning that they may be phased in for different local authorities with specific arrangements.

During the food waste collection consultation, concerns were raised that the instant rollout of separate collections could impact long-term disposal contracts and lead to high costs. Defra wrote to waste authorities in December 2022 with a questionnaire to gather more information.

A transitional rollout may address some of the concerns, but also carries the risk of creating a disjointed system. Food waste recycler ReFood says that they are calling for 'a firm hand' in the implementation of food waste collections and that 'we need clarity, commitment and proactivity'.

Philip Simpson, commercial director at ReFood, told Circular Online: "While we understand the challenges of adopting uniform kerbside food waste collections across England, we are also hugely concerned that these transitional agreements will simply result in the creation of yet another disjointed system."

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Plastics Enquiry: EFRA Committee's recommendations

Emily Nichols,
Technical Manager, Organics and Natural Capital

Last November, the House of Commons Environment, Food and Rural Affairs (EFRA) Committee published its report 'The price of plastic: ending the toll of plastic waste'. As part of a strategy to reduce the country's contribution to global plastic waste pollution, use less plastic and re-use and recycle more of what is used, the committee called for a ban on all plastic waste exports from the UK by 2027 and government publication of a roadmap, by March 2023, on how to achieve this.

Heeding evidence given by the REA and other stakeholders, the committee identified an 'emerging consensus that compostable material could serve a purpose in specific, targeted applications', particularly where plastic products are necessary but hard to recycle due to food waste contamination. Compostable plastics and chemical recycling industries 'currently appear to offer the best means of managing necessary but difficult-to-recycle plastics, such as plastic films'.

The committee's recommendations relevant to compostables included: that government update its infrastructure roadmap by 2023 to 'set out its plan for the future role of chemical recycling and composting within our plastics economy and waste management system'; that government decide, 'based on latest evidence about their impact on soil health, on the role of compostables, so that the organic recycling sector can adapt alongside the mandatory collection of food waste in 2024/25'; if compostables are to be encouraged, that government adapt national targets to reflect their expected use; that government 'publish clear, evidence-based criteria on how Extended Producer Responsibility fees and the Plastic Packaging Tax will apply to new technologies, including compostable plastics and chemical recycling'; that some of the income raised by the EPR and PPT schemes be used 'to research the most promising versions of these technologies or [invest in] the development of appropriate recycling infrastructure'; that compostable product labelling be 'standardised to clearly indicate to consumers how they should dispose of compostable plastics', and that 'Labels avoid unhelpful terms such as 'biodegradable''.

Shortly before this magazine went to press, the government's response was published. It acknowledged a role for compostable plastics in some niche applications but they 'will continue to prioritise the reuse and recycling of plastic packaging, where a reduction cannot be achieved'.

BAT compliance

Jenny Grant,
Head of Organics and Natural Capital

Many sites will have received Regulation 61 notices or permit variations and be looking at demonstrating how they are complying with Best Available Techniques (BAT).

The EA has published its guidance document for biological waste treatment; Appropriate Measures for permitted facilities, which sets out expectations. The Scottish Environment Protection Agency (SEPA) has also published BAT interpretational guidance and a gap analysis spreadsheet.

In January, REA's Organics forum held a member meeting with representatives from the EA, Natural Resources Wales and SEPA. Well attended by members, there were updates from the regulators on the progress with permit revisions and the implementation of the Best Available Techniques Reference document requirements. Questions were wide-ranging, covering process monitoring of compost, containment assessment, tank construction and feedstock contamination limits. Many thanks to the regulators for giving up their time and answering so many questions and to members for their engagement.

Environmental Improvement Plan

Jenny Grant

Government has published its Environmental Improvement Plan 2023, which sets out plans to continue to improve the environment in the UK and beyond.

Covering a range of areas from habitats, air, water, resources and waste, mitigating and adapting to climate change and boosting green growth and creating new jobs.
It contains specific targets and commitments to reduce food waste (in line with the UN Sustainable Development Goal), achieve a municipal recycling rate of at least 65 per cent by 2035, eliminate waste crime by 2042 and a long-term target to reduce residual waste (excluding major mineral waste) by the end of 2042 to 287kg per capita.

Government has also introduced a range of interim targets for January 2028, including that residual municipal food waste must not exceed 64kg per capita – representing a 50 per cent reduction from 2019 levels, which will hopefully drive high-performing food waste collections.

Green Gas Support Scheme

Paul Thompson,
Interim Policy Lead on Biogas

The Green Gas Support Scheme (GGSS) opened for applications in November 2021. It is essentially a tweaked version of the Renewable Heat Incentive (RHI) for biomethane, and is intended as a stop-gap while longer-term policy is developed. As a result, it has a fixed end date for new applications – currently November 2025.

Now that it's been open a while we can start to look at what effect it's having. At the time of writing, nine tariff guarantees have been granted (with twice as many waiting to be determined) and the first project has become operational.

Budget projections show around 75 per cent of the money committed to the scheme has been allocated, although BEIS has been at pains to stress that the amount available could rise if more projects come forward.

So the main challenge for developers is not really how much money is left, but how much time? Applicants for a tariff guarantee must build, commission and apply to the scheme before the end of November 2025. That's beginning to get a bit tight, particularly when delays in the planning and permitting system are taken into account.

The Department for Business, Energy and Industrial Strategy (BEIS) is planning to launch their 'mid-scheme review' of the GGSS shortly and, with any luck, it will be published by the time you read this. BEIS has already said that it intends to extend the commissioning deadlines by four months, so the latest possible date gets pushed back to end March 2026.

We've been engaging hard with BEIS on other issues to look at. These include allowing expansions of existing plants and looking again at the rules on waste/residue vs crop feedstocks. BEIS may also allow for a wider range of low-carbon heat sources to be used on site without reducing the payments to producers.

We understand that BEIS has started thinking about what comes next after the GGSS, so this review will be an opportunity to shape the longer term framework as well.

Quality Protocols Revision

Jenny Grant

The revision of the compost and anaerobic digestion quality protocols is progressing and there have been a few meetings of the task and finish group. As a reminder, the Task & Finish Groups comprise of EA, Defra, devolved regulators, REA, REAL and other trade body representatives. Initial discussions have been around the clarification of responsibilities of different stakeholders and to prioritise the order of the work.

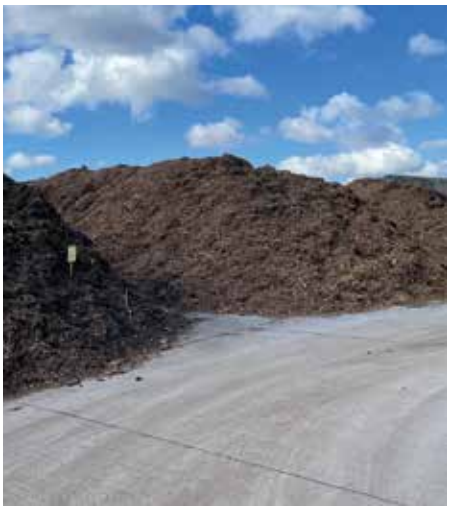
One of the key tasks identified by the EA is the consideration of existing risk assessments for compost and digestate, to ascertain whether to incorporate work published since the Quality Protocols were released. To inform the scope of the risk assessment, the lists of acceptable inputs in each QP need to be considered along with the markets that the materials are supplied to.

There are some proposed changes to the lists of input materials, to align with the standard rule permits along with some other changes. The proposed changes will be circulated to industry to enable them to provide feedback, particularly around some of the more unusual inputs.

In terms of the markets, there are no proposed additional markets for the compost QP but additional markets to be considered in the anaerobic digestion QP include landscaping, horticulture and growing media.

Existing research and evidence will be considered and further work may need to be commissioned where further information is required. We will keep members updated with any progress. As previously, the current compost and AD QPs remain in force whilst this work is undergoing.

At the end of 2022, the Environment Agency issued a call for evidence on the Biomethane Quality Protocol. The EA is gathering information and views, which it will take into account when deciding whether to maintain or withdraw support for the QP in its current form. If support is withdrawn OR it is deemed necessary to complete a revision of the QP then further, more detailed, calls for evidence will take place at that time.



This QP is relevant to any biomethane made from organic waste; whether from an anaerobic digestion plant or landfill. Within the scope of this review, the Environment Agency is also reviewing the current Regulatory Position Statement 255 which relates to treating, storing, and using carbon dioxide from anaerobic digestion.

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What should Local Authorities do to reduce contamination of biowaste?

Wendy Barratt,
County Waste Manager,
Devon County Council

Recently we had an enquiry from a resident wanting to know if she could cut up her artificial grass and place it in her green waste bin – after all, it was green and she wanted it to be recycled! I'm sure all Local Authorities can quote examples of unusual contaminants often included with the best of intentions. This just illustrates the problems that Local Authorities are facing when it comes to excluding contaminants.

So what is contamination and how much is too much? After all, we will never get a perfect feedstock despite our best efforts. The use of caddy liners can encourage participation levels but non-compostable bags can be seen as contamination even if they are extracted at the front end.

Education of the householder on what can actually be composted is essential to reduce contamination. Local Authorities have a statutory duty to collect waste that is put out for collection with little control over its quality. Most local authorities run regular behaviour change campaigns on limited budgets to try to inform and encourage their residents to put the right waste in the right bin. However, there needs to be a significant increase in funding if we are to make a real difference in reducing contamination levels.

Emma Beal,
Managing Director,
West London Waste Authority

Biowaste doesn't easily attract contamination because the food and garden waste systems are clearly defined and easy for service users to understand. The main threat comes from plastics due to bagging for transfer to the outdoor bins as well as the proliferation of compostable plastics that are well meant but have no disposal system of their own.

In whatever form it takes, decomposition is a natural process of decay and renewal that supports healthy soil structure. To support a sustainable future for the biowaste industry UK citizens must have confidence that their compost is clean, free of plastics and safe to use on the veg patch.

To achieve this, in WLWA we do several things; declare a preference for no plastics, remove contamination at the HWRCs, inspect and remove contamination at the transfer station before transporting to the contractor, specify low contamination rates in contracts, and work with contractors to reduce contamination levels. Most importantly, we explain the importance of soil health to those who object to our preference for no plastics. We accept our role in supporting the circular economy and in returning high-quality organic material for use in farming and food production.

Francine Powner,
Company Secretary, J&F Powner Ltd

What should Local Authorities do to reduce contamination of biowaste? Take responsibility for their waste like any other business and stop passing the buck. Strong words, I know!

Some Local Authorities (LAs) are doing extremely well and setting exemplary standards whilst some are still resisting by writing in their contracts that an acceptable level of contamination should be five per cent weight-for-weight, along with the language "we can't control what residents put in their bins".

If contaminated feedstocks are used in composting processes, then the quality of outputs is reduced and the likelihood of pollution increases.

LAs tell us what material goes in what bins, what time and day to have the bins out ready for collection and, overall, we get that right. So why are LAs resisting and thinking residents cannot achieve better results in reducing the contamination within biowaste? I'm saying biowaste but I believe the rule should apply to all waste streams. LAs have the power to educate and change the habits of residents (have a little faith).

LAs need to flip the coin and preach the three R's; Reduce, Reuse, Recycle. It's simply "put the correct waste in the correct bins; if you don't, we won't empty the bins."

LAs need to be delivering awareness and education campaigns in local schools, supermarkets, media, and radio. Simultaneously, education needs to be on the front line and starts with the crews; How to spot contaminated bins, and training collection operatives with skills in customer service so they are better equipped when challenged by residents. Train and empower admin staff alike. It is important that the collection crews get backup support. It's no good if the crews are rejecting bins, and then the admin staff are sending another crew to collect the missed bins.

Power to the crews to challenge contaminated bins with confidence. At the start of a campaign, lift every single lid and leave as many contaminated bins as possible to create maximum effect and behaviour change. Actions speak louder than words. It's important to reward crews for the number of contaminated bins left behind, for every bin left is a reduced risk of pollution and contamination of the land. A fact that needs to be celebrated and rewarded by all. Providing clean biowaste enables it to be recycled into high-quality outputs, making a great contribution to LA's net-zero targets.

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Farms of the Future

In March 2022, RASE published a report 'Farm of the Future: Journey to Net Zero' to offer practical agricultural solutions for swift implementation. Angie Bywater (Environmental Biotechnology Network Co-manager, University of Southampton) and Richard Gueterbock (Director, Foodchains) take us through some of its recommendations.

What will the farm of the future look like? With a wide variety of UK farm businesses, there won't be a 'one size fits all', but it is clear that there are already many 'tools in the toolbox' available to those who wish to embrace the systems change needed to decarbonise the UK's food supply chain and help meet Net Zero targets.

RASE's Farm of the Future report describes some of these tools, using case studies and examples to show how farmers can be part of the transition to a more circular economy, deploy solutions to sequester carbon, improve soil management, protect rural land and water resources and adopt on-farm renewable energy.

In addition to the main report, there are also sector brochures on:

- Decarbonising farm vehicles and future fuels (Cenex/Jonathan Wheeler)
- Decarbonising UK cereal production (Dr Nigel Davies)
- Reducing carbon emissions in the horticulture sector (Matt Appleby, Horticulture Week)
- Increasing sustainability in the dairy supply chain (John Allen, Kite Consulting)
- Reducing GHG emissions and resource use in intensive meat production (Professor Jude Capper, Harper Adams University)

With more than 30 sector experts from academia and industry, the reports highlight the value of an investment in data, technology, dissemination and training; the need for support for the protection of biodiversity and the adoption of environmentally friendly farming systems such as regenerative agriculture, as well as the need for the industry to embrace factors like dietary trends and consumer concerns.

The report is significant as it outlines the science and technologies that exist now to reduce emissions in the agri-food supply chain, alongside efforts to boost energy and food security. Recent world events have highlighted the importance of food security and the intricate relationship between fossil fuel energy and food. With food production as their primary role, farmers need to remain profitable in order to deliver the significant investment required to reduce the sector's carbon footprint and fossil fuel reliance.

Measuring farm carbon

Farm-based emissions include methane from ruminants, loss of carbon from soils through repeated cultivation and energy use by machinery. The off-site manufacture of fertiliser, agrochemicals, farm inputs and machinery accounts for a considerable proportion of emissions and energy consumption associated with farming and land management.

For those starting a decarbonisation journey, Becky Willson of the Farm Carbon Cutting Toolkit makes a number of practical recommendations in the 'measuring carbon' section of the main report, quoting the old adage 'you can't manage what you can't measure'.

Carbon measurement can be a complex endeavour – essentially

attempting to quantify a biological system impacted by climate, soil type, topography, vegetation and land management practice. Nevertheless, there are many arguments for reducing carbon emissions.

High carbon emissions tend to be linked to high resource use and/or wastage, so reducing emissions also tends to reduce costs, making the farm more efficient and potentially improving profitability. Farms are also in a unique position to be able to sequester carbon in trees, hedgerows, land margins and within the soil.

Although farms may vary considerably in their emissions, the charts below show average emissions across typical farms. Becky Willson notes that finding and consistently using the correct carbon measurement tool to track progress is important.

Primary emissions for arable farming come from fertiliser production and application; and for livestock, from the animals themselves. It might be thought that nothing could be done about these, but they certainly can be reduced through a number of measures and considerable effort is being made in livestock production science to reduce the impact of ruminants.

These include investment in livestock genetics to boost key traits such as rumen performance, feed conversion and longevity; improved husbandry and welfare practices; dietary changes/additives to reduce emissions; and improved slurry storage and handling methods, which can include options such as covered slurry stores or anaerobic digestion.

While the science of sequestration and its practical application is still in its infancy, improved genetics, husbandry and understanding of the issues could help livestock farmers to become part of the solution.

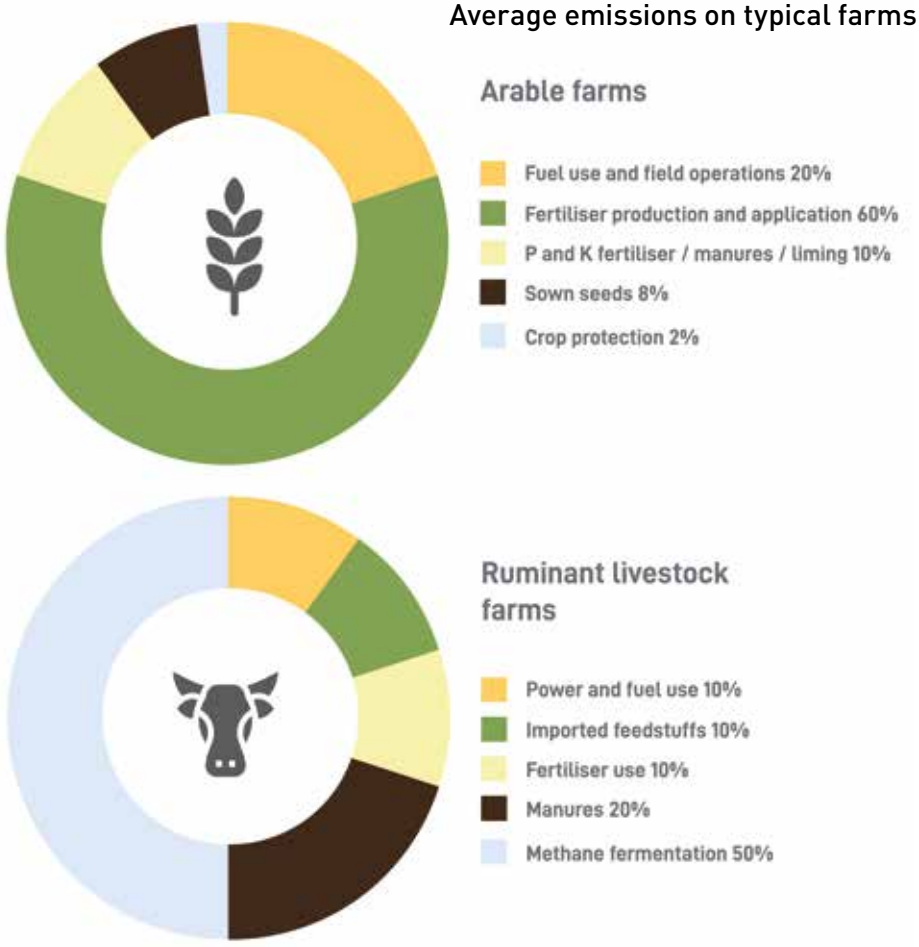
Soil management

For many decades, increasingly intensive agricultural practices have returned less carbon into the farmed soils than has been taken out. The result has been declining soil carbon (soil organic matter, SOM) leading to a corresponding decline in long-term resilience and productive potential.

Where carbon levels are suboptimal, soil degradation from compaction, wind and water erosion results in soil particulate loss into watercourses, with siltation and pollution problems from associated fertilisers and chemicals. In many cropped soils in Eastern England, soil organic matter levels are as low as 3 per cent, restricting infiltration, drought resilience, nutrient cycling and long-term productive capacity.

Soils vary enormously in their composition, but nearly all of them are improved by increasing carbon. Importantly, stable soil organic matter (hummus) can absorb six times its own weight in water, while supporting other microscopic soil dwellers that help to create a sponge-like soil structure with the capacity to absorb rainfall more effectively and help prevent flooding while mitigating the effects of drought.

Average emissions on typical farms



> Regenerative farmers believe that incorporating grazing livestock into the farming system will turbo-charge the number of beneficial soil creatures.

Multiple approaches to land and carbon management are impacted by numerous factors, including the farm size and location, the soil types and the spectrum of management methods that the farmer wishes to adopt ranging from re-wilding to conventional systems.

Regenerative farmers such as John Cherry who co-founded the transformative farming show 'Groundswell' as a contributor, described the six key principles of regenerative agriculture:

1. **Understand the context** of the farm operation.
2. **Minimise disturbance of the soil,** both physically and chemically.
3. **Keep the soil covered**, either with living plants (green cover crop) or a mulch of crop residue like chopped straw.
4. **Maintain living roots in the soil** for as much of the year as possible.
5. **Maintain as much plant diversity as possible**, as monocultures restrict the variety of soil creatures that can be supported.
6. **Reintroduce livestock into the system**.

Regenerative farmers believe that incorporating grazing livestock into the farming system will turbo-charge the number of beneficial soil creatures. It is essential, however, that grazing animals are managed to maximise the beneficial impact on the land. Some regenerative farmers are proponents of practices such as mob grazing and the inclusion of mixed 'herbal' leys.

By-products and co-products for soil management

Although manures from grazing add valuable nutrients to soils, the application of organic materials, by-products and co-products as a valuable source of plant nutrients has long been practised. Anna Becvar of Earthcare Technical contributed a report section on the role of such products, noting that improved recovery of wastes, recycling of products, by-products and co-products to land provides an opportunity to reduce the environmental footprint of food production, as well as being part of a circular economy.

Such products include a wide variety of biodegradable wastes or feedstocks from a range of different sectors including food production, catering waste, industrial processes, water industry residues and amenity gardens. In her section on 'The potential of recycled by-products to increase carbon sequestration and encourage beneficial microbial activity in soils', Professor Jennifer Dungait of Soil Health Expert highlighted three common products:

- **Digestates**, by-products of anaerobic digestion (AD), a process which changes the characteristics of the original feedstocks, increases pH and converts organic nitrogen (N) to ammonium (NH4-N), a form with more readily available N. Digestate contains less organic carbon than compost (C:N ratio 4-20). Digestate is normally a slurry (with 3-10 per cent dry matter), but it can be separated into fibre (20-40 per cent dry matter) and liquor (1-6 per cent dry matter) fractions.
- **Composts** are used as soil conditioners due to their large organic matter content (40-60 per cent dry matter) and as a source of plant nutrients. Their nutrient value includes less readily available nitrogen compared to digestate, with losses during composting (C:N ratio >30).
- **Biochars** are produced from a range of organic materials by heating them in an oxygen-depleted atmosphere (i.e. pyrolysis). The porous carbon-rich solid (C:N ratio >30-500) is resistant to decomposition and suited to long-term storage of carbon in the soil. The physical and chemical characteristics of biochar are based on the pyrolysis conditions and feedstock. Their porous structure can hold onto nutrients in soils that otherwise have a low ability to do so.

Overall, fossil fuel-derived fertiliser use in England and Wales has decreased by around 30 per cent since 1982, with a greater reduction for phosphate and potash-based fertilisers. The effect of properly applied organic recycled by-products on soil microbial biomass, activity and diversity is generally positive. There is a direct relationship between desirable soil structure and organic carbon content that is related to an increase in microbial activity.

There is a direct relationship between desirable soil structure and organic carbon content that is related to an increase in microbial activity.

The UK Government's 25-Year Environment Plan (2018) refers specifically to soil health and seeks to improve the UK's approach to soil management by 2030. A key objectives – to improve soil condition and carbon storage by adding organic matter – can be achieved whilst curbing the impacts of excess nutrients on the wider environment, including water and air

quality, and greenhouse gas emissions. Excessive application of materials to land, especially those containing large quantities of nutrients, poor timing of application, or unsuitable application techniques increase losses to the wider environment.

There are also potential benefits to using recycled inorganic by-products for soil carbon cycling. These include dust from silicate-rich rocks such as basalt, dolerite quarry fines, and industrial by-products including cement and slags from iron and steel manufacturing, which can be applied to acidic farmed soils instead of limestone to increase soil pH.

AD's role in the circular bioeconomy

In addition to the digestate fertiliser discussed above, an AD plant produces energy as biogas (approx. 55-60 per cent methane and 45-40 per cent carbon dioxide) which can be beneficially utilised for instance, in a specially designed boiler for heat-only when cows are indoors in winter, in a combined heat and power plant (CHP) to create electricity and heat, and as vehicle fuel, upgraded to biomethane and stored or used locally or directly injected into the gas grid. CHPs are usually connected to the electricity grid but can be used off-grid in 'island mode' if there is enough energy demand or storage on site.

The use of CHP has somewhat fallen out of policy favour, as the energetic efficiency of the biogas use is low, as only 27-42 per cent of the energetic value of the biogas is converted to electricity, with the bulk of the remainder produced as heat (and some losses).

However, smaller CHP plants (e.g. < 400 kW thermal) can often beneficially utilise the heat, with electricity production facilitating farm electrification: pumps, quad bikes, small loaders, farm machinery (including robotic or autonomous systems), vehicles, heating etc, as well as the introduction of on-site power or heat battery systems.

It is perfectly feasible to utilise smaller upgrading systems to produce off (gas) grid biomethane for local use in tractors and farm delivery vehicles, or in a boiler or CHP. Such systems can be used to add value to large CHP-based AD or, in smaller systems, to remove the considerable capital cost of gas injection and propane supplementation equipment.

> Successive policy initiatives have largely failed to realise the numerous environmental, farming and agri-food supply chain benefits that the adoption of smaller-scale AD would entail.

The carbon dioxide (CO2) produced from the upgrading process can also be used to offset industrial CO2 created by fossil fuels. Such uses include greenhouse environment enrichment for improved plant growth, in abattoirs or, if upgraded to a high specification, for food and beverage industry use (e.g. beer, cola, crumpets). As a mainly pure carbon source (unlike air at 400 ppm CO2 content), it could even be 'sequestered' (e.g. pumped underground).

Under successive UK subsidy schemes, AD plants have become larger and larger, in order to improve project economics, particularly with the cost of grid injection. The output of increased quantities of digestate requires a larger land base on which to recycle nutrients, with a commensurate increase in transport distance and cost. Crop-only digesters benefitted from a less stringent waste permitting regime, which led to their proliferation until sustainability criteria were introduced, limiting the amount of crop input in order to minimise indirect land use change.

Successive policy initiatives have largely failed to realise the numerous environmental, farming and agri-food supply chain benefits that the adoption of smaller-scale AD would entail. This has left the vast majority of slurries and manures untreated, as well as the food processing wastes produced further down the supply chain. The report identified that this is an area which needs to be addressed, possibly through carbon incentives, a clean gas floor price or a combination of grants/ low-interest loans.

Anaerobic digestion is part of the circular bioeconomy and is an important tool within the carbon cycle: it is an engineered system which captures and utilises the emissions which would naturally occur from the biodegradation of organic materials. AD is a mature and effective energy production and carbon/nutrient recycling technology, ideally suited for use in many livestock farms of the future.

The RASE will be collaborating with Harper Adams on the **Farm of the Future: Net Zero in Practice** event to be held on 13 April 2023, which will focus on technology being developed to cut farming emissions and boost resource efficiency.

How to replace peat with sustainable alternatives

Trewin Restorick, founder and CEO of Sizzle – a new Community Interest Company – explains how peat might be replaced with biowaste alternatives.

Ending the use of peat for gardening should theoretically be one of the simpler steps in the UK's transition to a low carbon economy. But, despite 30 years of campaigns, the horticulture sector is still using over 1.7 million cubic metres of peat every year. This matters as it is estimated that UK peatbogs hold 3.2 billion tonnes of carbon and every year 24 million tonnes of carbon are released through their degradation.

The transition has not occurred because the horticultural sector has built the way it operates around the stable conditions that peat provides as a growing media. Replacing it is feasible, but requires more complexity, new skills, it takes longer and requires investment. Most of the sector decided that it was something they could delay implementing, as legislation wasn't on the horizon and consumer concern was limited.

This situation has changed. In May, the Government announced that it planned to ban the sale of peat to English amateur gardeners. Wales followed suit and there is now legislative movement in other European countries. Whether the English ban materialises depends on finding legislative time within an increasingly packed agenda, but the direction of policy travel is clear for all to see.

The industry has realised that it needs to move rapidly to find peat alternatives that are sustainable, cost-effective, and available at the volume required. It is highly unlikely that one material alone can provide the growing qualities offered by peat. Instead, the industry will need to create different recipes consisting of a range of materials which will work with a wide variety of plant types.

This hunt for replacement materials opens opportunities for new industries to be suppliers to the horticultural sector. It is possible that some of the peat market could be replaced by biowaste derivatives offering a more sustainable and circular solution. For this transition to happen at scale four things need to happen:

1. The horticultural sector needs to feel confident that peat replacement materials are effective, economically viable and consistently available at the scale required. A new Defra-funded research project run by the Royal Horticultural Society (RHS) is working with large growing companies to explore and test options.
2. Greater collaboration is required between horticulture and other sectors especially waste management companies. This is needed to ensure that safe, clean and appropriate materials are available to the horticulture sector. This increased collaboration is more and more important with forthcoming changes to waste collection systems in the pipeline.
3. Supportive legislation is required. Ensuring there is a national ban on peat sales is essential to remove wriggle room for a further delay in phasing out the use of peat. Steps also need to be taken to ensure there are no unintentional barriers in place which unnecessarily prevent safe biowaste derivatives being available as a replacement material.
4. A consumer education campaign is required so that gardeners understand how best to use peat replacement materials. This campaign could also highlight the significant benefits of domestic composting as a way of generating home-based soil enhancer and mulch.

One of the UK's largest charitable funders the Esmée Fairbairn Foundation has been a major investor in campaigns to stop the use of peat in horticulture. They recently backed Sizzle (a new Community Interest Company) to undertake research with all key stakeholders to better understand the barriers that exist. This research generated a report 'Seeking Sustainable Alternatives to Peat' and it is hoped that the next phase of the project will be a fully evaluated campaign in one locality to demonstrate the feasibility of transitioning from peat using more sustainable materials. For more details, please contact **trewin@sizzle.org.uk**

Some of the peat market could be replaced by biowaste derivatives offering a more sustainable and circular solution

Evolving technology enables TMA Bark to keep growing

TMA Bark's Operations Director, Shane Andrews, describes how his specialist producer of growing mediums manages wood and garden waste using a wide range of Komptech equipment

Processing organic waste can cover a wide spectrum of activity, which is especially true for TMA Bark, as it has grown from its early beginnings as a specialist bulk haulier to becoming one of the largest producers and market leaders in the UK for bark, mulch, and woodchip products, as well as compost.

According to Shane Andrews, its Operations Director, the company's development in this space can be traced back to a chance encounter: "The business started off as a transport business, run by my family. One day my dad was approached by someone wanting to get rid of some bark. He's quite mechanically minded, so with my grandad, they built a very basic screening line. They screened the bark and then started selling it, got more bark in and then it basically evolved into a full-scale bark operation."

In 1997, they moved to their current 28-acre site on a former World War II airfield at Weston Longville in Norfolk, approximately 10 miles northwest of Norwich, where it continued to grow. "In 2003 we then expanded from bark and got into the garden waste. I think we were the first open window green waste recyclers in Norfolk," recalls Andrews.

To develop the composting side of the business in 1998, Shane's father Graham visited the RWM waste recycling exhibition, where he got to take a close look at some composting equipment. Although it was still early days for the sector, this led to the initial purchase of a Komptech Hurrikan windsifter and a Mustang drum screen, to help with the processing of garden waste.

This marked the beginning of a 25-year partnership between the two companies, which has played a critical role in the TMA Barks's growth and success.

Making specialist grades

Today, the company processes about half a million cubic metres of bark, producing 28 different grades of product that vary according to the species of tree and size of the resulting bark, mulch and woodchip that it specialises in making.

"Customers will push us," explains Andrews. "They say they want a particular size [of product] because they need a propagating bark for orchids. So we're trying to make this specific product for growing. That's when the Komptech stuff comes in, because the fixed line could only make a specific grade"

In 2014, TMA Bark acquired three Cribus 5000 drum screens – affectionately nicknamed 'the trio' – configured primarily to 5mm, 6mm and 8mm perforations. Having these lined up together enabled them to configure a time-saving process of running wood-based wastes through, in a way

that enabled one Cribus to feed another, which in turn feeds another.

"We'll reprocess some of our high-volume base products [from the fixed line, which includes static Cribus's] to then make finer grade specialist grades for these customers, most of it going to professional growing. We're finding a lot more of that is coming now with the ban on peat. People want a bark alternative and they want certain sizes, special grades, special mixes and blends."

The original trio have since been upgraded to the newer version of the Cribus 5000, Komptech's high-throughput 250m3 drum screen which runs with an hybrid electric drive. Andrews notes how this has noticeably improved their operating costs: "They're very fuel efficient. The diesel engine runs an electric generator and then the electric generator runs the machine. So fuel efficiency wise it's fantastic." Alternatively they can be plugged into mains power and run purely on electric.

He also cites their mobility as a valuable feature for their operation, easily moved on its trailer; it has notably enabled them to take it off site to do extra processing for some of their customers.

Green waste processing

Alongside processing wood-based products, TMA Bark operation now treats 25,000 tonnes of garden waste each year from Breckland Council, Broadland District Council and Norwich City Council, receiving RCV deliveries from these waste collection authorities direct to its site.

Once consignments have been vetted for quality, the green waste is put through a slow speed mobile Crambo shredder to create the windrows, which then goes through a 10 week composting schedule. It's a machine that Andrews is full of praise for: "The Crambo is phenomenal. [They clearly spent a lot of money on that over the years in research and development... It's down to tonnage, how much it can shred against its fuel return. In terms of how many tonnes it does, it's really efficient. I don't think there is another machine on the market that would beat the Crambo."

Once the windrows are formed, they routinely go through a process of inversion using a Top Turn X63, spreading out the inverted material to create a new windrow. This aerates the green waste, enabling faster decomposition and helping to prevent compacting and excess heat buildup. Here again, the Komptech equipment plays a vital role in tackling the job. "I think it should be compulsory that every site has a Top Turn, I don't know how you'd do it without one. It massively improves the product quality."

The X63 is again a recent addition to the operation at TMA Bark, replacing an X60. According to Andrews, the key aspects of the newer model are that it improves accessibility to the engine for routine servicing and maintenance, as well as also making it easier for the operator to use: "It's got an auto feature. So you can set it to auto and it'll go down the window. And that's very clever. It'll go down the line. If it senses dense material, it'll back off slightly. Let it clear, then keep going. The operator just has to basically just sit in there and keep an eye on it."

The final stage of the green waste process is screening the organic material. Here, the company uses the Cribus drum screen alongside a Hurrifex, a wind sifter and destoner that Komptech no longer produces, which has since been succeeded by the Hurrikan and Stonefex.

In the winter, TMA Bark tends to make greater use of the L3 Star Screen. With a range of decks available, Andrews points in particular to its ability to make fine grades, for the bark side of the business as well as with the larger compost. "Particularly in wet months, if we're struggling to screen, because the drum screens don't really like the wet."

With very little contamination, the resulting compost all conforms to PAS100 specifications. This means it can be used in specialist blends and mixtures for growing media that is well suited to the company's customer base of professional growers in the bark world.

The expertise and equipment the operation has developed managing green waste has also enabled it to be approved as a site for treating diseased bark. Applying the X63, the material is similarly put into windrows to generate a high enough temperature to kill the pathogens, with regularly turning to ensure it all gets treated.

"Basically [the process] sanitises the bark and then it can be used again. But then also what we'll do is we'll form windrows with a blend. Row it all up into a windrow and then turn it over with a window turner to blitz it and mixes it all up properly. So [the Top Turn] has got a multi use."

Long-term partnership

After almost 25 years of deploying Komptech machinery, TMA Bark has developed a close working relationship with the manufacturer and its UK dealer John Hanlon, which took on the franchise in 2016.

Andrews highlights the dependability and low maintenance costs as a key feature of his company's long-standing loyalty to the manufacturer, adding: "Their machines, most of the time, are reliable. They look good as well. There's no doubt about it. Komptech makes a good looking machine. And I'm a bit of a geek when it comes to machines."

In the event of a breakdown, he highlights that John Hanlon is always quick to respond. "I ring them up, say, 'It's broke, can they fix it?', and they send an engineer out, who comes out straight away. They're typically with you the next day."

According to Andrews, communication and the personal relationship has been key to a successful partnership: "I know a lot of the guys at Komptech, both in Germany and Austria. I can pick up the phone and talk to them anytime. Send them an email, they'll get back to me and I know that I probably won't get that anywhere else. And that goes a long way."

Realising the potential of green gas

Graeme Hunter, Chief Operating Officer of Barrow Shipping Limited, explains the commercial opportunities and considerations surrounding biomethane production

Biomethane is a naturally occurring gas which is produced by the anaerobic digestion of organic matter such as dead animal and plant material, manure, sewage and organic waste. Biomethane is chemically identical to fossil-derived natural gas and can be used in all the same applications such as electricity generation, water and space heating, cooking, and as vehicle fuel.

How the biomethane market works

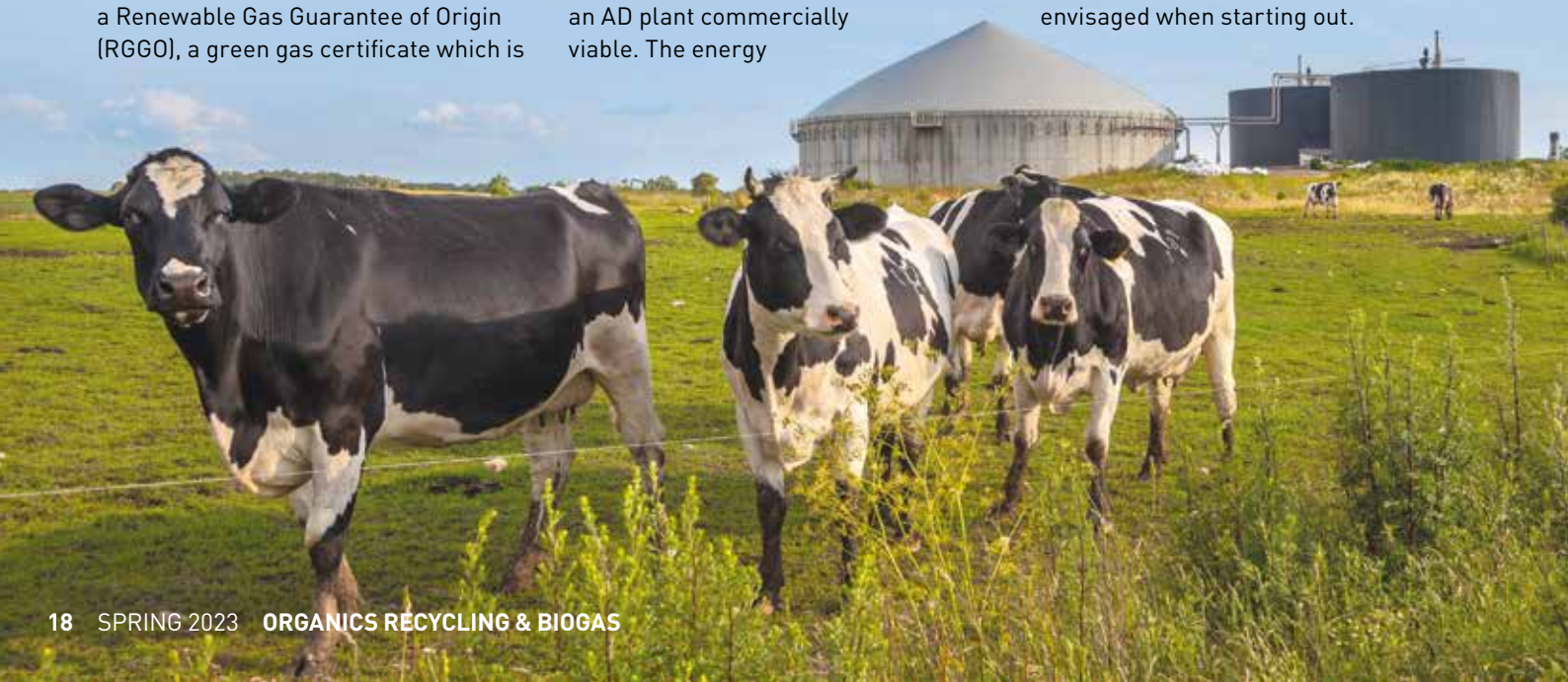
The biomethane market has been stimulated by the existence of the Renewable Heat Incentive (RHI) scheme (2011-2021) and now by the Green Gas Support Scheme (GGSS) (until 2025), both administered by Ofgem. The subsidy schemes provide a guaranteed tariff payable per unit of biomethane produced that is injected into the gas grid. The tariff is a fixed unit rate indexed to inflation and guaranteed for 20 years (in the case of the RHI) and 15 years (in the case of the GGSS), typically starting from the first day that biomethane was injected into the grid. For each unit of tariff payable to the producer, the producer is awarded a Renewable Gas Guarantee of Origin (RGGO), a green gas certificate which is a tradeable commodity. Each unit of gas (containing both biomethane and often propane, which is used for enrichment) that the producer injects into the grid is monetised as agreed in the terms of a Gas Purchase Arrangement (GPA) between the producer and an Ofgem-licensed gas shipper. A shipper is mandatory in the supply chain as the producer will only be awarded a Network Entry Agreement (the contract allowing them to input Biomethane into the grid) when a GPA is in place with a shipper. The combined value of the tariff from the subsidy scheme, the RGGO (Renewable Gas Guarantees of Origin) and the gas is the revenue stream received by the producer.

A producer wanting to fix prices should consider taking a flexible approach

Fluctuating prices

Prior to the current energy crisis, the RHI subsidy dwarfed the wholesale price of gas. The subsidy was necessary to stimulate the development of the biomethane market by making an AD plant commercially viable. The energy crisis has substantially altered the dynamics of valuing biomethane, with wholesale gas prices now exceeding the value of the subsidy.

The GPA sets out the terms for the services that the shipper will provide to the producer. This will set pricing arrangements for the gas that the shipper will buy from the producer, generally including floating and fixed price options. A floating price provides a risk-free hands-off approach for the producer. Although the producer is susceptible to daily market price fluctuations, typically there are no penalties for failing to produce. This approach to selling gas produced from AD is generally better suited to new plants or those with unreliable production. A fixed price transaction provides price and revenue certainty for the producer, although the producer may face penalty payments should they fail to inject sufficient gas to fulfil agreed fixed quantities. Since the beginning of the energy crisis, fixed price transactions are now more common as producers look to maximise revenues for forward periods at prices which are significantly higher than those they had ever envisaged when starting out.



Security of supply concerns due to the reduction of Russian gas supplies to Europe has led to prices in the near term being much higher than forward periods, the perception being that replacement gas supplies will come onstream over time and prices will fall. A producer looking to fix a long-term flat average price, say for three or more years to lock in guaranteed revenue, should expect to receive at the time of executing a trade a price lower relative to market prices in the near term in return for a higher price for further out periods. This would typically mirror a similar transaction with an end consumer. A producer fixing a price should realise that prices can continue to rise beyond where they have transacted. This can lead to seller's regret and, more damagingly, losses caused by higher feedstock prices and penalties for failure to produce if the market value of biomethane rises above the fixed price achieved by the producer. A producer wanting to fix prices should consider taking a flexible approach which combines fixed and floating prices, providing a partial hedge against prices rising or falling.

The value of proof of origin

RGGOs are issued for a retrospective batch of produced biomethane when the subsidy tariff is awarded, typically each quarter with certificates awarded two months later. RGGOs can then be sold once the certificates are in the producer's possession. As gas sales are typically settled monthly in arrears, the disparity in settlement periods has historically led to RGGO sales being unbundled from gas sales. Large corporations increasingly require a bundled supply of biomethane (a product of the gas and the RGGO being sold together) from specifically identified AD plants to fulfil their net zero obligations. A specialist shipper can facilitate such bundled transactions. Producer and shipper participation in a voluntary accreditation scheme, such as International Sustainability and Carbon Certification (ISCC), will further demonstrate and validate the chain of custody and add further value for the producer, through a price premium.

Producers have benefited from a significant increase in the price of RGGOs since mid-2021, in line with the increase in the price of the overall energy mix. The increasing price of carbon offset credits, prices for renewable electricity, and the increasing corporate obligation to achieve net zero have all driven up the price of RGGOs. Prior to the energy crisis, the average value of an RGGO (average price for a crop & waste certificate) was £6/MWh. At the time of writing the average price is £22/MWh, with a further premium for ISSC or similar accreditation.

The energy crisis has substantially altered the dynamics of valuing biomethane

Biomethane subsidies

The ability to use biomethane within the Renewable Transport Fuel Obligation (RTFO) has presented an alternative route to market for producers, typically those with a stream of biomethane produced from a non-crop feedstock qualifying for the double Renewable Transport Fuel Certificate (RTFC) multiple. A development fuel RTFC will carry additional value. A producer with an RTFO-eligible supply of biomethane may choose not to claim the RHI or GGSS subsidy from Ofgem should the net value of an RTFC be more valuable. Typically, the net value of an RTFC to a producer has outperformed the combined value of the RHI Tier two subsidy tariff and the price of an RGGO. The RTFC price is of course market-driven when compared to the guaranteed value of the RHI and GGSS subsidy scheme, so existing producers registered with RHI or GGSS must actively arbitrage between the alternative revenue options to maximise the value of their biomethane. The RTFO may also be an attractive option for producers currently generating electricity under a Feed-In Tariff or Renewables Obligation that is due to expire or where the RTFC price is simply more lucrative than their tariff. A specialist shipper will be able to assist a producer in facilitating an RTFO transaction.

The current energy crisis has increased the volatility in the RTFO market. RTFO demand for GB-produced biomethane has increased as eligible biomethane from mainland Europe has become more expensive relative to GB. Conversely, lower fuel demand and cheaper biofuels have reduced the demand and price for RTFCs. Despite a recent slide in RTFC prices, the RTFO remains a viable commercial alternative to producers under the RHI and GGSS schemes and is now establishing itself as a vital revenue stream for producers with existing AD plants facing expiry of their current subsidies.

The future is biomethane

A quarter of the gas in Denmark's grid is now biomethane, with plans afoot to take that figure to 100 per cent by 2034. It is not unreasonable to aim similarly high in GB. With proven commercially viable options available and specialist shippers ready to provide the expertise to cater to their needs, there has never been a better time for biogas producers to explore the opportunity offered by injecting biomethane to the grid.

In partnership to boost biomethane production

The European Commission and industry leaders from across EU Member States are teaming up to deliver an ambitious target: to sustainably produce and use 35 billion cubic meters of biomethane by 2030. By Harmen Dekker, CEO of European Biogas.

Launched last September, a new public-private Biomethane Industrial Partnership (BIP) is set to support the rapid scale-up of sustainable biomethane production and use. Made up of representatives from the European Commission; EU Member States (MS); companies active in the biomethane value chain; civil society, and academia, BIP's Task Forces will aim to lift barriers on permitting and grid injection, identify novel sustainable biomass sources, and instigate further advancements in research, development, and innovation among others. The work in the BIP has already kicked off with the official launch of Task Force One focusing on the creation of national biomethane targets, strategies, and policies, and Task Force Two focusing on the acceleration of the biomethane project development.

The REPowerEU Plan and the BIP

The need to extend biomethane production and usage in Europe is more urgent than ever; to reduce dependency on natural gas imports from Russia and high energy prices and to address the climate crisis. The cheapest and most rapidly scalable renewable gas available today, biomethane can contribute to an integrated net-zero energy system, diversify farmers' incomes and ensure a circular approach in the agricultural sector. Therefore, the European Commission set, in its REPowerEU Plan, an objective for the EU MS to increase their production and use of sustainable biomethane from three billion cubic meters (bcm) annually in 2022 to 35 bcm by 2030, and specifically called for the launch of the BIP to stimulate this ambitious new target. Achieving this goal requires biomethane investments in all EU MS. All this can be possible only if the EU MS and the value chain collaborate, and this is exactly what the BIP aims to support. The BIP is one of the cornerstones for Europe on its path to achieving a carbon-neutral and sustainable energy system.

> The need to extend biomethane production and usage in Europe is more urgent than ever

The Role of the BIP

During the EU Sustainable Energy Week (EUSEW), the significance of the BIP's mandate was voiced by Frans Timmermans, Executive Vice-President of the European Commission for the European Green Deal, stating

that "the BIP will be instrumental in ensuring an increase in the annual production and use of biomethane to 35 bcm by 2030". Also, Kadri Simson, European Commissioner for Energy, pointed out how the BIP will be fundamental to realise Europe's potential for biomethane production, by helping stakeholders to surpass barriers to growth, learning from best practices and promoting collaboration to increase the use and production of biomethane. Following its official launch in the EUSEW, this message was even further highlighted by the speech of Janusz Wojciechowski, Agricultural Commissioner, during the technical kick-off of the BIP, stating that "biomethane could be a 'win-win', both for improving energy security and reducing greenhouse gas emissions and for providing economic opportunities to rural areas".

> The BIP will be fundamental to realise Europe's potential for biomethane production

How does the BIP work?

While the Secretariat is responsible for the day-to-day operations of the BIP, the Governing Board (GB) is the highest body steering the Partnership that consists of representatives of the European Commission, EU Member States and the biomethane value and supply chain. To allow the effectiveness of the Partnership, the Support Group (SG) gathers representatives from the biomethane value chain. Made up of 12 members currently, the SG is expanding to reach twenty individual companies chosen by the value chain. All companies active in the biomethane value chain can currently apply for SG membership.

The Task Forces are formed of expert-level members from the European Commission, EU Member States, companies active in the biomethane value chain, civil society, and academia, who teamed up to tackle challenges within their Task Force. Each Task Force focuses on a different topic, ranging from rapidly scaling up a cost-efficient production of biomethane, lifting barriers such as speeding up permitting and grid injection, identifying novel sustainable biomass sources, promoting more circular agriculture, and advances in research, development and innovation. The BIP will help its members to share best practices in technological and business solutions, as well as in national support mechanisms for biomethane production and grid injection, fostering collaboration between the EU MS in policy making and, in the longer term, facilitating the creation of a liquid EU biomethane market.

The BIP Task Forces

In the past months, the BIP received more than one hundred applications for Task Force membership, coming from companies active in the biomethane value chain, civil society, academia and other relevant stakeholders.

Task Force One is currently composed of Member States who are working together on ensuring that biomethane production and use are enshrined in the National Energy and Climate Plans (NECPs) which are to be submitted in June 2023. Value chain members have also been added as associated members to share the market's perspective and needs ranging from production to end-use.

In Task Force Two, Three & Four the partnership is addressing the important topics around biomethane project development, innovative biomethane sources and cost efficiency.

Task Force Two is committed to rapidly increasing sustainable biomethane production capacity by identifying solutions to scale-up investments. Task Force Three identifies the potential of biomethane across the EU for innovative biomass sources and explores the potential of digestate for more circular agriculture. While Task Force Four works to identify and facilitate ways to decrease the cost of biomethane production and grid connection. Task Force Five is committed to identifying and supporting research, development and innovation in biomethane production, grid connection and end-use applications.

The work of the BIP is kicking off already

Biomethane is one of the major renewable gases of the future in Europe, fitting into a circular economy. It is the cheapest and most scalable renewable gas today, with large sustainable growth potential in every Member State in Europe. The commitment to enable this scale-up of sustainable biomethane across Europe is large, and the work is commencing to accelerate by minimising barriers, speeding up project realisation, and unlocking sustainable feedstock against affordable pricing. Research and innovation will further help the acceleration in the years to come.

The True Impact

Appropriate Measures for Biological Treatment Guidance

Emma Cheetham, Managing Director at Elleteq Limited, summarises the key points from the Environment Agency's recently released tome and advises swift planning and action to avoid penalty.

No waste permit operator wants to receive a Compliance Assessment Report (CAR) from the Environment Agency (EA) with a tick in Section three, Enforcement Response box "We will now consider what enforcement action is appropriate and notify you, referencing this form".

Sadly, we are finding that there is an increase in these boxes getting ticked, following the publication on 12 September 2022 of the long-awaited EA document entitled Biological Waste Treatment: Appropriate Measures for Permitted Facilities.

The first paragraph within it says 'This *guidance* explains the standards (appropriate measures) that are relevant to permitted waste management facilities that handle organic waste, also known as biowaste. Facilities that operate under a relevant waste exemption can also use this *guidance*'.

Personally, I am not convinced that *guidance* is the right word for this document given that 'must' appears 872 times. 'Assessment Tool' is to me a more accurate description. Since September, EA Officers have been assessing sites on the back of this document alongside normal measurement to site permit conditions.

I am not a betting woman, but I will wager by the time you are reading this article you may have had a visit by the EA. Whilst on site they will have mentioned the Appropriate Measures document several times resulting in an outcome of a long CAR with multiple breaches.

For those fortunate enough to not have that routine visit, take heed of these next few paragraphs, for they may help you.

Implementing appropriate measures

The Association for Renewable Energy and Clean Technology has put together a user-friendly version of the *guidance* through their member sign-in. It is still weighty with 13 sections, written over 146 pages. Not all sections may be relevant to your operations but Section 1.3, entitled 'Implementing appropriate measures' clearly states the EA expect two levels of improvement reviews by all operators; see yellow boxout to the right.

The first level of improvements is standard to those working to PAS 100 Quality Protocol (QP) or PAS 110 QP, as internal audits and Management Reviews are engrained with those Quality Systems. The challenge comes with meeting the second level which includes infrastructure reviews, which many Operators have already been hit with following the EA's review of all Standard Rules biological treatment permits. The outcome resulted in several existing permits being amalgamated, such as the 'SR2008No16 composting in open systems' moving to SR2021No2.

Inspection competency

The SR2021No2 has 17 set operating techniques, plus a time-sensitive improvement condition to 'undertake an inspection and works programme to ensure that all primary and secondary containment is fit for

Standard good practice requirements, which should be low cost and easy to prioritise based on risk:

The EA have said they expect these to be completed within a year of the publication of the *guidance*, so by 20/9/2023. Examples they have given are:

- Updating site management systems
- Reviewing waste pre-acceptance, acceptance, handling techniques and waste transfers off-site
- Equipment and infrastructure maintenance
- Measures to prevent fugitive or accidental emissions
- Appropriate (calibrated) monitoring equipment
- Waste, water, and energy efficiency measures

Longer term and capital-intensive improvements:

- Reviewing, revising, and installing abatement equipment
- Significantly redesigning the layout of the facility, including, for example, the design and installation of new buildings or treatment plants to prevent ongoing pollution or reduce the risk of pollution
- Replacing tanks or other primary infrastructure
- Installing secondary containment where there is a significant risk

purpose which shall include an assessment and inspection of all primary containment, using a Written Scheme of Examination devised and undertaken by an appropriately qualified engineer' by 1 October 2022. It then goes on to say the 'assessment and inspection of all secondary containment against the standards set out in CIRIA 736 [guidelines on the 'Design of containment systems for the prevention of water pollution from industrial incidents'] shall be done by a competent *structural* engineer'.

Our journey to find a competent structural engineer started early in 2022 and ended up being a total fiasco. The structural engineers we approached were not interested in reviewing a compost pad and lagoon (unless they were going to get a significant redesign contract from it). We went back to the EA to get some clarity on their definition.

From 'structural engineer', they redefined to say the engineer could be a *Chartered Civil* Engineer. Sadly, we soon found out these were like finding gold dust!

We again went back to the EA, and this time they agreed to remove the requirement for them to be chartered, which would be consistent with the installation regime permit reviews they had carried out for our sector. However, the assessment report must contain evidence of the engineer's competence e.g., qualifications/experience/CV and longstanding experience (20+ years).

Hopefully, Elleteq's persistence has paved a clear way forward for everyone. One further thing that helped us manage the process was being able to get our hands on the original design drawings and build specifications. If you have not already done so, go back through filing cabinets or computer archives; it will aid the process and give robustness to the findings made by the qualified engineer.

Site capacity review

A further key element in the Appropriate Measures *guidance* is that Permit Operators must review their site capacity. Section 4.3 of the guidance describes how calculating treatment capacity should be completed, including considering factors such as seasonal changes in feedstock supplies and markets for outputs. The expectation is that sites have enough space to operate plant and equipment safely and allow environmentally safe storage and treatment. It goes on to state that to determine the daily and annual throughput, the critical volumes, or tonnes of waste storage capacity at any one time must be established for incoming waste and processed material with allowance for the residence time for waste to be fully treated and recycled.

What it fails to do is define how to complete the calculation, which is buried deep in regulatory guidance, which makes the challenge even tougher. It is not the maximum tonnage figure quoted in the permit conditions or what the planning permission dictates, but what is accepted throughout the year and the capacity that can be treated at one time without the risk of causing pollution.

The EA would expect it to be done in line with the definition given in the Industrial Emission Directive Regulatory Guidance Note RGN2 Appendices One and Two namely, Biological Treatment of Waste (Section 5.3 and 5.4), which is as follows.

As the biological treatment of waste usually takes place over more than one day, the physical daily capacity can be calculated by dividing the maximum quantity of waste the biological treatment activity could treat at any one time divided by the minimum residence time.

For an anaerobic digestion facility with a number of biological treatment tanks in series, this will be the total working capacity of the treatment tanks (includes secondary digester tanks) divided by the minimum hydraulic retention time (HRT) from the first to the last tank. If the tanks are in parallel, then treat them as separate processes and calculate using the individual minimum HRTs applied to each tank, and then add the individual totals together.

A similar approach can be taken for composting that takes place in a series of stages (e.g., an in-vessel stage followed by an outdoor windrowing stage). For outdoor windrow composting the maximum quantity of waste that could be composted at any one time can be calculated from the pad area used for active composting, the size of the windrows and the density of the composting waste. The minimum residence time is the minimum time taken to produce sanitised and stabilised compost.

An example calculation is for a composting site where we have determined that the conversion rate for EWC code 20 02 01 (non-hazardous) biodegradable waste is 0.38 (taken from the EA 1998/99 commercial and industrial waste survey) and the processing residency time calculation is based on total tonnes/nine weeks (63 days). Therefore, the equation to use is Length x Width x Height /3 x Number of Batches (including loose windrows in treatment, batch forming material, and pre-shred reception material) = Total M3 x 0.38/63 = XXX tonnes treatment capacity per day.

Going forwards

I have only touched on a few of the elements within the *guidance*. Every site will have its own challenges arising from it, the key is not to ignore it. Read it, note the relevant factors for your site, make a plan to implement the initial first-phase improvements and start the investigation if any second-phase improvements will be required. Good Luck!

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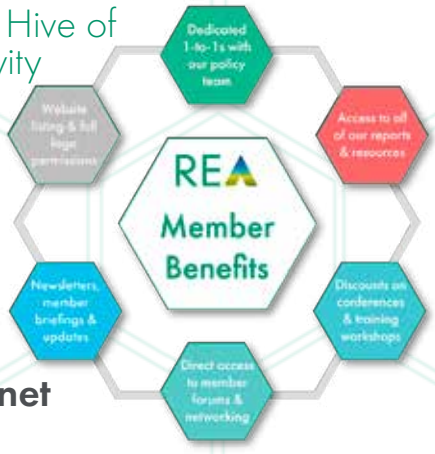

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CCS & BCS

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

CCS & BCS 2021 Annual Report

REAL published the 2021 Annual Report for the Compost and Biofertiliser Certification Schemes in September 2022. The report gives an overview of the data collected during 2021. By the end of 2021, there were 177 certified compost processes in the UK and 100 certified anaerobic digestion plants.

For the first time, this Annual Report also includes information on the macronutrient content of compost and digestate calculated from REAL's test results database. The report details that, on average, certified compost contained 15,167 mg/kg of nitrogen, 2,738 mg/kg of phosphorus, and 9,304 mg/kg of potassium in 2021. On BCS, the mean nitrogen content of digestate sampled in 2021 was 1.01 per cent m/m. The mean phosphorus and potassium content was 1731 mg/kg and 3142 mg/kg, respectively.

Composting compostables in the UK

REAL also recently published a paper titled *"Composting compostables in the UK: Capacity for the composting of certified industrially compostable materials at certified industrial composting facilities in the UK."*

The paper shares data collected through CCS to date (as of September 2022), presenting a picture of the number of industrial composting processes in the UK that are both certified by CCS and accept independently certified compostable material.

The paper shows that 24 CCS-certified composting processes confirmed they were accepting independently certified compostable materials.

Paper on plastic contamination in compost and digestage

For a separate project, REAL carried out a statistical analysis of a recent dataset showing the level of compliance with the limits required by PAS 100 and PAS 110.

The results provide conclusive evidence that the levels of plastic contamination in compost and digestate that has been independently certified to end-of-waste criteria in England are lower than those required by the standards.

The analysis in the paper shows 98.5 per cent of compost samples and 98.1 per cent of digestate samples tested were within the limits for physical contaminants.

In the majority of compost samples, the level of plastic contamination fell below 0.02 per cent mass/mass. In the majority of digestate samples, the level of total physical contaminants (including plastics) fell below 0.039 kg/t.

THE RESEARCH HUB

The Research Library

The Research Hub's Organics Recycling Research Library is an online platform that collates research on the composting and AD industries. It is regularly updated with new research on the sector and currently contains 381 articles, over 100 of which were added to the platform since launching in January 2021.

Residual Biogas Potential

Evaluation of the potential for the improvement of the Residual Biogas Potential test and investigation of alternative test procedures for PAS110 biofertilisers.

This project will undertake a comprehensive technical evaluation of the Residual Biogas Potential test; the only digestate stability testing regime recognised under PAS110.

Aqua Enviro was appointed as the contractor in early 2022. Work commenced April 2022 and is due to complete June 2023.

Carbon Accounting Benefits

How the benefits of applying compost and digestate to soils can be counted for under the Greenhouse Gas (GHG) Protocol.

This project aims to 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.

REAL opened a tender for this project in November 2022, which closed on 9th December 2022. The Project Management Team appointed a contractor in February 2023.

2023 Call for Proposals

We will be running a Call for Research Proposals starting in January 2023. During this time, we encourage anyone with an idea for a research project to submit a proposal to the Research Hub. More information on submitting research proposals can be found on the REAL Research Hub website.

Unlocking the Path to Net Zero: The Role of Anaerobic Digestion

By **Mick Fishwick**, Chief Operating Officer, Bio Capital

Against the backdrop of the current fuel and energy crisis, Bio Capital Group is a leading anaerobic digestion (AD) solution provider in the UK that's offering a viable alternative to fossil fuels – and a working model for circular, renewable energy generation.

Formed in 2018 by Equitix and Helios Energy Investments, we own and operate a diverse portfolio of AD plants across the UK. Our solutions from organic waste treatment to renewable electricity and vehicle fuel, biogas-to-grid injection and sustainable bio-fertiliser are helping the UK get closer to its Net Zero and Zero Waste targets.

Our UK plants currently generate 34MWe with a combined yearly capacity of 520,000 tonnes for the treatment of food waste and 113,000 tonnes for agricultural feedstock. In 2021, we supplied consistent power to the grid equivalent of supplying 50,000 homes. Our growing pool of feedstock partners includes local authorities, supermarkets, food manufacturers and more, including packaged food waste.

Reducing Landfill and GHGs

The AD sector can help the UK rise to the significant challenges it faces in the coming years. Firstly, it reduces landfill waste, instead directing organic material for energy and fertiliser production. Each year, the country produces an estimated 9.5M tonnes of food waste. And when that waste decomposes in landfill, it releases methane (CH4), a GHG that's 80 times more warming than CO2 over its first 20 years in the atmosphere. The waste sector accounts for four per cent of all GHG emitted in the UK with 75 per cent coming from landfill.

The AD process captures methane and turns this into green electricity and a low-carbon biomethane gas. The potential of AD is naturally dependent on the availability of feedstock, but new regulations requiring separated food waste collections by local authorities in England should significantly increase the amount available for treatment.

Bio Capital's Chief Executive Officer Peter Sharpe comments: "This developing regulatory environment is largely matched by public opinion seeking a lower waste, less resource intensive economy and more proactive approach to be positive for nature and our environment. We are well placed to make a positive contribution to help other businesses meet these challenges - helping achieve their carbon reduction and recycling targets, delivering cost savings on gate fees plus opening doors to transport innovation."

Local Green Energy Supply

What the UK needs is a range of localised, renewable energy solutions to liberate the country from dependence on imported fossil fuels. The AD sector can play a vital role in that transition, provided its potential is supported by the UK Government. At its full potential, AD can deliver a six per cent cut in the UK's GHG emissions by 2030, and in the hardest-to-decarbonise sectors.

With investment levels similar to Germany's, the UK AD sector could make a tangible difference to domestic green energy supply. The amount of biomethane supplied to the grid by 2030 could be trebled. New AD plants can be fully operational within one to two years and are a proven technology, paving the way to greater energy autonomy and boosting the circular economy.

AD plants also offer energy flexibility. Depending on the setup, they can produce electricity for the grid, biomethane for grid injection, or both. Biogas can be transported to local businesses for use in CHP units or utilised as a high-performance fuel suitable for HGVs. Local councils can demonstrate their circular approach to waste collection, by using biomethane in their collection fleets. Bio Capital currently has ten biomethane/CNG vehicles on the road, for example.

AD as Nature-Positive

One of the big focuses of COP27 was the global transition to more regenerative, nature-positive farming methods. One of the by-products of the circular AD process is a high-quality bio-fertiliser that can help to restore soil health. It can be used by local farmers or sold domestically and abroad, putting the UK in a position to benefit from the growing European bio-fertiliser market.

From reducing waste and emissions to helping the UK become more energy-independent and improving sustainable farming methods, anaerobic digestion is true circular thinking in action.

Green Gas Steering Group

Lucy Hopwood, takes a look at where growth for the anaerobic digestion industry might come from, identifying the key challenges for that growth and how they might be overcome.

Lucy Hopwood, Director and Lead Consultant for Bioenergy and Anaerobic Digestion, NNFCC

The AD industry feels particularly vibrant at present. In the UK, Ireland and elsewhere in Europe there is emphasis on how biomethane is critical to improving energy security, and essential in hitting decarbonisation objectives.

To do this, the industry needs to grow, but it is difficult to understand what the trigger will be for that growth. The industry has come far, and technology and finance are no longer major barriers, so what are today's challenges?

In the UK, growth has been consistent but slow for the past couple of years. We haven't seen the upturn in activity we anticipated since GGSS launched; we're only a year in but people are already talking about post-GGSS support. The scheme isn't long enough to stimulate the growth we need.

Although, even with a longer scheme and more support, the level of growth that's achievable is questionable – how are we going to feed new plants? Feedstock is the UK's biggest challenge at present, and there's no quick and easy solution. Food waste is competitive, crops are undesirable and productivity of livestock waste is poor, so we need to develop a robust national feedstock position before taking things further.

Ireland is late to the party, but keen to enter the market. When their renewable heat obligation launches in a couple of years, the industry should be ready. However, the same questions are being asked; how will Irish growth be fed? Low population and high recycling rates mean food waste is scarce, so crops and livestock wastes will likely be the focus.

If we could follow the Danish model and build huge AD plants to process livestock wastes, we might be onto something, but that's not what the industry is talking about. Everyone is pursuing the increasingly elusive food waste surplus.

There's a short-term opportunity to convert existing AD Combined Heat and Power (CHP) capacity to biomethane for injection, to eliminate or reduce the feedstock challenges, but in the absence of support, this isn't happening.

As strategic business consultants, we monitor the market in the UK and Ireland to complete the picture when looking at feedstock availability, treatment capacity and risk. And, we are working through challenges with investors and developers, to enable growth where possible.

REA Green Gas steering group members

William Mezzullo, *(Chair)* Senior Business Development Manager, Centrica Energy Trading

David Hurran, *(Vice Chair)* Renewable Energy Consultant

Anna Becvar, Earthcare Technical

John Baldwin, Managing Director, CNG Services

Simon Farris, Strategy and Development Director, Severn Trent Green Power

David Kinnersley, Head of Agribusiness, Fisher German LLP

Lucy Owen, Environmental Compliance Manager, Marches Biogas

Philipp Lukas, Managing Director, Future Biogas Ltd

Richard Gueterbock, Director, Food Chains

Mark Richmond, Technical Director, WRM Ltd

Thomas Minter, Managing Director, Malaby Biogas

Organics Steering Group

The organics industry is set for growth, as soon as the government lives true to its commitment and implements legislation to make food and garden waste collections mandatory. By **Becky Wheeler**.

Becky Wheeler,
Head of Business Development,
Future Biogas

The organics industry is in a prime position to help the UK deliver net-zero targets. However, it is still waiting for the Government to implement its commitment to mandatory food and garden waste collections.

BEIS' recent Call for Evidence on the 'Net Zero Review' gave opportunity to showcase the significant potential the organics recycling industry has in helping meet net zero targets.

Our industry has matured and scaled over several decades, with well-developed and proven infrastructure and technology operating all over the UK. But there is so much more potential for economic growth and investment in our sector to help decarbonise our economy.

Although BEIS' review focused on economic benefits, our sector also delivers significant direct and indirect environmental benefits including soil health, ecosystems services, displacement of fossil fertilisers and combatting climate change.

During a roundtable with Chris Skidmore MP, the REA Organics Forum put forward two key asks to help members bring decarbonisation projects to fruition.

The Government committed to mandatory food and garden waste collections in the Environment Act but a key barrier remains. A potential 'quick win' would be for Defra to urgently publish its response to the Consistency in Collections consultation, and subsequently, the secondary legislation needed to implement this commitment.

We have members who have 'oven ready' projects, poised to start the investment and build of additional organics recycling facilities to turn feedstock into green energy, carbon capture and quality organics to return vital carbon back to soils. These projects have social and economic benefits too including apprenticeships and jobs through the supply chain.

Significant numbers of members also report issues with the tardiness and lack of flexibility in our current environmental regulatory system. Our second ask was for Government to provide environmental regulators with more technical resources, to clear the significant backlogs that are inhibiting decarbonisation projects in our sector.

In a time of climate crisis, the Government should be proactive in making real changes on the ground. Can we afford to wait?

REA Organics steering group members

Stuart Hayward-Higham, Technical Development Director, SUEZ Recycling and Recovery UK

Charlie Trousdell, Charlie Trousdell Associates

Ralph Lodge, Technical Director, Enva Resource Management

Ben Brown, Director, WRM

Justin Dampney, *(Vice Chair)* COO, Eco Sustainable Solutions

Tony Breton, Market Specialist – UK & Ireland, Novamont

Robert Benford, Partner, G K Benford & Co

James Astor, Chairman, Regen Holdings Ltd

Andy Sibley, Managing Director, Envar

Graeme Kennett, Principal Environmental Consultant, Mabbett & Associates Ltd

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