

Organics Recycling & Biogas

Summer 2021 Issue 47

- ▶ **COUNTING CARBON**
Sequestration to soil
- ▶ **WET AD**
Innovation in the water industry
- ▶ **HOT TOPIC**
Comingling food and garden waste

The quarterly members' magazine from REA Organics and Green Gas



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water industry target
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Welcome

Kiara Zennaro, Head of Heat,
Green Gas lead

Jenny Grant, Head of
Organics and Natural Capital



Welcome to the latest edition of our magazine. We hope you and your families are well and have been able to enjoy a bit more freedom. We've both had our first vaccinations and hope it's the return to more normality – we miss meeting up with members in person.

It's been a busy time for Organics, with much effort dedicated to revision of the Quality Protocols. We are pleased to inform you that thanks to generous contributions from industry, the EA has confirmed that we can proceed with this and that the Compost and AD QPs will remain in force while the revisions go ahead. Please get involved to help shape the revisions.

The consistency in recycling consultation underway proposes changes that will transform collections, particularly in terms of requirements for food waste. We have held a webinar and been engaging with members so we can ensure that we take their views into account in our response.

As highlighted in the latest NNFFC report, the AD sector has seen significant growth, which is set to continue with the new Green Gas Support Scheme. In addition, recent changes to the RHI have made it possible for existing plants to boost green gas production, supply some biomethane for use in the transport sector and access support under the Renewable Transport Fuel Obligation.

You may have heard that the REA Biogas forum is now known as the Green Gas forum. This is to reflect the wider range of green gases that the forum represents. Our Green Gas Day at the National Motorcycle Museum on 9 September will showcase recent developments and explore the opportunities that green gases offer. We certainly hope to see you there in person, finally!

We'd be happy to hear from you if you'd like any more information on what we are doing or anything we can assist with. We hope you enjoy this issue of the magazine!

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

The Association for Renewable Energy and Clean Technology

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2-19 Lancaster Place,
London
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www.r-e-a.net



ISSN 2041 - 2169

Printed by Stephens & George
Printed on Revive 100% recycled

Published by
Resource Media Limited
CREATE Centre
Smeaton Road
Bristol
BS1 6XN
resourcemedia.co.uk

No views expressed in the magazine can necessarily be interpreted as the views of the REA or Resource Media.

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NNFCC's AD deployment report points to sector growth and maturity

NNFCC has recently published the eighth edition of its annual *Anaerobic Digestion Deployment in the UK* report. This summarises the developments in the UK's AD industry over the past 12 months and looks ahead to future developments in the sector.

The report shows that the sector has seen significant growth over the past 12 months, despite numerous delays in construction and commissioning, as well as operational challenges due to the pandemic.

As of 8 March 2021, there are 642 operational AD facilities across the UK, with NNFCC data showing 269 plants are still under development, while 49 are in the process of construction. Many of these are expected to benefit from the Renewable Heat Incentive (RHI) scheme before it closes on 31 March 2022.

The sector has seen growth of 11 per cent since April 2020, mainly from Combined Heat and Power (CHP) plants supported by the Feed-in Tariff (FiT) scheme.



There was a 'final rush' for RHI in the first quarter of 2021, while industry awaited details of the new Green Gas Support Scheme (GGSS), with 10 new RHI tariff guarantee (TG) applications being made over this period.

The NNFCC reports 'reassuring' continued investment in the sector, despite various challenges over the past

year, consolidating the status of the sector as established in the UK.

Government commitments, such as the Ten Point Plan, the Energy White Paper and the BEIS strategy, are incorporated in the report to include an indicative roadmap to full industrial decarbonisation, including key policy actions and major milestones.

Consultations on free garden waste collection draws mixed response

The Department for Environment, Food and Rural Affairs (Defra) launched its second consultation on consistent waste collections on 7 May, seeking opinion on plans to offer consistent recycling services across England from the 2023/24 financial year.

One proposal made within the consultation is that every household in England should get free garden waste collections, either separately or collected with food waste – where separate collection of food waste is not available.

A Defra impact assessment has estimated that a free garden waste collection service would increase local authority waste management costs by

£2,222 million, compared to a scenario in which residents are charged for garden waste collections. However, the assessment also predicted carbon savings of £732 million, with an additional 'societal value' of £691 million.

On the back of the initial consultation, 80 per cent of households were in favour of free garden waste collections, while 71 per cent of local authorities were not. With this initial mixed response, Defra has suggested a number of alternative proposals, including introducing 'reasonable charges' for garden waste of between £18 and £30 a year, communicating with residents who place garden

waste in household waste bins on the benefits of recycling garden waste, and encouraging home composting.

Defra has also proposed separate food waste collection from households, notably to include flats and other dwellings that to date many local authorities have not included.

Commenting on the proposals, Environment Secretary George Eustice said: "Householders want more frequent recycling collections. Regular food and garden waste collections will ensure that they can get rid of their rubbish faster, at no additional cost to them. Our proposals will boost recycling rates, and ensure that less rubbish is condemned to landfill."



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Green Gas Support Scheme details

Dr Kiara Zennar

Head of Heat,
Green Gas lead



The Department for Business, Energy and Industrial Strategy (BEIS) has published its response to the sections of the Future Support for Low Carbon Heat consultation that focus on green gas, as well as its response to the later consultation on the Green Gas Support Scheme (GGSS): digestate management and that on the Green Gas Levy.

The GGSS, which will support biomethane injection from anaerobic digestion (AD) only, is expected to begin in autumn 2021 and be open for applications until autumn 2025. BEIS has said that only new AD plants will be eligible under the Scheme, though details of what this means have yet to be provided. Biomethane from gasification and renewable hydrogen will not be supported, nor will be heat from biogas combustion.

GGSS will provide a 15-year tariff based on a three-tier structure, very similar to that provided under the Renewable Heat Incentive. Tier 1 will have a rate of 5.51 p/kWh, up to the first 60,000 MWh/annum of eligible biomethane injected, to encourage larger plants to come online where there are suitable conditions to do so.

Tier 2 will have a rate of 3.53 p/kWh for 40,000 MWh/annum of eligible biomethane and tier 3 will have a rate of 1.56 p/kWh for any remaining biomethane.

In line with government policy that encourages more wastes and residues to be processed through AD, BEIS will require 50 per cent of all biomethane (by energy content) to be produced using waste or residue feedstocks – like under the RHI – though BEIS will review this threshold in its mid-scheme review in line with the wider food waste market.

The scheme will also place requirements on digestate spreading, which must be carried out in a way that minimises ammonia emissions.

Further detail on the scheme features can be found on the Government's consultation response page.

You can email kiara@r-e-a.net if you require any clarification.

Revision of Quality Protocols

Jenny Grant

Following the EA's announcement that the Compost and AD Quality Protocols require revision and this needs to be paid for by industry, REA and other Trade Associations issued a call for funding. We would like to thank all members who have pledged funding and are pleased to confirm that we have sufficient pledges to proceed with the revision process.

It's not too late to get involved though, as we continue to accept donations to ensure there are sufficient funds for any external research that is required. We have written to the EA to confirm we want to progress with the revision.

The EA has confirmed that following the commitment for funding, these

Quality Protocols were not withdrawn at the end of May and will remain in force during the revision process, as long as progress is being made.

The next stage is to have a meeting to scope out the breadth of the revision and this is the point where we can set out what changes industry would like to see in addition to the items already outlined by the EA.

We have held workshops with industry in advance of this scoping study meeting to share views and gather evidence.

We are also in contact with Defra to discuss the revision of the Fertilisers Regulation and how it may affect revisions of the Compost Quality Protocol and Anaerobic Digestate Quality Protocol.

Please contact jenny@r-e-a.net if you require anymore information.

Green Gas forum and Hydrogen Member Working Group launched

The REA has recently changed the name of its long-established Biogas forum to Green Gas forum, a move that reflects the importance of all green gases, including biogas, biomethane from anaerobic digestion (AD) and thermal gasification, as well as low-carbon hydrogen.

We have also launched a new Hydrogen Working Group that aims to push forward the clean hydrogen agenda within the Government.

Clean hydrogen, in combination with biomethane and other green gases, is considered by the REA as crucial to decarbonising heat, power, transport and industry. Blue hydrogen is also seen as important to helping the transition to net zero, as long as the carbon is fully tracked, monitored, accounted for and captured. Green and bio-hydrogen, which can deliver zero or even negative GHG emissions, have a long-term role to play.

It is hoped that the REA's experience in the area of biomethane, renewable transport, energy storage and flexible power will help unlock the regulatory barriers faced by using clean hydrogen.

Frank Gordon, Director of Policy at the Association for Renewable Energy

and Clean Technology (REA), said:

"Earlier this year we published the REA Strategy, a pathway which identifies a range of actions that need to be taken to decarbonise the energy sector. Green and bio-hydrogen, which can deliver zero or even negative GHG emissions, have a long-term role to play in delivering net zero – growth in this area is crucial if the Government is going to meet its ambitions.

"The 'Green Gas forum' will play an important part in pressing for changes in policy in terms of clean hydrogen, biomethane and other green gases – I am looking forward to continuing our partnership with our 550 members to press for progress."

Kiara Zennaro, Head of Heat at the Association for Renewable Energy and Clean Technology (REA), said: "The REA has a long history of championing and supporting its members in the complex challenge of decarbonising the UK's gas network for its use in heat and transport.

"It is the right time to expand our scope to include all green gases, such as biomethane, so we can help unlock and overcome the regulatory barriers faced by clean hydrogen."

Resources and Waste Strategy consultations

Jenny Grant,
Head of Organics
and Natural
Capital, REA



Defra has published three consultations linked to the Resources and Waste Strategy. The Consultation on Consistency in Household and Business Recycling Collections in England, along with consultations on extended producer responsibility (EPR) and deposit return schemes (DRS).

Following the first consultation, measures were introduced in the Environment Bill requiring a set of recyclable waste streams to be collected from households, businesses and non-domestic premises. This latest consultation seeks to gather views on the details of these proposals.

It proposes that all waste collection authorities (WCAs) will be required to offer a weekly separate food waste collection, preferably sent for anaerobic digestion. In circumstances where it is not technically or economically practicable, or where there is no significant environmental benefit from separate collection, the food waste may be collected with garden waste on a weekly collection cycle, subject to a

written assessment. The requirements will be introduced from 2023/24.

Similarly, all WCAs in England are required to arrange for the separate collection of garden waste for recycling or composting. The preference is for this to be collected separately, however, it can be collected together with food waste where separate collection of food waste is not technically or economically practicable or there is no significant environmental benefit from the separate collection of food waste. It is proposed that all local authorities will have to arrange for the collection of garden waste for recycling from 2023/24. Defra is seeking further views on whether garden waste collections should be free to householders.

The consultation proposes food waste collections from all non-household municipal premises that produce food waste. This includes businesses, non-domestic premises (residential homes, universities, schools, hospitals and nursing homes) and other producers of relevant waste. Food waste must be collected separately from dry recyclables and residual waste. The consultation runs until 4 July. Please contact jenny@r-e-a.net with any thoughts or comments to feed into the REA response.

Access to RTFO eased for biomethane producers

The rules for the Renewable Heat Incentive (RHI) changed on 1 April to make it easier for biomethane producers registered under the RHI to access support under the Renewable Transport Fuel Obligation (RTFO).

Previously, producers could only get support as a transport fuel by giving up an entire quarter of RHI. The new rules give flexibility to producers to choose what proportion of their injection over a quarter they wish to claim RHI on.

To make a partial claim for biomethane injected in a given quarter, participants will still be required to provide as part of their quarterly submissions: a figure for

the total amount of biomethane in KWh injected in the quarterly period; and a figure for the biomethane for which they wish to claim RHI support.

Ofgem and DfT will be working together to validate the information provided and ensure RHI payments are not made for biomethane for which an RTFC has been issued.

Ofgem has already issued guidance setting out the rules. See in particular section 12 of volume 1 RHI guidance, and section 13 and appendix 2 of volume 2 RHI guidance on the Ofgem website.

You can email kiara@r-e-a.net if you require any assistance.

Government to consult on banning horticultural peat use

Emily Nichols,
Technical Manager
REA Organic



The sale of peat and peat-containing products in the amateur horticulture sector could be banned by the end of this parliament.

In 2011, the Government set voluntary targets for England's amateur horticulture sector to become peat-free by 2020 and for the professional horticulture sector to follow by 2030.

In its England Peat Action Plan, the Government acknowledges there has been progress towards meeting these targets but recognises that a voluntary approach has not been delivered. Consequently, this year the Government will consult on banning the sale of peat and peat-containing products in the amateur horticulture sector by the end of this parliament. The consultation will also cover phasing out horticultural peat and moving to alternatives in professional sectors. As we have done before on consultations and calls for evidence relevant to peat products and alternatives, the REA will respond to the coming consultation.

In 2017, the UK and Republic of Ireland's major growing media manufacturers used nearly 227,000 tonnes of commercially composted plant materials ('green compost') when manufacturing their peat-free and reduced peat-content growing media and soil improvers. Green composts represented 8.1 per cent of the total 2.79 million tonnes of growing media and soil improvers supplied by those manufacturers.

Almost 1.6 million tonnes of waste-derived composts that achieved product status were produced in England in 2019, so many more of these could be used to replace peat in growing media and bagged soil improvers in the future. There is also potential for dewatered, aerobically matured, fibre digestates made from suitable input materials to contribute, subject to supply to the relevant markets being allowed in the revised AD Quality Protocol.

What circumstances could commingled collection be considered instead of separate food waste collection?

Peter Jones,
Principal Consultant
Eunomia



Under Defra's latest consistency proposals, local authorities will have to provide weekly separate collections of food waste from 2023. This is subject to a practicability test, and where separate collections are found not to be practicable, it will be acceptable to collect food mixed with garden waste – though this must be provided weekly.

There are three grounds on which mixed collections could be considered.

The first is technical, however, there are examples of food waste collections taking place from all sorts of properties – both in urban and rural areas – so it is difficult to see what technical limitations might apply that couldn't be overcome with investment.

The second is economic, however, assessing this is complicated by Defra meeting many of the transition costs for authorities. Furthermore, in many cases, the cost of mixed food and garden services may well be higher than separate food waste due to higher garden waste treatment costs and weekly collections.

The third is environmental, but the benefit of generating biogas from

anaerobic digestion (AD) of food waste is likely to be greater than the value of producing compost alone – although this advantage could be overcome if both food and garden waste were sent to dry AD.

One circumstance in which Defra accepts that mixed food and garden services may continue, perhaps until 2030/31, is where an authority has a long-term treatment deal for the resulting material. Breaking a contract could be costly. Aside from this, if the rules are applied strictly, it is difficult to see many scenarios where source separation will not be required, or where mixed food and garden would be preferable.

Mark Richmond,
Technical Director,
WRM



The appropriate and the right collection system need to be considered at a local authority level. The strategy sets out technological, economic, or significant environmental benefits as the criteria, which is something we absolutely agree with, but assessing this at an individual local authority level is really important.

In our work, we've seen two ostensibly similar authorities have very different profiles, and outcomes. That might be because of underlying service design, it might be different services that are influencing a particular decision.

We've looked at projects where dry anaerobic digestion technology could be deployed, that would equally obtain the biogas benefits through a commingled collection. Garden waste can also be a putrescible fraction. There is a whole other industry of AD, such as crop digestion grass, silage, big feedstock. And you know, grass is in garden waste at certain times of year. Commingled approaches linked with dry AD could unlock that value opportunity as well.

We are also seeing other examples of where operators are using a press, which enables commingled collection to be separated into the gas yielding fraction – the food waste – and the kind of more woody fractions, lignin biomass, which can then go on to composting.

Moving on to the economic circumstances where commingled collection could be considered instead of separate food waste examples where authority has recently invested in a dedicated treatment plant, an IVC. The cost associated with a prematurely redundant public asset, or central government covering an unnecessarily high compensation cost for an early contract termination, could give rise to economic circumstances to remain with a co-mingled collection.

Another (separate) economic example would be where notably high collection costs are incurred. This could be due to factors such as, but not limited to low population density. The whole cost for a food waste recycling service, which includes collection and treatment, is between 70-80 per cent on collections, with 20-30 per cent of these being treatment gate fees.

An environmental justification could be where an authority with an existing co-mingled biowaste service demonstrates the ability to attain a recycling rate that is either high or above expectation. A recent example would be East Riding of Yorkshire Council, which has topped overall recycling tables in recent years, and operates a longstanding co-mingled food and garden waste service. Another example is a Metropolitan Borough Council with whom WRM worked that had low overall recycling rates. Compositional analysis on the weekly co-mingled biowaste collection showed that the food waste portion of the co-mingled biowaste exceeded the projected yield for a source segregated collection (using the WRAP IMD calculation).

A challenge to identifying or perhaps confirming these circumstances is that the evaluation and treatment of such examples remain unclear during the current consultation. The consultation references the WRAP Kerbside Recycling: Indicative Cost and Performance tool, which is being updated. Therefore, it is challenging for consultees to consider the full implications of this approach within the consultation timescale.

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Quantifying the carbon benefits of compost and digestates

As the contribution of composting and anaerobic digestion becomes more widely recognised, there is a need to quantify the value of these processes to the soil. **Jane Gilbert** and **Marco Ricci** describe recent work to calculate how much carbon can be captured through application to soil

Research over the past two decades has highlighted the value of recycling organic wastes into compost and anaerobic digestate in terms of improving the quality of soil, locking in carbon and (hopefully) going some way towards stabilising climate change.

Currently organic waste comprises around 45 per cent (by mass) of total municipal solid waste - globally 935 million tonnes are generated each year, most of it food waste. However, at the moment only a fraction of that is returned to the soil through composting and anaerobic digestion. According to the International Solid Waste Association (ISWA) if the global quantity of organic waste could be recycled, it would create 309 million tonnes of compost, enough to restore the fertility of 31 million hectares of arable agricultural soil - or 2.4 per cent of the world's cultivated land area.

It is easy to forget how important soil is. A non-renewable resource that supports all life on Earth, its loss can be devastating to both animal species and humans - one only has to think of the Dust Bowl in 1930s America, where failing to replenish the soils caused enormous economic damage and displaced many people in the process. A report by the United Nations' Food and Agriculture Organisation estimated that around 30 per cent of the world's soil is moderately to highly degraded due to erosion, nutrient depletion, and other factors, and that soil is being lost from agricultural areas 10-40 times faster than it is being formed. The erosion of soils then leads to the degradation of organic matter in soil, which is consequently released as carbon dioxide and methane - both of which are greenhouse gases.

And it's not just a problem in the developing world. Studies looking at five different regions in the world - Australia, Brazil, Chile, Italy and the UK - have found varying degrees of soil erosion and loss of soil organic matter in all five regions (see Ricci-Jürgensen, M., Gilbert, J. and Ramola, A. [2020] Summary of the State of Soils in Five Countries. ISWA, Rotterdam).

Applying organic matter to soil - whether that is compost or digestate - is one way to halt that loss. It helps water retention, acting as both a buffer against droughts in areas prone to desertification and aid in reducing flooding; it increases soil organic carbon content, improves nutrient cycling and reduces soil acidity, which in turn helps release micronutrients.

Aerobic and anaerobic gains

Organic matter has a number of common components - cellulose (a glucose polymer present in all food and green waste) and hemicellulose, proteins, carbohydrates, lipids (fats and oils that are particularly prevalent in food waste) and lignin. The latter is only present in wood and is only able to be broken down aerobically.

The role of micro-organisms in both processes is crucial. Bacteria predominate in the anaerobic digestion process, whereas both bacteria and fungi are fundamental to composting. Lignin is only degraded in aerobic environments by fungi and certain types of bacteria called actinomycetes.

Composting involves a biochemical process known as humification, which results in the formation of stable organic matter. Indeed, humic substances such as humic acids and fulvic acids are the main source of stable carbon in soil.

The extent to which humification has occurred provides an indication of the maturity of the compost.

The composting process starts at lower ambient temperatures, below 45 degrees C. At this stage mesophilic bacteria (that thrive in warm 20-45 C environments) dominate, breaking down easily degradable compounds such as organic acids and releasing heat energy. This causes a rise in temperature.

As the compost heats, microbes - thermophilic fungi and bacteria - take over. These begin the breakdown of lignin and the creation of humic substances. This humification process peaks at around 90 days, levelling off thereafter. It is at this point the carbon becomes stable.

Instead, anaerobic digestion relies on bacteria that thrive in an oxygen-free environment. There are three main parts of the process: hydrolysis, where complex feedstocks are broken down into simpler compounds; acid production, in which these compounds are broken down further into organic acids and alcohols, and methane production where they are converted into carbon dioxide and methane. At the end of these any partially degraded feedstocks, microbial biomass and non-degraded compounds remain as digestate.

As compost and anaerobic digestate are derived from largely different mixture of feedstocks and also differ in their chemical composition, the levels of humic substances and the type of plant nutrients they contain affect the ways they behave when applied to soil.

As a result of this, compost is identified as a soil improver. It provides a lower amount of plant nutrients than

anaerobic digestate but has a higher level of what is termed 'effective organic matter', which helps to improve the soil structure and function. The growing evidence base shows that regularly applying compost helps to significantly improve soil aggregate stability, soil pore structure, reduce compaction and increase water holding capacity.

Whereas, anaerobic digestate is best considered as an organic fertiliser, owing to its composition that is mainly readily available nutrients for plant growth. It also increases short-term microbial activity compared to inorganic fertiliser, though not to the same extent as compost.

Quantifying carbon value

In terms of mitigating climate change, compost's key selling point is carbon sequestration, enabling the soil to retain and stabilise carbon. But measuring this is hard because there are so many variable factors. These include the type and maturity of the compost, the soil depth and whether the compost was spread on the surface or tilled into the surface layers.

A number of studies have been conducted over the past two decades have laid down some markers about the efficacy of sequestration using compost and/or digestate (see Gilbert, J., Ricci-Jürgensen, M. and Ramola, A. (2020) A Summary of the Benefits of Compost and Anaerobic Digestate When Applied to Soil, ISWA, Rotterdam). In particular, the research decisively shows the contribution managed composting makes when compared to directly applying organic wastes to soils.

The impact of compost on carbon dioxide (CO₂) emissions is clear. One study (Powlson et al, 2012) found that one tonne of green waste compost applied to one-hectare results in a equivalent saving of 143 kg per hectare per year due to the resulting increase in soil organic matter alone. It's important to recognise that studies also show this type of benefit does not increase linearly. Rather, it is thought that the main benefits occur in the first 20 years during which organic amendments are applied; this then starts to tail off as a new 'steady state' (equilibrium) is reached.



As already noted, the addition of organic amendments not only increase the soil's organic content, it also improves the structure. This is important as cultivated soils tend to have poor structure caused by ploughing and loss of organic matter. Compost additions have been proven to increase the stability of the carbon and thus its ability to lock in (Ortas et al, 2013). Organic additions can also be seen to increase water retention - it helps soil porosity, meaning that there are more channels in which to hold water. A five per cent increase in soil organic material can increase its average water capacity by 1.1 cm³ water/100 cm³ (Huntingdon, 2007).

The addition of organic material also has a positive effect on microbial activity in soil - the carbon and nutrients in the compost provide a food resource for microbes, which then increase in numbers. This is crucial as it improves nutrient recycling and soil stability as well as a resistance of crops to pathogens. Diacono and Montemurro's 2010 study showed that green waste-derived compost is especially effective at reducing the incidence of crop diseases.

Compost also clearly has a positive impact on soil fertility. Its application can increase soil organic nitrogen content by up to 90 per cent (Diacono and Montemurro). This means that compared to chemical fertilisers it is far less likely to leach into groundwater and cause pollution. If used repeatedly, compost can help build up a 'nutrient bank' and improve the overall fertility of the soil.

Less clear cut is the benefit of digestate. Moller's 2015 study came to the conclusion it has a negligible effect on both soil organic matter and microbial activity in the long term, although short-term changes do occur. Where it does score highly is as a proven alternative to chemical fertilisers. Unlike compost, most of the plant nutrients in digestate such as nitrogen are available in mineral form and are thus readily available for crop uptake.

Quantifying these benefits in terms of monetary value is difficult (See Gilbert, J., Ricci-Jürgensen, M. and Ramola, A. (2020) Quantifying the Benefits to Soil of Applying Quality Compost, ISWA, Rotterdam). According to World Bank estimates for the price of carbon, compost can be valued in carbon sequestration terms at between €3.50-8.10 per tonne (fresh mass).

The price of the total macro-nutrient value of compost derived from either green waste only and food waste feedstocks is estimated at €17-20 per tonne on a fresh mass basis. Taken together this would the total value of compost to be in the range of €21.20-28.20 per tonne.

This highlights the current financial potential from compost, as well as the ecological gain. If all the global organic waste in urban areas were collected and composted, then 34 million tonnes of CO₂ equivalents could be sequestered per year. The sector has a potential global value of up to €8.8 billion annually in product alone. Composting is key to a sustainable future - it's time to recognise its value in improving soil and mitigating climate change.

ST Green Power shares keys to Komptech success

Neil Pollington, Operations Director at Severn Trent Green Power, talks about the company's ongoing relationship with Komptech GB and how the key to its continued success lies in both the latest machinery and the continuous customer service that Komptech provides

As one of the largest combined food waste recycler and composting business in the UK, Severn Trent Green Power (STGP) provides food waste recycling services to waste collection businesses and over 50 local authorities and turns half a million tonnes of organic waste into enough green energy to power 50,000 homes each year.

Komptech is an industry leader in supplying machinery and systems for the mechanical and mechanical-biological treatment of solid biomass as an energy source. STGP's Operations Director Neil Pollington highlights this speciality as the initial driver for their partnership, as it provided an opportunity to move towards a more mechanical process.

"Komptech are the experts in green waste and IVC composting with equipment purpose-designed and built for these industries and applications. Rather than creating a machine that can do a bit of this and a bit of that. This felt like it was for the organics market," Pollington explained.

"The fleet that we were operating [before] was ageing, and we were using quite a lot of manual intervention to remove contaminants."

Komptech's product range includes over 30 types of machines covering the critical process steps in modern waste handling, such as shredding, separation and biological treatment.

The partnership between the two companies began in 2018 when STGP initially bought the Hurrikan S, a mobile windsifter that removes light plastics, film and foils from screened overflow particles, with a separation efficiency of up to 95 per cent.

"Komptech provided an overview of what the machine could do. I had a look at the machine in their yard, and then they deployed it on a demonstration with us for a good period of time," Pollington recalls. "I could see the value in the machine, what it was doing and how that would fit into the operation, how that would reduce cost and also improve contamination capture."

STGP administered the Hurrikan S at their South Mimms site, a large IVC plant that has an annual throughput of up to 50,000 tons of primarily green waste that it receives from local authorities. "One of the other things that really surprised me is when we started to use the Hurrikan S, we got quite a bit of stone coming out of the process, quite a lot of metal being

captured and obviously, a high level of plastic," said Pollington.

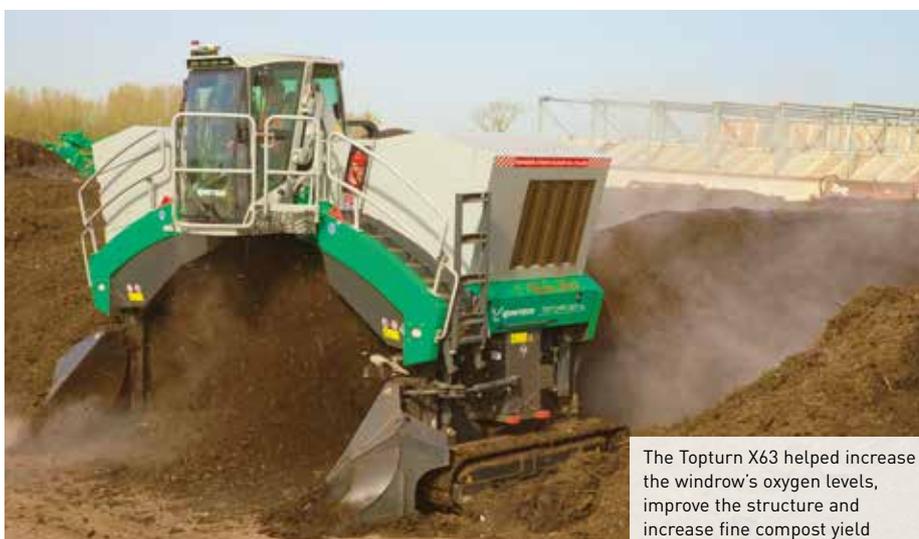
The Hurrikan S allows STGP to have a segregated area for the sifting process with no crossover between people and machinery. It enables operators to screen any oversize contaminants and make the process safer, cleaner, and more efficient, giving Pollington the confidence to further invest in Komptech.

"I then purchased a second one for Ardley, which is our other in-vessel composting site, so basically replicated the same process," said Pollington. "We just let it be for three months. We could see the real benefits and then rolled it out to the other site, which was positive. Then from there, we purchased two Crambo low-speed shredders."

Komptech's Crambo shredders are designed to process wood and green waste. Equipped with two slow-running drums designed to minimise fine particle, noise and dust emissions, the degree of shredding can be adjusted flexibly by exchanging its screen baskets. Komptech set up a demonstration of their Crambo 5200 Direct shredder at STGP's Wallingford site. Pollington ran the current shredder against Komptech's Crambo shredder to compare the output and decided to switch to the Crambo shredder after finding fuel savings and increased throughput hours with higher-end product yields.

"The biggest driver was the saving on fuel [and] the throughput per hour, as that saves operating hours," Pollington said. "Previously, the high-speed shredder will be running all day to get the waste through the process where [the Crambo shredder] could now push it through in maybe five, six hours."

"One of the other drivers was moving away from high-speed to slow-speed and making quite sure that you



The Topturn X63 helped increase the windrow's oxygen levels, improve the structure and increase fine compost yield



The Crambo 5200 Direct shredder delivered a higher-end product yield than SGTP's previous shredder

could shred the material without any contaminants in there being broken up too small, so they could be captured again by picking."

STGP has also invested in Komptech's Topturn X63 Track, a compost windrow turner that boasts an intake width of up to six meters and can achieve a turning capacity of 4500 cubic meters per hour. Upon its installation, Pollington recalls making sure it could fit into STGP's operations.

"Again, Komptech organised the demonstration for us to see an X63 in operation on a composting site. We took several of the site managers to see that machine in operation and they were impressed with how it worked. It was as good, if not better than the machine that we were operating," Pollington explained.

"I think the key thing to me was making sure that it could fit into our operation. Could it get over our windrows which are slightly bigger? We picked out a few large windrows on this other site, and they managed to get through it, and it seemed like it was going to be a good fit for our operation."

The Topturn X63 has helped increase the windrow's oxygen levels, break down the fine hair, and increase fine compost yield.

Since the implementation of Komptech's product line, STGP identified an increase in odour control and reduction in odour complaints, something that the Environmental Agency also noted during site visits.

The Komptech investment allows STGP to move from a manual based process to a more mechanical process, which has increased efficiency, reduced the need for manual picking and contributed to moving the composting process forward.

Another driving force behind the relationship's success is Komptech's commitment to providing after-sales coverage and training. Pollington recalls that as work with the initial Hurrikan S began, Komptech rolled out a training program for all operators at the South Mimms site, including full training criterion that STGP has since incorporated into their training plans.

"[Komptech GB] spent a lot of time with the team showing them the maintenance of the machine, how it should operate, how to set it up, how to get the best out of the machine. They were quite clear that it's not a 'tonnes

machine'; it's an 'hours served machine'. It's not how many tonnes you can get through. It's the quality at the end," explained Pollington.

As well as providing training to operators at STGP, Komptech GB has ensured their staff are always available to respond to any enquiries quickly. For Pollington, this support has been key for the continuation of the partnership.

"Komptech GB are very quick to react all the time. If the guys are struggling on-site, they're on the phone to them. If I ask them to train six new guys on our machine, they will organise to do that," Pollington said.

"The support has been the piece that gave me the confidence to continue with Komptech GB because they do support everything, and that's the bit that gives me the confidence to keep purchasing and building the relationship with Komptech GB."



The hybrid electric drive Cribus 5000 has a 50cm screening area, operating with a high throughput

Decarbonising the water industry

With the water industry setting a target to achieve net-zero carbon emissions by 2030, water utility companies are investing in renewables. **Organics Recycling & Biogas** examines how some of the leading operators in the sector have shifted the focus and technology of their anaerobic digestion process to match with the current direction of travel.

The water industry has a history of harnessing biogas from sewage. Gas lamps were run in Exeter as early as 1895 using methane from sludge, so it is perhaps no surprise that in this time, water companies have developed a lot of expertise in the application of anaerobic digestion.

Today, there is a big push to make this vital industry more sustainable given the size of its environmental footprint, and capitalising on this expertise will play an important role.

“Most people don’t recognise the scale of the water industry,” explains Sam Larsen, Director of Programmes and Planning at Water UK, which represents companies working in this sector. “There are about 2,500 railway stations in the UK, and there are about 6,500 sewage works. We use almost two per cent of UK electricity.”

To play its part, as we decarbonise the economy, Water UK has worked with the

10 big water companies to produce the Net Zero 2030 Routemap, which sets out an industry-wide plan. It includes quite significant changes to biogas capture and use, says Larsen, adding that there is the potential for scaling ‘up to three terawatt-hours of production of biogas in the sector, which would make up 0.5 per cent of the total gas demand in the UK.’

“Ultimately, gas to electricity isn’t great from an energy or carbon-balance point of view”

Andy Pennick, Energy Manager at United Utilities, the water services company covering the North West of England, notes that anaerobic digestion (AD), already a mature technology for the industry, has been improving.

There is, he notes, the opportunity to do more by using sludge pre-treatment processes such as thermal hydrolysis: “This is a high-temperature process that raises steam to heat up the sludge, resulting in a better quality digestate out of the back end and liberating more energy from the sludge itself.”

“Ultimately, gas to electricity isn’t great from an energy or carbon-balance point of view, and that is why the roadmap outlines doing more with our gas, in terms of injection to the grid.”

United Utilities has 57 bioreactors facilities that treat 185,000 tonnes of sewage sludge a year. According to Pennick, the largest, serving Manchester and the surrounding area, generates ‘about 250-gigawatt hours a year of energy (rather than electricity)’.

“At that site, we have installed a biogas-to-grid plant, which exports about 45-gigawatt hours under the Renewable Heat Incentive (RHI) per year,” he adds. “There’s also another 12 megawatts of CHP [combined heat and power]. It’s a wastewater plant serving Manchester, so as you can imagine, it’s pretty big, with the demand of about 65-gigawatt hours per year of electricity, which we provide through that CHP. It’s a broadly self-contained system from an energy perspective, although there are imports of sludge from around the region. That site is probably our most technologically advanced, as it has a thermal hydrolysis process.”

Anglian Water’s pioneering approach

The ambition to maximise the energy from sewage has led to a novel approach devised by Anglian Water, which serves the East of England. Its process, branded HPH technology,



United Utilities’ Davyhulme facility, the biggest wastewater treatment works in the North West

applies a particular method of biological hydrolysis prior to anaerobic digestion, resulting in some significant performance gains.

Steve Riches, ADP Portfolio Lead (Bioresources) at Anglian Water, and one of the people responsible for developing the system describes the innovation: "Around 2008, we got some funding for a small pilot plant at Kings Lynn at one of our sites and did various tests to demonstrate that we could successfully pasteurise and hydrolyse the sludge.

"We also did some independent laboratory trials at the time with Aqua Enviro. The output of both those tests demonstrated that we could reliably get the quality product we needed." Following this, Anglian Water has invested in the development of the technology over four sites at Basildon, Ipswich, Colchester and Grimsby, which manage approximately 56,000 tonnes of solid waste a year.

The three-stage pre-treatment process starts with heating up the input sludge (in the range of 7-9 per cent solid waste) to approximately 40 degrees Celsius, using recovered heat from the cooling water jackets of the CHP engines.

In the pasteurisation stage, the sludge is fed into two tanks: while one tank is filling and heating, the other is holding its batch at a set temperature – usually around 55 degrees – for 5 hours. This processes around four batches per day of an enhanced biosolids product. Hydrolysis and acidification take place in the biological pre-treatment process, where sludge is conditioned for biogas conversion in the anaerobic digester.

"The advantage of being able to design this from scratch, with a blank sheet of paper, is that we were able to incorporate a lot of learning from operating general digestion processes over the years within Anglian Water," says Riches. "So we were able to build in a lot of process flexibility that we perhaps would not have done if we had just bought a process off the shelf."

The process produces hydrolysed sludge and volatile fatty acids (VFA), as well as acids needed to digest the biowaste, yielding one megawatt-hour of electricity for every tonne of dry solids the plant processes. Riches states that this compares favourably



Anglian Water manages around 56,000 tonnes of solid waste per year at its HPT technology treatment facilities

with conventional digestion, which normally yields around 0.6 megawatt-hours per tonne of dry solids, and with most other technologies on the market yielding an average of 0.8 megawatt-hours.

He adds: "We would expect to get something like 450 metres cubed biogas per tonne of dry solids, whereas conventional digestion is about 360-380 metres cubed biogas per tonne of dry solids. That is at least a 30 per cent uplift, if you are comparing it with other advanced digestion technologies on the market.

"We were able to incorporate a lot of learning from operating general digestion processes over the years"

The digestate produced is put through the dewatering centrifuges and taken back to a dewatered cake at approximately 25 per cent dry solids, turning it into a biosolids product called 'Nutri Bio', which is then sold to farmers as a soil conditioner or fertiliser substitute through Anglian Water's recycling team.

A key challenge Anglian Water faces in utilising wet AD is dealing with the water that is returned to the wastewater recycling centre for further treatment at the end – which often contains high concentrations of ammonia. This means the company has to treat it with aeration throughout the hydrolysis process.

Riches continues: "But obviously, we

do have the advantage that we are co-located around a water recycling centre that is designed to do that anyway, so it's usually balanced. Some of the sites do have a liquor treatment phase, where we pretreat the liquor to reduce the bulk of the ammonia through package aeration plants before it returns into the water recycling centre."

Moving targets

As the UK's energy infrastructure decarbonises, by default this means that the water industry will decarbonise without taking action. As a result, this transformation means the justification for subsidies such as Renewable Obligation Certificates (ROCs) that incentivised water companies to invest in CHP is no longer well-anchored.

Against this backdrop, the 2030 Route Map published by WaterUK identifies other targets for using biogas that match with the current direction of travel in climate change policy.

Larsen points to sectors that have a high heat demand, such as glass making or 'as a transition fuel in things like heavy vehicles, regional trains, perhaps long-distance buses, HGVs, those sorts of things. There is a chance to use that biogas in a way that's quite effective for society as a whole'.

Inevitably, government policy will play a key role in determining how bioresources in the water industry develop. "It's an area we watch with interest," says Larsen. "There are plans for the Green Gas Support Scheme, which, as an industry, we're awaiting. We hope it will align with what we've got in our route map."



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CCS & BCS



Molly Rogers, 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

Scheme Rules

In 2020, REAL reviewed and revised the CCS and BCS Scheme Rules. A revised draft version of each was circulated for consultation to all certified producers, certification bodies, and Technical Advisory Committee members. Following this consultation period and further discussions with stakeholders, version 9 of the CCS Scheme Rules, and version 5 of the BCS Rules were published and are available on the respective websites. The rules were published on 1 March with a two-month transition period, during which producers were required to make any necessary changes to documentation.

Plant Response Test Technical Working Group

Last year, REAL set up a Technical Working Group (TWG) to focus on issues raised at the CCS Producers' Forum around the Plant Response Test (PRT). The PRT TWG is the working group, authorised by REAL, to provide industry and the environmental regulators with the opportunity to discuss specific issues that compost producers experience with the plant response test specified in PAS 100:2018. The PRT TWG will define the aims of the test and assess the appropriateness of the test method for the scheme.

The group has met twice since its inception. One of the key outcomes from the second meeting was the submission of a research project proposal to the Research Hub in April titled 'Investigation of contaminants and phytotoxins in PAS 100 composting feedstocks and finished composts'. The group now awaits the outcome of the research panel meeting in May, where the panel will shortlist the project proposals.

An update paper for industry was published on 30 April 2021, detailing REAL's work surrounding the Plant Response Test and the formation of the PRT TWG. This paper can be found in the news section of the CCS website.

RESEARCH HUB

Research Library

REAL was pleased to announce the completion of the first project funded by the Research Hub earlier this year. The Research Library, which is an online platform compiled of research undertaken across the composting and anaerobic digestion industries, is now live.

The Library brings together research that has been carried out across the industries and highlights notable research gaps. The Library will advance industry knowledge, inform areas of focus for future research project proposals, and in turn drive the industry forwards. CCS and BCS Scheme participants, who fund the Research Hub, have been granted priority access to the Research Library. Wider industry stakeholders may request access to the Library.

Digestate data pack

Following a competitive tender period, the contract for the second project of the Research Hub 'To develop a 'data pack' on the properties, characteristics, and content of digestate that will provide the context for the development of new uses of outputs from Anaerobic Digesters' has been awarded to Solidsense Ltd. Solidsense will be sub-contracting AquaEnviro and Cambridge Eco Ltd to carry out specific elements of the project.

The project has commenced, and the work is expected to finish at the end of November 2021. The project will gather information on the diversity of digestate characteristics produced across the UK, and how these characteristics relate to the feedstocks of the digesters. Currently, most digestate in the UK is applied directly to agricultural land, however, there are limits on the land available and restrictions on the timing and quantity of application. The work is designed to investigate alternative markets for digestates and explore technologies to develop new products from digestates.



Making AD add up in Aberdeen

Target Renewables will be a name familiar to many in the sector. Robin Szmids, the company's founder and a director, has been a recognised expert in the organics recycling sector for over 20 years.

Recently, the company has played a key role as a consultant in a new anaerobic digestion plant for Aberdeen City Council (ACC), built to take food waste from households, as well as other organic wastes from the surrounding areas.

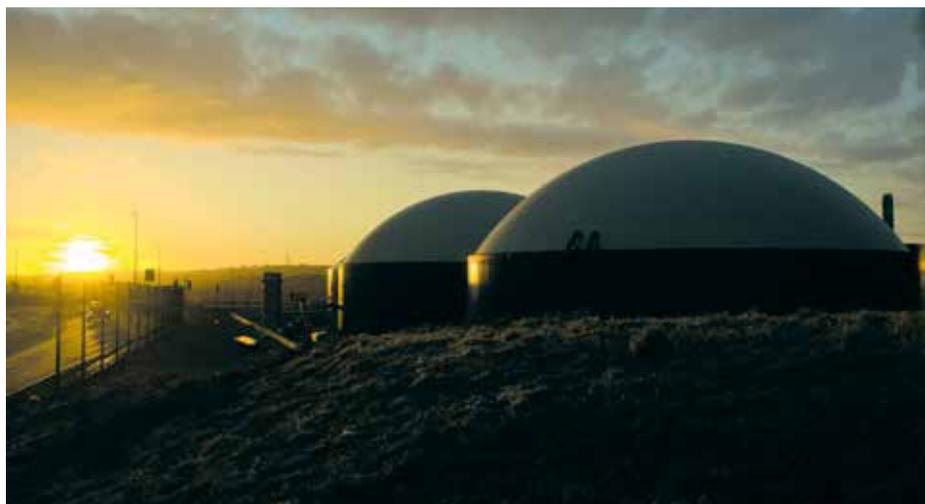
Szmids, who has a PhD in compost microbial interactions, has long believed in the importance of obtaining value from organic recycling processes. His work has included research into early designs for in-vessel compost systems in the mushroom industry, continuing this through work for the Agricultural Development and Advisory Service (ADAS) in Lee Valley.

Subsequently, in his role as Head of Protected Crops in the Scottish Advisory System, he contributed to the precursor standards that would provide the foundation for PAS100 and PAS110, having come across AD in 1999. Something he likens to a 'light bulb moment'.

Between 2008-13, Szmids worked with German company Kuttner Group as a consultant, assisting in the development of dry AD systems. Subsequently, he founded Target Renewables, which was established as a family company specialising in high solids AD systems.

This has recently led to his work, which is contributing to the development of what he terms a 'semi-dry AD' facility on the outskirts of Aberdeen, sited adjacent to the city's airport.

"Aberdeen, as a city, certainly sees itself as the energy capital of the UK, but I think it's true to say that Scotland as a whole can realign to the modern world of green energy," says Szmids, referring to Aberdeen's policy of regeneration as the city takes steps to adapt its energy infrastructure to a 21st-century model. In 2016, the council published an energy action plan for the city.



This included building a new Exhibition Centre as a state-of-the-art venue, with its own integrated AD plant and a Combined Heat and Power (CHP) system. To build any AD unit in immediate proximity to such a big investment – that was a courageous decision", muses Szmids, whose company Target Renewables facilitated stakeholder dialogue around the project and between Thoeni – the Austrian company that won the construction tender in 2018 – and ACC.

The plant's location – at the site of Aberdeen's central arts venue, and close to the airport and residences – has certainly presented challenges, with odour-risk and proximity to the airport at the top of the agenda for consideration.

Target Renewables was established as a family company specialising in high solids AD systems

Although the plant neared its completion by the end of 2019, with its first gas-to-grid achieved on target in early 2020, the COVID-19 pandemic has inevitably impacted on ramping up to full operational throughput.

Likewise, the community engagement activities Target Renewables has been responsible for, supported by Zero Waste Scotland, such as informing schools, local communities and other interested groups about how they can benefit from the project, have also been subject to Covid restrictions.

Ultimately, Aberdeen's AD investment: an estimated capacity of around 85,000 tonnes, taking food waste collected at kerbside, as well as crop and silage waste, the plant has a minimum design target of 1,500 cubic hours of biogas per hour. The 3.5 megawatt (MW) plant will receive pre-prepared 'soup' feedstock from Keenan Recycling on a just-in-time basis.

As well as doing this, for odour mitigation the plant also has a fully computerised odour control system that uses ozonation and carbon filtration processes to ensure the air within the building is controlled. Furthermore, as it sits at the end of an airport runway, several considerations have been made regarding the height of the plant and its modelled impact on the radar detection of incoming aircraft. Owing to this, the height of the individual digester roofs varies, and for an AD facility, a world first 'stealth fence' has been erected to soften its radar profile.

According to Szmids, the experience of working with ACC and Thoeni – particularly during such difficult circumstances – has been overwhelmingly positive: "It's just incredible that the team has got the project to this stage. The Aberdeen team is by far the most professional in dealing with the sort of disaster-level risks that we've been faced with in the last 'COVID' year, and the Thoeni staff – including project manager Andrew Black, who has been a magician in getting everything done, and engineer Michael Krismer – have been amazing."

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REA Green Gas steering group

Willim Mezzullo, Chair of the recently renamed REA Green Gas Forum, considers the growing scope for the sector to play a key role for the Government

William Mezzullo,
Senior Portfolio
Manager,
JLEN Portfolio Lead
Foresight Group



As we happily put the past 18 months behind us, it's never been a better time to be working in the green gas sector.

We are right in the middle of what feels like the development of pivotal policy strategies from the UK Government – which the REA is helping to shape. Having just had the Energy White Paper, the call for evidence on the Bioenergy Strategy, the Green Gas Support Scheme launch, we eagerly await the Hydrogen Strategy – to name but a few!

Those eagle-eyed among you will have noticed that the REA renamed its biogas forum to the green gas forum earlier this year to represent all forms of green gases, including biomethane, hydrogen and syngas. We've set up a specific hydrogen working group, helping our members with interest in hydrogen, to unlock the barriers to delivery for further greening the gas network.

The long-awaited replacement of the Renewable Heat Incentive (RHI) subsidy scheme, called the Green Gas Support Scheme, is on the home straight after the Government's consultation response earlier this year. The Government hopes to see an increase in green gas production through this scheme in the form of biomethane production. However, in contrast to the

RHI, the Green Gas Support Scheme could lend itself well as a policy tool for deploying all forms of green gases, including hydrogen, and we look forward to working with BEIS on this in the future.

However, in the short term, if we want to see further deployment of biomethane, we need to divert organic materials from going to waste. This is where good coordination between Government departments is essential. The REA has and continues to work with the Government highlighting the importance of banning organic material from going to landfill and ensuring regular food waste collection services are deployed across the country. There's still lots of work to do, but it's safe to say we have an exciting future ahead of us!

REA Green Gas steering group members



David Hurren,
(Vice Chair)
CEO UK, Air Liquide
Biogas Solutions
Europe



Neil Liddell-Young, Strategy
and Development
Director, Severn
Trent Green Power



Richard Gueterbock,
Director, Food
Chains



Anna Becvar,
Earthcare Technical



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



David Kinnersley,
Head of
Agribusiness, Fisher
German



Mark Richmond,
Technical Director,
WRM



Lucy Owen
Environmental
Compliance
Manager, Marches
Biogas



Thomas Minter,
Malaby Biogas



John Baldwin,
Managing Director,
CNG Services



Philipp Lukas,
Managing Director,
Future Biogas Ltd

REA Organics Steering Group

We are in the midst of an exceptionally busy time, writes the new ORG Chair. **Dr Becky Wheeler**, challenging the sector to shape the opportunities on offer

Dr Becky Wheeler,
Business Development
Manager, 4R Group



I can't believe it's been six months already since Charlie handed me the reins of chairing the Organics forum.

It's been an exceptionally busy time right across the whole industry with what feels like an extraordinary number of technical consultations and regulatory reviews, all while businesses continue to adapt to the ever-changing situation of the Covid pandemic.

Change is on the horizon for feedstocks with the much-anticipated 'Consistency in Household and Business Recycling in England' consultation released earlier this month which

should see separate weekly collections of food waste and garden wastes from as early as 2023/2024. It is hoped that this will divert additional tonnage into both composting and AD and help to tackle the ongoing challenge of feedstock contamination issues.

We've also seen the composting and AD sectors rally together, showing a united response to the Environment Agency's Quality Protocol revisions. Sufficient funds have been raised across the whole sector to form The Task and Finish groups. These groups will face a series of technical challenges navigating the regulatory requirements and seeking opportunities. It's a fantastic chance to renew these vital End of Waste frameworks, but what comes out needs to be fit for purpose and be practical on the ground. Above all, they must instil market confidence in the finished products.

Moving onto landspreading, the final destination for most organics, it's become clear the Farming Rules for Water, introduced in England over three years ago, are finally becoming more visibly regulated. Regulation is filtering through Environmental Permitting deployments, S3 exemptions for biosolids, clamping down on autumn applications and other areas, although so far most of this has been paper-based rather than physical inspections.

The statutory obligation of farmers to properly plan all nutrient applications to their soils through regular testing and nutrient management planning has always been a welcomed concept and is the right thing to do. However, consistent and fair regulation going forward is key to encourage and promote proper investment in storage and spreading and to create a fair and level playing field in the organics recycling market.

REA Organics steering group members



Andy Sibley,
Managing Director,
Envar



Graeme Kennett,
Senior Consultant,
360 Environmental
Ltd.



Justin Dampney, COO,
Eco Sustainable
Solutions



Charlie Trousdell,
Charlie Trousdell
Associates



Tony Breton,
Market Specialist
- UK & Ireland,
Novamont



Stuart Hayward-Higham, Technical
Development Director,
SUEZ recycling and
recovery UK



Ralph Lodge,
Technical Director,
Enva Resource
Management



Robert Benford,
Partner, G K
Benford & Co



Eilidh Brunton,
Group Recycling
Consultant, Vegware



Ben Brown,
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A full range of static green waste and compost screening plants are turnkey designed and built by our specialist team.



The Topturn
Innovative design
Compost turner



The Axtor
2 in 1 - high speed
chipper and shredder



Drum-roll
full range of hybrid & hydraulic
drive drum screens
620 & 518 compatible drive option



The Crambo direct
Market leading green waste and
wood shredder with high throughput
Low fuel consumption



The Multistar L3
Star screen at it's best -
with a true 0-8 mm
star now available



The Hurrikan
High performance
windsifting