

AD&BIORESOURCES

NEWS

THE UK ANAEROBIC DIGESTION & BIORESOURCES
TRADE ASSOCIATION'S QUARTERLY MAGAZINE

ISSUE 45 AUTUMN 2019

adbioresources.org

THERE'S NO NET ZERO WITHOUT BIOGAS

**'AD POISED FOR A DECADE OF
SUPERCHARGED GROWTH'**

**SIZE MATTERS: DEMAND GROWING
FOR SMALL AND MICRO-AD**

**GLASTONBURY ROCKED
...ON BIOGAS**

**SOCIAL VALUE: AD DEAL
SECURES PUBLIC SPENDING
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- **TECH FOCUS: MIXERS**
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EDITORIAL:

To be considered for inclusion in a future issue, contact jon.hughes@adbioreources.org

AD&BIORESOURCES NEWS FEATURES

Features planned for Issue 46 (Winter 2019) include:

- Hub and spoke: the emerging pathway to a new wave of AD development
- Biorefining: from phosphate to plastics and protein, AD's role in the bioeconomy
- Tech focus: tanks
- Advice clinic: feedstock permitting; grid connection
- How to present accurate samples to achieve the best results

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**NET ZERO CHAMPIONS SAY BIOGAS IS KEY**

By **Karen Potter**, Project Director, sustainability hub

In a bold move the UK recently became the first major economy to legislate for the reduction of greenhouse gas emissions to net zero by 2050. This pioneering strategy will kickstart the UK's green revolution, bolstering jobs and firing up the low carbon economy, which is predicted to grow to £170 billion by 2030.

The 2050 net zero target provides an encouraging signal for businesses, especially those that have endured difficult times with inconsistent and abrupt policy change, a volatile political landscape and Brexit uncertainty. Businesses understand the realities of delivering the change required to achieve this transition are enormous. Many are concerned the scale of the challenge, the timescales required, and the state of politics may present insurmountable obstacles.

As, too, are many parliamentarians, who recognise these challenges and concerns and are taking proactive steps to work with industries to develop a policy pathway to a net zero economy. These net zero champions believe that a cross-party approach, as successfully employed to deliver the Climate Change Act, is the way forward to develop strategy and workable solutions.

In June, Vision10 agreed to collaborate with MPs Simon Clarke and Alex Sobel to develop a new Net Zero All Party Parliamentary Group (APPG). This group will build on the momentum Mr Clarke and Mr Sobel created through their efforts to promote broad parliamentary support for net zero. In January, their letter to the Prime Minister urging policy action was signed by over 170 MPs and helped secure the 2050 target. Vision10 is a collaborative cross-party forum working to shape policy on low carbon thinking and priorities. Over the past year this forum has investigated the low carbon challenges confronting the UK. The investigations sought net zero solutions to future energy use and supply, examined new and SMART technologies, and explored the need to both accelerate and embed low carbon policies in the UK.

The Net Zero APPG and Vision 10 will campaign to promote the key findings and pledges in the resulting "Making Zero Carbon Britain" publication, which will be launched in early November. The APPG will hold investigative enquiries and focused industry roundtables to explore and promote specific policy solutions across parties and localities, to make measurable and tangible impacts on Government strategy, planning and implementation, as well as to build a formidable group of MPs to front the effort.

Now is the time for business and politicians of all parties to come together and press for action. The Net Zero APPG is seeking business support and engagement in this effort. For the past decade ADBA has been a driving force in the campaign to build a sustainable, circular economy and we hope that the anaerobic digestion and biogas industries, providers of key solutions and innovations leading to a cleaner waste and energy future, will get involved and support this initiative.

The many topics the APPG will be focusing on include the challenges of decarbonising heat, pushing for clarity on bio-methane, addressing the obstacles to delivering electric vehicles at scale and promoting greater local authority and council engagement; all fundamental to delivering net zero by 2050.



GETTING THE WORD OUT...

BBC PANORAMA PREVIEW - SAVE THE DATE

Exciting times! ADBA's Chief Executive, was interviewed at the Biogen Rushden AD plant for a forthcoming BBC Panorama programme on food waste. Watch out for the broadcast on the 7th October and again on 9th October.



In case you missed it; AD featured heavily in episode three of C5's Secret World of Your Rubbish. It explained how waste is turned into gas and creates digestate, with a spokeswoman from Refood delivering a fabulous explanation of the circular AD process. To which the narrator responded, "What's not to love?" Viewing figures for the broadcast, a little under one million.

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News & updates from the UK trade association for Anaerobic Digestion & Biogas. @adbioresources, @BiogasUK, @BioenergyUK, @CircularEconomy, @Digestate, @BiogasTradeShow

12.3K Tweets | 1,550 Following | 5,232 Followers | 5,525 Likes | 1 Retweet

198,100 impressions
389 mentions
134 new followers

TOP TWEET - 4,654 impressions

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"Biogas can fill an important place in climate change emergency" says UN Climate Change Niclas Svenningsen at World Biogas Summit 2019. Read the full story at <http://bit.ly/2S6bCSS> @WBAtweets <http://www.world-biogas-summit.com> #biogas #climatechange @RHarrabin @EIC @BBCScienceNews pic.twitter.com/pxPVNVqVm7

ADBA MEDIA COVERAGE



38
articles

12
Press releases

812,000
reach

Top story: "A family owned fruit farm operating in the Dedham Vale has scooped an international green energy award for its biogas generation."

AD&Biogas Industry Awards winner Boxford Farm made headlines in the East Anglia Daily News. With a reach 374,000, it goes to show the power of the regional press and the value of entering awards.

<https://bit.ly/2m3Y7Hc>

Meanwhile Charlotte was also interviewed by **Loop** magazine and for a Q&A article on the IPCC report on Climate Change and Land for **Bioenergy Insight**. A feature article on biomethane for transport was written for **GreenFleet Magazine**.

MOBILISING GENERATION BIOGAS

UK AD AND WORLD BIOGAS **EXPO** 2019

THE WORLD BIOGAS **SUMMIT** 2019

Over **2,000** delegates, **160** exhibitors and **130** speakers from more than **50** countries to the UK AD and World Biogas Expo 2019 and World Biogas Summit. We would like to thank our sponsors



76

Members enquiries addressed

18

Meetings with government (despite Brexit and recess) PLUS a meeting with Zero Waste Scotland.

15

Site visits

7

Regulatory and R&D Meetings/Workshops

WELCOME VIKTORIYA



Viktoriya Nestserava, Policy Manager

"I have always taken an interest in politics and the legislative environments around the world. My experience with international trade and supply chain management has given me an overview of the potential and the desired developments in varied industries. I am, therefore, very proud to be part of an organisation that seeks to bring about sustainable change."

WELCOME NICK



Nick Primmer, Policy and Market Analyst

"Having spent the last few years researching environmental change, I am now excited to apply my skills and knowledge to drive real-world, positive change. I am proud to join ADBA's talented team and believe we can play a critical role in improving sustainability across the UK (and beyond)."



CLIMATE CRISIS DEMANDS WE ACT NOW ON NET ZERO

By Charlotte Morton, ADBA's Chief Executive

At the time of writing we are still experiencing a period of extraordinary political uncertainty, as we creep closer to the current Brexit date of 31st October – and every day that Brexit remains unresolved either way is a day when politicians are taking their eye off the ball when it comes to the climate and our environment. It is an understatement to say that this is extremely unfortunate.

We are in the middle of a climate emergency that should be treated as such. No one who has seen the extent of the forest fires raging in the Amazon or rapid melting of the Greenland ice sheet among many other examples can be in any doubt of the gravity of the existential threat our failure to address climate change and biodiversity loss poses.

Today, 26 years after the UN Convention on Climate Change was adopted, there are still only two countries which have put plans in place that will limit their emissions to a level which would keep the rise in temperature below 1.5 degrees, Morocco and the Gambia. The biggest emitting countries are on a trajectory to cause a 3- or 4-degree increase. Unfortunately, that means so are the rest of us.

Theresa May in one of her last acts committed the UK to going Net Zero by 2050, a commitment Boris Johnson as Prime Minister has taken on board. But the policies to deliver this are not in place. We need to use every lever at our disposal in order to make progress NOW, if we are to have any hope of reaching this exceedingly challenging but necessary target.

As the World Biogas Association's new Global Potential of Biogas report shows, our industry can reduce global emissions by 12%, using the technology we have today – this includes a 4% cut here in the UK on top of the 1% we have already delivered. Globally, we are delivering just 2% of our potential – so we have an enormous amount to do, and not very much time to do it in.

Along with our members and partners, ADBA continues to lobby strongly for actions to support our industry and the contribution we can make. We have urged clarity on funding to help local authorities put into place separate food waste collections as soon as possible, and support to boost on-farm AD to produce more biogas. This can help generate more gas to help our post-Brexit energy security, and provide income and revenue for farmers when the Common Agricultural Policy ends – all this while recycling and processing methane emitting slurries and manures which, under law, will have to be covered in a short number of years.

2019 has been the most active year for forest fires in the Amazon in recent history, while the Greenland ice sheet is melting at an unprecedented rate – which climate models predicted for 2070 in the worst-case scenario



© Greenpeace/Victor Moriyama



© OMG Oceans Melting Greenland/ Nasa Ice

Looking slightly further into the future, we are working with multiple Government departments on how AD can fit into the heart of a circular economy, looking in a new support mechanism to replace the RHI, so we can provide more biomethane for transport and heat, produce more organic fertiliser for our soils, and generate green jobs and economic growth. We need our members support in these efforts – so I hope to see many of you at our ADBA National Conference in London on 11th December. Early bird rates are available until the end of September, so do look out for the agenda and sign up!

The next few months will be critical if we are to make any progress towards meeting our Net Zero targets and I look forward to working with you, our members, to achieve this and provide the vital support and security for our industry we all desperately need.



ENGAGING WITH THE NEW GOVERNMENT

The UK Anaerobic Digestion and Bioresources Association (ADBA) has written to congratulate the new members of the Government on their appointments and request meetings with those whose brief directly impacts on the development of the AD industry. These include the Treasury, Business, Agriculture, Trade, International Development and Local Government departments.

In the letters ADBA's chief executive Charlotte Morton emphasised that for the UK to meet its Net Zero obligations, AD must be supported and promoted as a solution to many of our energy, waste recycling and soil conservation challenges.

On being elected, the new Prime Minister Boris Johnson made only brief reference to the environment and emerging climate crisis, and the urgent need to take action to meet the UK's Paris Agreement commitments and achieve net-zero emissions targets by 2050.

ADBA firmly believes that the UK will not meet its Net Zero obligations without strong support for AD, which can reduce greenhouse gas emissions in the UK by 5%. In addition to addressing climate change, AD also offers great opportunities to boost the UK economy, from exports to farming resilience and green jobs, and to deliver on the Clean Growth and Resource and Waste Strategies.

The World Biogas Association, of which ADBA is a founder member, has just published its Global Potential of Biogas report, highlighting the role that AD and biogas can play in decarbonising multiple sectors (energy, agriculture, transport, urban living, water) and developing a sustainable circular economy worldwide. Developed to its full potential, the biogas industry could reduce global GHG emissions by 10-13%, and in hard to reach sectors such as agriculture, heat and transport (see pages 18-19).

GOVERNMENT IS 'WORKING HARD' TO STREAMLINE BIOGAS POLICY

ADBA's Senior Policy Manager Rebecca Thompson has over the summer engaged in a series of meetings with the Department for Business, Energy and Industrial Strategy (BEIS) to discuss future policy support for biogas.

In a meeting with the Head of Biomass Electricity Ms Thompson laid out ADBA's concerns that Contracts for Difference (CfD), the new support mechanism for renewable electricity generation, did not effectively support biogas electricity generation because the size of plants was generally too small to be eligible. She made the case for the government to introduce a bespoke low-carbon CfD scheme to support small-scale renewable technologies like AD.

The Smart Export Guarantee was also discussed. This mechanism has been purposefully designed to support small scale generation with a variable price paid by electricity supplier. The details of this policy, including the challenge in effectively recognising the wider benefits of AD, will be discussed at a future meeting with the Lead Policy Advisor on Small-scale Low Carbon Generation at BEIS.

The importance of cross-departmental working was emphasised during the meeting, given the broad range

of benefits delivered by AD. This is critical as the country starts to plan for its transition to Net Zero, so that AD is deployed as a ready to use technology to capture, use and convert the harmful methane emissions currently created when organic waste breaks down.

Ms Thompson was assured that government is working hard to join up the numerous officials working in this space and coordinate ongoing work. This included the ambitions for incorporating AD into the replacement of the Common Agricultural Policy, and an assessment of the agricultural system as a whole.

At a separate meeting Ms Thompson met with lead officials at BEIS to discuss the technical issues that need resolving to future proof the RHI regulations as the policy draws to a close. The BEIS team stressed that they are keen to engage with the AD industry as much as possible on RHI closure. Issues already in discussion include:

- Interaction with existing and future support mechanisms
- What counts as commissioned, and how will the policy ensure against plants just missing the deadline
- Sale of assets
- Better management of relationship between Ofgem, BEIS and industry
- Accreditation of feedstocks
- Decision needs to be made around adding capacity
- Need sensible approach to replacement plant that shows flexibility
- Future proof the regulations of RHI to allow for changes to gas network composition.

BEIS officials made clear at the meetings that they are keen to know the concerns that most matter to the industry, from investors, owners and operators. To feed your views in, contact rebecca.thompson@adbioresources.org



WHO'S WHO?



Sajid Javid – Chancellor



Andrea Leadsom – Secretary of State for Business, Energy and Industrial Strategy



Alok Sharma – Secretary of State for International Development



Liz Truss – Secretary of State for International Trade



Grant Schapps – Secretary of State for Transport



Robert Jenrick – Secretary of State for Housing, Communities and Local Government



Theresa Villiers – Secretary of State for Environment, Food and Rural Affairs



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More information and delegate registration at: adbioresources.org/events/adba-national-conference/

NEW APPG ON NET ZERO GEARS UP

The Sustainability Hub, of which ADBA is a member, has established a new All-Party Parliamentary Group (APPG) to influence and advance the benefits of a low carbon economy, press for a far stronger Government commitment to net zero carbon solutions and 2050 climate change targets.



The new Net Zero APPG will be chaired by (above from left to right) **Alex Sobel** (Lab), with vice chairs **Sir Bernard Jenkin** (Con), **Rosie Duffield** (Lab), **Vicky Ford MP** (Con), **Anna McMorrin** (Lab), **Lord Teverson** (Lib Dem) and **Paul Williams MP** (Lab). Group secretaries are **Angus MacNeil** (SNP) and **Helen Hayes** (Lab).

The Sustainability Hub champions action for a low carbon economy and sustainable development and counts global corporations, NGOs and academics amongst its members, providing a forum for policy development and debate. The new group is currently examining its proposed work plan for the year, covering topics such as resource management and transport and heat; areas that anaerobic digestion and biogas have a readily identifiable role to play.

The Hub will launch the new APPG at the forthcoming party conferences, and ADBA will be participating in all relevant work streams going forward. We will keep members updated on opportunities to engage and put forward their ideas to influence Parliament and Government.

FUNDING BOOST FOR RURAL RENEWABLE ENERGY PROJECTS

The Rural Community Energy Fund (RCEF) – a £10 million programme to support rural communities in England develop renewable energy projects – has re-opened.

Formerly administered by DEFRA it will from now on be managed by BEIS through five regional Local Energy Hubs: North East Yorkshire and Humber; North West; Midlands; South West; and South East.

Support is available in two stages: stage 1, grants of up to £40,000 for a feasibility study for a renewable energy project; and stage 2, grants of up to £100,000 for business development and planning of feasible schemes.

AD projects can deliver significant economic and social benefits to rural communities, while also helping to decarbonise agriculture by abating emissions from manure and other farm wastes. It is an ideal solution for rural community energy systems.

For more information visit
www.gov.uk/guidance/rural-community-energy-fund

If you're interested in applying and have any questions, the ADBA team would be more than happy to help. Contact
Rebecca.Thompson@adbioresources.org

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ADBA WELCOMES FOOD WASTE STRATEGY COMMITMENTS

The Government has published its response to the Resources & Waste Strategy Consultation, to which ADBA contributed earlier this year. It contains positive news for the AD industry, as Ministers have accepted many of our recommendations – with a significant majority of other respondents also in favour of strong action to improve recycling measures.

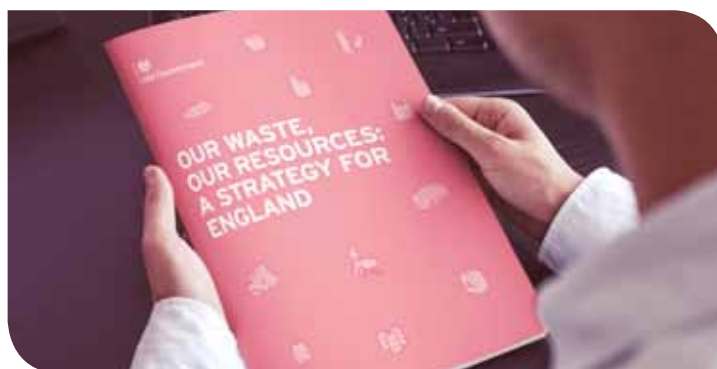
The Government will be mandating weekly separate food waste collections and will consider whether a minimum service standard of alternative weekly collection for residual waste (alongside the weekly food waste collection) might be appropriate, subject to an assessment of affordability and value for money. They will also be consulting on rolling out collections to businesses too, ensuring that this significant sector will play its part in boosting capture rates.

Importantly, the Government recognises the cost pressures that will fall on local authorities from this proposal, especially in extending mandatory food waste collections to flats, and has committed to fund any shortfall. Local authorities will therefore receive additional resources to meet any new net costs arising from the policies when implemented. This includes both net up front transition costs and net ongoing operational costs – something else ADBA called for in our response.

Ministers will consult further on the distribution of free caddy liners, and significantly, recognise the need for better food waste treatment facilities, specifically mentioning anaerobic digestion.

Charlotte Morton, ADBA's Chief Executive, said, "ADBA has long been advocating improved food waste management in England. If food loss and waste were a country, it would be the third biggest emitter of emissions globally. Separate food waste collections help us see how much food we are wasting and take action to reduce it, which is the biggest benefit. But the resources that went into producing the food are still in the inedible fraction. Recycling this through AD into clean green gas for power, transport or heat and natural fertiliser to grow more food shows the circular economy in action. Recycling a full kitchen caddy of food waste can generate enough energy to power a TV for 2.5 hours! Recycling all organic wastes through AD can reduce global emissions by a whopping 13%.

"Good food waste management starts with the implementation by local authorities of wide-ranging, efficient and cost-effective food waste collections schemes, and we are therefore very pleased to see that Defra's response to the consultation makes important steps towards achieving this."



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FUTURE BIOGAS OPPORTUNITIES

An RAF F-35B Lightning II flying over RAF Marham

‘Social value’ is a phrase we are all going to be hearing more of in the months and years to come. And the template has been set by Future Biogas. **Jon Hughes** reports

When Future Biogas turned on the power to RAF Marham in February there was a justifiable fanfare. The moment marked the end of a five-year journey to establish a private wire from its largest AD plant. Less immediately apparent was the wider impact on government policy.

The unprecedented deal has subsequently been heralded as an example of best practice of ‘social value’ in action and set in place a formal process to allow other renewable energy providers to bid for similar public sector contracts across the public estate. The government spends over £280bn a year on goods and services.

RAF Marham in Norfolk is home to the 617 Squadron and as such is one of the UK’s Main Operating Bases (MOB). In other words, RAF Marham is of major strategic and operational importance, on the front line of the nation’s defences.

The F-35 Lightning II, a 5th Generation, multi-role, stealth fighter is based there, alongside over 3,600 Service Personnel, civil servants and contractors. And it all runs on biogas, supplied by Future Biogas’ 4.5MWh plant, saving the MOD £300,000 a year. Originally the intention had been for the plant at Swaffham to supply 100 per cent

of the power required by the airbase but following the arrival of F-35 Lightning II in late 2018, as a replacement for the RAF Tornado Force, an additional five per cent of load is taken from the national grid.

Nevertheless, it is a ringing endorsement of the ability of biogas to deliver a reliable and secure green energy supply.

How the deal was done

The prime movers behind the deal were John Scott-Kerr, Head of Business Development at Future Biogas, and Steve Perry, Chartered Energy Manager/ Area Utilities Manager at the Defence Infrastructure Organisation (DIO), which is responsible for maintaining the country’s military estate.

Future Biogas made their first approach to the airbase in 2014, followed by various letters to

departments and ministers. The first meeting with the DIO and Crown Commercial Services (CCS), the executive agency and funding arm of the Cabinet Office responsible for improving government commercial and procurement activity, was held in 2015.

“This was not a well-trodden path,” recalls John Scott Kerr. “Getting everyone on board was quite a journey. Throughout, however, I think we all quickly recognised it was a win-win for everyone. It wouldn’t have happened if people in each organisation hadn’t wanted it to happen.

“There were quite a few logistical problems to overcome, such as how do we get power to Marham and excess from there to the grid.”

The project’s delivery required the collaboration of a large number of organisations, including: the DIO (for contract amendment support and technical guidance); Army Defence Services (the MOD Industry Partner for the maintenance and running of RAF Marham); CCS (for contract guidance); EDF (the current energy provider); UK Power Networks and District Network Operator; Redstow / Future Biogas and their subcontractors and suppliers; RAF Marham personnel, (the end recipient of the new supply); and Highways England.



John Scott-Kerr



Steve Perry

© Steve Pope/Sporting Wales x 2

Claire Gibney

© Steve Pope/Sporting Wales



Over the following two years access rights were agreed with landowners, to allow for the laying of 6.5km of private wire to connect the plant to the airbase, and commercial terms agreed with EDF and CCS. Construction started in 2018 and the connection was made in February 2019.

Trailblazers

“This was a first for the public sector,” says Steve Perry. “It blazed a trail.”

That trail has gone to the heart of government, setting both the framework for renewable energy suppliers to bid for public procurement contracts, and a benchmark for delivering ‘social value’.

Social value is a phrase we are all going to be hearing more of in the months and years to come. Steve Perry says the deal between Future Biogas and RAF Marham “set the framework for HELGA, developing the processes checks and balances we have to follow.”

HELGA is the acronym for a dynamic procurement system developed by CCS in light of that deal. It stands for Heat Networks and Electricity Generation Assets and has been developed with energy demand management and generation in mind. At the UK AD & World Biogas Expo, Claire Gibney of CCS, described HELGA as being like a “dating agency”, connecting interested suppliers with the needs of customers.

The public sector has set a voluntary target to reduce its own carbon emissions to 30 per cent of 2009/10 levels by 2020/21. The CCS has been tasked with supporting this aim through the development of energy agreements – sets of terms and conditions which suppliers agree to abide by when dealing with public bodies to help them and the wider public sector find the right suppliers for renewable energy, heat networks, battery storage and more.

By self-generating, the public sector seeks to benefit from energy security, lower costs and demand reduction, measures designed to increase the uptake of renewable energy and reduce the environmental impact of the public sector.

“We took the model pursued during the Future Biogas / RAF Marham deal and are replicating it

The Future Biogas Swaffham AD plant



across the whole public sector. We aim to save £2bn by 2020. We aim to use the aggregate buying power of the public sector to deliver social value and decarbonisation.”

It takes 10-15 working days from registering as a supplier to achieving appointed status, with the right to bid for contracts. (<https://bit.ly/2IUuGQ>)

There is an overview of the process available at <https://bit.ly/2k3ShVS>

Social value example of best practice

Yet it is the deal’s impact on the emerging policy of ‘social value’ that offers the greatest breakthrough and potentially game-changing shift in how the government will determine to spend its money. Steve Perry says, “Usually government looks for value for money. Now it is also to look at social value, asking how many local people will be employed, what training will be offered and, in terms of energy, is generation being undertaken locally, is the feedstock source local?”

“It’s something we need to drive forward across the public sector as a whole. We’ve trod the path that proves we can do it.”

Such has been the success of the Future Biogas-Marham project, in March it was adopted by the Government as the primary example of best practice in delivering social value, featuring in consultation documents regarding the proposals for legislating to deliver Social Value in Government Procurement. It has subsequently also been cited copiously in Parliament.

In the document, the government says the Social

value benefits that are being delivered through the deal include:

- The fuel is a green and sustainable solution, helping to tackle climate change.
- Locally grown crops will power the plant, supporting the local rural economy and ensuring continued business and employment in the local area.
- Building, running and maintaining the anaerobic digestion plant supports skilled, long-term employment opportunities in the Norfolk area.
- Future Biogas employs five highly skilled engineers on-site and an apprentice who started a four-year apprenticeship at the end of 2018.
- An agricultural contracting business supporting the plant has increased its full-time employees by 5 and seasonal staff by a further 10.
- As part of an improved crop rotation regime, soil quality is boosted, and the weed and pest burden lessened.
- The digestate output from the plant is a sought-after organic fertiliser, improving yields of food crops and locking up carbon in the soil.

At the time Philipp Lukas, CEO of Future Biogas, said, “It’s great to see the government recognising the importance of social value.

“We deliver social value in many ways, such as providing employment opportunities for skilled local young people in rural communities, generating green electricity and gas, enabling biodiversity in the rural environment, improving soil health and capturing carbon into the soils.

Continued>>

INDICATIVE EVALUATION MODEL FOR SOCIAL VALUE IN ENVIRONMENTAL SUSTAINABILITY

Themes:	Environmental Sustainability in support of the 25 Year Environmental Plan
Policy outcome:	Environmental impacts are reduced
Policy Context:	25 Year Environment Plan https://bit.ly/2CTW7VH Resources and Waste Strategy for England https://bit.ly/2LpLSxl Clean Growth Strategy https://bit.ly/2yiDY3R Greening Government Commitments https://bit.ly/2lYylnU Clean Air Strategy https://bit.ly/2CmF5R7
Possible Evaluation Question for Bidders:	Describe how your organisation would perform the contract to ensure that environmental impacts are reduced, and how you would monitor and measure this?
How Departments Could Evaluate Supplier Responses:	Responses should set out how the prime contractor and any key suppliers in the supply chain would minimise or mitigate any negative environmental impacts, and contribute to the appropriate targets in the 25-Year Environmental Plan, in the performance of the contract: • clean air • clean and plentiful water • thriving plants and wildlife • reducing the risks of harm from environmental hazards • using resources from nature more sustainably and efficiently • enhancing beauty, heritage and engagement with the natural environment • mitigating and adapting to climate change • minimising waste • managing exposure to chemicals • enhancing biosecurity • reducing the use of consumer single-use plastics
Proposed Policy Metrics (for monitoring delivery of outcomes) could include:	• Number and type of initiatives to reduce environmental impacts in relation to the contract • Annual percentage by which environmental impacts will be reduced in the delivery of the contract, from the baseline to be established in the first year of the contract (e.g. waste to landfill, water consumption, greenhouse gas emissions)

Proposed policy metrics regarding environmental sustainability in determining social value

“The government’s commitment to ensuring social values are at the heart of its contracts will ensure that the contributions we make to society are recognised in full. We fully support this excellent initiative.”

The power to drive social change

Social value is not a new concept. It first emerged in the Public Services (Social Value) Act 2012, requiring “public authorities to have regard to economic, social and environmental well-being in connection with public service contracts and for connected purposes”. The act primarily targeted local authorities. However, it only said they need to ‘consider’ social value when awarding contracts.



Lord Young

It wasn’t hugely successful and led to a review being launched in 2015, led by Lord Young of Graffham, formerly Secretary of State for Trade and Industry (1987-89) and previously Employment (1985-87). As he

noted in his report, “The Act asks commissioners to consider social value. To comply with the letter of the Act, commissioners therefore only need to show that they have thought about these issues and have thought about whether they should consult on them.”

The potential of the act where properly applied was however very apparent. Young’s review noted, “where it has been taken up, it has had a positive effect, encouraging a more holistic approach to commissioning which seeks to achieve an optimal combination of quality and best value.”



Chris White

Chris White, currently director of the Institute for Industrial Strategy at King’s College, was the MP who introduced the original act. He conducted a second review of it for Social Enterprise UK two years after Lord Young’s. He found that the Act had helped to achieve

better value for money in around £25bn worth of public spending.

Subsequently in 2018 the then cabinet office minister David Liddington announced that the government was going to extend the Social Value Act to ensure that all central government ‘major procurements’ explicitly must evaluate social value rather than just consider it.

Areas which will be now looked at when contracts are being drawn-up by the government will include:

- the use of firms of all sizes, including those owned by under-represented groups
- the safety of supply chains - to reduce the risk of modern slavery and cyber security issues
- encouraging firms to employ people from diverse backgrounds, including those with disabilities and from ethnic minorities
- focusing on environmental sustainability to reduce the impacts of climate change
- encouraging firms to prioritise staff training to boost their employees’ long-term employability

Within the consultation document each was accompanied by a more detailed breakdown of the evaluation process, detailing the policy context and suggesting possible evaluation questions and responses (see box, environment).

How much social value?

There is one important bone of contention, the weight the government is proposing to award to the social value content of any bid. In the consultation document it said, "In order for the social impact to be a differentiator between bids we are proposing that, where there is the potential for social value, departments must apply a minimum of a 10 per cent weighting to social value in the evaluation. Departments would be free to apply a higher weighting if they deemed it appropriate, but they should not apply less than 10 per cent."



Baroness
McGregor-Smith

When the proposals were recently debated in the House of Lords Baroness McGregor-Smith said the social value element should be weighted at 50 per cent. Moving the motion, "That this House takes note of the case for increasing the social value of public

procurement by aligning it with Her Majesty's Government's Civil Society Strategy", the Lady McGregor-Smith said, "A minimum 10 per cent weighting is suggested by the Government's March consultation. This is really not ambitious enough; the ambition should be up to 50 per cent and this should be a mandatory calculation across all procurements. Social value should not be optional but at the heart of every procurement decision in the public sector."



Lord Shipley

Lady McGregor-Smith was supported in her call for 50 per cent by Lord Shipley, although he said he would accept 33 per cent as a bare minimum. He said, "There are three factors in commissioning: the cost; the quality of what happens

as a consequence of that commissioning; and the social value generated. I would like to think the proportions would be a third each, but I guess we could look further than that [referring to the 50 per cent target]."

Responding to the debate on behalf of the government Lord Young of Cookham said, "To sum up the debate, the view is that what we have done is good, but we need to do more, and do it better and faster; that is the message I shall take away."

He too referenced the Future Biogas RAF Marham deal. He said, "I asked officials for an example of

how incorporating social value in the tendering process would lead to a different outcome. They came up with a Ministry of Defence contract with Future Biogas...

The MOD could have taken the conventional lowest-price approach, without considering the social, economic and environmental benefits that could flow to the local area but did not. Instead, it engaged up front with the supply market and developed an ambitious social value plan."

Listing the benefits of the deal, as already detailed above, he concluded, "I found that a very helpful illustration of the case for social value and it is that sort of lateral thinking that we want to promote."

On the level of weighting to be afforded social value he said, "A number of noble Lords... wanted the Government to increase the minimum weighting for social value in central government procurement awards from 10 to 20 per cent - or up to 50 per cent. As mentioned, we launched a consultation paper in March. One of the areas



The then Minister for Defence People and Veterans Tobias Ellwood MP at the opening of the new power plant for RAF Marham, with (l) Philipp Lukas, MD and founder of Future Biogas and (r) Colin Corbally of Downing LLP who delivered funding for the project.

on which we are seeking feedback is whether a minimum 10% weighting is appropriate; we are genuinely consulting on this and have an open mind."

ADBA certainly endorses the calls for social value to be weighted at 33 per cent at least if not 50 per cent. The emphasis on environmental sustainability and tackling climate change present a positive opportunity for biomethane producers, as Future Biogas has shown.

BS 95009:2019 PROCUREMENT TO THE PUBLIC SECTOR

A new tool to simplify and strengthen public sector procurement processes has been written by the British Standards Institution (BSI).

BS 95009:2019 is the first generic, non-sector-specific standard for procurement in the UK public sector. It specifies how an organisation can demonstrate that it is both suitable as an external provider of products and services to the public sector and able to reliably deliver products and services, meeting the requirements of the contracting authority.

The requirements are generic and apply to any organisation, regardless of type, size or the nature of its activities.

BSI say the standard has been written as "historically, UK public sector procurement struggles with a poor reputation: there's a perception that the processes involved could be fairer, more transparent and more accessible to smaller or newer organisations.

"This standard has been written to tackle those issues. It provides criteria and guidance that enable potential suppliers to demonstrate their generic trustworthiness, transparency and ethical practice." The BSI say the standard's single, generic assurance framework will reduce bureaucracy and eliminate duplication of effort for organisations.

www.bsigroup.com/en-GB/standards/bs-95009-procurement-in-the-public-sector/



Over 2,000 delegates attended the 10th UK AD & World Biogas Trade Expo at the Birmingham NEC on July 3rd-4th buoyed by the increased recognition of the role the industry can play to keep temperature rises below 1.5C.

The more than 160 exhibitors and 130 speakers present exemplified the readiness of the AD industry to deliver – not just in the UK but globally. For the first time the Expo ran alongside the World Biogas Summit, co-produced by ADBA along with its partner organisation the World Biogas Association. From this platform UN Climate Change chief Niclas Svenningsen declared “there is tremendous potential for biogas to be a significant building block in the climate and energy plans of the UK, EU and the world”. That potential has been calculated in a landmark report from the WBA, The Global Potential of Biogas. Using modelling that has subsequently been adopted by the International Energy Agency, biogas can reduce global carbon emissions by over 10%.

THE UK POTENTIAL OF BIOGAS

Welcoming delegates to the Expo and Summit ADBA Chief Executive Charlotte Morton said the AD industry is poised for a decade of supercharged growth. Ten years of campaigning has established the industry as a recognised, proven and ready-to-use technology that has a leading role in delivering net zero and averting climate catastrophe.

“I’m sure it hasn’t escaped the notice of anyone here that we are in the midst of a climate crisis the scale of which is beyond scary. Or that we have been given around 10 years to get our emissions under control,” Ms Morton said.

“The urgency of our climate situation means that we need governments to act now to allow AD and similar industries to make our vital contribution to decarbonisation before it’s too late, and before it becomes unfeasibly expensive to do so. We as an industry also need to come together, agree what needs to be done to supercharge our industry’s growth and work with single-minded purpose to achieve our goal.”

That goal is for AD to be mobilised to fulfil its potential to reduce the UK’s total greenhouse gas emissions by 5%, which would require the industry to grow fourfold. “The AD industry has



ADBA Chief Executive
Charlotte Morton

already reduced the UK’s total emissions by over 1%, and we have the potential to reduce them by a further 4%, decarbonising difficult sectors too – agriculture, heat and transport.”

There are currently 648 AD plants operating across UK with capacity to power 1.2 million homes – equivalent to powering all the homes in a city three times the size of Birmingham. The 650-plant milestone will be achieved very soon.

AD currently recycles 2.5 million tonnes of food waste, contributing over 6% of renewable heat generated in the UK, and has capacity to fuel 80% of UK’s entire bus fleet. As a result, AD is reducing greenhouse gas emissions by 1% per annum.

“But,” Ms Morton said, “This is just a fraction of what AD could deliver with the right support. If the UK AD industry was to reach its full potential, it could reduce UK emissions by up to 5%.”

“It could recycle six million tonnes of food waste, the equivalent in emissions savings of taking over a million cars off the road for a year; it could heat over 30% of UK households; it could fuel the UK’s entire bus fleet as well as 60% of HGVs; and it could achieve almost the entire emissions reduction target for agriculture that the Committee on Climate Change has set for 2050.”

Ms Morton said the mechanisms to allow this to happen are emerging. The recent extension of Tariff Guarantees to 2021 will allow a few more plants to get built. And a consultation in the autumn should include proposals to support



the generation of more green gas after that date, following the then Chancellor's commitment in the Spring Statement.

The Resources and Waste Strategy should liberate at least 4 million tonnes of food waste for recycling through AD. And the UK's National Farmers' Union has committed to achieving Net Zero by 2040. There are around 90 million tonnes of farm wastes and manures that require recycling through AD to achieve that.

Of the NFU's target to achieve net zero a decade ahead of the timeframe set by the Committee on Climate Change Ms Morton said, "That's the kind of ambition we need and the kind of ambition we need to see more of."

To ensure we do see greater ambition, she said, ADBA would build on its successful first decade of campaigning. "We are currently working closely with government departments on our strategy to progress AD in the United Kingdom, delivering the simple and clear message of what AD can deliver as a facilitator of change to a more circular economy.

"To help us deliver that, the industry needs to come together. To steal a current hashtag – together we can. And together we must."

Continued (p17)>>

BIOGAS IS A WIN-WIN-WIN-WIN-WIN

Biogas stands front and centre in the fight to keep global warming below 1.5C, says UN chief

Four years after the Paris Agreement was sealed as the blueprint for global climate action to keep global warming below 2C, the Nationally Determined Contributions (NDCs) submitted to date by 183 of the 197 signatories put the planet on a trajectory to 3.6C warming.

Delivering the keynote speech to the inaugural World Biogas Summit in Birmingham on 3rd July, Niclas Svenningsen, Manager, Global Climate Action at UNFCCC (UN Framework Convention on Climate Change), emphasised the urgent need for countries to incorporate biogas into their NDCs. NDCs are the key tool to delivering the Paris Agreement, he said, pointing out that next year, 2020, all parties are required to update their national targets; 105 signatories to the Paris Agreement are already actively engaged in the process.



Niclas Svenningsen
addressing the
World Biogas
Summit

Biogas should feature "front and centre" in those new NDCs, Mr Svenningsen said. "There is a tremendous potential for biogas to be a significant building block in the climate and energy plans for the UK, EU and the world", he said. "The largest single emission source is by far energy production. Some 70% of global GHG emissions are directly caused by energy generation, and most of that is by burning fossil fuel. Wind and solar are among the most rapidly expanding new renewable energy sources, but too many countries are still subsidising fossil fuel."

"UN Secretary General Antonio Guterres has been very clear in stating that the Paris Agreement and investments in fossil fuels are incompatible. Some say it is impossible to stop or even decrease our fossil fuel dependence, but business as usual is not an option, and we have seen these transformations before. Horses replaced by cars, telefax machines replaced by email... It was possible because the need was there, and the technology was there. And this is where we are with biogas technology".

"Biogas has all the features of the next generation technology", Mr Svenningsen continued. "It is a win-win-win-win-win industry.

- **Win for turning GHG into energy**
- **Win by using that energy to replace fossil fuels**
- **Win by turning global waste, that releases dangerous levels of methane gas every day, into a valuable resource**
- **Win by creating jobs and contributing to the new low carbon economy**
- **Win by offering a stable energy source that can be built and used even at the household scale in remote areas.**

"With the right incentives, the right policies and the right support, biogas can and will offer key opportunities for many countries to help implement the Paris Agreement, while at the same time address several of their Sustainable Development Goals: clean energy, clean water and sanitation, good health, responsible consumption and production, livable cities, sustainable transport...".

"Biogas needs to be at the table when the future policies of governments are designed, when NDCs are reviewed and taken to the next level and other supporting measures such as targets for banning food waste going to landfill are set."

"This work needs to be conducted hand in hand; it needs to put together business, government and civil society" He concluded with a plea on behalf of the youth of the world, "the generations that will inherit this planet, our sons, our daughters, their children and all generations to come. We have the power and the responsibility to build the world that they want and deserve."

DEALS DONE, PARTNERSHIPS FORGED, PRODUCTS LAUNCHED

The UK AD and World Biogas Expo is the only international trade show solely dedicated to biogas. It is the place where deals are struck, partnerships made, and new products launched. Here are just a few of the highlights from 2019.

Gas engine supplier and support specialist **Gen-C** sealed two deals in two days. Gen-C's Managing Director James Thompson said, "We've exhibited at the UK AD and World Biogas Expo for several years, and this year our stand was bigger and better than ever. The visitors didn't stop coming, creating a real buzz on our stand. It was great to catch up with so many familiar faces, as well as make new contacts, but the icing on the cake for us was securing a major sale on each day."

On day one of the show James secured a sale with Keith Ripper (pictured) of Ripper AD for a 250 kW Scania-based Sandfirden CHP engine, to be installed on Keith's on-farm AD plant in Essex. On day two the company sold a Motortech control panel, featuring ComAp technology, which enables operators to unlock and take full control of their CHP engine.

Gen-C also showcased its new biogas engine exchange programme. Through its sister business **LouwSon Energy**, AD operators can exchange their existing CHP engine for a fully-serviced, zero-hours engine in just one week instead of the usual four – and save up to 50% on the usual servicing costs.

The seeds of many other deals were also sewn. Matt Hale, International Sales and Marketing Director of **HRS Heat Exchangers**, said, "The increase in International visitors to the 2019 show was of huge benefit, with live projects from a number of prospective clients." Delegates from over 50 countries and across all continents attended the show.

Industrial cleaning specialists **Andidrain** left the show with over '20 concrete leads and appointments' for their services, signalling an emerging trend for proactive tank and slurry cleaning.



CNHi and its associated brands, New Holland Agriculture, Iveco and FPT, sponsors of the Circular Cities stage, showcased their pioneering biomethane tractor and Stralis biomethane HGV, both of which attracted a "great deal interest" from farmers, fleet operators and local authority delegates.

Meanwhile, AD operator and consultancy **Amur** and **NRM**, the UK's largest provider of laboratory services to the AD market, announced a partnership to deliver greater access to rapid, more accurate testing of feedstocks, incorporating an inhibition test. NRM will now offer Amur's Bullet BMP test, which provides results in just five days. Under the partnership, Bullet BMP samples will be received by NRM and sent anonymously to Amur, with just a reference number for identification, to comply with GDPR and ensure Amur does not have sight of confidential information from competitors.

Sean Stevenson, Commercial Director at Cawood Scientific, NRM's parent group said, "The value of Bullet BMP is in the result. If a feedstock becomes available, operators can see how much gas is present and quickly make a decision before a competitor takes advantage of it."

QED unveiled new software to offer remote support to customers with the company's Fixed Position Gas Analysers such as the Biomethane 3000, to cut downtime. With customer approval, the programme allows QED Support Engineers to remotely access the system and perform

troubleshooting activity with the intention of applying a remote fix. Diagnostics include being able to update instrument firmware, interrogate systems settings and work with the customer to identify a root cause. In the hopefully rare instance that an engineer has to attend site, they will do so with a clear understanding of the issue and will be prepared with appropriate spares and/or equipment to complete an effective fix.

ExxonMobil, sponsors of the Engine Room Theatre, launched Mobil Pegasus™ 610 Ultra, a high-performance lubricant specially formulated for gas engines operating on landfill and biogases.

The high BN oil – BN describes the standard industry measure of alkalinity – has been developed in collaboration with **Infinis** to neutralise acids, offsetting the adverse impacts of hydrogen sulphide and siloxanes which can considerably increase wear and reduce engine component life.

Test results have shown the lubricant's oxidation and chemical stability extends oil drain intervals – from 7 to 10 days – reduces unscheduled maintenance costs and increases overall engine reliability.

Finally, for the first time the **NEC Group** installed separate food waste bins, to try to maximise the amount captured to go to AD as part of the NEC Sustain initiative. Already a zero to landfill venue, the NEC has an average recycle rate of 80%; food waste is separated on site and taken four miles to a Severn Trent Anaerobic Digestion Plant.

A spokesman for the NEC Group said, "It was great to trial this for the first time at the AD and World Biogas Expo, and we are looking to conduct further trials to ensure as much of our food waste enters the AD biogas stream as possible."



THE GLOBAL POTENTIAL OF BIOGAS

Ms Morton was pleased to announce the launch of the report into the Global Potential of Biogas, written by the WBA of which ADBA is a founder member.

Introducing the report, WBA President David Newman said the decision to co-locate the World Biogas Summit and Expo was taken "to help us as an industry to work together to deliver our potential".

The key finding of the report is that AD can help reduce global greenhouse gas (GHG) emissions by 3,290 to 4,360 Mt CO₂, 10-13% of the world's current GHG emissions. To put that in perspective, that is the equivalent of more than half of all industry in the world abandoning fossil fuels, China ceasing to burn coal or the removal of all petrol and diesel cars from the world's roads. Biogas can be used as a fuel for transport and as energy for electricity and heat, whilst the residue left over from biogas generation, known as digestate or natural fertiliser, can replace 5-7%

of inorganic fertiliser currently in use. This means it could fertilise 82 million hectares of land, equivalent to the combined arable land in Brazil and Indonesia.

Currently, however, only 2% of available feedstocks are treated through AD. These include food waste, sewage waste, farm wastes and crops, which can all be used to make biogas in every country. The potential for growth is therefore huge, and with it, the development of a major economic force that provides renewable energy and food security, manages waste, protects water bodies, restores soil health, improves air quality, promotes health and sanitation, and creates mass employment.

David Newman, WBA President, said, "The contribution that AD and biogas can make to protecting the environment, developing a sustainable circular economy and improving quality of life around the world is enormous.



Left to right: WBA President David Newman, UNFCCC Climate Change manager Niclas Svenningsen and lead author of the WBA report Dr Sarika Jain

Our report calls on governments worldwide to prioritise policies which aims to maximise treatment of the waste streams, create the legal frameworks in which biogas can be implemented, and to act urgently. With just a decade in which we need to drastically cut GHG emissions, there is no time to lose. The biogas industry is here, now and ready to scale up."

Boost Productivity with Micronutrient Technology

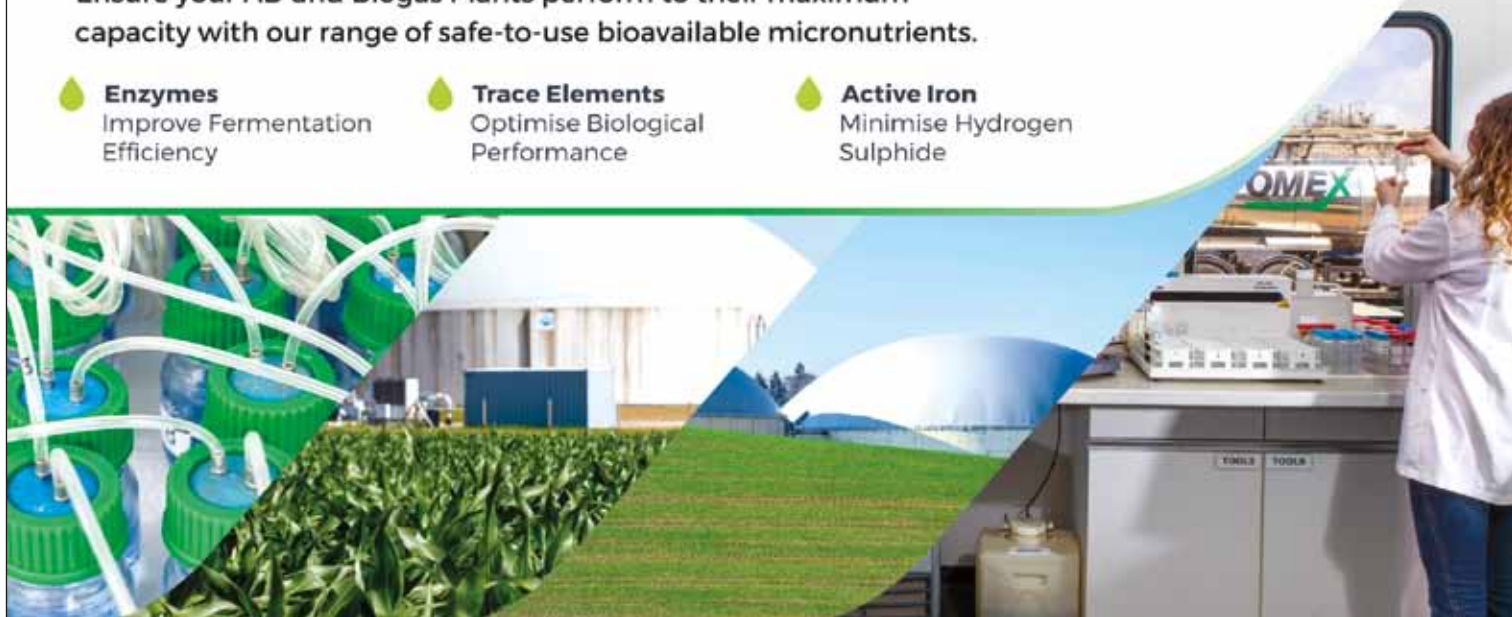
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Improve Fermentation Efficiency

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CELEBRATING THE INNOVATION AND EXCELLENCE THAT MAKES AD A GAME-CHANGING SECTOR



The crème de la crème in the anaerobic digestion (AD) and biogas industry gathered at the AD & Biogas Industry Awards Ceremony 2019 in Birmingham on 3rd July to celebrate those organisations and individuals who demonstrated outstanding commitment to innovation and excellence in support of this game-changing sector over the past year.



Jointly organised by the UK Anaerobic Digestion and Bioresources Association (ADBA) and the World Biogas Association (WBA), the 2019 Awards competition recognised companies and people from around the world across 14 categories, reflecting how the industry is optimising its performance, establishing itself at the heart of the circular economy and moving into biorefining. The evening was hosted by BBC reporter and eco-adventurer Andy Pag and guests were entertained by the mind-boggling mind-reader Alex Crow.



ADBA Chief Executive Charlotte Morton welcomed the over 400 guests and emphasised how this is a pivotal moment for the industry, demanding we build on the successes of the last decade. Biogas has an instrumental role to play as a ready-made replacement for fossil fuels, as both an energy provider and bio-refinery, capable of, among many other things, replacing oil-based plastics and creating protein, while delivering vital nutrients to land.

“If we valued the environment properly, recognising how essential it is to our existence, then billions of pounds would be pouring into the industry,” said Ms Morton. “Unfortunately, we are still subsidising the fossil fuel industries that are killing our climate. Until that stops, we need to harness all of our ingenuity to continue to grow our industry.”

“AD and biogas can make an unrivalled contribution to cutting global CO₂ emissions and tackling the climate emergency. We only have a limited time left to stop damaging our planet and everyone in the sector has their part to play in this vital mission. We are looking to each one of you, to work together to figure out how we can ensure the AD industry delivers its potential in the next decade.

“To make a real difference, we need an industry that is innovative, safe and effective. Congratulations to tonight’s Awards winners and highly commended organisations and individuals. They are the proof, alongside all those who entered this year’s competition, that we can be a world-beating sector. Our thanks go to them all.”



WBA President David Newman said, “This morning (3rd July) we launched a major report on the global potential of biogas in addressing the environmental crisis and supporting the development of a sustainable circular economy. The people recognised tonight are at the forefront of our efforts to realise that potential. Their dedication, ingenuity and commitment to excellence inspire us all to continue championing the benefits of our game-changing sector and to tirelessly engage with world governments and international policy makers, investors and influencers to ensure they provide our industry with the political, regulatory, financial and social framework it needs for growth. Congratulations to our worthy winners in leading the way.”

Special thanks to the evening’s sponsors: Awards sponsors: **Vogelsang, Pentair, CooperOstland, Future Biogas, ABA and Yasasu**; drinks sponsors, **In Good Nic**; and, last but not least, **Glenmorangie**, who have provided each table with a bottle of their best whisky, produced with the benefit of lovely green gas from AD.



AND THE WINNERS ARE...

CLEVER USE OF OUTPUTS

Winner **Strutt and Parker Biogas, Suffolk Green Renewable CO₂**

The judges praised Strutt and Parker for putting more than the fizz into the market and maximizing revenue streams from high grade high value CO₂. Originally of fossil origin, bio-CO₂ is very safe to use for food and related processes. All aspects of the bioeconomy need to be supported to compete with fossil market. Congratulations to Strutt and Parker Biogas.



Charlie Fillingham, MD Strutt and Parker

Highly commended **Greve Biogass: The Magic Factory & West Country Soil Improvements: Bloomin' Amazing**

The judges were very impressed with the Greve Biogass' holistic approach to optimising outputs and the fabulous job on branding from West Country Soil Improvement, which demonstrates a market for digestate does exist.

Nominated Hexagon Purus GmbH - Reducing Carbon Footprint with Hexagon's Mobile Pipeline® Biomethane Transportation Solutions; **Seleda Biogas and Fertilizer** - Best Use of Organic Matter, Zero Waste Vision

BEST R&D INNOVATION

Sponsored by



Pratik Desai, Perlemax Technical Director, who couldn't attend the ceremony as he was on a business trip in SE Asia.

Winner **Perlemax and partner Viridor: In Situ Ammonia Removal in the Desai-Zimmerman Anaerobic Digester.**

The judging panel considered this was a promising research project that will open the door on potential new feedstock streams and high value products. They thought it was great to see important research converting an environmental pollutant into a valuable resource with a huge potential economical market in the digestion of chicken litter.

Highly commended **Severn Trent Green Power: Severn Trent Green Power Derby.**

Plastic is an important issue and it's great to see a corporate invest at scale in potentially market changing process technology to develop bioplastics.

Nominated Energy & Waste S.L Biolimp-Dry Technology for Biogas Drying, The Best Way to Remove Water Vapor and Others; **Farmergy Ltd/ Wiefferink**, Wiefferink Triple Membrane Digester Roof; **Kelvin Cave Ltd**, Proven Preservative Optimises Plant Performance and Profit; **Pumpenfabrik Wangen GmbH** Wangen X Unit, the Modular system for reliable protection of plant equipment.



AD HERO OF THE YEAR

Sponsored by futurebiogas

Winner **Alexander Maddan from Agrivert Limited**

In addition to being recognised as one of the very early leaders in commercial food waste AD, 2018 was a particular high point. With the sale of Agrivert to Severn Trent, Alexander clearly demonstrated the economic and environmental value that AD can bring. Like any hero, he seems unable to resist the fight and is now back, once again, in the blood and guts of AD.



Philipp Lukas, MD of Future Biogas, presents the award to Alexander Maddan



Neil and Dawn Gemmell celebrated their silver wedding anniversary on the night of the awards.

Highly commended **Neil Gemmell: Clayton Hall Farm.**

The judges were very impressed with the fantastic level of Neil's passion and personal commitment that drives success in this sector. Further proof of Neil's commitment is the fact that today is his 25th Wedding Anniversary. Please raise a glass to Neil and Dawn - many congratulations we hope the next 25 years are just as happy for you both!

Nominated Dr Dermot Hughes, NVP Energy; **Marcus Jones**, Uniflare Group Limited

AD RISING STAR

Winner **Chris Hoare from Amur**

Chris has been dedicated to driving feedstock innovation and creating novel feedstocks working with the market. He has been described as very helpful, flexible, engaging and has been creating business change by facing challenges head on.



Rising star Chris Hoare (centre, with award) celebrates with (from l-r), Jason Fewell, an Amur customer, Nigel Lee, Amur General Manager, Lucy Hopwood, Lead Consultant at NNFC, an Amur Partner, Jason Ward, Amur Head of Procurement, Christine Parry, Amur (Head of Technical and Development, Dean Barclay, Amur Head of Commercial, Clare Farrington (Amur AD Account Manager, Dr Chris Rose Amur AD Technical Specialist and Robert Kennedy, an Amur customer.

Nominated Bobby Stearman, Mercorr Limited

Continued>>

BEST ANAEROBIC DIGESTION/ BIOGAS SUPPORT

Winner Evolution Biogas Ltd.

The judges were impressed with the provision of engineering and technical support across several plants by this company, getting more value out of operational maintenance across the renewable energy sector. Such support is getting more important; the bigger the fleet becomes the greater the need to ensure ROI for investors.



Mark Pugh, Divisional Director of Evolution Biogas, with Lucy Downes, Environmental Compliance Manager

Highly commended Octego: Committed to ADDing Value.

Nominated for the second year running and a strong entry provided, showing impact across several plants over the year in an evolving distributed energy market area, and having seen a further uplift over the past year.

Nominated Cenergi SEA, Cenergi O&M Biogas Support Specialists; CooperÖstlund; OMEX Environmental Ltd; Uniflare Group Limited

BEST EXPORT

Winner Prodeval

Having consolidated its position in France, the company over the past year has signed six contracts around the world, adding seven million Euros to the bottom line; a clear example of the rising demand for biogas equipment and expertise.



Prodeval Commercial Director Yann Pierre

Nominated Uniflare Group Limited



INTERNATIONAL KNOWLEDGE EXCHANGE & COLLABORATION

Sponsored by **YASASU**
Environment Management Services

Winner Thai Biogas Energy Company Limited: KIT Biomethane Project

The judges felt that the demonstration of collaboration across Asia and Europe to deliver a challenging project, a retrofit to existing markets was what gave Thai Biogas Energy the edge. What's good to see is other markets moving into methane as a higher value product and increasing the value in decarbonisation.



Des Godson of Asia Biogas receives the award from Yassasu MD Suhas Bhand

Nominated Ancitel Energia e Ambiente Virtual Reality Biogas Experience; Lundsby Biogas A/S, Erich Stallkamp ESTA GmbH, Biogas Technik A/S A Rising Biogas Star Based on Manure and Waste; Uniflare Group Limited

BEST MICRODIGESTER

Winner Yasasu EMS Private Limited

The judging panel concluded that Yasasu shows intent and is trying to do something that is an important part of the development of a comprehensive biogas industry resolving global problems at a local scale.

Nominated JA Yuki Aomori, Hitachi Capital, Komatsu and EPower Corp JA Yuki Aomori Biogas Power Plant



Yasasu Director Yashas Bhand

BEST BIOGAS PLANT (ON-FARM, FOOD WASTE OR SEWAGE) EQUAL TO OR BELOW 1MWE-EQUIVALENT

Sponsored by  **VOGELSANG**

Winner **EkoGea: Hendwr Farm AD**

The judging panel were very impressed with how the company delivered a well-documented entry clearly illustrating what is possible on a smaller scale.



L-R: Philip Hughes, EkoGea UK Director, Goran Đorđić, EkoGea's Chief Scientist and Microbiologist, and James Tolson, MD of Vogelsang

Highly commended

Technical Bioenergy Crete

For doubling its generation capacity and optimising outputs across the whole system

Nominated **HoSt Bio-Energy**

UK Ltd/ HoSt B.V., Microferm Manure Biogas-to-Biomethane Plant in Merselo: Manure Digestion Pays Off

BEST BIOGAS PLANT EQUAL TO OR ABOVE 1MWE-EQUIVALENT

Sponsored by  **PENTAIR**

Winner **Boxford (Suffolk) Farms Ltd**

A plant demonstrating both excellent consistent performance and considerable initiative in the use of integrating the AD operation into its wider business community and local economy.



The Boxford team: Grzegorz Swiaczkowski, Orchard Structures Manager; Carmella Meyer, Family Director; Alex Racovitan, AD Plant Assistant Manager; Robert England, Farms Director; Lucian Benke, AD Plant Manager; and Susanna Rendall, Managing Director

Highly commended **Severn Trent Green Power: Severn Trent Green Power North London**

The judges agreed that the company has demonstrated continued excellent operational performance and integrity since taking over the facility from Agrivert

Nominated Botres Global GmbH Efficient AD Process with Highly Impure OFMSW; **Cenergi SEA** Sri Jelutung 1.5 MW Biogas Power Plant; **Foresight Group** ELBL; **Foresight Group/Wight Farm Energy** Wight Farm Energy; **HoSt Bio-Energy UK Ltd/ HoSt B.V** BECH Biogas Plant, More out of Digestate; **Seleda Biogas and Fertilizer** a different approach to integration and innovation



BEST BIOGAS MARKETING CAMPAIGN

Sponsored by  **aba** building brands with purpose

Winner **Greve Biogass: The Magic Factory**

Brilliant work from Greve Biogass. Its carbon capture tomatoes are an example of genius marketing, with work under way on a knowledge and visitor centre to further the cause of the industry.



Ivar Sørby, Ass. CEO Greve Biogass receives his award from David Vann of ABA

Highly commended **Ancitel Energia e Ambiente, Virtual Reality Biogas Experience.**

Using its virtual reality experience in getting the message out to schools about the benefits of recycling all waste, this company is really helping to lead the way to the future.

MOST CIRCULAR CITY AWARD

Winner **Technical Bioenergy Crete**

Greece was the birthplace of Zeus so will this be the birthplace of circular island economy? A clear example of how AD can and should sit at the heart of the circular economy.



Vasiliki Kopidou

Highly commended **Boxford (Suffolk) Farms Ltd**

As previously said, the judges were impressed with Boxford integrating the AD operation into its wider business community and local economy. With one on a farm and one at a golf club, they have also developed a 2km gas pipe to a hotel. A fantastic achievement.

Nominated **Foresight Group** ELBL; **Yasasu EMS Private Limited**



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POSITIVE SIGNS IN 1-YEAR SPENDING REVIEW

The last few months have seen some big wins for the anaerobic digestion sector but also some continuing challenges. At the time of publication, we are now in the run up to the new date of Brexit on 31st October, and the political atmosphere in Westminster remains febrile under the new Johnson Government.

The new administration contains both new and familiar figures, and over the summer ADBA have been introducing ourselves and lobbying new Ministers for policies that will help support the AD sector to grow. These include a new system of support to replace the RHI, the passage of the long-delayed Agriculture Bill with AD at the heart of its system of public goods and, of course, rapid funding to support the roll-out of separate food waste collections. AD can play a vital role in the Government's new stated aim of reaching Net Zero emissions by 2050, and we want to ensure that everyone in Government who can play a role in making this happen knows who we are and what we do as an industry.



Simon Clark

We have already been engaging over the Summer Recess with advisors and officials from BEIS, Defra and the Department for International Trade, and have been invited by the new Exchequer Secretary Simon Clark MP to meet with his officials to discuss AD's requirements.

As mentioned above, in a major lobbying achievement by ADBA and our allies, the Government has now committed to funding mandatory separate food waste collections in England, to be up and running by 2023. This is a significant win for ADBA. It ensures a reliable supply of inedible food for recycling in our plants, enables this valuable resource to be effectively utilised, prevents the methane emissions caused when this waste is sent to

landfill, and helps our sector grow at the same time.

While, as expected, the '1-year Spending Review' largely focussed on ensuring the UK is ready for the Government's intended 31st October Brexit deadline, the Chancellor announced a £30 million fund to tackle our ongoing air pollution issues, and £432 million for DEFRA to develop new environmental standards post-Brexit.

In a potentially positive move, the Chancellor also announced £200 million to invest in Britain's bus network, with particular reference to ultra-low emission vehicles, which could of course include biomethane. Mr Javid also pledged an extra £30 million towards decarbonisation schemes led by BEIS, to help the UK meet its obligations to Net Zero by 2050; more details of this scheme will be set out in a National Infrastructure Strategy this autumn. This is on top of £87 million to help developing countries reduce their carbon emissions and adapt to climate change – a potential opportunity to promote anaerobic digestion abroad. We welcomed these policies and will be discussing them with Treasury officials in the coming weeks.

As we approach 31st October and the political situation becomes clearer, we will be on hand to assist members on what will certainly be an eventful couple of months, highlighting any relevant Government guidance for Brexit and strongly communicating member needs to the relevant Ministers. Please do get in touch if you need any help and advice during this time.



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SUPPORTING QUESTION



Biomethane can deliver heat or transport fuel, meaning it is eligible to claim for alternative support mechanisms but not both. ADBA's Senior Policy Manager, Rebecca Thompson, outlines the latest government position.

Q I am confused about whether I can apply to receive support under both the Renewable Heat Incentive (RHI) and Renewable Transport Fuel Obligation (RTFO). Can I?

A Unfortunately, the answer isn't a straightforward one. The Department for Business, Energy & Industrial Strategy (BEIS) on 14th June 2018 announced that biomethane producers will now be able to claim under both the RHI and RTFO. Then they released a statement saying, "We are pleased to confirm that we are content that biomethane producers should be able to claim under both schemes, provided that all relevant eligibility criteria are met."

When announced it seemed to promise flexible support to the industry amid the uncertainty around what will happen when the RHI closes. The statement indicated that it would now be possible for biomethane-to-grid projects to be flexible regarding where their biomethane goes.

For example, biomethane producers who generate more than 40 GWh of biomethane per year could, instead of claiming RHI Tier 2 tariff on gas above 40GWh, allocate it to transport and claim under RTFO. At the time of the announcement RTFO was offering a better return than RHI Tier 2.

However, there was a critical caveat, "A formal operational framework for dual participation has not been agreed/published at this stage and all claims will be treated on a case-by-case basis by Ofgem and the Department for Transport (DfT)."

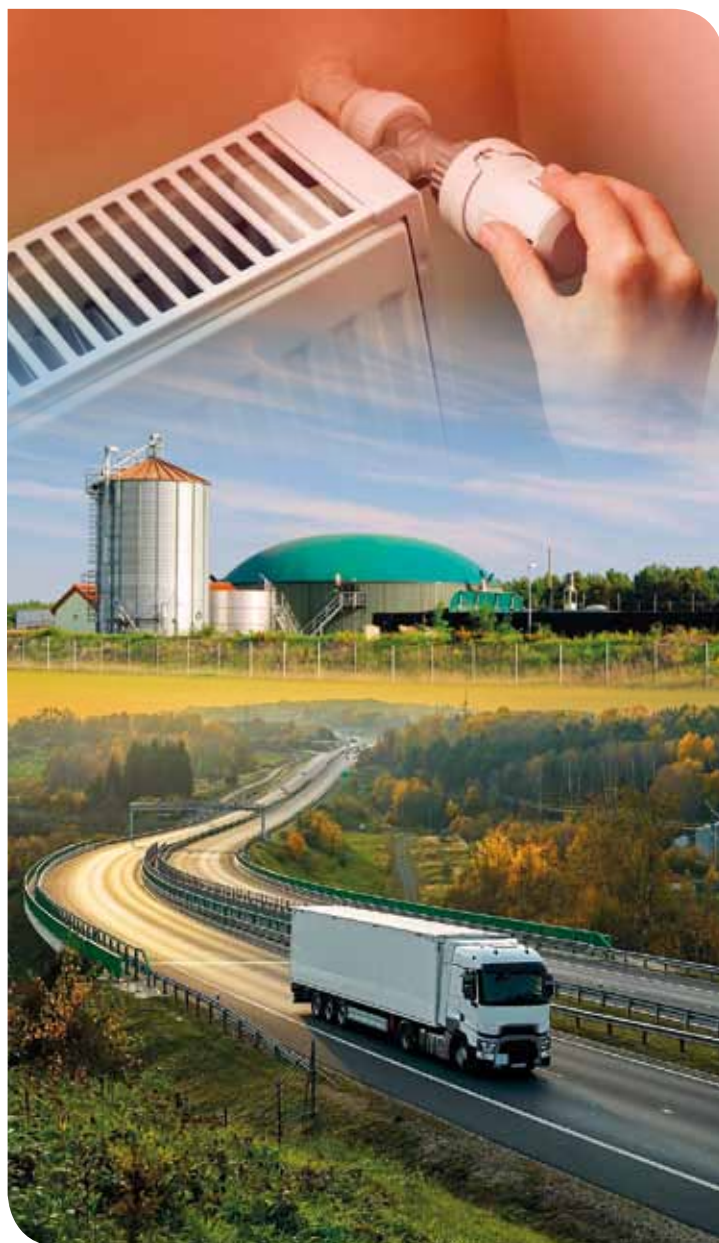
The devil has subsequently emerged in the detail. Following the last RHI closure group meeting BEIS officials provided the position agreed between BEIS, DfT and Ofgem, as set out below.

While it was confirmed that dual participation was possible it was noted that RHI Regulations were not written with an interaction with RTFO in mind. It was emphasised that operators could not claim for both means of support for the same biomethane injected into the grid and that while this was not clear in the RHI regulations, provisions within the RTFO legislation specifically prevent this.

Furthermore, given the definitions and calculations used to calculate eligibility within the RHI Regulations, BEIS did not consider that a registered biomethane producer could submit a partial RHI claim for a quarterly period. This means that if a registered biomethane producer submits an RHI claim, they will need to include all the biomethane they have injected within that quarter.

However, that does not mean biomethane producers cannot choose to claim their preferred option. BEIS recognise it may be possible for a registered biomethane producer to choose not to claim RHI for a quarterly period with a view of claiming under the RTFO instead.

In this instance, due to the ongoing obligations and reporting required of registered biomethane producers, they would still need to provide each quarter's full injection information to Ofgem (e.g. biomethane injected, propane usage, heat to upgrade/production, sustainability information) even if they were opting not to claim under the RHI for that quarter.



We would recommend that any operator considering to take these steps contact Ofgem at the RHI.Periodicdata@ofgem.gov.uk inbox and they will assist with your submission of RHI data for this period.

ADBA will continue its discussions with BEIS on this matter as they assess the possibility of refining the RHI's interaction with the RTFO, within the scope of the RHI closure regulations. Meanwhile, Ofgem and DfT will continue to review how this process of dual participation will work in practice and we will let members know as soon as we have any news on these operational aspects.

How does the RTFO stack up against the RHI?

The figure below illustrates the potential return on investment from the RHI and the RTFO, using two feedstock mix scenarios and other pricing variables –

particularly the value of Renewable Transport Fuel Certificates (RTFC), which it must be noted reached a 20-month high in August.

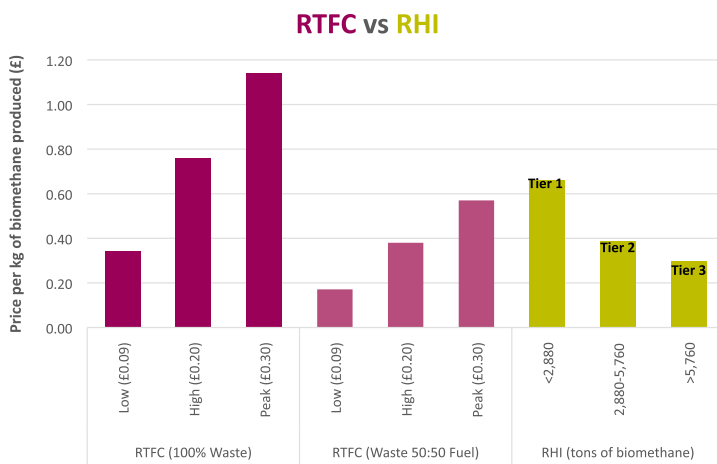
The dark purple bars represent the RTFC price for biomethane derived from feedstock comprised of 100% waste or residue, whilst the light purple bars represent the RTFC price for biomethane derived from feedstock comprised of 50% energy crop and 50% waste or residue (this is because 1.9 RTFCs can be claimed per kg of biomethane generated from energy crops, whilst 3.8 RTFCs can be claimed per kg of biomethane generated from wastes and residues). The RHI Tier 1 in January 2019 was set at 4.76 p/kWh, the RHI Tier 2 at 2.80 p/kWh, and the RHI Tier 3 at 2.16 p/kWh – the tariffs currently on offer.

For example, if the biomethane is generated from 100% waste or residue feedstock, and one could guarantee an average price of more than 17.4 p/RTFC, then supplying biomethane for transport would prove a faster return on investment than the RHI for that Tier 1 gas. If, however, the biomethane is generated from 50% energy crop and 50% waste or residue, then one would need to guarantee an average price of more than 34.7 p/RTFC in order to achieve a faster return on investment on the RTFO than the RHI for that Tier 1 gas. The lower RTFC price required for waste and residue biomethane to be profitable is reflective of the fact that biomethane from wastes and residues receives 3.8 RTFCs/kg biomethane, whereas biomethane from energy crops receives just 1.9 RTFCs/kg biomethane.

RTFC prices

According to Energy Census, the average price for RTFCs over the past 10 months has been between 16.4-17.8 p/RTFC – this is above the 10.26 p/RTFC that this analysis shows is required for the RTFO route to prove a faster return on investment than the RHI Tier 2 on biomethane generated from 100% waste. However, it is below the 20.53 p/RTFC required for the RTFO route to prove a faster return on investment from biomethane generated from 50% crop and 50% waste residues. Yet it must be noted that the RTFC buyout price can reach up to 30p.

As a result of the introduction of a crop cap (a maximum cap for crop-based biofuels) in the RTFO reforms, we expect the market price for RTFCs awarded to waste based biofuels (RTFCw) to diverge from the market price for RTFCs awarded to crop based biofuels (RTFCc) to reflect the increasing demand for waste-based biofuels.



The figure above displays the potential price (per kg of biomethane) gained through the RTFC (purple) and RHI (green) support mechanisms. As the buy-out price per RTFC varies, this graph compares three RTFC price points against the RHI's fixed tariffs (Tiers 1-3). This comparison assumes: 1.9 RTFC/kg of biomethane from energy crop, 3.8 RTFC/kg of biomethane from wastes and residues, and 13.889 kWh/kg of biomethane.



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SIZE MATTERS



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It will be harder to hit Net-Zero without support for small-scale and micro-AD in agriculture. The Clean Air Act and proposed Agriculture Bill alongside industry innovation all suggest that now might be the time for it to take off. Jon Hughes reports.

Rebbecca and Patrick Holden, like most farmers, want to do the right thing, by their livestock, the land and the environment. In many respects they are ahead of the game. Their farm, Bwlchwernen Fawr, is the oldest certified organic dairy farm in Wales. And Patrick has been at the forefront of sustainable farming campaigns since the early 80s, most famously with the Soil Association and now Sustainable Food Trust.

The farm consists of 135 acres owned, with additional land rented. The Holdens run a 75-strong dairy herd, with a similar number of followers, and make cheese, Hafod cheddar. They crop on a rotation system around 30 tons of barley, oats and peas a year, for cattle feed as well as silage and hay for forage. They also have a solar array. The National Farmers Union (NFU) says that nearly 40% of farmers and growers have already invested in some form of renewable energy production for their own supply or for export to other users.

The Holdens use no manufactured fertiliser on the farm, a prerequisite to securing organic status. Instead, they utilise herbal leys in the rotation system, to restore biodiversity to the soil and ensure better uptake of the nutrients from the spreading of the slurry and whey.

The slurry and whey are kept in two stores: one with a gas tight cover that has a 281,096 gallons capacity (height 5.663m and diameter 17.063m) and an old open concrete slurry store with a 172,504 gallons capacity. The wastes held in the open store are regularly pumped into the covered unit where it is held for spreading, to minimise harmful greenhouse gas (GHG) emissions. They also use low emissions spreading equipment. For the past year, by dint of circumstance, with the University of South Wales conducting studies into whey waste, Gas Data Ltd has monitored the Holden's covered slurry store, sampling the gas in the headspace. While yet to be fully analysed, Dr Daniel Lee said the preliminary results indicated

that methane content was between 5-7 per cent and CO₂ content double that, 10-14 per cent.

On occasion the Holden's covered store 'hippos'; the cover blows up as a result of gas production when the vents get blocked. When this happens, it is a painful reminder to them that, as Rebecca puts it, "Biogas is an extra resource to be harnessed and used."

They have over the years explored the possibility of installing an anaerobic digester on the farm, to capture and convert the methane to energy and natural fertiliser. But it has never proved viable.

"We thought we could save money by capturing the gas and using it – it seems tantalisingly possible. Yet whenever we've looked at it, the costs were prohibitive," Rebecca says.

The Holdens find themselves in a Catch-22 position. They would either have to build to such a scale it would involve financing, employing specialist staff and importing feedstock, or self-finance a small-scale AD solution. They are reluctant to go large, not wanting to 'mortgage' the farm, and are also concerned about the "waste miles" it would entail and the fact that bringing in organic waste from elsewhere would place them in a more complex regulatory regime. On the other hand, a small-scale AD solution is not economically viable; the costs would fall wholly on the farm.

The government consider AD plants under 250kWe to be 'small'. Micro- and small-scale AD units are however measured differently, in m³ and kWe (and in relation to heat, kWth) respectively (see box). To treat their slurry and wastes through AD the Holdens would require a digester of around 70-100m³. With feed-in-tariffs (FITs) now defunct, there is no support for AD at such a scale.

If a farming family as environmentally conscientious as the Holdens cannot see a way to viably manage their slurries and wastes, then



Patrick and Rachel Holden with their son Sam. Main picture: The Holden's herd of Ayrshire milking cows



The Holden's open slurry store; "Stirring and mixing slurry for some spring-time soil feeding... making the plants grow so that the cows may give us milk so that we may make you cheese"

SMALL AND MICRO-AD DEFINED

The identification of scale is arbitrary since tank size/gas use are dependent on other factors, particularly feedstock and loading rate. However, the notes below provide a basic guide to the scale and potential of small and micro-AD.

Scale	Tank Size	Gas Use	Reasoning/Notes
Micro	0.2m³-100m³	~ <20m³: heating and cooking. ~ >=20m³: heating or CHP 3-25kWe, depending upon feedstock and loading rate.	0.2m³ is practical enough to provide cooking gas for a small household, although it is also used at lab scale; a 20m³ digester on for example food waste can run a small CHP. Up to about 100m³ is possible on modular/'portable' systems (eg 5 x20m³ tanks). After about 80-100m³, it is usually more economic to build a single fixed tank.
Small	100m³- ~1,000m³	CHP ~ 10kWe-200kWe, depending upon feedstock and loading rate. Gas heating possible, as well, particularly at lower end.	After 100m³, fixed tank(s) likely to make more economic sense. 100m³ tank on slurry would produce ~10kWe (100 cows). 1,000m³ tank would produce ~100kWe on slurry (1,000 cows) or potentially ~230kWe on food waste.
Medium	~1,000m³+	CHP ~100kWe – 1MWe.	The lower range of 'medium' is where the slurry-only digester becomes almost impossible (1,000+ dairy herds are still relatively rare in UK) and up to the point where biomethane becomes economic. Early UK biomethane plants were in excess of 1MWe equivalent.
Large	~4,000m³+	Biomethane upgrading & CHP.	Biomethane upgrading is economic at this scale, policy dependant.

something is clearly wrong. It is a conundrum facing many farmers across the UK, the majority of whom are classed as small farms, below 100 hectares (200 acres) with a herd of 120 cows.

The scale of the problem

Agriculture is held responsible for 10 per cent of all GHG emissions in the UK. Farming produces three main GHGs: methane from ruminant emissions and slurry stores; nitrous oxide, primarily from fertiliser use; and carbon dioxide, which comes from electricity for farming processes, oil use - as many farms are off the gas grid - and fuel for tractors and vehicles.

In the UK, where two-thirds of the farmland is only suitable for grazing livestock, 56 per cent of the roughly 49m tonnes of CO₂ equivalent emitted annually comes from methane. Nitrous oxide accounts for a further 33 per cent and carbon dioxide 11 per cent, according to 2017 UK government statistics.

Currently, 90 million tonnes of manure are left untreated every year, emitting methane to the tune of over 7.2 mega tonnes (Mt) of CO₂e; 1.5 per cent of the UK's total GHG emissions.

There is also the associated issue of ammonia. Ammonia is released when organic manures and fertilisers come into contact with air. Agriculture accounts for 88 per cent of UK ammonia emissions which, when it interacts with emissions from cars and trucks, creates a lethal cocktail in urban air.



AD can address many of these issues. It can supply a farm's energy needs; reduce emissions from rotting wastes and the use of petro-chemical fertilisers; and restore organic matter to soils, helping to return the land to being a carbon store rather than net-emitter.

A study from the University of Ghent recently concluded that treating slurries through AD reduced methane emissions by up to 70%.

It reported, "The lowest carbon footprint could be achieved on dairy farms with fresh manure collection by a manure scraper, followed by controlled

digestion and storage of the digestate in a gas-tight tank, located outside."

These many environmental services are recognized by the NFU, which has set a target to decarbonise farming by 2040 and is actively embracing change in farming practices.

In the report 'United by Our Environment, Our Food, Our Future', it calls for increased support for anaerobic digestion to address air quality and GHG emissions. It recommends, "More explicit support for on-farm anaerobic digestion that recognises its multiple environmental benefits (avoided methane emissions, improved nutrient management, protection of water resources) in the form of tax allowances and agri-environmental payments."

Dr Jonathan Scurlock, NFU Chief Adviser Renewable Energy and Climate Change says, "Government needs to recognise the special qualities of small-scale AD and needs to reward that. Within government there is some support for the environmental services of AD to be valorised. But it is difficult to make the economics stack up."



Dr Jonathan Scurlock, Chief Adviser Renewable Energy and Climate Change, NFU

Continued>>

Minimising costs

Currently the primary support available to AD is for energy generation in the form of the Renewable Heat Incentive (RHI) or for biomethane as transport fuel under the Renewable Transport Fuel Obligation. Neither of which support small-scale AD as the required upgrading and grid connection mean the economics simply don't make sense in the UK as things stand.



Mark Clayton

Mark Clayton is a director of Qube Renewables, a specialist developer of small and micro scale AD solutions although not exclusively – Qube's sister company Aardvark EM has been instrumental in developing 37 large scale digesters from due diligence to now recovery and trouble shooting.

He has undertaken a cost analysis. Essentially, an operator who develops a 2MWe plant is investing £2-3,000 per kWe. A 0.5MWe digester sees that figure rise to £3-4,000 per kWe. Below that size and the costs spiral, to in the region of £10,000 per kWe.

The reason? "Making a digester smaller increases the cost." To make a small-scale digester as durable as a large one you need all the same materials and components – the same fabrication, flanges, valves, membranes etc – to be built to the same quality.

The other issue to consider is that once the investment in a digester is made what is used as feedstock will determine the return on investment. Differing feedstocks have different biogas yielding values. For example, one tonne of cow slurry yields 21m³ of biogas compared to one tonne of fatty food waste which yields 320m³ of biogas, 15 times greater.

Clayton says that as a rule of thumb one dairy cow will produce enough slurry per year to generate 0.05kWe continuously. A herd of around 100 dairy cows, housed in winter only, will deliver around 2.5kWe.

It is only where there are extraordinary costs associated with waste disposal or farm processes that would make investing in a digester rational under the current support system.

"Highly engineered small-scale and micro-AD are really not viable in the UK, even when run with a micro CHP run behind the meter (in island mode) or putting the gas through a boiler to meet domestic needs and other processes, such as dairy washing or cheese production," Clayton says.

Understandably then Qube's main market is international, in North America, Africa, the Philippines, India and Cambodia, where they serve a 'humanitarian and environmental need', delivering energy and sanitation services to remote communities often in harsh environments (see box).

Mass production

Bioelectric is a name that crops up repeatedly in relation to small farm-scale AD. The Belgian company specialises in containerised AD units with an in-built CHP and suitable digester, from 10kW up to 74kW, with prices starting from c£125,000.

The company was founded in 2011 by current CEO Philippe Jans and colleagues Jan Palmers and Jonathan Schrauwen. Their aim: to break the cost barrier and deliver affordable micro-AD. It has kept costs low by standardising production, an emerging business model within the AD industry on the continent. Bioelectric units roll off a production line in the manner of car production.

Jans says, "We identified a viable business case

where there is high energy usage and of course recognising the rising global demand for carbon reduction.

"It took around five years to crack the code of components to standardise the build and enable us to go into mass production," Jans says. "Traditionally AD plants have taken a year to complete and involve a lot of contractors – every plant used to be different. After the commissioning process we can deliver and install a unit in a matter of days."

Subsequently the company has delivered over 220 units in Europe, including 15 in the UK. While those on the mainland have primarily been in the 22-33 kWe range, in the UK they have mainly been in the larger 33-44 kWe capacity. Like Clayton, he says that because of the lower levels of support in the UK compared to mainland Europe the smaller digesters are not viable. The larger ones fare better as they are essentially off-setting higher energy bills.

All those deployed are on-farm and primarily treating slurry and whey. Yet it is on the smaller scale, c10kWe, for the majority of farms in the UK of less than 100 hectares with smaller herds, that AD is required.

France and the 20p FIT

Angela Bywater, a specialist in small-scale/micro-AD through Methanogen UK and as a Network co-manager of the AD Network (and the follow-on Environmental Biotechnology Network), says, "Stories like the Holden's make me weep and gnash my teeth!"



Bioelectric CEO Philippe Jans



Angela Bywater



A Bioelectric 33kW biogas installation on its way to the UK.

...and in situ on a dairy farm, to treat only slurry



"In the 1980s and 90s when there was 50-60% grant support [1987-95] tech was developed that most farmers could afford, with boilers that heated the house in the winter when the cows were in and either just ticked over and ran an Aga/Rayburn in the summer or were left dormant until Autumn. The Farmgas/WRI digesters were very high-tech-low-tech in that they had simple and robust operational systems, and the farmer or an electrician could pretty much fix everything, as a great deal of the complexity had been engineered out. These, too, were produced on a production line basis, with minimal site work required."

Post 1995, support for micro-AD all but disappeared until feed-in-tariffs (FITs) for small scale energy producers (below 250kWe) were introduced in 2011. However, FITs failed to ignite interest in the AD sector when applications were called for in 2010 – indeed there was an investigation as to why the tariff only attracted two AD applications.

The study concluded that technologies have a variety of factors affecting their performance in terms of installation levels, including cost, size, availability, standardisation of the technology, planning issues, ease of installation, perceived sensory impact (sight, sound and smell) and administrative complexity. It found that while domestic PV scored very positively on all these factors, small AD did far less well. It was too complicated, involved and expensive for the perceived upside.

When first mooted the FIT for AD was 14p per kWh. On introduction in 2011 it had been revised down to 13p, starting a trend of depressions, as FITs were tightly capped across all renewable energy sectors, until their demise. Two years earlier the Renewables Obligation also ended.

It is a different story within mainland Europe where support for micro-AD is far greater. France offers a prime example. In 2015 it introduced a tariff rate of €220 per MWh for units below 80kWe with more than 60% animal manure by volume as feedstock. It is nearly three times the rate being offered to domestic waste facilities above 2MWh, €81.2.

The French tariff was introduced in recognition of the myriad environmental services small-scale AD delivers, targeting farms with herds of up to 200 cows, or between 200 to 5,000 tonnes of organic waste per year.

It aims to enable small farms to reduce GHGs related to livestock manure and energy consumption; reduce the strong odours associated with the use of untreated manure as fertiliser; minimise the need to transport the organic inputs

HUMANITARIAN IMPACT OF SMALL AND MICRO-AD



Small and micro-AD has a great role to play in addressing humanitarian needs, both in crisis situations, such as on refugee camps, and addressing the long-term targets set out in the UN's 17 Sustainable Development Goals (SDGs), established to end poverty and hunger in all its forms, mitigate the effects of climate change, and ensure prosperous, fulfilling, and peaceful lives for all.

The SDGs are targets to be met by 2030 – this gives governments and businesses a little over 10 years to make the urgent and necessary changes required to bring about and deliver a step change in sustainable development. The biogas industry is uniquely positioned to directly help achieve nine of the SDGs, numbers 2, 3, 5, 6, 7, 9, 11, 13 and 15, and therefore act as a catalyst for others.

Small-scale biogas digesters provide a wide variety of socioeconomic benefits, including diversification of energy supply, enhanced regional and rural development opportunities, and creation of a domestic industry and employment opportunities. Potential environmental benefits include reduction of local pollutants, reduced disease through greater sanitation, reduced deforestation due to logging for fuel, and increased sequestration of carbon (C) in soils treated with digested organic waste. Ecosystem services include increased carbon sequestration, improved water quality and increased food production; the productivity of the soil can be improved through improved soil structure and water holding capacity achieved by the application of digestate.

Among the many great benefits small and micro-AD is it increases gender quality, especially freeing up time for children to be educated rather than engaged in collecting firewood. Replacing wood or as if often the case kerosene for cooking delivers untold health benefits.

for treatment; and benefit from the advantages of digestate, which it details as being easier to spread, with fewer weeds, occasioning less need for pesticides and petro-chemical fertiliser.

Angela Bywater crunched the numbers and concluded that the French tariff is the equivalent of the UK introducing a FIT of around 20-22p per kWh at current exchange rates. In the modelling she undertook she also came up with a more radical proposition, to reflect the true cost of production in the price of the produce.

"We all pay a huge amount of money to dispose of the 400 g of poo we each produce a day. A

dairy farmer has to deal with 60 kg of manure each day per cow and we don't really pay for that as an environmental service within the price we pay for milk. If a farmer was allowed to put a guaranteed 'environmental' premium on every pint of milk produced to pay for this, then it could potentially help introduce AD," she says.

That premium for micro-AD would be in the region of 20p a litre, marking the end of the era of cheap milk, although Angela Bywater points out that coconut and oat milk are £1.80 a litre while dairy milk is £2 for four litres. Nevertheless, in

Continued>>

the current climate such a price hike would be a political hard sell. Yet if net-zero is to be achieved across farming and indeed the whole UK the cost of managing slurry and its spreading must be met somehow.

Slurry store digesters

By 2027, under regulations being introduced in the Clean Air Act, all slurry and digestate stores will have to be covered. This is primarily to address the health issues associated with ammonia emissions.

The UK has international obligations to meet targets for limiting ammonia emissions to protect human health and the environment. These agreements mean the government is legally obliged to reduce ammonia emissions by 16% by 2030, compared to 2005 levels. To meet these targets, it has drawn up the Code of Good Agricultural Practice.

The move is primarily driven by air quality concerns and the impact on public health; hence it stems from the Clean Air Act. This speaks directly to the health costs that could be offset by recognising and supporting AD for the health and environmental services it delivers.

The Code explains “that when ammonia emissions combine with pollution from industry and transport (like diesel fumes) they form very fine particulate matter (PM2.5), which can be transported significant distances, adding to the overall background levels

which people are exposed to. It is estimated that particulate matter emissions as a whole result in 29,000 early deaths every year in the UK.”

The code also says that ammonia also adversely impacts the fertility of soil and biodiversity, adding that “once the soil quality has changed, together with the balance of species on the land, it takes a long time, and can be costly, to restore it”. Most ammonia emissions from agriculture arise from the way organic manures – such as slurry, solid manure and litter, digestate, sludge and compost – are stored, applied to land and used in conjunction with petro-chemical fertilisers.

The code explicitly says that current practices are leading to an increased use of oil and water intensive manufactured fertiliser. “The more nitrogen is lost as ammonia, meaning the material is a less effective fertiliser and loses value. Therefore, measures to reduce ammonia emissions and improve overall nutrient management practices could reduce the amount of manufactured fertiliser that farmers need.”

Much of the code is hinged on keeping organic manures covered until required, to then be applied by trailing hose spreaders to reduce the time it is exposed to the atmosphere. The government recognises that this will lead to farmers having to make costly infrastructure changes to their existing slurry stores and lagoons and in the form of equipment – only around 20% currently have

trailing shoe equipment. There is however one blindingly obvious issue that is overlooked. That is, as the Holdens discovered when they witnessed their covered store hippo, stored manures produce gas. This gas which has a good proportion of methane will have to be vented to the atmosphere.

Qube recently installed its LagoonQUBE technology to cover and convert a 2,500m³ lagoon store in East Anglia into a digester. This is generating around 50m³ of biogas per hour capturing the same volume of gas produced from a herd of 1000 dairy cows.

Clayton says, “We are staggered by the volume of biogas that comes off lagoons in a fugitive and latent way. Lagoons can be cheaply and efficiently converted and covered, and we can recover the latent gas and do something with it, either run through a boiler or CHP system or upgrade for vehicles fuels. Not only is this about self-generation and clean energy supplies it’s also about reducing emissions from agriculture and the other environmental services delivered.”

He is also perplexed about the legislation. “Covering slurry stores and lagoons will still create ammonia emissions (less than the status quo he agrees) but still huge volumes of methane, the government needs to join the dots and do something useful with this resource.”

Angela Bywater agrees. Alongside James Murcott and Will Llewellyn, she recently delivered a 300m³ slurry digester. She says, “We could probably do that for less than £200,000 with a bit of volume. However, that volume is not going to happen until government starts to support farmers to mitigate the environmental cost of handling millions of tons of slurries and manures every year.”



James Murcott

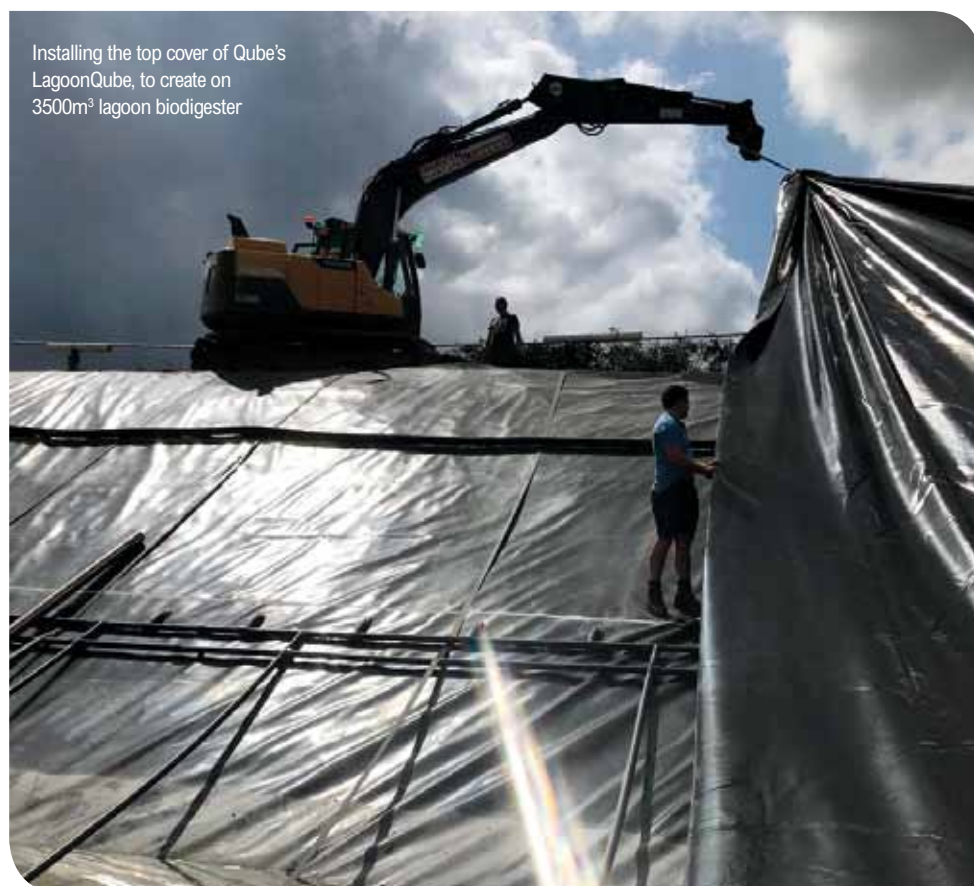


Will Llewellyn

The Clean Air Act would seem to offer an opportunity for that to happen. The proposed Agriculture Bill, pending Brexit, sets out how future financial support for the farming sector will be focused on delivering improvements to the environment. It explicitly proposes that a future environmental land management system should fund targeted action to protect habitats affected by ammonia.

Now is the time to recognise and give value to the environmental services AD delivers, far more efficiently than any other options. If we continue to vent methane into the atmosphere, both the NFU and the Government could struggle to achieve their Net-Zero targets on their respective deadlines, by 2040 and 2050.

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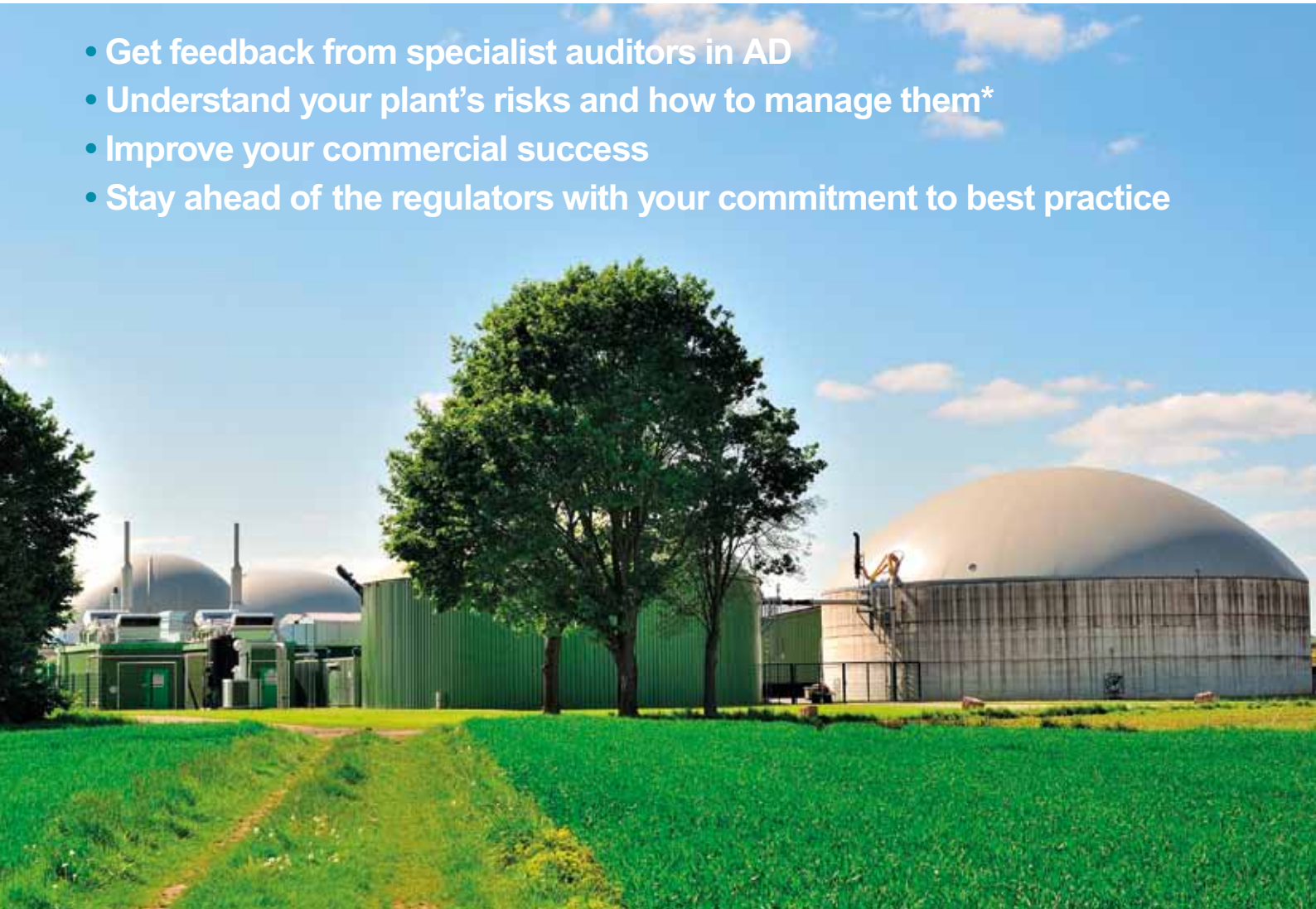
Installing the top cover of Qube's LagoonQube, to create an 3500m³ lagoon biodigester



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AN ANAEROBIC DIGESTER SHOULD BE IN EVERY SCHOOL

One of the overlooked benefits of AD is its power to educate as a concrete example of the circular economy in action. **Jon Hughes** reports.

When the public get the opportunity to see an anaerobic digester they are blown away by the technology's capability, to magically turn organic waste into energy and fertiliser.

That much was apparent when a 1m³ micro-digester was unveiled recently in Tower Hamlets, east London. The event drew an enthusiastic crowd of over 150 people.

The AD facility has been developed by the architecture firm Public Works, which is part of the R-Urban network, a pan-European movement that seeks to build community resilience in response to issues such as climate change, resource depletion and austerity.

The digester was designed and built by LEAP (Local Energy ADventure Partnership), which is behind the successful 2-stage Micro-AD development, which ran for four-and-a-half years at Camley Street Nature Park in King's Cross. There, biogas from the 2m³ micro-digester was used for cooking in the Park's café and to generate heat and electricity in a CHP engine.

At the Calthorpe Community Garden, a second micro AD plant produces biogas for use in a mini boiler and for cooking. The digestate is filtered, with the liquid fraction used to support food growing and hydroponic trials and the fibre fraction added to compost to produce a soil conditioner. The food that is grown is then used by the café, the organic circular economy in action.



Rokiah Yaman

After a short presentation from Rokiah Yaman, LEAP's project manager, the residents were given a tour of the R-Urban AD facility, which resides in a standard 20ft shipping container. The buffer tank and digester sit side by side in the rear half. Hot water for the system is heated by solar thermal panels mounted on the outside of the unit.



A small monitoring unit sits on the right-hand wall and to the left of the are the electricity storage batteries for the solar PV system on the roof. The gas is stored outside at the rear in a gasometer, where the bell rises and falls depending on the level of gas stored.

The biogas produced by the plant is used to power stoves in a community kitchen housed in an adjacent container unit, which is used to deliver cookery lessons and catering for community events. There is also a small biogas boiler on the outside of the AD container.

The resultant digestate is to be used on raised beds, where food will be grown, developing a micro-circular economy in principle. This was of particular interest to the audience, many of whom were keen allotment holders.

One question was repeatedly asked. Why isn't this technology in all schools? It could be used to treat food waste, provide energy to cut running costs, and gas for cooking dinners, and integrate with the curriculum to support behavior change, with children becoming more aware of resource efficiency and by extension their parents.

Well, there is little to prevent this, other than perhaps the will and the upfront cost but over the next couple of years, LEAP is expecting good progress to be made in this area.

While some of those present might not have understood what is meant by a 'circular' economy, in that instant the inherent logic of it all became abundantly clear as the technology was explained to them. Indeed, this is one of the invisible powers of AD.

The International Energy Agency, in its report 'The Role of AD and Biogas in the Circular Economy' emphasized this benefit, saying the biogas plant stands at the heart of the circular economy and could be used for "education purposes to give children concrete examples of a circular economy concept. Showrooms in farms have been used to show "where the food comes from" to school groups. These same concepts could be used more widely to explain how separate collection of food waste in homes can be used to produce green energy or fertilizer production".

Graphic designer and father of two Ian Dunn is a passionate champion of getting schools to embrace a mix of renewable technologies. It all began when his children started school and Ian, who trained as a chef on leaving school, was dismayed at the food his children were given for school dinners.



Ian Dunn

He launched a web and Twitter campaign, vegschoolmeals, calling for schools to grow food, which has morphed into a vision of schools to become circular economies and community power stations, integrating AD, solar, wind. The website www.vegschoolmeals.co.uk is currently running a petition, "Make school food-growing and self-sufficiency a dedicated national curriculum subject".

Ian says. "I want to see renewables being taught on the national curriculum. I describe it as 'living education', 'living learning'." Particularly AD. "It is science, biology, physics, economics, maths, it is environmentally sound, the fertiliser can enrich the earth they use for growing. It should be in every school."

To that end Ian has been speaking with his children's schools - infants and juniors stand adjacent to each other - in the hope of developing a 'model school', "where all these things are happening, AD, wind power, solar - I roughly worked out that if we put every UK school roof together as a huge mass, we could probably fill Southampton - rain-water harvesting, a case study that other schools can use as a benchmark."

Ian is shocked that schools are not required to measure the levels of food waste. His website also carries a questionnaire to help identify how self-sufficient schools are. He says, "I believe that it should be, and we should be pushing for that. Food waste is electricity, gas and fertiliser, it is money! The waste needs to be seen as income for the school. Organic waste is gold."

When he first contacted ADBA, Ian signed off saying, "Do remember though that I am just a parent with a lot of ideas, I'm not an expert as such, I have pulled together all the things that I believe schools should be doing and the

VegSchoolMeals



government must support schools in order for them to become sustainable, more self-sufficient, models for the future."

ADBA fully supports and endorses Ian's campaign and is exploring the potential of taking AD into schools, as both a practical means of integrating waste and energy streams to cut costs and enhance the curriculum and as a rolling programme of outreach events to introduce pupils to the technology that stands at the heart of the circular economy.

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PLANT OPTIMISATION IS ALL IN THE MIX



Mixers are critical to maximising the gas yield from anaerobic digestion by supporting the biological processes. ADBA's technical manager **Sam Hinton** looks at the key attributes of various mixing options.



Mixers are used in all anaerobic digesters apart from UASB (Upflow Anaerobic Sludge Blanket) reactor systems and some lagoon type digesters, due to their high flow rates and long retention times respectively. Simply put, mixing provides a way to stir the contents of digesters, buffer tanks, pasteurisers, feedstocks and digestate storage.

There are three fundamental reasons why this is required. First, mixing supports the biological process by circulating the tanks: bacteria, improving consistency and ensuring both the feedstock and heat in the digester are adequately distributed throughout the tank. Secondly it ensures digesters do not build up floating layers. The final fundamental reason is that mixing helps gas move upwards, which can cause foaming incidents if mixing is not appropriate under certain liquid viscosities.

Mixing has a direct impact on the active volume of your digester i.e., the gas-producing content. To be effective a mixing system should ensure at least 85% of the tank's volume is active, meaning actively mixed. A poorly mixed digester will contain stagnant zones where inefficient digestion is taking place.

Stirred... not shaken

All AD plants broadly operate on the same symbiotic biological processes: hydrolysis of complex organic matter – carbohydrates, fats and proteins – into simple sugars, fatty acids and amino acids. This is further broken down into alcohols, VFAs with gaseous products and again further into more gaseous by products and acetic acid. The final stage is where the majority of biogas is produced by converting the previously mentioned products into water, methane, carbon dioxide and other gases leaving a nutrient rich organic fertiliser.

The interdependency of the above reactions and processes shows the importance of mixing. Mixing ensures the products of each step – hydrolysis, acidogenesis, acetogenesis and methanogenesis – are available to the other stages bacteria to optimise the production of biogas.

Some of the main factors that influence the biological processes are the hydraulic retention time (HRT), temperature and pH. This article explores mixing and how it plays its part in the stability of those main factors. So, done efficiently, mixing potentially increases the active volume of a digester, allows for even digestion, and distribution, of new feedstocks and prevents pockets of volatile fatty acids (VFAs) forming that can lead to biological instability in the process.

This is of high importance as if pockets of VFAs do form it can adversely affect data monitoring and subsequently analysis, resulting in wrong decisions being taken regarding feed planning and other operations, which could again lead to an increasingly unstable biology and potentially complete biological collapse.

Efficient mixing also ensures an even heat distribution in the digester. This is not only for when a digester requires heating to support the biology but can assist with heat distribution. The mixing can reduce the effect of the exothermic process, which can occur in plants with high OLR during periods of high ambient temperature. This heat change can lead to rapid environmental changes for the biology and again cause instability.

Ensuring consistent movement is essential for stripping the gas bubbles that become suspended in the digester. Not only does this ensure your gas is being collected it reduces the chance of foaming, pressure spikes and subsequent infrastructural or operational damage. While there is little evidence that the choice of mixing system can prevent foaming there is evidence that poor mixing can cause it to arise. As previously mentioned, poor mixing results in the digester having a reduced active volume and poor dispersal of feedstock which results in process instability that can result in foaming.

Adequate mixing of a tank can also prevent floating layers and crusts from forming. However, the type and condition of feedstock is often the determining



Example of a Hidrostal pump mixer in situ; Main Pic, Horizontal mixer in situ



A submersible mixer in situ

factor. With some feedstocks there can be a tendency for plastics and fibres, and in some cases oily and fatty compounds, to rise to the top of the digester's contents. If there is not adequate mixing to keep tank contents completely agitated this floating layer of plastics and fibres can accumulate to significant thickness. Floating layers and crusts also reduce the active volume of the tank and prevent efficient gas release.

At the base of the digester, efficient mixing can minimise the level of grit, silt and sediment settling at the base of the digester. If allowed to settle grit

again serves to reduce the active volume of the tank. No amount of mixing will eradicate the problem of gritting. It is worth noting that mixing systems do not suspend large grit particles, hence digesters will either have automatic degritting designed in or access points to allow for routine degritting operations.

Mixers come in various sizes and designs to deal with differing levels of viscosity, dry matter, pH, temperature and fibre length in multiple media and feedstocks. Alongside the conditions in which the mixer will operate the positioning of them is a key consideration. The choice and number of mixers and where they are positioned in the tank is primarily based on a plant's mass balance, the feedstock choice and tank design. For instance, plants with a longer HRT – hydraulic retention time – often use feedstocks that are more fibrous and slower to digest and have different mixing requirements. Those treating more liquid feedstocks will essentially have a short retention time.

When designing digesters, it is critical that the design retention time is based on the active volume of the digester, not the tank volume. For example, if the digester has an active volume of ~68%, an operator who believes they are running the digester at 20 days' feedstock retention time within the digester, based on tank volume, in reality only has 14 days' retention. This means that the process is not being optimised, with the example above nearly 30% of gas yield being lost, due to the reduced time for microbial activity. If retention times become too short, the digester will be wasting valuable feedstocks, depleting the microbial population within the digester and releasing emissions via digestate that still contains biogas.

Continued>>



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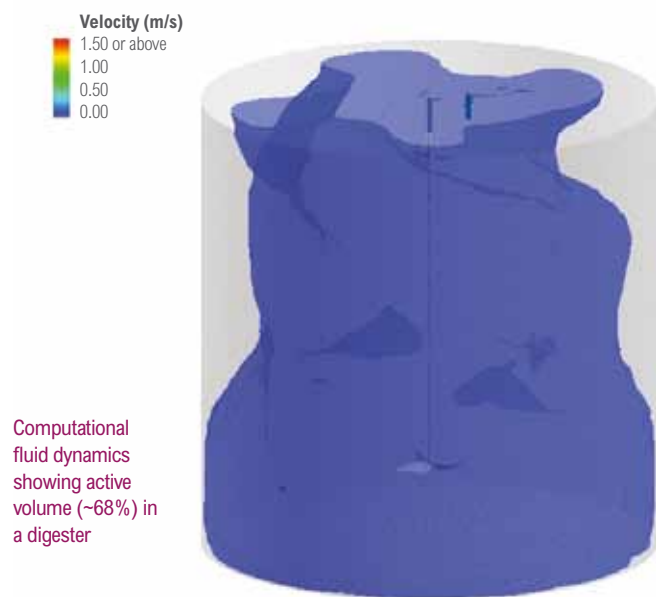
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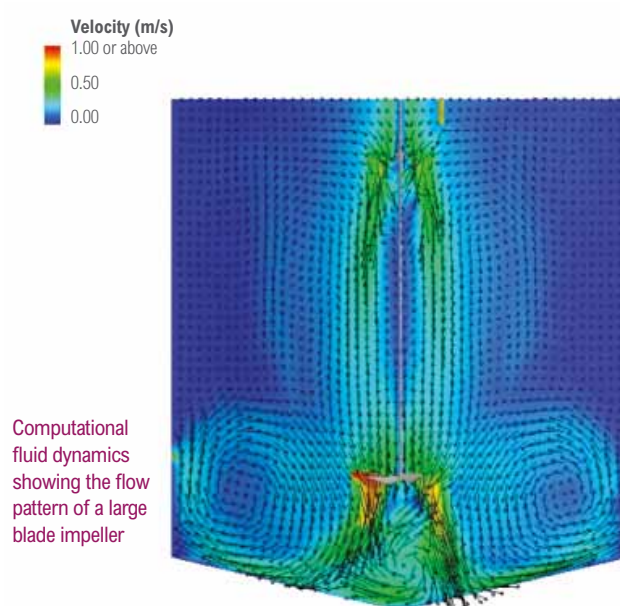
Other elements of the digester design also impact on mixing efficiency. For example, the inlet and outlet points should be at a reasonable distance from each other to prevent short-circuiting (where the feed enters the digester and egresses without fully mixing).

Types of mixer

There are essentially three main types of mixer; mechanical, gas recirculation and pumped. Several factors should be considered when determining what is best for the plant. Factors include capital and operating costs, maintenance requirements, process configuration and particle size and consistency of the substrate in the reactor.

As reactor solids – and in the case of manure and crop digesters, fibre content – increases, viscosity and non-Newtonian behaviour usually increases, which requires more (parasitic) energy for mixing. In non-Newtonian fluids, viscosity can change when under force to either more liquid or more solid. Tomato ketchup, for example, becomes runnier when shaken and is thus a non-Newtonian fluid.

In some cases, parasitic energy demands are higher with gas or pumped mixing systems due to the energies needed for compression and for fluid



movement, but this depends on the size of motors, dry matter and viscosity of materials that impellers need to mix. However, as there are no moving parts within the tank, they are easier to maintain and do not operate for as many hours as other mixers so the pay-off must be calculated. It must also be considered that some pump mixing systems have nozzles inside the tank, which can block and create the need for internal maintenance.

Impellers

Impeller mixing is very common among crop-fed digesters. An internal impeller creates thrust within the digester bulk from rotating blades, which in turn creates a flow. Impeller mixing tends to be either a large top-mounted impeller designed to create downwards movement, or a side-mounted impeller designed to create horizontal movement. Impellers can also be submersible and positioned in the tank and moved from outside of the tank.

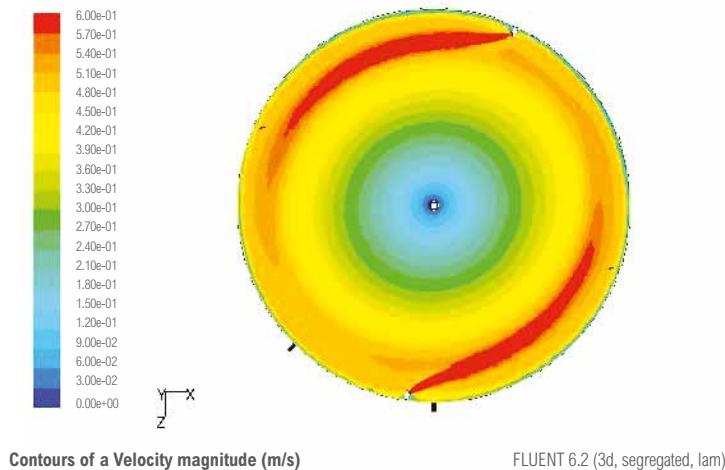
Side and horizontally mounted impellers commonly have externally mounted motors and gearboxes outside the tank that are attached to the impeller via a shaft. On submersible mixers the gear box and motor are submerged in the tank.

Side-mounted impellers are often designed with smaller paddles (impellers) and operate at a higher RPM to provide a vigorous mix. However, they can be impeded by high fibre feedstocks accumulating on the shaft and impellers.

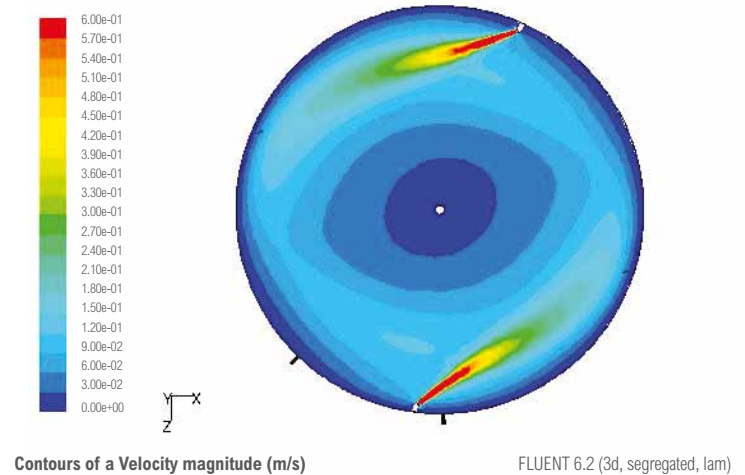
Horizontal impellers tend to have larger paddles and operate at low speeds, creating downward mixing, but struggle to generate turbulence in wetter plants. These can often be fastened at the base of the digester for support and have multiple paddles attached to a single shaft, which can generate a continuous release of gas and mixing. Submersible impeller mixers have the added benefit of being adjustable, when this is built into the design, which means they can be moved up and down as required, depending on content levels in the tank and can help to ensure no crusts or layers are forming.

It is worth noting that with impeller systems full emersion in the contents of the digester prevents stresses on the blades that occur when only half submerged.

Impeller mixing systems are simple but have a common drawback; the need to access the digester to maintain them. However, technological advances are increasing the expected lifecycle of impellers and ability to monitor and remotely control them. Some impeller mixers now have a system whereby the impeller can be taken out of the digester into a box, which can then be accessed for maintenance.



Computational fluid dynamics showing profile of a jet mixing system in a digester 2% dry solids



Computational fluid dynamics showing profile of a jet mixing system in a digester 6% dry solids (all graphics from The Practical Guide To AD, ADBA)

For instance, **Stallkamp**'s GRF Submersible mixer is made from high-strength cast polyamide with steel reinforcement, creating a smooth surface on the large diameter blade to minimise the potential for fibrous material to accumulate. While it has a large blade to keep the contents of the tank permanently on the move, the energy required to move its mass is offset by its low rotational speed. The company uses a similar fabrication on the TMR-3i. Designed for high flow rate systems, its material choice helps prevent corrosion in decreasing pH environments, such as hydrolysis and feeding buffer tanks. Both are offered in the UK by Tramsread.

Mixers that are positioned in the tank often suffer from poor maintenance compared to mixers with externally mounted motors and gears unless they are fitted with the previously mentioned system where the impeller can be removed into a box on the outside of the tank. This can be because they must run at 100%, regardless of whether that level of activity is needed or not.

Again, the supply chain has responded to operator's needs. **Xylem** has developed Flygt Adaptive Mixers, which offers variable thrust, and can be remote controlled, meaning they can be more energy efficient and adapted to suit the media it is operating in. It also means it is responsive to mixing the varying demands of different feedstocks. Hence the range is described as 'adaptive'. While the electronics are housed in the mixer it delivers constant information regarding its status to the operators to allow maintenance to be timed accordingly and reduce unnecessary maintenance downtime.

Food waste and water

Gas recirculation and pump mixing tend to be more widely used than impellers in the food waste and wastewater treatment industries but not exclusively. Landia's GasMix system is also treating agricultural wastes, incorporating a chopper pump into the process, constantly reducing the fibrous materials that might be present. Gas mixing can either be continuous, which means the gas is removed from the headspace, compressed and

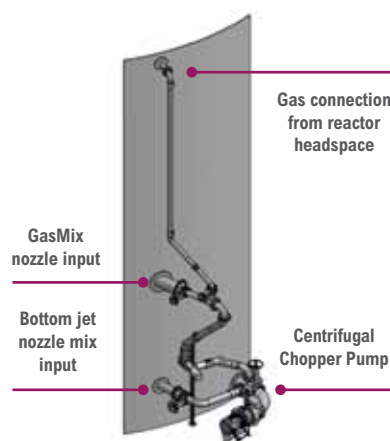


Diagram of the Landia GasMix system

reintroduced at the base of the digester, or sequential, where the compressed gas is released around the whole digester via different inlets to allow a mixing of high dry solids and viscous liquids.

Pumped mixing uses one of two principles; high flow rates or high velocity. High flow rates describe a low-energy process that recirculates the digesters contents over a period of several hours. The high velocity principle uses a

Continued>>

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combination of chopper pumps and small nozzles to inject a high velocity slurry into the digester. This option does use more energy but provides the additional benefit of additional chopping for scouring the digester base or floating layers.

Both gas and pumped mixing reduce the moving parts within the digester, making maintenance easier, but both are suited to tanks with a smaller diameter, which is often why long retention time tanks that are large often do not solely use gas or pump mixing. Notably the nozzles on pump mixing can be susceptible to blockages inside the tank that poses a different maintenance issue.

Hidrostal's HidroMix is an example of pumped mixing, which is a practical alternative to conventional submersible and gas mixing. The system uses the Hidrostal screw centrifugal pump to draw sludge from the source and return it through a nozzle, which is purposefully sized and positioned to both take into account the sludge characteristics and the geometry of the tank to provide optimum mixing energy and circulation of the tank contents. For larger tanks, a two-pump system has been developed. The two-pump system has the opportunity to place the nozzles at different heights and discharge angles. This can provide a more effective mixing system than a single submersible mixer might in some situations.

Digestate stores and lagoons

Once digestate leaves the digester it can end up in digestate stores and lagoons where mixing is often overlooked or inadequate due to lack of infrastructure to attach to. If mixers are not installed on digestate storage tanks options such as the PTO driven RECK Mammoth or Typhoon are

available. When access and infrastructure is limited on lagoons alternative measures are needed and Xylem offer a raft based mixing system. This can overcome the issue of sediment settlement in large lagoons that cannot be reached with PTO driven mixers.

Mix to the max

Good and reliable mixing is a key component of optimising output, ensuring the tank's active volume is maximised to deliver the optimal gas yield and not waste feedstock. When choosing a mixer, particularly at the design stage, it is advisable to select one that can adapt to different feedstocks. By having versatile mixing – with the ability to alter the mixer's angle, speed or blades or additional manways on the digester – can mean a smooth transition between treating agricultural wastes and crops to sewage sludge, commercial and household waste.

SUPPLIERS

A comprehensive list of specialist suppliers of mixers for anaerobic digestion is available in The AD, Biogas & Bioresources Industry Directory. The directory is published every Autumn and is available in print and on line (www.adbioresources.org/member-directory) The 2020 edition is currently being compiled and ADBA members receive a FREE listing.

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BIG DATA QUIZ 2: ON-FARM AD



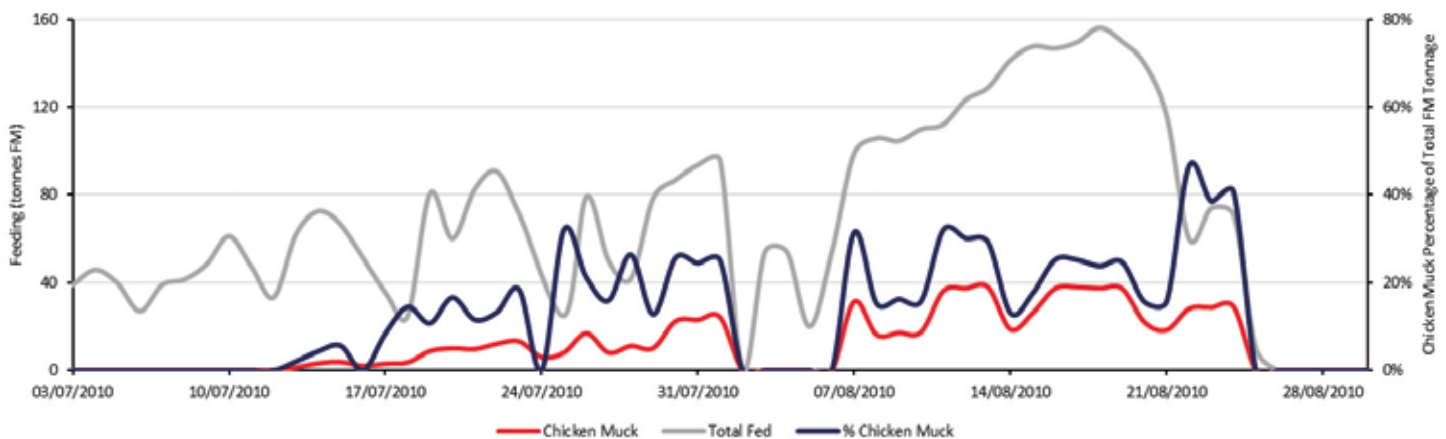
In the last edition of AD & Bioresources News (Summer 44), Angela Cronje of ROOTS Organics presented a big summer quiz, to illustrate how the methodical collection of data allows operators to see patterns emerging and identify potential issues before they become critical. That quiz primarily addressed food waste plants. Here ADBA's Technical Support Manager **Sam Hinton** puts on-farm AD in the spotlight. The quiz has four main questions, addressing several issues and common problems.

All answers on page 37. The data is from multiple plants and has been adapted in some circumstances.

Q1: FEEDING AND NITROGEN-RICH FEEDSTOCKS

From the figure below can you identify:

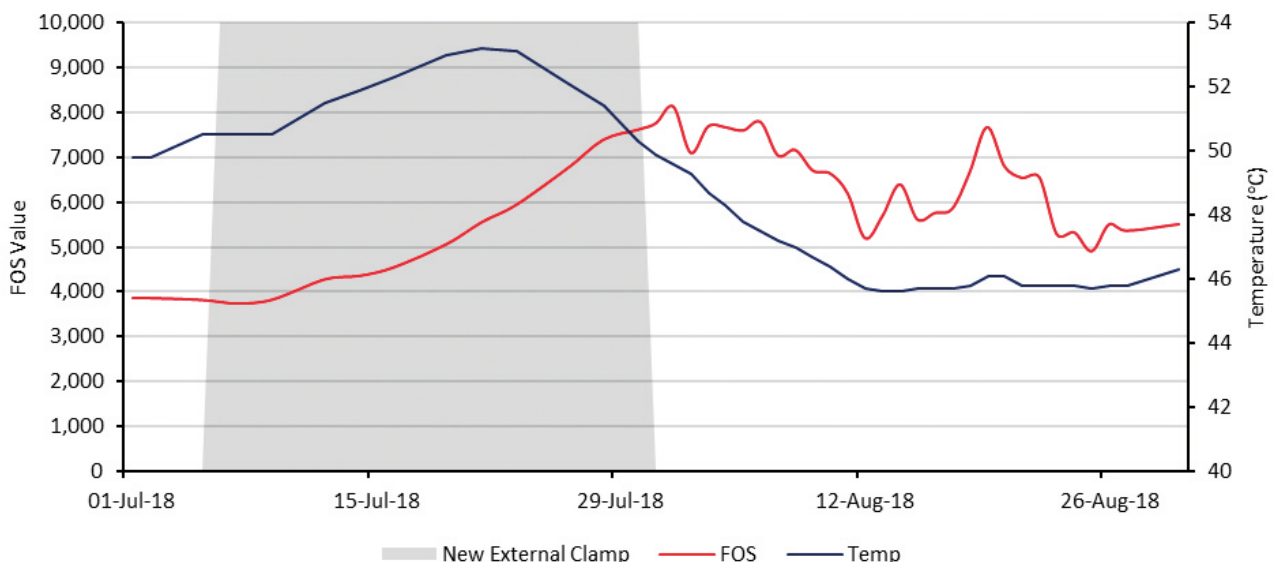
- Q1** What are the problems with the operation?
- Q2** What problems could stem from this?
- Q3** What corrective actions could be/were taken?



Q2: TEMPERATURE

From the figure below can you identify:

- Q1** What are the problems with the process?
- Q2** What could have caused the problems?
- Q3** What corrective actions could be/were taken?



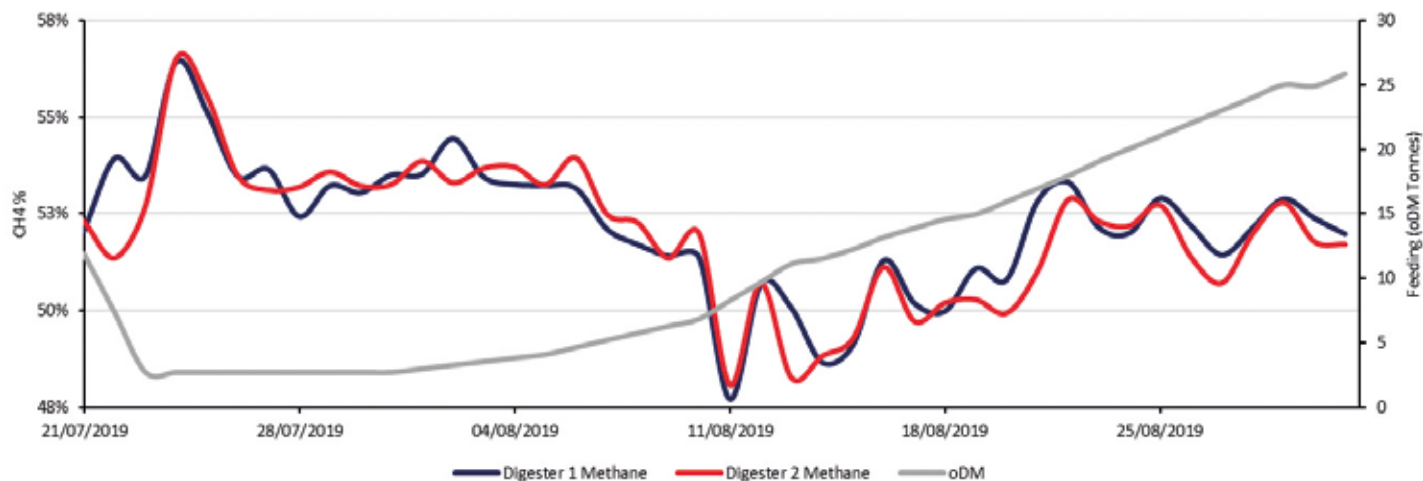
Q3: GAS QUALITY AND OUTPUT

From the figure below can you identify:

Q1 What are the problems with the process?

Q2 What could have caused the problems?

Q3 What corrective actions could be/were taken?



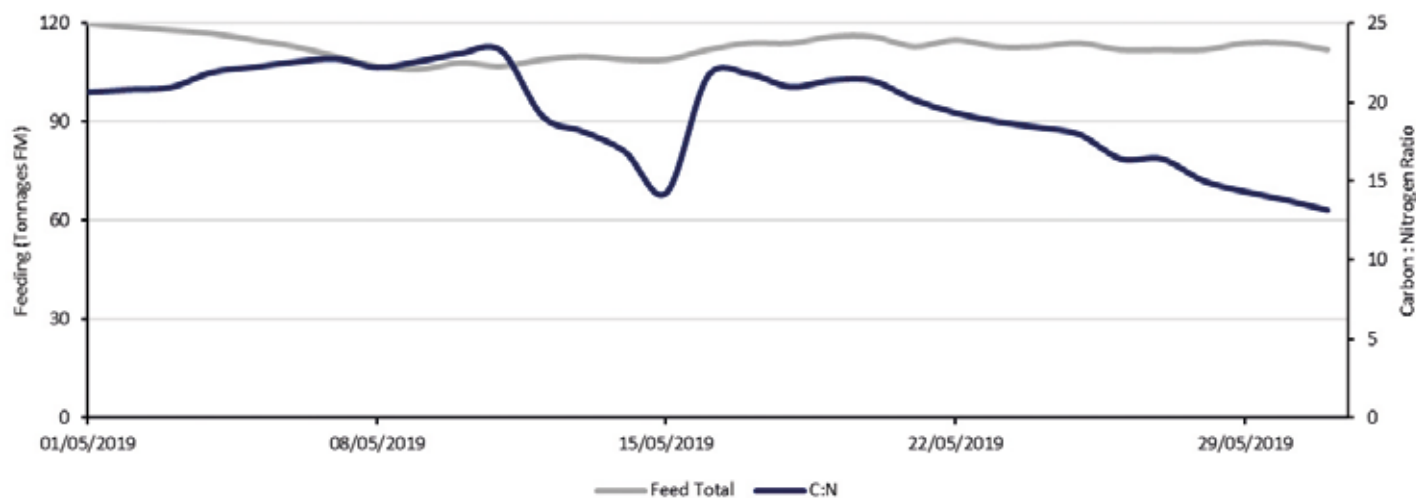
Q4: C:N RATIO (CARBON:NITROGEN RATIO)

From the figure below can you identify:

Q1 What are the problems with the feeding regime?

Q2 What could have caused the fall in C:N ratios?

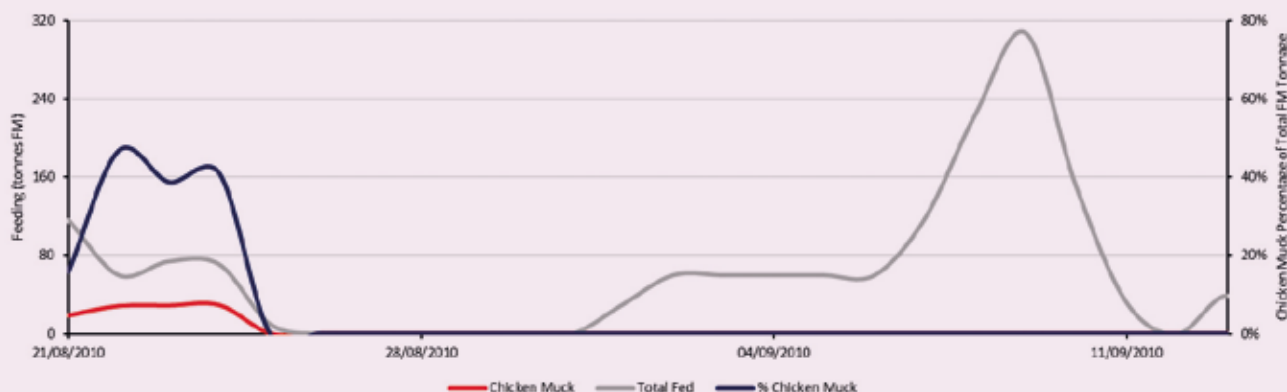
Q3 What corrective actions could be/were taken?



ANSWERS

Q1: FEEDING AND NITROGEN-RICH FEEDSTOCKS

- A1** a) Erratic feeding tonnages, which, even though the dry matter percentage is not recorded, shows inconsistency with either feedstock types or feeding rates.
b) The rapid introduction of nitrogen rich feedstock.
- A2** a) Unstable biology that has not had the opportunity to fully mature and adapt to a consistent input; ammonia/ammonium toxicity, poor feedstock analysis and feeding plans.
b) Acidification of the digester.
c) Actual cause: inhibition present in the feedstock was the underlying issue in this digester.
- A3** a) Reduce/stop feeding, add water to dilute the acidic concentration, input slurry [see figure below] to dilute the acidic concentration and put active bacteria back into the digester - this also adds more feedstock - and ensure when ramping up you do not use feedstocks new to the digester.



- b) Check the bioavailability of nutrients in the trace elements additives. In general trace elements aid digestion and the biological activity of the bacteria.
c) Ensure temperature and pH are stable and de-sulphurisation controls are working.

Q2: TEMPERATURE

- A1** a) The volatile fatty acid (VFA) content of the digester is increasing and showing signs of instability at an elevated level, presuming the 4,000mg/L is the normal operating level.
b) The temperature rose rapidly.
- A2** a) Actual cause: Exothermic reaction, the feedstock was changed and the fresher feedstock released more energy per tonne (higher dry matter and volatile solids) that equated to overfeeding, leading to the temperature (and acids) rising over a short period, more than 10C per week, which can affect the acetogenesis stage and create the build-up of longer chain VFA's.
b) Potential other causes: Inhibition, the acidification of the digester and decreasing ratio of acetic to propionic acid ratio may prevent stages of the digestion. The external feedstock could have been poorly clamped and have mould infestation, meaning inhibition through mycotoxins. The inhibition could also be caused by oxygen, ammonia, H₂S, heavy metals, antibiotics or disinfectants, the latter two are more of a concern for animal manures and slurries.
- A3** a) Feedstock analysis should be used to adjust feedstock daily, especially if changing clamps.
b) Temperature should be adequately controlled using heating or cooling techniques.

Q3: GAS QUALITY AND OUTPUT

- A1** Aggressive feeding, leading to a sharp reduction in gas quality, methane content and erratic results, with no minimal signs of reducing the re-introduction of feed. Somewhat counter-intuitively, when gas output drops off (as represented) it often signifies a need to reduce feeding rates to allow the bacteria to multiply.
- A2** a) The initial rise is likely to be from the reduced feeding and break down of longer chain VFA's that increases methane content.
b) The drop in gas quality could either be from increasing the feeding rate too quickly, or introducing different feedstocks, which can result in volatility as a result of the biology not being fully mature.
- A3** a) The feeding mix should be kept as before the feeding stopped.
b) A slower ramp up, which can be seen from around the 13th August 2019, with ample bio-available trace elements.

Q4: C:N RATIO

- A1** a) The C:N ratio is falling, and is not consistent, from either an increasing nitrogen input or falling carbon input proportionately.
b) Unstable biology.
- A2** a) Change in feedstocks type.
b) Composition of feedstock could also have changed, eg, crop residues, such as from potato and beet, have a high carbon value while chicken litter has a high nitrogen content.
c) Excessive dilution of the digester. Using the digestate liquid fraction can increase the nitrogen content, as it is dissolved in the liquor.
- A3** a) Ensure you are analysing feedstocks, to understand its composition, and know the source material to try to keep the ratio between 20 to 30 (varies between digesters but this is the theoretical recommendation).
b) Ensure the system has a consistent source of both nitrogen and carbon as both are essential for the formation of cell structure.

GLASTONBURY, ROCKING ON BIOGAS

On the road with the Circular Bioeconomy Roadshow, **Angela Bywater** finds she's still amazed by the magic of microbes to turn waste into energy and more



Anyone who has run an anaerobic digester knows that it appears to be a rather delicate system, requiring a round-the-clock team of engineers and trained operators gently heating it, carefully feeding it at regular intervals and trying to cajole it into optimal performance. So even the most experienced operator would blanch at the mere thought of taking that process, mounting it on a trailer, bouncing it across the countryside, powering it using solar panels and allowing passers-by to feed it in a rather random fashion whilst still maintaining good biogas production – in all weather conditions and over several days.

Yet for the past 5 years, researchers from the Circular Bioeconomy Roadshow have been doing just that, demonstrating to the public the 'power of microbes' to do amazing things, not least of which is the biodegradation of putrescible organic wastes to produce energy and fertiliser through the process of anaerobic digestion.

This year, the Roadshow, based at the University of Southampton, headed for the Glastonbury Festival where the small mobile digester running on food waste joined the new 124kWe Worthy Farm digester, installed by Biogest and running mainly on slurry from the farm's 1,000 head of dairy cattle. Christened 'The Biogas Stage' by the researchers, electricity from the site's digester was used to power Glastonbury's Main Stage, as well as some backstage areas.

The farm digester was only part of a range of very impressive policies introduced to make the Glastonbury Festival as green as possible. These included a blanket ban on single-use plastic drinks bottles, ensuring that all caterers used compostable/reusable plates and cutlery, and prohibiting the use of single-serving sachets, such as those used for sauces and sugar.

These small changes had big implications for the mobile digester. "In addition to their food waste, of which there was surprisingly little, our visitors could now happily feed the digester with their food cartons", said Methanogen's James Murcott, the digester designer, "although we still had to check for plastic fruit



Love food? Use Waste – James Murcott and Angela Bywater of the Circular Bioeconomy Roadshow, promoting biogas at Glastonbury's Green Fields

labels(!) and tea bags, two small items which have sadly not yet gone entirely plastic-free."

The Festival has its own recycling centre, with a large team of volunteers who collect and sort the material. A number of visitors to the micro-digester were part of this volunteer team, many of whom had been doing the job for years, gathering together from all over the country in order to deal with the rubbish left by more than 200,000 visitors.

"To be honest, we're sometimes scratching around a bit [to pick up rubbish] this year," said one of the volunteers, "It's so nice without all the piles of plastic." With temperatures reaching more than 30°C, festival-goers simply took their re-usable water bottles for a free refill at WaterAid kiosks, a really impressive example of behavioural change, brought about by a clear and simple Festival policy.

The Circular Bioeconomy Roadshow was based in the Science Tent in Glastonbury's Green Fields. With no mains electricity available, all inhabitants of the Green Fields utilised renewable energy, including wind, solar, pedal power and – biogas! For Science Tent researchers, this was a golden opportunity to exercise their creativity in order to produce simple, engaging and imaginative activities.



Powering Glastonbury; the Worthy Farm anaerobic digester from Biogest nestles into the landscape

Members' News & Views



The biogas roadshow explains AD in a nutshell; with the biogas created being used to cook breakfast and an evening meal, as well as producing popcorn for visitors during the day.

The micro-digester was mixed and heated using adjustable solar PV panels, with the biogas being used to cook breakfast and an evening meal, as well as producing popcorn for visitors during the day. Butter for the popcorn was housed in a small evaporative fridge, constructed using plant pots, tights, leca balls and water. And the rocket scientists used a small solar-charged battery to electrolyse water in order to create a regular and impressive rocket launch.

PhD researchers Ana Perdomo Marin and Michael Cousins demonstrated the different ways we can utilise our organic wastes to produce energy and new materials by harnessing biological processes, such as anaerobic digestion and microbial fuel cells. Exhibits included scale models showing how bioenergy technologies work, activities in which participants learn skills for monitoring biotechnologies (such as pH) and volatile fatty acid 'show and smell' tests.

Ana said, "I think that people are particularly impressed when we tell them how scientists can produce a range of products, including bioplastics, from organic materials. They also like biomethanisation, where we take hydrogen produced through electrolysis from excess renewables and produce biogas with a much higher energy (methane) content. People start to realise how research



Did you know? The Glastonbury main stage is powered by AD

contributes significantly to discovering ways that we can reduce our impact on the planet."

Children, in particular, 'get' the concept of anaerobic digestion. It's a lot of fun to ask them to 'feed the popcorn machine' then watch their faces when we hand them a cupful of food waste, as well as showing them the plants we've grown using the fertiliser. Even after years of working in the field of anaerobic digestion, I still share their amazement when we explain how microbes can turn food waste into energy and fertiliser to grow more food.

We might start with anaerobic digestion as a topic with our visitors, but we can end up discussing so many related things: renewable energy, sustainability, waste collection ("why is it different everywhere?"), plastic pollution, biotechnology, research, transport, housing, heating, community, sustainable development goals, government policy, food waste, cooking, gardening, agriculture, urban living – the list is both fascinating and endless. We meet so many inspiring people and we hope that we inspire people with the technology and the research, as well. That is the reason why we take this amazing biological process and bounce it across the countryside.



Angela Bywater is co-manager of the BBSRC-funded Environmental Biotechnology Network. The Circular Bioeconomy Roadshow would like to thank the BBSRC AD Network, the Supergen Bioenergy project and the University of Southampton who provide resources for researchers to attend this and many other public events.

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'GRATE' DEAL PROVES A BIG WINNER FOR AD INDUSTRY

When Iona Capital announced it had struck a deal with the Yorkshire Wensleydale Creamery to produce over 10,000 MWh of energy from whey permeate it gave the whole industry cause to celebrate. It secured for the industry unprecedented positive coverage, reaching millions of readers. The story appeared on the front page of the Daily Star and page 3 of the Sun, appeared in the Mail on Sunday and Observer, and was featured by the BBC as well as the regional press.

The Star reported "Grate Britain; cheese to solve energy crisis"; The Sun said, "Wallace and Gromit's favourite Wensleydale cheese waste to heat 4,000 homes", with an explanation of how AD works; The Mail declared, "Cheese toasty! Watery waste from making Wensleydale cheese will help keep thousands of homes warm"; and the Observer said, "Cracking cheese, Gromit! Wensleydale waste to heat 4,000 homes - Yorkshire dairy by-products will be turned into renewable biogas to cut carbon emissions".

Whey permeate can be classed as a 'Goldilocks' feedstock (just right) for AD. It has a high energy content and is easily digested. Furthermore, it is a free-flowing liquid that is consistent in quality. Mike Dunn, co-founder of Iona, said of the deal, "This partnership with Wensleydale not only shows how we are turning waste food products into useful energy for homes and business, but also our commitment to Yorkshire. Once we have converted the cheese by-product supplied by Wensleydale into sustainable green gas, we can feed what's left at the end of the process

onto neighbouring farmland to improve local topsoil quality. This shows the real impact of the circular economy and the part intelligent investment can play in reducing our CO₂ emissions."

The Wensleydale Creamery's managing director, David Hartley, said of the partnership, "We are delighted to have signed this agreement with Iona Capital and proud to be delivering sustainable environmental and economic benefits to our region. The whole process of converting local milk to premium cheese and then deriving environmental and economic benefit from the natural by-products is an essential part of our business plan as a proud rural business.

"It is only possible as a result of significant and continued investments in our Wensleydale Creamery at Hawes and to sign this agreement and have the opportunity to convert a valuable by-product of cheese making into energy that will power hundreds of homes across the region will be fantastic for everyone involved."

Iona Capital's Whitchurch AD in Shropshire also takes whey permeate from another cheese-maker and is in discussions with other cheesemakers, not only over the supply of waste and by-products to feed their AD plants, but also to look at cheaper, low carbon solutions to meet the high energy and heat demands of cheesemaking facilities. Iona has established nine anaerobic digestion facilities across Yorkshire, investing £100m in the region, and opened a York office in June 2018. The renewable energy plants save the equivalent of 37,300 tonnes of CO₂ each year.



John Kutner (l), Chairman of Iona Capital's Investment Committee, and David Hartley, MD of Wensleydale Creameries signing the agreement



A poster for the Farm Business Innovation 2019 event. The top section features the Twitter handle @FARM_INNOVATION, the dates 6 & 7 NOVEMBER, and the location NEC BIRMINGHAM. The main title is "FARM BUSINESS INNOVATION 2019" with the subtitle "INSPIRING RURAL ENTREPRENEURS". Below this, it says "EUROPE'S LARGEST DIVERSIFICATION EVENT FOR FARMERS AND RURAL LAND OWNERS". The poster is decorated with various images and circular callouts: "BEAT BREXIT UNCERTAINTY", "PIONEERING TECHNOLOGY", "550 INNOVATIVE EXHIBITORS", "250 INSPIRING SEMINARS", and "EXPERT ADVICE FROM THE CLA". At the bottom, it says "REGISTER FOR FREE TICKETS" and "FARMBUSINESSSHOW.CO.UK".

AD PRIZE FUND LAUNCHED

A new £2,500 prize fund aimed at attracting new talent into the anaerobic digestion (AD) and energy from waste (EfW) industries has been launched by Privilege Finance. The Energy from Waste Innovation Fund is open to undergraduate and postgraduate university students in the UK completing a dissertation related to renewable energy technology and engineering. The prize fund comprises £1,000 for the winner and £750 each for two runners up upon completion of their research, as well as 12 months of mentoring from the award founder, Privilege Finance.

"We're keen to support new talent in the renewables and EfW sectors," says Phil Gerrard, CEO at Privilege. "With a growing focus on developing the UK's circular economy, new and existing technologies that use waste materials to generate a sustainable source of energy will become ever more important. "To make sure the UK is at the forefront of this technology, we need to encourage, attract and retain fresh talent," he adds. The prize fund has been developed to bring students with a flair for innovation, problem solving and 'outside the box' thinking, to the fore. The three finalists will also be offered access to Privilege's business contacts and network.

Applications are now open, and further details on the award and how to apply can be found on the company's website:

www.privilege.finance/privilege-innovation-fund/

SCOTLAND TAKES LEAD ON DELIVERING NET ZERO

ADBA has welcomed the publication of the Scottish Government's programme of action for 2019-2020 and beyond, which puts emphasis on addressing climate change and achieving its net zero carbon emissions target by 2045 through a range of policies, including decarbonising transport and heat. Scotland has also been a leader in the drive to reduce and recycle food waste into bioenergy and bio-fertilisers, with 56% of Scottish households having access to separate food waste collections. The paper sets out Scotland's "Green New Deal" to stimulate investment and build momentum towards reducing emissions across multiple sectors and generating new green jobs.

Charlotte Morton, Chief Executive of ADBA, said, "Once again, Scotland is demonstrating its commitment to addressing climate change and leadership in putting policies in place to stimulate the development of a sustainable green economy. We have been working for many years with Zero Waste Scotland and have a very productive relationship with this nation. We look forward to supporting their efforts in achieving their net zero objective."



ADBA ENGAGES WITH LOCAL AUTHORITIES



Hilary Tanner

As part of our ongoing stakeholder engagement on the implementation of separate food waste collections, Jon Harrison and Charlotte Morton recently met Hilary Tanner from the Local Government Association, to discuss local authority views on this important policy. We agreed on the critical importance of the promised government funding, given the various complexities in introducing this policy, and the need to learn from best practice both here and abroad. The External Affairs and Policy team will continue to talk to our local government colleagues to ensure that AD is recognised as a critical component of the food waste recycling hierarchy, and then solid systems are in place to recycle this waste once it has been collected.

CALL FOR FEEDBACK

The National Grid's gas operations are looking for feedback regarding the ease and cost of connecting to their high pressure gas network. The National Grid has been working over the past few years to deliver Project CLoCC (Customer Low Cost Connections), which aims to make connecting to the National Grid easier and cheaper. They are now looking to the AD industry to provide their insight into any and all issues which impede connection to the grid – this may include financial, technical and/or administrative considerations. Specifically, what are the main barriers to entry? Please contact us at enquiries@adbioresources.org with your feedback and insight.



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- Bio-Methane Potential Test

For more information please contact

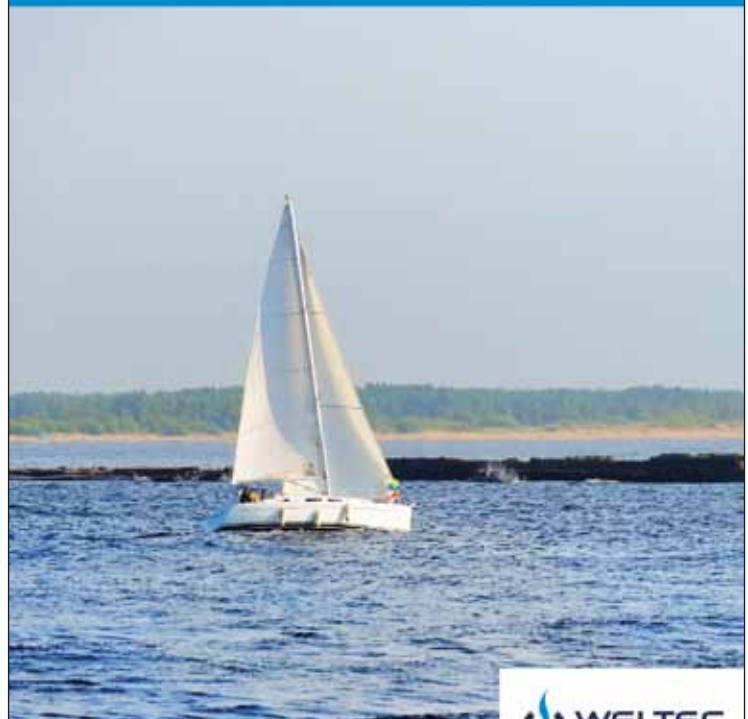
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INDUSTRY CLEARED OF 'PHANTOM' SUBSIDY CLAIMS

Site inspections by the Department for the Economy in Northern Ireland have disproved claims that "phantom" renewable power plants earned large sums of subsidy payments. However, it has said that a small number of plants, which are currently set up to operate in a way to attract maximum payments, may need to be moved to less lucrative subsidies. The investigation follows a long-running issue in Northern Ireland regarding AD and subsidies. Onshore wind turbines and anaerobic digestion (AD) plants were accredited to the Northern Ireland Renewable Obligation scheme (NIRO) to incentivise renewable electricity. A BBC investigation claimed that 'phantom' AD plants were receiving large subsidy payments via the NIRO.

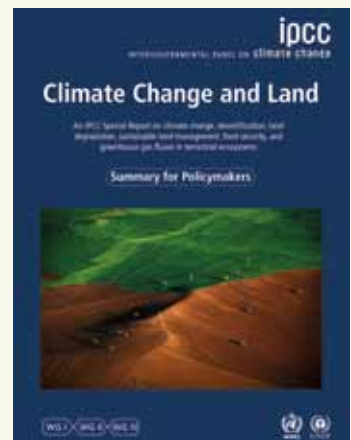
The Department of the Economy has now said it had found no evidence of fraud, to date, but is taking legal advice on what actions it can take if fraud is subsequently found. The bulk of the 23,500 installations accredited to the NIRO are wind turbines, with 89 units generating electricity from biogas produced by ADs.

BIOENERGY KEY TO KEEPING GLOBAL WARMING BELOW 2C

At the beginning of August, the Inter-governmental Panel on Climate Change (IPCC) released its latest report, Climate Change and Land, which not only states that better land management is needed to address climate change, but also that reducing GHG emissions from all sectors, especially from food waste, is essential to keep global warming to 1.5C or well below 2C.

ADBA welcomed the report and the acknowledgement that future land use will need to support bioenergy to ensure that global warming is limited to 1.5C. This would need to be integrated into a portfolio response to the climate crisis, including reforestation, afforestation, reduced deforestation, and a reappraisal of our existing food system.

Charlotte Morton, Chief Executive of ADBA, said, "On-farm AD is a key growth area in the UK and an essential part of achieving the UK's Net Zero emissions target by 2050. It enables the development of a sustainable farming model in which organic wastes are recycled into natural fertilisers, to restore our depleted soils; and biogas to generate power for electricity or biomethane for the hard-to-decarbonise transport and heat sectors. We are feeding in our views to help shape the UK's Agriculture Bill, among other policies, to ensure the UK can take the lead in revolutionising farming, food waste and sustainable land use. This IPCC report is welcome in emphasising the very urgent need to do so."



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for membrane cover digestors

With two
inspection
glasses
Full control at
a glance!



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DYNAMIC DISCUSSIONS DEVELOP EXPERTISE



The ADBA Training and L&D programme addresses all aspects of running an AD plant efficiently, to optimise processes safely and sustainably, from feedstock planning through to utilising digestate. Programme organiser **Greville Southgate** reports back on the latest events

Plant Optimisation Training, 29th August, Cambridge.

This training day was hosted by **Bidwells** in Cambridge and delivered by Angela Cronje of **Roots Organics**, an engaging and dynamic speaker. Angela is a Chemical Engineer with 15 years' experience in the waste industry and now specialises in AD, working with investors, AD and composting operators, farmers and end users of digestate and compost products. Those attending mostly comprised of operators of on-farm AD plants with a broad cross-section of industry knowledge in the room. This made for a lively, busy day with everyone contributing to the discussions. Plant optimisation is about improving a range of processes by small increments, which add up to a significant impact overall. Angela explained how data monitoring is critical. Measuring the different processes provides data which can be laid out in graphs. Whilst this is initially time-consuming, once established new data can be easily added, to provide an accurate picture of the plants' activity across time. This provides the guide for what the plant should be doing and what it could be achieving, allowing for optimisation. Plant optimisation is also about adopting best practice, to ensure that the plant is run safely and managed professionally. All these aspects feed into the ADBA ADCS programme, which aims to recognise and certify plants that are well run.

Clamping event – Good clamping increases yield, 5th September, Bury St. Edmunds.

This L&D event brought together excellent presentations from three clamping providers, one lawyer and one representative from the Environment Agency. The supplier presentations from Will Wilson of **Ark Agricultural**, Will Mallon of **WM Agri** and Andy Strzelecki of **Kelvin Cave Ltd** addressed the importance of careful planning and good management, safe operating practices, equipment and crop additives. Jonathan Croley of **Ashfords LLP** addressed the legal considerations on the various aspects of managing sub-contractors, with particular focus on clamp filling contracts. Alan Jones of the **Environment Agency (EA)** explained the EA's role and activities in ensuring that agricultural AD plants meet the relevant standards. This was another lively, interactive day with lots of questions and involvement from the delegates, often providing useful feedback from the operators on the ground. We learned about various different tools and equipment that can make filling, compacting and emptying both safer and more efficient. We discussed using digestate to seal the clamp and looked at the impact of various crop additives, with some interesting and surprising conclusions.

Future Training and L&D events for the coming year will address:

Feedstock & Biology; Process Monitoring in Agricultural AD Plants; Process Monitoring in Food waste AD Plants; Pipes, Pumps, Valves & Gauges. For further information on these or any of the other ADBA Training or L&D events should contact:

greville.southgate@adbioresources.org or check the ADBA website www.adbioresources.org

FORTHCOMING EVENTS



10th OCT
2019



ADBA AUTUMN MEMBERS MEETING 2019

Ashfords LLP, London, EC4A 1AN

This free, member-only event gives you the chance to hear from government departments such as BEIS and DfT, as well as regulators including Ofgem, and to discuss the latest industry developments with our policy team.



11th DEC
2019



ADBA NATIONAL CONFERENCE 2019

One Great George Street, London SW1P 3AA

The UK anaerobic digestion industry has a critical role to play in helping the government achieve their 'net zero' greenhouse gases by 2050. This year's conference will discuss what this is and how it can be achieved. Therefore, the central theme is: **There's no Net Zero without Biogas**. As well as debating this issue with leading industry figures, delegates will address specific sectors such as farming, heating, transport, digestates, CO₂ and end of life, and learn more about how **AD can help end waste, deliver the circular economy and tackle the climate crisis**.



2nd JUL
2020



AD & BIOGAS INDUSTRY AWARDS 2020

The Vox, Birmingham

The AD and Biogas Industry Awards acknowledge the contribution individuals and organisations make towards driving the advancement of biogas all over the globe. The Awards will open for submissions in November 2019 and the winners announced at the annual black-tie gala dinner on 2nd July 2020 alongside the UK AD and World Biogas Expo. adbioresources.org/events/awards/



1-2nd JUL
2020



UK AD AND WORLD BIOGAS EXPO 2020

NEC Birmingham

The UK AD and World Biogas Expo is the largest international trade show dedicated solely to the anaerobic digestion and biogas industry, providing the latest market and technology news, sector by sector, as well as a platform for industry professionals from the UK and overseas to network, share best practices and strengthen and form business relationships. Along with up to 200 exhibitors, the Expo will offer free content across themed theatres bringing you everything you need to do to prepare for the opportunities that lie ahead for the industry. Free registration, sponsor and exhibitor opportunities visit www.biogastradeshow.com



1-2nd JUL
2020



WORLD BIOGAS SUMMIT 2020

NEC Birmingham

After a successful launch in 2019, the World Biogas Summit will be returning to bring an international line up of thought leaders together to discuss how to realise the huge potential of biogas. The event will feature case studies from around the world, demonstrating where it is already happening in practice. Visit www.world-biogas-summit.com for free registration and sponsorship opportunities.

THIRD PARTY EVENTS



6-7th NOV
2019



FARM BUSINESS INNOVATION 2019

NEC Birmingham

Visit the ADBA team on stand FR106 at the nation's biggest event dedicated to providing the guidance, education, suppliers, and opportunities needed to help farmers and rural business owners diversify and increase their income. Find out more at www.farmbusinessshow.co.uk

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