LookiNg beyoNd eNergy –
the New froNtiers for Ad
the import ANce of hA viNg
robust odour coNtroLs

MOBILISING GENERATION BIOGAS

CREATING THE CIRCULAR
CITIES OF TOMORROW

LOOKING BEYOND ENERGY –
THE NEW FRONTIERS FOR AD

THE MoD ENLISTS AD AND
SALUTES £300K SAVING

THE IMPORTANCE OF HAVING
ROBUST ODOUR CONTROLS

TALKING ABOUT YOUR GENERATION...
AND NEW MCPD REGULATIONS
Tank Lining for secondary containment
Lining for Digestate Lagoons
Storage Clamp Lining
Leakage detection for tanks and lagoons
PE Pipe installation

Agitation pipe systems for lagoons
Tank bund liners
Floating covers for lagoons
Design and drawing assistance for planning
Comprehensive 25 year warranty

Enviroseal Lining Solutions supply and install a range of lining solutions for concrete digestate tanks, tank bunds, storage clamps, lagoons and floating covers. The materials we use meet current guidance for containment and are approved by the Environment Agency and SEPA.

We also supply and install our own, Environment Agency approved, geosynthetic leakage detection system for storage lagoons and tanks. We have extensive experience of providing bespoke technical solutions for clients across the UK and Europe.

Enviroseal offer free design services, material selection advice and site survey with for all of our projects. All of our work covered by a comprehensive 25 year warranty.

www.enviroseal.co.uk

t: 01695 228626
THE AD INDUSTRY OFFERS REMARKABLE POSSIBILITIES FOR THE UK’S FUTURE

Graham Stuart MP, Minister for Investment at the Department for International Trade

The Government recognises the AD Industry’s potential to make a real difference. It can help in the battle against man-made climate change, meet many of the United Nation’s Sustainable Development Goals, and improve the UK’s export performance. Few industries can boast of such a combination of advantages, which include improving the environment, our economy and international development. The Government is looking to support this in a number of ways:

Defra has published its Resources and Waste Strategy, setting out a new policy direction for the next 25 years and identifying a wide range of objectives for maximising the value we get from our resources and minimising waste. It tackles long-standing issues like waste crime, inconsistent collection systems, plastic pollution, and food waste.

Introducing the requirement for separate food waste collections from all households and appropriate businesses proposed in our Strategy would represent a big step in the right direction. We would invite the AD industry to respond to this opportunity and develop the necessary infrastructure to ensure we get the most out of separately collected food waste. This is a great chance to develop this sector further since it is clearly the best option to treat food waste, from both commercial and domestic sources.

The Department for International Trade is also working with firms to begin exporting, which is the necessary next step in expanding to new global markets. We have a network of International Trade Advisors throughout the country to support new exporters and small to medium-sized companies.

In addition, the Renewables Sector team can provide advice with their industry experts and specialists. We also have an extensive overseas network which operates in 108 countries and 177 individual posts and links for companies interested in these markets. UK companies already export over £100 million worth of biogas-related expertise and equipment per year and ADBA has calculated that the sector could export up to £5 billion worth a year. I’d like to stress that the Government is working closely with ADBA to help realise that ambition.

We are dedicated to giving the right support to meet business needs, such as guiding companies to trade internationally, attract the foreign direct investment and to open-up markets and champion free trade. The Government understands that the AD industry offers remarkable possibilities for the UK’s future. Officials are also working to ensure that the right incentives are in place to support the AD industry to help decarbonise the heat network and promote sustainable transport fuels.

I believe this industry has the potential to be a pioneer in exporting waste management technologies around the world and I’d like to encourage everyone to engage with officials at the Department for International Trade to make this happen.

WELCOME ALYSSA

Alyssa Thorp, Marketing Manager - Events

“It’s important to me that I work for an organisation that exists to promote more environmentally friendly, sustainable ways of living and doing business. The work that ADBA is involved in is so important and I’m proud to be contributing to it.”

WELCOME GREVILLE

Greville Southgate, Conference Producer & Programme Manager

“Coming from a background of organising events and training in the voluntary sector, I am excited to now be involved in driving the circular economy and green agenda. I am proud and pleased to be a part of the crucial role that ADBA performs in supporting members and facilitating progress throughout the sector.”
I try to avoid the use of buzzwords, but it’s difficult not to mention one specific concept that is currently hanging over the AD and other industries like a heavy fog: uncertainty. The government’s attempts to secure a Brexit deal have gone right to the wire, and at the time of writing the threat of no deal continues to loom large. We encourage those in the AD industry to take all necessary precautions to prepare for the eventuality of no deal, including ensuring that you have sufficient stock of spare parts in case you experience a plant fault on 30th March. The ADBA team is on hand to assist members, so do get in touch if you’re experiencing any problems.

We are hopeful that some certainty will be provided by the government’s forthcoming Spending Review, due to take place this year. It’s essential that the Review includes a decision on a long-term strategy for supporting renewable heat generation, detailed plans on how farmers will be supported under the government’s new Agriculture Bill, and meaningful funding for implementing the government’s plans for rolling out universal food waste collections. Government needs to make decisions on these areas now; AD is a low-regret option that can make a vital contribution to achieving policy goals across the board, as well as providing a vital post-Brexit opportunity to export into the potential £1trn global biogas market.

The publication of the Resources & Waste Strategy and its provisional export into the potential £1trn global biogas market.

Despite the current atmosphere of uncertainty, I believe that the best for AD in the UK and beyond is just around the corner. We’re looking forward to joining members in celebrating ADBA’s 10th anniversary this year, taking the opportunity to toast successes to date and to look forward to what we need to collectively achieve to ensure the industry meets its enormous potential. I hope you’ll join us on this exciting journey.

THE NEED FOR CERTAINTY IN A TIME OF CHANGE

By Charlotte Morton, ADBA’s Chief Executive

The need for meaningful engagement with householders and businesses to ensure that they use their food waste caddies correctly feeds into a broader need for government and the AD industry itself to engage with the general public to share understanding of and increase public support for AD. We have just 11 years to dramatically reduce global greenhouse gas emissions to avoid the worst effects of climate change, and it’s essential that everyone, from politicians and policymakers through to businesspeople and everyday citizens, recognises the vital role that AD can play in tackling emissions across waste, energy, farming and transport.

Conference Producer & Programme Manager, Greville Southgate
T +44 (0)203 176 4415 E greville.southgate@adbioresources.org

Events Admin & Production Assistant, Cheryl Murdoch
T +44 (0)203 735 8118 E cheryl.murdoch@adbioresources.org

Senior Marketing Manager, Jocelyne Bia
T +44 (0)203 735 8117 E jocelyne.bia@adbioresources.org

Marketing Manager – Events, Alyssa Thorp
T +44 (0)203 735 8117 E alyssa.thorp@adbioresources.org

Marketing Manager – Membership, Robert Zlokower
T +44 (0)203 960 0780 E robert.zlokower@adbioresources.org

Finance Manager, Subi Nagendra
T +44 (0)203 176 6962 E subi.nagendra@adbioresources.org

Finance Assistant, Angela Knight
T +44 (0)203 567 1041 E angela.knight@adbioresources.org

AD Finance, Bruce Nelson, Director of Compass Renewables
T +44 (0)1732 464495 E bruce@compassbusinessfinance.co.uk

Jelf Insurance Team
T +44 (0)1905 892356 E adba@jelfgroup.com

CEO, Green Gas Trading Limited, Grant Ashton
T +44 (0)7951 240728 E grant@greengastrading.co.uk

Editorial Manager – ADBA and AD&Bioresources News, Jon Hughes
T +44 (0)203 176 0590 E jon.hughes@adbioresources.org

View from the Top

ADBA TEAM

Chief Executive, Charlotte Morton
T +44 (0)203 176 0503 E charlotte.morton@adbioresources.org

Head of Policy, Ollie More
T +44 (0)203 567 0751 E ollie.more@adbioresources.org

Senior Policy Manager, Dr Thom Koller
T +44 (0)203 176 0592 E thom.koller@adbioresources.org

Policy Officer, Alberto Rocamora Garcia
T +44 (0)203 735 8115 E alberto.rocamora@adbioresources.org

External Affairs Manager, Jon Harrison
T +44 (0)203 176 0591 E jon.harrison@adbioresources.org

PR & Parliamentary Affairs Executive, Chris Noyce
T +44 (0)203 176 5441 E chris.noyce@adbioresources.org

Sales Manager, Roberta Bontempo
T +44 (0)203 176 4414 E roberta.bontempo@adbioresources.org

Senior Sales Executive, Ellis Owen
T +44 (0)203 960 0774 E ellis.owen@adbioresources.org

Senior Sales Executive, Cristina Martins
T +44 (0)203 176 0592 E cristina.martins@adbioresources.org

Senior Events Manager, Nigel Kay
T +44 (0)203 176 5440 E nigel.kay@adbioresources.org

AD & BIORESOURCES NEWS | SPRING 2019

www.adbioresources.org

adbioresources.org
FROM DITCH TO DIGESTER: ADBA AND THE STORY OF FOOD WASTE

ADBA’s Senior Policy Manager Dr Thom Koller recalls the milestones on the long and winding road to achieving separate food waste collections across the UK.

Later this year ADBA celebrates its tenth year. Since its formation, one of the principle campaigns we have pursued is food waste: playing our part in reducing waste, calling for household collections to be rolled out throughout the UK, and seeing to it that any food waste goes to AD if it cannot first be redistributed.

Just before Christmas a significant step was taken, with the Department for Environment, Food and Rural Affairs (Defra) publishing the Resources and Waste Strategy for England. The Strategy commits local authorities to introducing food waste collections by 2023 and recognises the importance of AD in recycling inedible food waste, as representing “the best environmental outcome for food waste that cannot be prevented or be redistributed”.

The Strategy has been welcomed by the wider sector, achieving broad support by providing assurances “that local authorities are resourced to meet new net costs arising from the policies in this Strategy, including up-front transition costs and ongoing operational costs”. A supported transition to separate food waste collections throughout England is vital for all involved, if we are to undertake this adoption of the circular economy.

According to our estimates, around 4.2 million tonnes of food waste is annually being sent to a lower value use, i.e. technologies that are lower down the food waste hierarchy than AD – this could present huge growth opportunities for AD. The journey to here was not easy but by coming together as an industry we have been able to make our best case – well done to all involved in this significant step. Here is our how we got to where we are today.

2010 in response to Defra’s AD Implementation Plan, ADBA called for action to address the sending of organic wastes to incinerators and landfill, putting AD forward as the appropriate solution.

Meanwhile, the Scottish Government published its Zero Waste Plan, setting the groundwork for the The Waste (Scotland) Regulations 2012. Coming into force in 2014, these made it mandatory for food businesses to separate out food waste for collection by 2014 (if producing greater than 50kg per week) or 2016 (if producing greater than 5kg per week). They also required local authorities to provide separate food waste collections in all non-rural areas by 2016.

As designs for the Renewable Heat Incentive were first being discussed, ADBA noted to government the important role AD could play in providing waste management solutions for the food manufacturing industry, as well as providing them with clean renewable energy.

And in response to the UK National Renewable Energy Action Plan which noted that “if all the food and wood waste sent to landfill were used for energy it would generate 42 TWh, or approximately 18% of our renewable energy target”, we urged for support on collection infrastructure changes and measures to ensure consistency and quality also be introduced.

2011 Things really kicked off with the Defra led Review of Waste Policy recognising AD as achieving the greatest environmental benefit of any food/organic waste treatment process. We put forward our view that AD be placed above composting in the waste hierarchy and energy from waste. Subsequently the 2011 Anaerobic Digestion Strategy and Action Plan committed to increase energy from waste through AD, as a result of the Coalition Government’s commitment to support a ‘huge increase in energy from waste through AD’.

2012 Defra consulted on amending the Waste Regulations of 2011 and ADBA called for a more proactive approach to be taken, with source segregation of food waste necessary to help improve dry recycle and allow for high value products from the organic material.

2014 The Welsh Government’s 2010 Towards Zero Waste strategy began to be implemented with millions of funding for AD plant and separate household food waste collections.

2015 Northern Ireland introduced the Food Waste Regulations (Northern Ireland) 2015 which place a duty on food businesses producing, 50kg or more of food waste per week to present food waste for separate collection from 1st April 2016; and 5kg or more of food waste per week to present food waste for separate collection from 1st April 2017.

Continued>>
With just England now without some form of separate food waste collections, ADBA lobbied at the EU level to have compulsory segregation of biowaste, now an important part of the Circular Economy Package.

**2016** We lobbied more locally too, with ADBA Chief Executive Charlotte Morton saying before the Environment, Food and Rural Affairs Committee in 2016 that it is “mind-bogglingly obvious that we should be separating out food waste and recycling it”.

A Food Waste Recycling Action Plan was launched by WRAP in July, to increase the quantity and quality of household and commercial food waste collected and recycled in England. As a result of an ADBA initiative, supported by the then Defra minister Rory Stewart, a panel of industry experts developed the Framework for greater consistency in household recycling in England.

**2017** We continued to advocate the important role of AD and separate food waste collections to the development of the bioeconomy (BEIS' Call for evidence on the UK Bioeconomy) and to future needs for UK infrastructure (National Infrastructure Commission's National Infrastructure Assessment). We also provided evidence to the London Assembly Environment Committee.

Following the publication of Defra’s 25 Year Environment Plan and the commitment in that to develop a new national Resource and Waste Strategy we knew 2018 was an important year for AD and food waste.

**2018** For their Bioenergy Review, we provided evidence to the Committee on Climate Change on the emissions reduction of separate food waste collections and AD. We also responded to Defra’s request to us for evidence, detailing industry growth and investment that would be achieved through the introduction of separate food waste collections in England; job creation; digestate potential; reduction in food waste and greenhouse gas reduction. Our October 2018 Policy Report was a ‘food waste’ special edition.

Despite this progress, we are not at the end of the journey. Not only do we need to ensure the ambition of the Resources and Waste Strategy is realised — and there will soon be a consultation launched — but in the years to come we also need to continue to work together as an industry to reduce contamination and improve food waste capture rates.

**Policy News**

With just England now without some form of separate food waste collections, ADBA lobbied at the EU level to have compulsory segregation of biowaste, now an important part of the Circular Economy Package.

**2016** We lobbied more locally too, with ADBA Chief Executive Charlotte Morton saying before the Environment, Food and Rural Affairs Committee in 2016 that it is “mind-bogglingly obvious that we should be separating out food waste and recycling it”.

A Food Waste Recycling Action Plan was launched by WRAP in July, to increase the quantity and quality of household and commercial food waste collected and recycled in England. As a result of an ADBA initiative, supported by the then Defra minister Rory Stewart, a panel of industry experts developed the Framework for greater consistency in household recycling in England.

**2017** We continued to advocate the important role of AD and separate food waste collections to the development of the bioeconomy (BEIS' Call for evidence on the UK Bioeconomy) and to future needs for UK infrastructure (National Infrastructure Commission's National Infrastructure Assessment). We also provided evidence to the London Assembly Environment Committee.

Following the publication of Defra’s 25 Year Environment Plan and the commitment in that to develop a new national Resource and Waste Strategy we knew 2018 was an important year for AD and food waste.

**2018** For their Bioenergy Review, we provided evidence to the Committee on Climate Change on the emissions reduction of separate food waste collections and AD. We also responded to Defra’s request to us for evidence, detailing industry growth and investment that would be achieved through the introduction of separate food waste collections in England; job creation; digestate potential; reduction in food waste and greenhouse gas reduction. Our October 2018 Policy Report was a ‘food waste’ special edition.

Despite this progress, we are not at the end of the journey. Not only do we need to ensure the ambition of the Resources and Waste Strategy is realised — and there will soon be a consultation launched — but in the years to come we also need to continue to work together as an industry to reduce contamination and improve food waste capture rates.
WASTE STRATEGY COULD SPARK £860M INVESTMENT IN AD

The government has published its long-awaited Resources & Waste Strategy, the first major change to waste management in England in over a decade. The Strategy requires government to reduce greenhouse gas emissions from landfill “by ensuring that every householder and appropriate businesses have a weekly separate food waste collection”, subject to consultation.

Importantly, it provides assurances that local authorities will be “resourced to meet new net costs arising from the policies in this Strategy, including up front-transition costs and ongoing operational costs”. This will be vital in ensuring a supported transition to separate food waste collections throughout England, with many local authorities currently unable to meet the upfront costs of introducing these.

The actions set out in the Strategy are significant for the AD industry as it should see more than four million tonnes of household food waste redirected to AD from energy recovery and landfill. We estimate that this could lead to the building of 80 new food waste AD plants, with an associated £860m investment.

SCOTTISH GOVERNMENT BACKS AD AND FITs

The Scottish Government has reiterated its support for AD and said it believes the Feed-In Tariff (FIT), which is due to close to new applicants at the end of March, should be retained.

Scotland’s Minister for Energy, Connectivity and the Islands Paul Wheelhouse MSP said in response to a written question from a fellow MSP:

“The Scottish Government is committed to encouraging and promoting renewable technologies, such as anaerobic digestion in Scotland. We recognise that energy from anaerobic digestion, as part of a diverse energy mix, can contribute to our renewable targets, and support the future decarbonisation of Scotland’s agriculture sector and wider energy market.

“(…) Anaerobic Digestion schemes up to 5 MW have been supported through the UK Government’s FIT scheme which will close to new applicants in March 2019. The Scottish Government have agreed that the FIT regime should be retained given its importance for small scale projects and community renewables projects.”

ADBA also understands that the Scottish Government will be developing a local energy policy statement this year that will set out measures it can take to support AD. The first step will be a consultation, which is expected before the summer.

For the latest news on AD in Scotland, be sure to join us on 28th February in Glasgow for the ADBA Scottish National Conference 2019 (see adbioresources.org/events/scottish-national-conference/ for details).

EIGHT NEW TARIFF GUARANTEE APPLICATIONS

The energy regulator Ofgem has confirmed receipt of 16 applications for biomethane Tariff Guarantees under the Renewable Heat Incentive (RHI) ahead of the 1st January tariff degression.

ADBA believes that eight of these were resubmissions of existing applications, seeking to push back their planned commissioning date to nearer the deadline of 31st January 2020. This means that a further eight new applications were lodged in addition to the 26 that have already gone through the process. While these applications may be yet to provide evidence of financial close and receive a Tariff Guarantee Notice (TGN), they will, if granted a TGN, constitute around £25 million estimated spend for the scheme. These new applications would take us nearer to the level necessary for a further degression but, according to our understanding of the data, would not cause one on 1st April. It is possible, however, that they may count towards a possible July degression.

The commissioning deadline, meanwhile, is now extremely tight in respect to typical plant build times, with the situation made worse by the two winters that fall between the time when applicants received their TGNs and January 2020.

To support members and ensure that plants can deploy, ADBA, the Energy Networks Association and the Renewable Energy Association have suggested that a ‘grace period’ be introduced for such plants in conditions whereby injection commencement is unavoidably delayed due to reasons completely outside of their control.

The trade associations continue to discuss this proposal and other options with government officials, as well as sharing with them the impacts on the AD industry and the efforts being undertaken to meet the deadline.

For more information on the RHI and Tariff Guarantees, contact thom.koller@adbioresources.org
CLEAN AIR STRATEGY PUBLISHED

The Department for Environment, Food & Rural Affairs (DEFRA) has published its Clean Air Strategy, which sets out the comprehensive actions required across all parts of government and society to improve air quality. The part of the Strategy most relevant to AD is agriculture. DEFRA continues to recognise the benefits of AD but acknowledges that digestate storage and spreading contributes to ammonia emissions. Last year’s draft Strategy proposed several measures to mitigate ammonia emissions from agriculture and ADBA was pleased that, following consultation, DEFRA had revised these in a manner that recognised some of the concerns we set out in our response.

The government intends to consult as quickly as possible on its proposed measures to provide farmers, farm suppliers and farm service providers with certainty on the investments needed.

For England, these measures will likely be aligned with the development of an environmental land management scheme rewarding farmers delivering public goods. This new scheme will ensure ammonia emissions are not allowed to impact protected habitats.

As part of the Clean Air Strategy, DEFRA is also launching a £19.6 million ‘Clean Air: Analysis and Solutions’ research programme, to be delivered in partnership with UK Research & Innovation. The programme will drive innovation to solve air pollution problems, enable the development of novel technologies and promote a cleaner economy — and many of its focus areas are relevant to AD.

For more information on the Clean Air Strategy, contact alberto.rocamora@adbioresources.org

GOVERNMENT CONSULTS ON SMALL-SCALE POWER REFORM

The Department for Business, Energy & Industrial Strategy (BEIS) has published a new consultation on introducing a mandatory supplier-led route to market for small-scale, low-carbon electricity generation: the Smart Export Guarantee (SEG).

The consultation recognises that routes to market for exported electricity are currently limited and have an emphasis on larger capacity generators. BEIS therefore believes there is merit in exploring possible arrangements for the small-scale low-carbon generation sector after the closure of the Feed-In Tariff (FIT) in March.

Under the SEG, government would legislate for suppliers to remunerate small-scale low-carbon generators for the electricity they export to the grid. Remuneration would be available to all the technologies currently eligible for the FIT scheme up to 5MW in capacity.

The consultation follows the news from just before Christmas regarding the closure of the current FIT flat-rate export tariff to new applications from 31st March 2019 alongside the generation tariff. For more information on the SEG and FIT, contact alberto.rocamora@adbioresources.org

LAND MANAGEMENT IDEAS SOUGHT

Following the 2016 referendum decision to leave the European Union, the government’s planned reforms for agricultural support in England are well underway.

As was signalled in last year’s consultation on the future for food, farming and the environment in a Green Brexit, government is seeking to fundamentally change UK farming and food production to ensure public money — i.e. support for farmers — delivers certain key ‘public goods’. ADBA has argued that these public goods should include benefits delivered by AD, such as production of renewable energy and natural fertiliser, decarbonisation and soil restoration. From 2021, farmers and land managers will enter into environmental land management agreements that will determine payments. While payments under the existing scheme will continue in 2019 and 2020, trials of the new system are getting underway from this year.

The Department for Environment, Food & Rural Affairs is now welcoming proposals for pilot schemes for its Environmental Land Management scheme. If you are interested in applying you can download an application pack at http://adbioresources.org/docs/Invitation_to_submit_proposals_and_ideas.docx

Applications should be made before 1st April 2019 to elmtestingandtrials@defra.gov.uk

FUEL EMISSIONS LIMITS COME INTO FORCE

The UK Motor Fuel Greenhouse Gas (GHG) Emissions Reduction Obligation has entered into force, aiming to achieve the interim target of a 4% reduction in GHG emissions by the end of the year from a 2010 baseline.

The final target for 2020 is a reduction of 6% in line with the European Union’s Fuel Quality Directive. 2019 also sees the Renewable Transport Fuel Obligation (RTFO) level increase by 1.25 percentage points to 8.5%, meaning that fuel suppliers now have to source 8.5% of their fuel from renewable sources such as biomethane. At the time of writing, the trading price of RTFO certificates was currently 10.25 p/certificate, significantly down on the 15p/ certificate price that the scheme has seen since the RTFO reforms were first announced in September 2017.

The obligation under the Motor Fuel GHG regs operates independent to but simultaneously with the RTFO, applying to fuel suppliers providing over 450,000 litres of fuel. Fuel suppliers can either acquire as many credits as they need to reach the targets or pay a buy-out price of £74/ tonne of carbon dioxide.

For more on biomethane for transport, contact alberto.rocamora@adbioresources.org
BioMethane Grid Entry Units (GEU)

LP/IP/MP/HP Network Connections

Orbital's BioMethane-to-Grid solutions provide a fully integrated system, incorporating our unique propane injection solution providing unmatched speed / control / accuracy by interfacing with Orbital GasPT and VE Technology. Our solutions are in full compliance with gas network requirements.

A market leader in BioMethane to Grid Entry Units, Orbital’s advantages include:

- Connected to All UK Networks Operators
- Designs for all pressures tiers
- In-House Registered Design Approvers
- GasPTO (Ofgem approved CVDD)
- Propane Optimisation and Control – target CV < 30 secs
- Reduced OPEX (Propane and utility gases)
- Segregated Control & Telemetry
- Remote access for on-line maintenance and support
- Retrofit Propane Injection and Control System available

Visit www.orbitalgas.com to see how Orbital is Innovating Gas Solutions for Focused Accuracy.

www.orbitalgas.com/biomethane
In future cities there will be no such thing as waste. Built in obsolescence will be a thing of the past. Single use plastics too. All goods will be made to be reused or repurposed. Organic wastes will be routinely collected, to make energy and natural fertiliser. Diets will have changed; meat eating will have reduced by half, fundamentally shifting the nature of agriculture. Modes of transport and working will have also changed.

The target dateline to achieve this: 2030; just 11 years to decarbonise the economy and avoid catastrophic runaway climate change, say the Intergovernmental Panel on Climate Change. The timeframe is tight but widely accepted. We are in real blockbuster movie territory.

Professor Lord Nicholas Stern, who wrote the landmark Review of Climate Change in 2006 and is the IG Patel Chair of Economics and Government at the LSE and affiliate of the Grantham Research Institute on Climate Change, is unequivocal about that. Delivering a post COP24 analysis at the LSE shortly before Christmas he said, “We have 12 years to decarbonise the existing economy by 50%.” But, and it is a big BUT, over the next 20 years the global economy will simultaneously double in size. All that new growth will have to be carbon free, or else “the fossil fuel industry will extinguish itself in the environment it creates”. By extension, it will take us all down with it. Business as usual is clearly not an option.

**The circular economy**

In response to this challenge a new economic orthodoxy has emerged, known as the circular economy. The Ellen MacArthur Foundation is one of the key drivers of this new thinking. It was founded by Dame Ellen MacArthur, the renowned offshore racer and solo yachts woman who, in 2005, set the record for the fastest solo navigation of the globe. It was on that journey that the finite nature of resources on the planet dawned on her. Simply put, she realised we shouldn’t keep burning carbon to make more things to throw away.

Songdo in South Korea is the prototype smart green city. It has been built from scratch on 600 hectares of reclaimed land, 65km outside Seoul. It was the brainchild of former President Lee Myung-Bak, who wanted to promote low-carbon growth as the critical driver of future development.

The city is designed to be a smart city or ‘ubiquitous city’, with computers built into the buildings and streets. This allows residents to control lighting, heating and air conditioning and more at the touch of a button. Sensors gather information on things such as traffic flow and energy use. The water pipes are designed to prevent drinkable water being used in toilets or showers. A pneumatic food waste disposal system means there are no bins and refuse collection vehicles – with organic food wastes separated en route to become energy feedstock.

There are 25km of cycle paths and charging stations for electric vehicles. It is a Leadership in Energy and Environmental Design certified city, which played a determining role in the UN Green Climate Fund relocating there.

**Circular Cities**
“Sailing solo around the world you have to manage your resources down to the final detail. Your boat is your entire world, and what you take with you when you leave is all you have. I suddenly realised our global economy is reliant on finite resources and we need to manage them more carefully,” she says.

Her foundation defines the Circular Economy as “a regenerative system, in which resource input and waste, emissions and energy leakage are minimised by slowing, closing and narrowing energy and material loops.” This is in contrast to the current linear economy, with its ‘take, make, dispose’ model of production. When it first emerged in the midst of the swinging sixties it was dismissed amid a general belief in unlimited growth forged in the ‘white heat of technology’. Over the last decade or so the notion of the circular economy has become orthodox thinking.

It is now a central tenet of the EU, evident in the Circular Economy Package and Renewable Energy Directives. And where it does not exist in national plans it is emerging as the central response to the mounting challenges confronting City States around the world. Cities consume two thirds of the world’s energy and are responsible for 70% of all carbon emissions, says the C40 Cities Climate Leadership Group, which represents 90 of the world’s greatest cities, home to more than 650 million people. The UN projects that by 2050 70% of the global population will live in cities, up from 58% today.

As C40 say, “Cities are on the frontlines of global climate change and are also well-positioned to play a leadership role in driving global action to address climate change. Nimble city governments often have closer relationships with their businesses, residents and institutions than state and national governments, allowing new policies to be implemented more quickly and decisively.”

Think global, act local
Andy Street, the hugely successful former managing director of John Lewis, is a leading advocate of local control. On being elected as the first Metropolitan Mayor of the West Midlands in 2017, one of his first acts was to establish an

---

**BIOGAS & BIOMETHANE**

Anaerobic digestion (AD) is the natural breakdown of organic material such as food waste, farm wastes, purpose grown crops and sewage sludge in the absence of oxygen. Biogas from AD plants is approximately 60% methane and 40% carbon dioxide. It can be used in a Combined Heat and Power (CHP) engine to generate electricity and heat. Or it can be upgraded to biomethane – almost pure methane – by removing the impurities and the renewable CO₂, which itself can be used commercially. Biomethane can then be used locally to fuel vehicles or injected into the gas grid for use as a transport or heating fuel elsewhere.
Decentralisation is inevitable says Jeremy Rifkin, happen locally.” such as waste or transport, which must necessarily energy systems, such as heat and electricity grids, most urgent problems require the integration of solutions will also differ by location. Many of the and challenges differ from place to place, meaning York. And with good reason: energy resources localisation. All over the world, municipalities are in clean energy over the past decade has been its He continues, “One of the most striking trends in clean energy over the past decade has been its localisation. All over the world, municipalities are increasingly active in clean energy innovation: from Copenhagen and Munich to Bogota and New York. And with good reason: energy resources and challenges differ from place to place, meaning solutions will also differ by location. Many of the most urgent problems require the integration of energy systems, such as heat and electricity grids, or the integration of energy into wider systems such as waste or transport, which must necessarily happen locally.”

Decentralisation is inevitable says Jeremy Rifkin, economic and social theorist and adviser to the EU, Germany and China on the Third Industrial Revolution and Internet of Things. In an interview with Business Insider he said, “If we look at the great economic paradigm shifts in history [the industrial revolutions], they share a common denominator. At a moment of time, three defining technologies emerge and converge to create what we call in engineering a "general-purpose technology" that forms an infrastructure that fundamentally changes the way we manage power and move economic activity across the value chain. And those three technologies are new communication technologies, to more efficiently manage the economic activity, new sources of energy, to more efficiently power the economic activity, and new modes of mobility, transportation logistics, to more efficiently move the economic activity.”

He said its ‘totally over’ for fossil fuels and nuclear and that centralised energy companies “are in pandemonium” as a result, experiencing the same disruption from digitalisation that saw Napster revolutionise the music business model and digital publishing, the newspaper, broadcasting and book publishing models. Citing his experience of Germany, where he was an adviser to Chancellor Merkel, Rifkin said, “There are four major transmission companies in Germany, and they’re big global players: EnBW, RWE, E.ON, and Vattenfall. Now, we thought these giant vertically integrated companies were invincible 11 years ago. What’s happened to them in the last 10, 11 years as we’ve moved this renewable-energy internet into Germany is what happened to music, TV, publishing, et cetera. And that is, small players have come across Germany and created energy cooperatives, farmers associations, small businesses, urban neighbourhoods. And they all got low interest loans from the bank because the banks knew they’d pay back on the energy they produced. No one defaulted. So they’re producing all the new electricity — the energy cooperatives. And the big four power companies — they’re out of it.” In the midst of this social revolution being wrought on societies by the advent of smart technology, it is climate change and the need to decarbonise that remains ‘the real-time game-changer’. AD is the catalyst In 2015, the UK along with over 190 other countries signed up to the Paris Agreement and established Nationally Determined Contributions (NDCs) to decarbonise the global economy and limit the global rise in temperature to below 2°C. However, two separate reports released toward the end of 2018, by the Grantham Research Institute and Climate Action Network respectively, found that most countries were not on course to hit their targets.

Through the Climate Change Act the government has committed to reduce carbon emissions in the UK by 80% against 1990 levels; the target in the Act was based on scientific analysis which said this was what was required to keep temperature rises below 2°C. To meet these targets, five-yearly carbon budgets were established, which currently run until 2032. They restrict the amount of greenhouse gas the UK can legally emit in a five-year period. The UK is currently in the third carbon budget period (2018-2022) (see table). UK emissions were 43% below 1990 levels in 2017. The first carbon budget (2008-2012) was met and the UK is currently on track to outperform on the second (2013-2017) and third (2018-2022). However, it is not on track to meet the fourth (2023-2027).

“To meet future carbon budgets and the 80% target for 2050, the UK will need to reduce emissions by at least 3% a year, from now on. This will require the government to apply more challenging measures,” the Climate Change Committee says. If the UK is to achieve those targets it urgently has to address carbon emissions from heat and transport, which combined account for 46% of total emissions, at 26% and 20% respectively. The immediate and most readily available solution to these challenges is biogas; which from the single source of AD can be used to immediately contribute towards the decarbonisation of both the transport and heat sectors as well as agriculture, which stubbornly accounts for 10% of the UK’s total emissions.

Heat – one of the great challenges facing the nation BEIS, in a consultation paper exploring pathways to decarbonise heat, describes it as one of the ‘great challenges facing the nation’. This is because heat demand is met primarily by the gas grid. The majority of residential buildings - 85% or 23 million - are currently connected to the gas grid, using a boiler and a wet-based central heating system. The remaining 15% of homes - four million - are not connected to the gas grid, using either oil or liquid petroleum gas (LPG) as their main heating fuel or electric heating. Alone, ‘off-grid’ housing accounts for nearly a quarter of all carbon emissions from heating. Two pathways to achieve the decarbonisation of heat are dominating the agenda; hydrogen...
conversion and decentralisation. In both scenarios, biogas has a crucial – catalytic - role to play.

Developing a hydrogen network is emerging as a favoured long-term option by government. Yet this is fraught with complexity. According to stakeholders, “meeting this timescale [2030 for roll out to begin under government scenarios] will require urgent research and trials to understand the costs and technological issues posed by a hydrogen gas grid”. The same goes for carbon capture and storage, which would be required in most instances to make the creation of hydrogen carbon neutral. Again the technology needs to be proven.

In an extensive review of future energy, the UK Energy Research Council says centralised solutions such as a hydrogen network are being driven by the vested interests of the big six energy suppliers, what it calls the incumbents, which is drowning out the potential of alternative means. Developing a pure hydrogen network would require consumers to change their appliances, i.e. fires, boilers and cookers, and the wholesale replacement of the gas infrastructure, replacing steel pipes with polythene and meters, which may impact billing. The costs and timescales involved are described as ‘significant’. Whether a hydrogen network is able to deliver in the long term is largely immaterial, given the timeframe to decarbonise the economy is set at 11 years. While the mains replacement programme is well underway, such a major infrastructure development does not address the immediate issue.

This was clearly recognised in the CCC’s report Hydrogen in a low-carbon economy, which was released in November 2018, and revised its assessment of the most feasible approach to decarbonising heat for buildings, and it leans toward the decentralisation of supply.

“The path to near-full decarbonisation by 2050 now entails the near-term deployment at scale of ‘hybrid’ heat pumps in buildings on the gas grid, alongside substantial improvements in energy efficiency, low-carbon new build and other ‘low regrets; heat decarbonisation deployment,’ the report stated.

The carbon footprint of a sustainably produced biomethane eligible to receive the Renewable Heat Incentive is nearly half that of natural gas. The CCC views biomethane as a ‘low-regret’ option because it offers “a means of decarbonising supply without requiring changes from consumers and provides a route for capture and use of emissions from biodegradable wastes.”

It estimates the potential of biogas upgraded to biomethane to be 21TWh. ADBA’s Senior Policy Manager Dr Thom Koller says, “While this is less than our view of the market potential of biomethane from sustainably sourced feedstocks, it represents a fourfold increase in current generation levels.”

ADBA’s view is that the market potential of biogas upgraded to biomethane is 80TWh, which would be around 30% of the current total of UK domestic gas demand. Alternatively, biogas could deliver all the heat required by the 15% of homes currently off-grid, reducing heat's carbon footprint by 23%.

Localised, ‘district’, heating is also identified by the CCC as a ‘low regret’ action. It is also included in the Clean Growth Strategy as a significant heat source in its three indicative pathways. BEIS too is

Continued>>
Circular Cities

FUTURE TRANSPORT

Shifting to bio-fuel. Waitrose has introduced a fleet of 50 Bio-CNG fuelled trucks. Each lorry will save more than 100 tonnes of CO2, a year (versus diesel)

Nottingham City Transport’s fleet of 53 bio-gas double decker buses will more than double in size this year, with the introduction of a further 67. Biogas buses emit 86% less carbon than their Euro VI diesel equivalents. Meanwhile, the pioneering Warren Group has introduced a Bio-LNG fuelled refuse collection vehicle – running on the biomethane produced by the organic wastes it collects. And New Holland International is developing a Bio-LNG tractor.

consulting on the potential of district heating under the Heat Networks Investment Project (HNIP), for which biogas is eligible.

ADBA has responded to this consultation with a clear message; when biogas is used to fuel a combined heat and power (CHP) engine, AD is a baseload generator that can deliver a constant supply of heat with significant reductions in GHG emissions.

HNIP assumes in its technology mix a 33% volume of heat demand being provided by CHP powered by gas. This starting point, together with the intention that “once the original gas CHP plants have reached the end of their operational life, they will be replaced by lower carbon technologies such as energy from waste”, makes AD an especially cost-effective technology to turn existing CHPs into low carbon by using biogas as feedstock instead of natural gas.

Heat networks, like district heating, are most energy efficient when they are situated as close as possible to the end-user, to avoid loss during its delivery – normally as water or steam. In other words when they deliver locally. ADBA estimates that 5.3 TWh of heat co-generated from existing AD plants is vented; in other words thrown away. And that’s just the tip of the iceberg. ADBA estimate the current number of plants generating heat and not making full use of it to be 130-160. The wasted thermal capacity of these plants is in the region of 135MWth, which, if captured and used, could abate 170,000 tonnes of carbon annually.

Shifting to bio-fuel

Decarbonising transport remains the other great challenge facing the economy, not solely to tackle climate change but also as a public health imperative.

A Lancet commission on air pollution and health in 2017 reported that air pollution now kills more people than tobacco and three times as many as Aids, tuberculosis and malaria combined. According to a paper in the International Journal of Environmental Research and Public Health at the turn of the year, burning fossil fuels is now “the world’s most significant threat to children’s health”.

Given that transport in the UK is responsible for 26% of all carbon emissions and 45% of all NOx pollution, it carries a heavy burden. In response to the looming health crisis the government has said it will ban the sale of diesel and petrol cars and vans by 2040. The ban does not cover heavy goods vehicles, lorries or buses, which account for 17% of total transport emissions.
However, it is this sector that is making the switch to clean fuel, namely biogas. Waitrose, Ocado and Hermes are among them. The Post Office is trialling biogas trucks on its long haul routes. And bus services are following suit. Nottingham leads the way with a fleet of over 50 double decker buses – and more on the way, followed closely by Bristol.

The shift makes economic sense, with over 30 cities and local authorities across the UK imminently set to introduce what are known either as Low Emissions Zones or Clean Air Zones. Under these schemes buses and HGVs failing to meet minimum standards face charges for entering the zones of £200 a day. Such zones are commonplace in cities across mainland Europe.

It has been found that fleet operators who switch to biogas more than exceed what is required under the benchmark minimum standard for emissions. Operators report a reduction in CO2 output of around 85-96%, and recent detailed testing of Euro VI diesel versus biofuels conducted by IVeCO has shown that NOx emissions can be cut by between 50-70%. In addition, particulate mass emissions can be nearly eradicated.

Fuel savings are notable too. With costs that are typically 33% less – and in some instances, as much as 50% less – operators can see that biogas makes commercial sense. Two issues have previously constrained the uptake of biomethane as a fuel for HGVs; a sustainable supply and refuelling infrastructure.

On the supply side, ADBA’s analysis concludes the AD industry today has sufficient capacity to produce enough biomethane to power 80% of the UK’s entire bus fleet and the potential to power 75% of all HGVs in the UK. The issue of a refuelling infrastructure is also being addressed. David Rix, Managing Director at Roadgas, which supplies the Nottingham bus fleet with biogas, says, “At present, there is a highly organised biogas supply market with a structured supply chain. As it stands today, sourcing compressed biomethane is relatively simple and with the rise in demand for liquid biomethane for LNG-powered vehicles, I envision increasing levels of supply coming into the market very soon. Furthermore, with the growth of the anaerobic digestion industry as a solution for our waste problems here in the UK, the potential to produce biogas is enormous.” BOC, the UK’s largest supplier of industrial, medical and special gases announced in February that it would start supplying BioLNG to the HGV sector. Shell Ventures, meanwhile, announced it was backing Nordsol EuroNet to create a biogas refuelling network across mainland Europe, with a filling station every 450km from Spain to Poland. Nordsol intends to purchase its biomethane from existing AD operators while developing its own supply side. In the UK Gasrec is also planning to roll out more refuelling stations. It seems biogas as HGV transport fuel has reached tipping point.

Future farming

While perhaps not immediately evident the government’s determination to decarbonise heat and transport and deliver clean air has a bearing on the future of farming.

Continued>>
Farming is responsible for 88% of all ammonia emissions. When these drift over industrial regions, it combines with other pollutants – particularly those associated with transport – to form the “particulate matter” so lethal to public health. As a result 40 towns and cities in the UK are at, or exceeding, air pollution limits set by the World Health Organization (WHO).

The government plans to regulate to reduce ammonia emissions, including new rules governing the storage and use of slurries and manures and land management. Treating manures and slurries, particularly from intensive farming, through AD addresses this issue but does not eradicate it. The government holds AD responsible for 3% of ammonia emissions, primarily emanating from digestate. However the industry is addressing this with new treatments and pilots in ammonia-neutralising acidification underway.

The bigger picture, however, is that AD can decarbonise the sector’s own operations, through AD & Bioresources News | spring 2019

Government’s Industrial Strategy, which wants rural economies to diversify their income streams, and the thrust of the Agriculture Bill, which seeks to wean farmer’s off using energy-intensive mineral fertilisers to protect the country’s rapidly deteriorating soils.

Closing the loops
What is being described in the heat, transport and agricultural sectors is a closing of the loops. Closed loop agriculture describes farming practice that recycles all nutrients and organic matter back to the soil that it grew in. Turning the organic waste from the food produced by farms – sewage and food waste – into energy and returning the nutrients from that to the land closes another loop. Using the energy produced from both processes to decarbonise the national grids, on which the food is prepared, and transport, which brings the produce to town, closes more loops.

It is this closing of loops that has led the International Energy Agency Task 37 to describe AD as epitomising the circular economy. In its report The Role of Anaerobic Digestion and Biogas in the Circular Economy it says, “The biogas plant is the hub in the future circular economy” and “Biogas is a ‘green’ sustainable energy vector and has a significant role in shifting to a sustainable decarbonised society”.

Another great attribute of AD is to be an awareness tool for the circular economy. As has been seen with the gilet jaune protests in France, resistance will be met if governments don’t bring the public along with them during the fight to decarbonise and recalibrate the economy.

The IEA states that as show rooms in farms have been used to show where food comes from, so AD facilities should be used to show how valuable resources can be derived from organic wastes – emphasising that nothing should be thrown away; rather it should be recycled, re-used or repurposed, to save dwindling natural resources and decarbonise society.

School children and students across the world get it. Tens of thousands have recently taken part in protests in cities from Australia to Europe, calling on governments to rapidly adopt the circular economy approach as a defence against climate change and biodiversity extinction.

The common sense inherent in seeking to extract the maximum value from any material is mobilising generation biogas. Greta Thunberg, the 16-year-old who famously started the first school ‘strike for climate’ outside the Swedish parliament - and subsequently delivered a TedX speech and upbraided political leaders for failing to act fast enough at the UN’s climate change conference COP 24 - inspires the burgeoning movement.

We know what needs to be done. We know how it can be done. We await a clear commitment from governments around the world to ensure it is done.
MOBILISING GENERATION BIOGAS
Putting biogas on the world map
3rd - 4th July 2019 | NEC | Birmingham, UK

www.biogastradeshow.com

UK AD AND WORLD BIOGAS EXPO 2019

www.world-biogas-summit.com

OVERVIEW
WHY AD AND BIOGAS?

The anaerobic digestion (AD) and biogas sector has the potential to grow into a global industry worth £1 trillion. As a technology that generates clean energy, reduces greenhouse gas emissions, restores soils, improves air quality and energy security, and recycles organic wastes, AD can play a vital part in addressing global sustainability challenges.

12 YEARS TO ACT!

The anaerobic digestion and biogas industry has a very narrow window of opportunity to demonstrate its value to society in the drive to address climate change and promote the development of a sustainable circular economy.

2020
- deadline for governments to submit their commitments to the Paris Agreement

2030
- deadline to deliver on the United Nations Sustainable Development Goals
- deadline from the Intergovernmental Panel on Climate Change to avert catastrophic rise in global temperature

REALISING THE INDUSTRY GLOBAL POTENTIAL

NEW IN 2019

PUTTING ANAEROBIC DIGESTION AND BIOGAS AT THE HEART OF SUSTAINABLE DEVELOPMENT

This new event will provide a global thought-leadership forum on anaerobic digestion and biogas. The World Biogas Summit will feature leading international figures reviewing the contribution that AD and biogas can make to society across many sectors and how to realise the industry’s potential through finance, operational excellence and public engagement. The 500-strong international audience will include policy makers, business leaders, municipalities, investors and other key stakeholders in the sustainability agenda.

5 THEMED THEATRES

Engine Room
Food Waste
Circular Cities
Future Farming
Future Water

3000+ Attendees
50+ Countries
250+ Exhibitors
50+ Hours of content
100+ Speakers
£1trn Industry

www.biogastradeshow.com
www.world-biogas-summit.com
GET INVOLVED IN 2019:
- Raise your company profile at the largest UK and international gathering of AD and biogas vendors, buyers and stakeholders in the industry calendar
- Enhance your reputation by association with market insight and thought-leadership
- Strengthen your brand by gaining prominence amongst your peers
- Seize new business opportunities
- Be recognised as a forward-thinking company for technology and innovation.
- Learn about the latest market trends
- Network with thousands of fellow industry professionals
- Discover the latest technologies, products and services
- Help put AD and biogas at the heart of global sustainable development

2018 IN NUMBERS
- 2,000+ delegates
- 160 exhibitors
- 18 countries from all seven continents represented
- 92.5% of visitors rated the event good to excellent

VISITOR / JOB SENIORITY
- 40% Manager
- 13% Managing Director / Chief Executive / Owner
- 6% Chairman / Board Director
- 8% Executive level
- 9% Assistant
- 24% Other
- 8% Other

ALSO AT THE SHOW...
The Vox, Birmingham, 3rd July 2019
Celebrating the best in the ad and biogas industry.

VISITOR / JOB SENIORITY

WHY DO VISITORS COME?
- 61% To network or meet clients
- 39% To learn more about the industry
- 12% To receive expert advice
- 55% To find out the latest industry info / news
- 29% Say to source AD equipment, products or services

Sponsor a category or the Awards Ceremony contact: Roberta Bontempo, roberta.bontempo@adbioresources.org
T: +44 (0)20 3176 4414

www.biogastradeshow.com  www.world-biogas-summit.com
“A fantastic and the only focussed event for the AD and biogas industry, where you get everyone you need in one place.”
Carl Gurney, Jelf

“A well-attended and high energy event with excellent quality of speakers.”
Brad Douville, Greenlane Biogas

“A great opportunity to meet existing clients, network with operators and find new leads.”
David Reay, CPL Activated Carbons

Exhibitor and sponsorship opportunities are available now!
Contact: Roberta Bontempo, roberta.bontempo@adbioresources.org  T: +44 (0)20 3176 4414
By the time you read this article, we will be in touching distance of March 29th, when we are currently scheduled to leave the European Union — unfortunately at the time of writing my crystal ball is defective, so I am unable to predict what sort of shape our future relationship will be by then! Since our last edition it is fair to say that Brexit has had a tangible impact on both our lobbying efforts and the industry as a whole. We have had important political meetings postponed due to tight votes in the House of Commons, and key pieces of legislation for our sector, such as the Agriculture Bill, have ground to a halt mid-way through their passage through Parliament.

ADBA has been actively working to ensure that MPs and officials are aware of the effect the current political uncertainty is having on our sector, and we have produced a briefing note for members on Brexit which can be found on the ADBA website. No matter what happens before and after March 29th, we will be on hand to advise members and keep you informed as to what happens next. However, despite the uncertainty there have been some exciting developments for our industry. Just before Christmas the government published the Resources & Waste Strategy, finally committing to mandatory separate food waste collections in England. This is something ADBA and our partners have campaigned for, for a long time, and we would like to thank all those who joined the Food Waste Coalition to push Ministers to make this change. We are now working with the Treasury, DEFRA and DHCLG (Department for Housing Communities and Local Government) to develop the most effective funding system to help local authorities implement this challenging but necessary new policy. As mentioned, the Agriculture Bill is still working its way through Parliament and presents perhaps the most important chance to support the development of on-farm AD over the coming years post-Brexit. If AD, or its products and processes, are recognised as one of the new ‘public goods’ under which financial support will be provided, this would give a significant boost to our sector while recognising the holistic benefits we can provide, such as organic fertilisers, slurry recycling and clean power production for farms and their wider communities. We will continue our conversations with DEFRA, DIT and No.10 on these important issues and hope that this important Bill clears the Brexit logjam soon.

The next few months may be politically uncertain, but members will be able to discuss these important issues and find some clarity at the annual UK & World Biogas Expo in Birmingham this July, where there will be a full programme of sessions dedicated to the key topics of the day. Do get in touch if you’d like to find out more about this exciting show — we’d love to see you there. For now, we wait to see what March 29th may bring, but stand ready to support our members whatever form Brexit may take. It’s going to be an interesting few months ahead for the AD sector and the country.

For more information please contact External Affairs Manager Jon Harrison on jon.harrison@adbioresources.org
As most people reading this will know anaerobic digestion is a practical, efficient, mature and scalable technology to utilise organic wastes from agriculture, animal production, food processing and domestic and commercial use. It deals with wastes arising during production, distribution and consumption and can be collected and treated as a recycling fraction to produce biogas for electricity generation, local or process heating and direct injection into the gas network when upgraded.

Digestion of organic waste produces useful biogas and fertiliser but some sites emit highly odorous gases that have the potential to cause considerable nuisance and result in persistent complaints from nearby residents and businesses: H₂S can be detected by at least half the population at a concentration in air as low as 0.47 ppb. Therefore, considerable care and effort must be taken in the design and management of AD plants to ensure that unpleasant odours are not released during their operation.

Concerns about odour are one of the principal reasons why people object to AD plants being built in their neighbourhoods. As increasing numbers have recently been built close to cities, towns and villages (and the potential for more grows to address waste and climate change issues) there is an increased risk that odour issues could undermine the benefits AD can deliver. To build supportive public opinion the industry needs to tackle this issue and minimise that nuisance. To develop a robust odour management plan operators need to identify where the potential for odour emissions arise.

Sources of potential odour emissions include:

- Receiving feedstock that has already begun to degrade before arrival. Transport vehicles are not pressure vessels and gases created en-route can escape.
- Transferring and sorting feedstock and feeding digesters and other vessels on site.
- Transfer, storage and treatment of the biogas produced, including upgrading.
- Discharging the digesters after digestion, including transfer, treatment and storage of digestate.
- Processing the digestate, e.g., dewatering/solids separation, storage, aerobic conditioning and transport prior to land spreading.
- Maintaining, cleaning, modifying, optimising or expanding the AD plant.

Several proven methods can be implemented to control and prevent the release of the odorous gases so AD plants remain a benefit to the local community and do not become an unpleasant nuisance:

Space & Ventilation Design
The plant should be designed so that all processes are carried out in enclosed spaces – buildings, housings, containers, etc. Using ventilation and extraction of air to maintain a positive air flow inside at all times, meaning air is treated before being vented into atmosphere. Designing-out and operating-out the generation of odour will reduce the need for a secondary treatment.

Scrubbing
Odorous contaminants are removed by passing through a series of scrubbers, packed with media and/or irrigation, where the air is drawn upwards against a counter flow of water with chemical dosing to absorb and neutralise odorous compounds. The wash solution will itself need regular treatment to remove the dissolved compounds, either by a treatment system installed onsite or by a specialist service team.

Carbon Filtration
Activated carbon filters are used to absorb gases such as ammonia and H₂S. The filter’s media needs to be changed regularly to avoid it becoming saturated with absorbed gases and ceasing to work effectively. The media may be sent away for heat treatment so that it can be reused. Treated media can be selected to improve absorption of specific compounds. Carbon filters are easily fitted and removed as required. They require careful monitoring as filtration effectiveness drops off rapidly as the media becomes saturated. Operational cost for media changes can be high, depending on the level of odour to be treated.

Bio Filtration
Columns, vessels or tanks can be used with either open top, passive ventilation or enclosed mechanical extraction. Media may be organic (bark or wood chip for example) or inorganic (plastic or clay). Packed media needs to be irrigated so a biofilm of aerobic bacteria and fungi develop, which biologically remove odorous compounds. The air for treatment is drawn up through the media, which is kept moist by a downward trickle of water and dissolved nutrients, which in turn maintains the biofilm.

Biofilters, especially passive exhaust ones, can be cost-effective to both build and maintain. However, organic media requires management and changing as the media breaks down or becomes saturated with odour compounds. They become fully effective once the biofilm has become established on the media, which must be kept moist and aerobic at all times by maintaining an air flow through them. In climates with sub-zero winters the biofilters may need to be insulated or heated depending on the air flow temperature. Operational costs tend to be low if they are designed and sized correctly.
As the AD process is by definition completely contained odours tend to arise from the upstream, downstream and side system connections and processes, so all aspects require ongoing attention.

**Front End Management**

The reception and handling of feedstocks, especially food and animal wastes, to minimise contact with the open air will significantly reduce odour and prevent local nuisance. Delivery, transfer and onsite handling of feedstocks are all operational activities that will create potentially offensive odours. Designing facilities and procedures to do these activities with minimal handling will help reduce odours. Their effective implementation and overall site cleanliness and hygiene will ensure front end odours are kept as low as possible.

**Biogas Management**

Although methane is an odourless gas, biogas contains organic compounds that are odorous. These include, H₂S, VFA’s, mercaptans and other feedstock specific sources, which can combine or act independently to cause a high level of offensiveness at low concentrations. Many of the odours are contained within the gas-borne water vapour fraction. Ensuring a well-sealed and balanced gas train will ensure any downstream processes, such as combustion (flare, CHP, boiler) or biomethane upgrading, can be undertaken without causing gas to escape from leaks in membrane gas holder, flanged pipe connections or pressure relief valves. A difficult problem to resolve is the odour created from digester pressure relief valves which, by their nature, need to be passive, at high level, ATEX compliant and fail safe. Critical to ensuring gas emissions are minimised from an odour perspective is to ensure regular and adequate monitoring for leaks and faults together with maintaining a well-balanced process to avoid frequent over pressurisation caused by fluctuations in system operating pressure, commonly caused by such things as emptying tanks, feeding, switching gas consuming equipment on or off, changes in mixing regime etc. Up front design flexibility combined with focused operational management control are important to ensure odour releases are controlled.

**Digestate Management**

Digestate is removed by transferring it from digesters to holding facilities. Initial storage will form part of the AD plant as an enclosed vessel or lagoon, where the digestate is held until used on fields as a natural fertiliser. It may either be used as a whole digestate or separated into solid and liquid fractions. Odour arises from digestate as ammonia and other organic compounds, which will be volatile as a result of higher temperature digestion (32-38°C in a mesophilic system or 55+°C in a thermophilic system).
Storage, transportation and spreading of separated or whole digestates will release considerable volumes of strong odours, which, in proximity to residential or business properties, may become offensive until air dispersion, aerobic biological activity or soil absorption occur. Control of digestate odours during the transfer and storage phases rely on enclosing the material with covers or in vessels and using sealed transfer pipes and connections. It is important to ensure on-site storage ventilation is incorporated into any site and air handling system to avoid the emission of untreated digestate compounds to the air. Control during land spreading relies upon swift soil incorporation either using modern spreading techniques such as shallow injection or dribble bar application.

**Site Management**

While design, operational techniques and procedures will manage the risk of emissions of odours from specific activities there is considerable risk of low level, undefined odours which, although less intense, can cause enough of a nuisance to undermine local credibility and support (aka fugitive emissions). It is often difficult to identify specific point sources. However, they can be significantly reduced by ensuring the operational workforce are well trained and fully engaged in maintaining a clean and tidy site. Spills and poor equipment hygiene such as dirty pipes, equipment, tools, clothing can lead to dispersed low-level odours that can linger. This is especially true on sites with permeable surfaces, such as gravel or grass surfaces and semi permeable membranes, like gas holders or tarpaulins, where odours and odour sources can be absorbed. Good site hygiene and husbandry together with regular cleaning practices will help reduce such fugitive emissions.

Agricultural anaerobic digesters are often built in more isolated locations away from towns and villages. However, commercial food waste, industrial and waste water treatment digesters are more likely to be located close to roads and built up areas where there is a closer collection of odour receptors, i.e., noses—such as work places, public spaces and residences.

Over recent years with the growth in the number of AD plants and populations there has been a growing interface between odour emission and reception. As a consequence, it is imperative that we as an industry employ active odour monitoring and control measures to minimise nuisance to local communities, which, if left unaddressed, threatens to undermine the public benefit of AD treatment of wastes and residues.

Measures traditionally used on landfills and waste transfer facilities, such as networks of atomising nozzles placed around sites, do not properly address the source of the odours. AD operators should take due consideration of the proximity of local communities, wind direction, potential amount/strength of release of odorous gases, in developing a robust odour management plan. Chemical treatment of airborne odours at best merely masks bad odours and does not effectively neutralise them, leaving the odour still present in the air. More effective treatment of airborne odours includes ionisation of air inside reception and treatment halls, air collection at source and handling and treatment in filtration systems before any emission to the atmosphere occurs.

**Stakeholder engagement**

A critical part of an odour management plan is to effectively manage expectations for all stakeholders, whether they are regulatory, internal or public. While the design and development concerns will impose limits and controls on a plant these are likely to be different from the expectations and, more importantly, perceptions of stakeholders. This is particularly important in interactions with the public and nearby residents and businesses.

The public opinion of AD is critical to the growth and development of the industry and therefore using odour management as a tool to address the wider remit of improving the profile of the industry among policy makers and investors is critical. Holding open days, public meetings and addressing the complexities of odour head on acts to build trust and consensus and develop dialogue even when opinions differ. Providing information in a range of formats for different audiences – technical documents on a website, newsletters on monitoring activities and presentations to town or parish councils for example – allow the operators to positively engage, build allies, promote understanding and encourage support for the plant as a local asset rather than an industrial blight.

In conclusion, a strategy of prevention, treatment, communication and continual improvement will ensure that the population in nearby towns and villages are not adversely affected by the presence of AD. We all know there are more environmental and economic benefits to the implementation of AD technology than there are issues. Addressing odour in a transparent and robust way will help turn ignorance and resistance into the widespread public support the industry needs.

**Odour monitoring**

Robert Sneath, Director of Silsoe Odours Ltd., a dedicated consultancy in odour measurement and management, says, “With AD plants we generally find the handling of raw material—the feedstock—is the primary cause of odour complaints. An AD gas plant is generally well-engineered, it is from the reception buildings that we find most odours are being emitted.” The secondary source is the digestate storage and processing area.

Silsoe offer a range of tailor-made odour surveys and analysis to identify the sources of odours and advise on remedial action, which can help both existing and new operators develop the robust odour management plan that Thomas Minter says is critically important.

These include field odour surveys and analysis, to determine the exact location of odours and measures their travelling distance and ascertain the source, concentration, and compounds causing the problem. Results from this latter stage of the process will provide the evidence required for process modification, and quantitative design information for an operator’s odour control equipment supplier.

Plant buildings are intended to contain odours and are usually ventilated through some odour abatement plant but there can be fugitive emissions. Silsoe Odours use smoke testing to locate leakage. Measurements of the emissions provides data for dispersion modelling to determine the likely impact of odour pollution on the local environment and resultant diminishment of quality of life. This gives a clear indication of the size and complexity of the problem to be dealt with and provide design specifications.
Technology Focus: Odour

Obtaining such a diagnosis is invaluable in that it allows operators to draw up a robust odour management plan and show stakeholders – the general public and regulators – that their responsibility to the wider community is being taken seriously. With the government consulting on mandatory food waste collections, AD operators will increasingly need to show AD can deliver its many benefits without getting up the nose of its neighbours.

Digestate storage

As much as reception areas are a cause for concern, so too is the storage of digestate, especially regarding the potential for ammonia emissions. Indeed, Environmental Permitting Regulations will require all digestate and slurry stores be covered as of 2020 to address this issue.

Edwin Baker, Sales Director with Tramspread, said, “The imminent requirement to have slurry and digestate stores covered is creating a lot of interest and we are finding that customers are less interested in investing in covered concrete stores, choosing to purchase either lagoon covers or slurry bags instead.”

In regard to lagoon covers, the Hexa-Cover is proving particularly popular. The cover is formed by thousands of tiles that are simply deposited on the lagoon before settling into position to form a cover. One of its great attributes is that it allows a mixer arm to be easily introduced, allowing operators to make the best use of nutrients.

“It’s excellent for minimizing odour and emissions and very simple to install,” says Edwin. The system is available in two types of tile, light and heavy. The heavy is more popular as they are better able to withstand wind.

Another increasingly popular option among AD operators is ‘slurry’ bags, such as Albers Alligator Bagtanks and Winbags. Bagtanks are available in sizes up to 7000m³ and are designed for permanent storage, installed in pre-prepared ground. They can be fitted with either electric or hydraulic stirrers and incorporate one or two fill/empty pipes with double sluice valves.

Winbags are a more versatile and temporary solution to the storage problem and particularly applicable to AD plants in confined spaces. Available in sizes from 100m³ to 350m³ they are an alternative to traditional nurse tanks and require only a smooth level surface on which to stand. They have as standard two inlet/outlets on one end and are designed to be used in conjunction with the Winsystem, which is a reeler that rolls up the bag and can then transport it to another site and lay it out ready to use again.

As such they can be used on or off site and fed by tanker. Edwin says, “For many AD operators, Winbags offer a more economical solution to temporary storage rather than a traditional steel nurse tank, or erecting a temporary store.”

The environmental regulators have all issued guidance on odour management and it is an integral part of the AD Certification Scheme. Having a robust odour management plan speaks to good operational practice and plant optimization, so will pay immediate dividends for operators and developers while assisting the industry to fulfill its potential as a renewable energy provider.

www.malabybiogas.com
www.silsoedours.com
www.tramspread.co.uk

A permanent Bagtank

© Tramspread

Winbag storage is transportable

Stallkamp

Reliable and powerful.

We do not only engineer exceptionally robust separators like our new PSG for high dry matter content. We also produce stainless steel tanks, top performance pumps and durable agitators with best value pricing. Convince yourself!

Phone +44 1449 766133

Made in Dinklage
Advice Clinic: MCPD

TALKING ABOUT YOUR GENERATION

AD operators face new permitting and emissions requirements under the Medium Combustion Plant Directive (MCPD). Jessica Allan of WYG responds to questions from ADBA members and considers how operators can best prepare themselves to meet the new requirements.

Q
What is the MCPD and how will it affect AD operators?

A
The MCPD is an EU Directive that entered into force in December 2015 and is now in the process of being implemented in the UK. It regulates emissions of sulphur dioxide (SO2), nitrogen oxides (NOx) and dust into the air, with the aim of reducing emissions and the associated risk to human health and the environment. It also fills an existing regulatory gap at the EU level between large combustion plants (those above 50 MWth) and smaller appliances (those below 1 MWth).

The Environment Agency (EA) states on its website that “Medium Combustion Plants and Specified Generators are a major source of air pollutants that may cause harm to human health and the environment. The Specified Generator regulations also control emission to air, primarily NOx, from generators that would not be captured by the MCPD. Together they seek to protect the environment by securing reductions of these pollutants.”

The regulations will apply to combustion plant in a variety of sectors regardless of fuel type used, including AD, landfill gas utilisation, energy from waste and the power sector.

Q
How will the MCPD be implemented in the UK?

A
In the UK, the MCPD will be regulated by the environmental regulators (the EA, Natural Resources Wales, the Scottish Environment Protection Agency and Northern Ireland EA) through the existing Environmental Permitting regime. This means that the processes will be familiar to many in the waste industry.

Through the introduction of the MCPD and Specified Generator Regulations, new facilities with a rated thermal input between 1 MWth and 50 MWth are required to obtain an Environmental Permit prior to operation.

Newly installed Medium Combustion Plants (MCPs) put into operation on or after 20th December 2018 will have to operate within the new rules. Existing plant will have a longer transition, the detail of which can be found in the EA’s draft guidance. For initial information, the implementation dates are shown in the table, taken from the draft guidance document.

TIMESCALE FOR IMPLEMENTATION OF IN SCOPE MCPD AND SPECIFIED GENERATOR CONTROLS

20/12/2018
New MCPs must be permitted, emissions tested within four months of permit issue and comply with Emission Limit Values (ELVs).

01/01/2019
Tranche B generators must be permitted and comply with standard permit conditions.

01/10/2019
Tranche A 5-50MW generators with emissions above 500mg/m3 (15% O2) which operate for more than 50h per annum must be permitted.

01/01/2024
Existing MCPs above 5MW must apply for a permit and test emissions within four months of permit issue.

01/01/2025
All existing plant above 5MW must comply with MCPD ELVs Remaining Tranche A 5-50MW generators must be permitted.

01/01/2029
Existing MCPs 5MW and below must apply for a permit and test emissions within four months of permit issue.

01/01/2030
Existing MCPs 5MW and below must comply with ELVs Tranche A 1-5MW and sub 1 MW generators must be permitted.

Significant permitting dates for MCPs and Specified Generators (Tranche A and B). It should be noted that MCPs which are also Specified Generators must comply with both requirements. The earlier permitting dates and tighter Emission Limit Values (ELVs) will always apply. An explanation of what is meant by Tranche A and Tranche B can be found in the MCP/SG technical guidance (see below).
How will the MCPD affect the AD sector?

At AD plants, CHP engines that have a net rated thermal input between 1-50 MWth will require a permit to operate and will have to comply with emissions limits and monitoring. If you’re not sure of the net rated thermal input, ask the manufacturer. Many operators will have ongoing relationships with their engine manufacturer/supplier, so make the most of their expertise.

Furthermore, many AD plant operators are already operating under an Environmental Permit covering their treatment of wastes such as slurries, manures and food waste. However, many currently fall outside of the scope of the permitting regulations in England and Wales – specifically, those that only accept and process crops or crop residues. Following the implementation of the MCPD, all operators of MCPs will need to obtain permits to cover the combustion activity regardless of the permitting requirements of the AD process itself.

The simplest permit type is a Standard Rules Permit (SRP), and there are a number available covering combustion plant. However, these permits have locational conditions which must be met for a site to be eligible, such as proximity to sensitive receptors. For those found not to be eligible for an SRP, there are two types of bespoke permit available: low risk and complex. To determine which of these types of bespoke permit is required, applicants will need to refer to the EA’s guidance ‘Emissions from specified generators’. Guidance on the dispersion modelling for oxides of nitrogen assessment from specified generators.

With newly implemented legislation there will always be a period of adjustment for both the operator and the regulator, as both parties become accustomed to complying with and enforcing the new requirements. To avoid getting caught out, and to give you some peace of mind, it is advisable to spend some time in advance getting to grips with the legislation and how it might affect you. Even if the legislation does not currently apply to your sites, at least you will be fully informed when going into new projects or when making changes to existing plants.

Where can I get advice on MCPD?

The EA has made some draft guidance available, which you can find on their website (see below). It is highly recommended that you read through this as it contains the detail of how the MCPD will be implemented and regulated. A key aspect to look at is the transition timescales. It is always advisable to seek a second opinion from the regulator or an adviser if you are unsure of the regulatory requirements that you may have to comply with.

I recently attended the Air Quality and Emissions (AQE) Show 2018 in Telford, where the Source Testing Association ran a conference dedicated to the MCPD. It was apparent that while there is generally industry support for the directive in principle, there is some confusion over the requirements, the implementation dates and the detail around monitoring.

One key message from the conference was the importance of speaking to the regulator as early as possible. John Henderson, the EA’s lead on the MCPD, stated that while the EA has been making preparations for an influx of permit applications, it values discussions with operators to allow it to establish its intended timescales and plan most effectively. So don’t hesitate to get in touch with your local EA officer or the MCPD help desk (see below).

There was also discussion around whether operators should carry out pre-emptive monitoring of emissions from their existing plant. The EA advised that for existing plant it is recommended to take steps to understand whether it will comply with the emission limits. This will give the operator maximum time for replacing or optimising plant, if needed. John reiterated that it is wise to obtain as much information from the manufacturer as possible; if they have been carrying out maintenance checks then you might find that they have more data on record than you are aware of. Accessing this existing data could save you money and ensure you’re fully informed on your plant performance.

While I believe that there is a general level of awareness of the MCPD in the AD industry, I think there is still room for greater understanding of the detail so that planning and decision-making can be fully informed. My advice is: don’t wait until the last minute; start planning as soon as you can.

The EA Draft Guidance on MCPD is available at https://consult.environment-agency.gov.uk/psc/mcp-and-sg-regulations/

The EA also has a dedicated MCPD help desk that you can email at: MCPDhelp@environment-agency.gov.uk

What if I have more than one CHP engine at the same site?

The draft guidance states that aggregation will only apply to new MCPs. Where waste gases from two or more separate MCPs discharge through a ‘common windshield’, the combination formed by the plants is considered as a single MCP. The size of the MCP is calculated by adding the capacities of the plant discharging through a common windshield, disregarding any units less than 1 MWth. The EA guidance helpfully notes that a ‘common windshield’ is frequently referred to as a common structure of stack and may contain one or more flues. Operators should not separate discharge points in order to avoid aggregation thresholds.

For Specified Generators, there is a similar scenario – new generators operating at the same site, by the same operator and for the same purpose will be grouped to form a ‘Specified Generator’. In this situation, the permitting date will be the ‘earliest of the relevant dates’. This is a potential area for confusion, so you will want to refer to the guidance and check with the regulator if you are unsure.

Jess Allan is a Principal Consultant at WYG, an environmental and infrastructure consultancy with expertise in environmental permitting and air quality issues.

Email: jessica.allan@wyg.com Tel: 0796 637 2056 www.wyg.com
MAKING UNIVERSAL FOOD WASTE COLLECTIONS REALITY

ADBA’s PR & Parliamentary Affairs Executive Chris Noyce has been out and about discussing what needs to happen to make the government’s new commitment to universal food waste collections (see Policy News, p7) reality. In February, Chris represented the AD industry at a Parliamentary roundtable chaired by Kerry McCarthy MP, member of the Environment, Food & Rural Affairs and Environmental Audit Committees. The meeting, which included representatives from government, local authorities and industry, explored the challenges and opportunities of universal collections and issues around public awareness and education.

Chris highlighted the need for a joined-up strategy for rolling out food waste collections from DEFRA, BEIS and Ministry of Housing, Communities and Local Government that covers three key areas:

- Providing meaningful support to local authorities to help meet the upfront costs of introducing collections
- Delivering a significant national food waste recycling communications campaign to encourage high capture rates from households and businesses
- Providing support for the building of new food waste AD plants through suitable incentives for production of renewable heat and electricity

ADBA has also been continuing to work with partners across the industry on the Food Waste Recycling Action Plan, which seeks to increase the quantity and quality of food waste collected for recycling. At time of going to press, we are expecting Defra to publish its consultation on consistency, which will include questions on the rollout of universal food waste collections, very soon. As ever, we’ll be keen to incorporate our members’ views in our response, so do keep your eyes peeled for further news and the opportunity to input. Read Chris’s report from the food waste roundtable here: [https://bit.ly/2I9AxDP](https://bit.ly/2I9AxDP)

PLANNING FOR CO-DIGESTION

ADBA’s Head of Policy Ollie More joined stakeholders working in AD and sewage sludge treatment and regulation at a workshop in January to discuss plans to create a favourable regulatory environment for co-treatment of sewage sludge and other feedstocks.

Operators co-digesting sewage sludge and another feedstock are currently likely to need an environmental permit with associated permission from the Environment Agency for the deployment of digestate to land. This can be costly and inflexible, meaning that operators and digestate handlers may be waiting for permission to spread to land, and explains in part why so little co-digestion has taken place to date.

The other main barrier is allowing farm and food waste plants to accept sewage sludge as a feedstock. This has been a topic of discussion for decades but has gained impetus since the water regulator Ofwat published its Water 2020 proposals, which call on the industry to look again at making co-digestion work. The benefits of co-digestion include reduced transport movement, operational benefits, and maximising the throughput capacity of existing digesters relative to new plants.

There was a consensus at the workshop that actions could be taken to improve the regulatory framework for co-digestion in a way that does not increase the risk to the environment. This would involve establishing protocols that would need to be followed by the industry undertaking co-digestion.


HEAT POLICY FLUCTUATIONS CAUSING INVESTOR JITTERS

The government is currently consulting on developing a market framework for heat networks to ensure that as these networks become more commonplace, consumers are protected and sustainable investment is delivered alongside the potential economic and environmental benefits. ADBA has now submitted our final response to the consultation following discussion with members. In our response we acknowledge the importance of initiatives like the Heat Network Investment Project (HNIP) and the Heat Networks Delivery Unit but make clear that in order to provide investor confidence, government should avoid chopping and changing policy, including for schemes relating to heat (and heat and power) generation.

The arrival of HNIP is welcome but with the scheme starting now – with the Renewables Obligation having ended and with the Feed-in Tariff closing to new applicants on 31st March – there may be fewer applications for biogas-supplied heat networks than would have otherwise been the case. This is also the case for low-carbon heat generation, where incentives are required in order to assure the availability of low-carbon heat for the network.

Read ADBA Senior Policy Manager Thom Koller’s summary of ADBA’s response at [https://bit.ly/2N2AgRV](https://bit.ly/2N2AgRV)

MIXING IT UP TO MAXIMISE SOIL HEALTH

ADBA’s Policy Officer Alberto Rocamora attended the 4th Annual Conference of the publicly funded research programme ‘Resource Recovery from Waste’ in January.

Of the five projects that make up the programme, one will be of particular interest to the AD community, ‘Adding Value to Ash & Digestate’ (AVAnD), being run by Lancaster University and Stopford Energy & Environment. The aim of this project is to identify and examine novel nutrient-recycling pathways and retention mechanisms to maximise soil sustainability and crop productivity. Researchers are combining bioenergy generation by-products (anaerobic digestate and biomass ash) and assessing their suitability as alternatives to finite mined-mineral P-and synthesised N-fertilisers. The initial results show the digestate-ash mix performing relatively well compared to pure mineral fertiliser.

Part of AVAnD’s research was included in the ‘evidence and case studies’ section of the government’s recently published Resources & Waste Strategy.

Read Alberto’s report from the workshop at [https://bit.ly/2SLAx0C](https://bit.ly/2SLAx0C)
RAF ENLISTS BIOMETHANE POWER

Minister for Defence, People & Veterans Tobias Ellwood MP described anaerobic digestion (AD) as “a truly green and sustainable solution” as he launched a new deal that will see a Norfolk military base receive almost all its power from a nearby AD plant.

Future Biogas’ Redstow Renewables AD plant, which converts locally harvested crops such as maize and rye into renewable electricity (in the form of biogas) and natural fertiliser, will meet over 95% of the power needs of nearby RAF Marham. The base will be the first in the UK to run almost entirely on green electricity.

The AD plant will generate 4.5 MW of electricity every hour, enough to power 350,000 LED bulbs. The deal will save the Ministry of Defence nearly £300,000 every year and reduce its carbon emissions by 14,000 tonnes of CO₂ annually.

The waste residue from the AD process will also be dried and used as fertiliser to help grow local crops.

Speaking at the launch Mr Ellwood said, “RAF Marham is leading the way as Britain’s first green military airbase. The biogas fuel is a truly green and sustainable solution, helping us tackle climate change, support the local economy and save taxpayer money. I hope that this plant can act as a model and we can see more sustainable energy schemes rolled out across other military bases.”

Philipp Lukas, Managing Director at Future Biogas, said, “It’s fantastic to see the UK military join the green revolution. If we are to combat the imminent global threat of climate change, everyone, from all walks of life, needs to transition to renewable, sustainable energy as quickly as possible.

“The AD plant in Swaffham now powers a significant local institution. In doing so, it not only helps secure the energy supply of a strategic national asset, but also takes the pressure off the local electrical infrastructure, which has been really struggling to keep up with growing regional demand.”

Jon Harrison, External Affairs Manager at ADBA said, “This pioneering deal demonstrates the enormous value that AD offers in producing home-grown, renewable energy that is increasing the UK’s energy security and helping to tackle climate change. “It’s great to see yet another minister extolling the many virtues of AD – what we now need from government is long-term support for AD to ensure we see lots more good-news stories like this in the future.”

ADBA’s Policy Officer Alberto Rocamora and PR & Parliamentary Affairs Executive Chris Noyce attended the launch and were given a tour of the AD plant by Future Biogas staff.
An inspirational new format for 2019...

Connecting more promising environmental technologies with more investors to accelerate growth in cleantech.

This will be the most exciting Cleantech Innovate event yet with more on offer for a broader range of entrepreneurs, investors, SMEs and corporates.

A programme of events across 3 theatres includes finalists' pitches, expert speakers, entrepreneur workshops and a solutions garden all in a new open format at a new venue The Royal Horticultural Halls, Pimlico.

Could your technology be a game-changer?

Do you have a technology to solve sustainability issues in our 6 key theme areas?

Enter Cleantech Innovate 2019 for free now at www.cleantechinnovate.com

All entries reviewed by a panel of leading experts.
Deadline for entries 12th March 2019

For Partnerships and Sponsorship opportunities please contact: Roberta Bontempo, Sales Manager +44 (0) 203 3176 4414 roberta.bontempo@cleantechinnovate.com
www.cleantechinnovate.com
BEYOND BIOGAS – CREATING MORE THAN JUST RENEWABLE ENERGY

The future for anaerobic digestion has been mapped out as a central pillar of the circular economy, creating edible protein, providing storage for intermittent energy from renewables and as part of a biorefinery in the production of fertiliser, platform chemicals, biodegradable plastics and more.

The themes of climate change, soil degradation and the Paris Agreement may not at first appear to be obvious ones for a highly technical academic conference entitled “Beyond Biogas”. But international keynote speakers used these themes to place in context the latest research into anaerobic digestion.

Thus, states Verstraete, AD can no longer just be ‘energy for CHP’, it must dare to speak out about its additional potential for climate change abatement via CO₂ and nutrient production AND it must explore new value chains which relate to novel products, particularly protein production. AD has a ‘magnificent opportunity’ to play a key role in energy, CO₂ abatement and food/feed/biodegradable commodities.

Of the vectors outlined by Verstraete, the use of aerobic fermentation to upgrade C1 gases (CO, CO₂), particularly CO₂ produced through AD in order to create microbial protein, may prove to be one of the most interesting. The market potential for microbial protein not only includes animal feed and food, but also organic fertiliser and even bio-based biodegradable plastics where the protein is a component of the formulation.

Concerns about energy, climate and feeding the growing number of inhabitants on earth have leapt to the forefront of the minds of many. With renewable energy still only 10% of the total energy mix in Europe, the possibility of the hydrogen economy becoming a reality increases as the price of renewable electricity from wind and solar continues to fall.

Edible protein

Protein forms a critical part of the human diet, with a requirement of about 100g (dry weight) of plant and/or animal protein required by each person every day – of which 14g of nitrogen is excreted. The increasing world population brings a soaring demand for nutritious edible protein.

Verstraete pointed out that the current anthropogenic (man-made) nitrogen (N) cycle is unsustainable. The cycle involves converting fossil fuel to fertiliser using the Haber-Bosch process which, although becoming more efficient, still requires a great deal of energy, approximately two litres of fossil fuel per kilogram of nitrogen produced from atmospheric nitrogen (nitrogen in the air). When applied to agricultural crops, only 40% N goes into the feed/food chain, with 60% being lost to the atmosphere or aquatic environments. With 12.5% of the food chain nitrogen being excreted and sent to waste water treatment plants to be returned to atmospheric nitrogen through aeration,… again using two litres of fossil fuel to produce one kilogram of nitrogen! Using such quantities of fossil energy to take nitrogen from atmosphere, waste a large proportion of it and deploy more fossil energy to return the nitrogen to atmosphere is patently not sustainable.

Not only does it take two hectares of land to produce one tonne dry weight of conventional edible animal protein per year (e.g. pork, chicken, beef), it also requires 50,000 m³ of water and produces 100,000 kg of related CO₂ production. Such processes have a very heavy environmental footprint and the system is under pressure.

Edible protein

Professor Irini Angelidaki from the Technical University of Denmark spoke about a sustainable world through the prism of the bioeconomy, where natural inputs are used, minimum amounts of energy are expended and materials discarded by one process are inputs for another process, so are reused within the ecosystem. She regards biogas/the AD process as the pillar of the bioeconomy: in addition to biomethane, AD as part of a biorefinery that can produce platform chemicals, bioplastics and microbial protein.

Her focus, however, was upon second generation biogas upgrading: one pathway which includes using hydrogenotrophic (hydrogen converting) methanogens to turn carbon dioxide and hydrogen (CO₂ and H₂) into methane and water (CH₄ and H₂O). This can be done in a fermentation tank, either outside of an anaerobic digester in a process known as ex-situ biogas upgrading, or within the actual digester itself, known as in-situ biogas upgrading. Hybrid systems containing both types are also possible. Headlines such as “Scotland's wind turbines provided more electricity than the country needed four days in a row” and “Germany basically had to pay people to use electricity on Sunday” emphasise the imperative to store excess energy from intermittent renewables such as wind and solar. Hydrogen can be produced through electrolysis using this surplus renewable electricity and then used in ex-situ or in-situ biogas upgrading in order to raise the methane level in biogas to 95% and more.

Continued>>
However, one of the major challenges with such biological upgrading (or biomethanisation) is gas mass transfer of hydrogen into the liquid. Angelidaki’s group have experimented with membranes, as well as different ex-situ reactor configurations, using glass rings and sponges in order to analyse and improve the gas liquid transfer. The addition of hydrogen produced changes in the microbial community, with some species being favoured and others inhibited. Angelidaki’s group has monitored the microbial dynamics of their ex-situ biomethanisation system for more than two years at stable conditions, achieving greater than 99% methane over long-term operation.

In a detailed talk on his in-situ biomethanisation project, Prof Charles Banks elaborated on a few of the shortcomings of the process: not only is there energy inefficiency in the production of hydrogen through electrolysis, there is only a 78% conversion efficiency in the production of methane from hydrogen. Nevertheless, interest in the technology has grown because there are still insufficient cost-effective ways of storing excess renewable electricity and hydrogen is difficult to store/use, whereas the gas grid has huge storage and distribution capacity.

With methane also being an excellent starting point for C1 fermentations, commercial companies are starting to exploit this bioconversion niche, both with pure cultures and as an add on to AD processes, says Banks. His IB Catalyst H₂AD project adopted the view that in-situ conversion is worthy of attention because it is likely to be economically competitive to retrofit to existing digesters, with low capital and operating costs and because it increases the total methane yield per tonne of carbon arriving at the plants.

The project found that the bottleneck with the process was the pH (alkalinity) increase associated with biomethanisation, so maintenance of CO₂ partial pressure was required for stable operation, with 95% methane about the maximum safe value for in-situ conversion. In line with Angelidaki’s work, the research group found that the digester microbiome changed quite quickly after the introduction of hydrogen.

Ecological theory of the biome
Professor Tom Curtis from Newcastle University continued the focus on the microbiome in his talk “Using Microbial Ecology and Ecological Theory to Engineer Biology”. Tom stressed the importance of applying an ecological systems approach to complex microbial systems. He gave an example where a scientist might take a sample of a 100m³ reactor system which equates in cell number terms to looking at 1 square inch of land in the 243,610 km² of the UK. Part of the challenge is to understand the ‘species’ rank and abundance in the entire system based on the very limited size of the sample. If the digester is regarded as an island, ecological theory would suggest that the rate of immigration of new species becomes increasingly smaller as the number of species present becomes bigger.

However, in a complex system like a digester, a cell death is much more likely to be replaced by growth of existing species than by immigration. Prof Curtis concludes that the implications of the study to date is that species in the digester arrive at start up, so initial digester seeding is important. Thus, immigration is low and bio-augmentation (the addition of new species) is problematic in established reactors. Whilst island theory states that the number of species increases in line with the area of the island, he predicts that diversity does not scale in AD, i.e., that the number of species in the system changes very little with the size of the digester. He concludes that understanding the ecological theory behind such complex AD systems is vital if improvements to the technology are going to be made.

These three speakers covered a very small proportion of the range of fascinating flash presentation and main topics in the Research Colloquium’s thematic areas of:

1. Advanced AD for effluent treatment
2. Optimisation of digester metabolic performance
3. Alternatives and complements to methane as AD products, and
4. Biogas upgrading and carbon capture through biomethanisation

FIND OUT MORE
For more in-depth analysis, speakers’ presentations from the colloquium, held in Manchester on January 23rd to 25th, can be found on the website www.anaerobicdigestionnet.com and videos of some of the speakers will also be added in due course.
Finding Solutions to Ammonia Emissions

The Department for Environment, Food & Rural Affairs (DEFRA) is seeking to reduce emissions of air pollutants such as particulate matter and ammonia. DEFRA is particularly concerned about ammonia, as it is the only air pollutant for which emissions are rising rather than falling.

Sources of ammonia emissions include the use of artificial fertilisers, livestock husbandry, manure and slurry management, and the handling, storage and spreading of digestate. ADBA's Head of Policy Ollie More and a number of ADBA members recently attended a workshop organised by DEFRA on how acidification of slurries and digestates could help tackle ammonia emissions. DEFRA has allocated a relatively large pot of money to assess whether this is a viable solution to the ammonia issue for pig and cattle production and for digestate.

Trials will be undertaken to assess the impact of adding sulphuric or other acids to slurry or digestate to reduce the pH of the material, which has the effect of reducing ammonia emissions. The trials will test this in practice and assess other impacts from the process, such as impacts on soil health. The trials will focus on food waste digestate, and the results will be added to existing work on this issue that has been carried out by the Waste & Resources Action Programme.

ADBA is working closely with our members to examine how we can help to reduce ammonia emissions from digestate. Read Ollie's full blog on the workshop here [https://bit.ly/2DvugMT](https://bit.ly/2DvugMT).

How to Cash-in on Your Digestate

ADBA is to kick start a new programme of Training and Learning and Development (L&D) events, beginning this April. The programme will include modular training courses and L&D sessions, each dedicated to a single topic or group of inter-related topics. Training days will deliver practical skills, addressing issues such as: Plant Optimisation; Health & Safety; Efficiency; Essential Operator Skills and many others. L&D sessions will focus on the opportunities and challenges associated with a single issue and include a range of presentations from operators, farmers, industry experts and external specialists. The first event is a L&D day, addressing “How to cash-in on your digestate”. It will take place in the first week of April, date and venue tbc – see the website (below) for details.

If you’re interested in this or other events, please contact: Greville Southgate at [greville.southgate@adbioresources.org](mailto:greville.southgate@adbioresources.org) or visit the website to register your interest: [www.adbioresources.org](http://www.adbioresources.org)
QED FORMS STRATEGIC PARTNERSHIP WITH SIEGRIST GMBH

Leading manufacturer of environmental monitoring and remediation equipment, QED Environmental Systems has recently announced a strategic partnership with Germany based, Siegrist GmbH.

The company has been designing and distributing high-tech monitoring and measuring devices for toxic gases, radioactive, explosive and hazardous materials, for work place monitoring, process analytics and civil protection under the motto “Sign of Safety” for over 30 years.

Its expertise in the design and distribution of products, particularly within the areas of anaerobic digestion, landfill and biogas, will facilitate QED’s long-term vision of serving a global market place.

“Our partnership with Siegrist brings together two market leaders in our respective fields. With shared objectives and complementary competencies, we will be able to provide our customers with the best and will offer the market a unique blend of proficiency and advanced products unlike any other,” said Paul Gooch, Global Sales and Marketing Director at QED.

“The global biogas market has grown exponentially in recent years and is definitely an important part of the future hybrid energy system. I strongly believe that our partnership with Siegrist will help us grow and continue to innovate products and we look forward to the exciting opportunities over the next few years.”

Meanwhile, QED Environmental Systems has announced the appointment of Mark Weinberger as its new President. With a wealth of experience in engineering and design, Mark’s appointment will strengthen QED’s growing business in the environmental monitoring and remediation markets. Mark joins QED from Graco’s Applied Fluid Technologies Division, where he spent over 10 years as an Engineering Manager.

BALMORAL TANKS SCOOP TWO QUALITY AWARDS

Llantrisant-based Balmoral Tanks was won two prestigious awards at a special ceremony to mark the 30th anniversary of the Wales Quality Centre. The event was a celebration of all companies that have been recognised by the organisation during its 30-year existence - Balmoral Tanks was joint winner of the Wales Quality Award in 2016.

The prizes are based on the European Foundation for Quality Management (EFQM) business excellence model and are a rigorous, independent analysis of an organisation’s ability to achieve sustainable excellence. Balmoral Tanks received both the ‘Recognised for Excellence’ trophy in the ‘Best Newcomer Ever’ category and was the outright winner in the ‘Highest Score Ever’ class. The awards are seen by the company as just reward for the commitment to quality shown by its employees at the Llantrisant operation. Managing director, Allan Joyce, said, “To receive these awards spells out that here at Balmoral, quality is not just reflected in the goods we supply, it’s an attitude that permeates our entire business.”

The company is currently refurbishing its Llantrisant facility and investing a further £10m in a glass fused to steel manufacturing line at its South Yorkshire plant to complement the epoxy coating plant already in place there. Mr Joyce continued, “We are positioning ourselves as a full-service tanks supplier to the water, wastewater, processing and anaerobic digestion sectors. With recent acquisitions and internal restructuring, we now offer turnkey packages that include tank design consultancy services, manufacturing, civils groundwork, installation, pipework, commissioning and after sales maintenance. This promises a very exciting future for everyone associated with Balmoral Tanks at Llantrisant and further afield.”

IS THE NATIONAL GRID BOUND FOR THE HISTORY BOOKS?

The National Grid is still the driving force behind the nation’s energy needs, but is it fit for purpose? According to Duncan McPherson, CEO at CooperOstlund, the UK’s largest supplier of gas engine specification, installation and maintenance services, our future energy needs will need more than a centralised solution. “Despite being one of the UK’s largest companies, with a reported operating profit of £3.8bn in 2017, the National Grid is failing to cope with rising demand and unprecedented change,” he said.

“Some industry analysts believe that this failure is due to a lack of investment in expanding and upgrading the UK’s ageing infrastructure. Add to this the decommissioning of coal-fired power stations and the push towards greener, more sustainable forms of energy, and you can see why a centralised National Grid may soon be bound for the history books. That is, unless it adapts.”

According to Duncan, the UK must now prepare for a gradual transition away from a centralised National Grid system and invest in different forms of energy, such as anaerobic digestion, biogas, renewables, batteries and peaking plants. “This ensures a gentle transition to a more diverse, decentralised energy system, without disrupting our energy supply in the process,” he explained. “Peaking plants, for example, are a simple but effective way of injecting relatively low-carbon energy into the grid at short notice by using natural gas to generate electricity, which is then sold to the National Grid (usually at a premium). “At times of peak demand, electricity use exceeds that provided by the baseload. To avoid system shutdown, other sources of energy are required to top up the Grid and meet the specified demand.”

As Duncan explains, it’s unlikely that the Grid will disappear completely. “Its role, however, may move away from the wheel that drives our energy infrastructure, to one of the cogs driving the wheel,” he said. “For this reason, we need a delicate balance of investing in the Grid to keep it ticking over and investing in alternatives that will one day supersede it. Peaking plants are, and will remain, a key part of this transition.”
Upcoming Events

UK AD AND WORLD BIOGAS EXPO 2019
NEC, Birmingham
The largest international trade show dedicated to the AD and biogas industry reviews the latest market news, sector by sector and showcases the latest innovations and technologies. In this, ADBA’s 10th Anniversary year, it promises to be the best ever, as the industry gears up to address the demand for clean energy, clean fuel and the anticipated introduction of compulsory food waste collections in the UK. Registration is free – get your ticket at www.biogastradeshow.com

STOP PRESS - FURTHER EVENTS NOW CONFIRMED
May – ADBA Finance Forum
Find out more at www.adbioresources.org

UK AD & BIOGAS INDUSTRY AWARDS 2019
The Vox, Birmingham
Our annual black tie industry awards ceremony will celebrate outstanding contributions to the AD and biogas industry, both in the UK and globally, across 16 categories. The event offers an excellent opportunity to network with industry leaders and pioneers. Tickets include a drinks reception, three course meal and entertainment. Book your ticket at www.adbioresources.org/events/awards

CLEANTECH INNOVATE
The Royal Horticultural Halls, London
Cleantech Innovate connects the most promising environmental technologies with investors. We provide an equal platform, driven by diversity and innovation. Our aim is to accelerate results for a more sustainable future. Become a driver of change! The 2019 event will bring together the cleantech community in a transformational new format. Enter your technology or register a place at www.cleantechinnovate.com

WORLD BIOGAS SUMMIT 2019
NEC, Birmingham
Co-located with UK AD and World Biogas Expo, the inaugural World Biogas Summit, themed Mobilising Generation Biogas, will bring together global thought leaders to provide invaluable insights into the industry’s potential and how to realise it. From development banks and those breaking open new markets to those addressing the new energy paradigm centred round localism – down to AD being in-built into apartment buildings, join us 3rd-4th July to be a part of this global discussion. Register today for free. www.world-biogas-summit.com

3rd JUL 2019

ADBA SPRING MEMBERS MEETING
TBC
12:30 – 17:00 with a drinks reception from 17:00 onwards. Further details available soon. www.adbioresources.org

3rd APR 2019

COULD YOU BE A WINNER?
We are delighted to invite entries for the seventh AD and Biogas Industry Awards. This event will recognise innovation and achievement across all sectors of the anaerobic digestion (AD) and biogas industries both in the UK and globally.

View the categories and make your entry at adbioresources.org/events/awards

Enquire about sponsorship by contacting: Roberta Bontempo E: roberta.bontempo@adbioresources.org T: +44 (0)120 3176 4414

3rd July | NEC | Birmingham, UK

RESERVE YOUR TABLE NOW!
Our parent company Singleton Birch, has a reputation for excellence. Birch Solutions is bringing this level of excellence to the UK biogas market.

**Plant Operations & Maintenance**
- Service and maintenance
- Breakdowns
- Refurbishment
- System expansion
- Highly skilled team of engineers
- Plant optimisation

**Biological Service**
- Plant specific biological advice
- Tailored feedplans
- Nutrient analysis
- Testing, results and feedback
- Chemical and additive advice

**CHP Service & Maintenance**
- 2G Service partner
- Overhauls
- Service packages
- Repairs
- Parts

**Service Agreements**
- Full O&M
- Parts
- Performance guarantees

Tel: 01652 686060
www.birchsolutions.co.uk
@BirchSolutions